### NAMES OF OBJECTS AND PLACES

**REPRESENTED ON THE**

**KEY TO PICTORIAL CHART.**

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EASY LESSONS
IN
POPULAR SCIENCE;

AND

Hand-Book to Pictorial Chart:

Combining the

Conversational,
Catechetical,
Blackboard and
Object Plans,

With maps, illustrations, and lessons in drawing,
spelling, and composition.

By James Monteith,
Author of School Geographies, etc.

New York ·· Cincinnati ·· Chicago
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**THE PICTORIAL CHART** is designed for the class-room wall. It is mounted on cloth and rollers and measures 42 by 55 inches. (Key on following page.) It represents in an immense landscape, all the Divisions of Land and Water—Ocean—Lakes—Streams—Mountains—Islands—Vapor—Rain—Snow—Agriculture—Mining—Manufacture—Commerce, Etc., Etc., as seen on a voyage around the world. It is adapted to oral and object teaching.
CHARACTERISTICS OF THIS BOOK.

It contains Primary Sciences for Two Grades; the lower (comprising very young children) to be restricted to the paragraphs in large type.

Method.—By Illustration, Comparison and Familiar Conversations. Objects are illustrated on a large Pictorial Chart for wall of Class-room; and on Blackboard, according to given directions for drawing.

Topics.—Short and Varied—those suggested on an excursion in the country by a teacher and her class; such as Air, Water, Rocks, Land,—what they contain and what are their uses; with interesting lessons on Rain, Rivers, Plants, Trees, Agriculture, Mining, Manufacture, Fishes, Birds, Animals, Insects, Geography, etc.

Exercises, also Short and Varied, include:
Reading;
Drawing on Blackboard and Slates;
Oral Exercises, with Questions and Answers,
Written Reviews, combining Spelling and Composition.

Exercises on the Pictorial Chart and Wall Map of the World.

Although adapted to the Pictorial Chart, the book is complete in itself and may be used independently as a Text-Book for Primary Classes or for Oral Instruction by the teacher.

It contains numerous Wood Engravings and Colored Maps.

Its object is not only to instruct, but to Educate,—to draw out and strengthen the reasoning faculties, and to encourage habits of observing, thinking, analyzing and comparing.
CHAPTER I.

DIRECTIONS.

To conduct the lessons, Monteith's Pictorial Chart and a large map of the world should be hung on the wall in full view of the class. A globe, also, should be shown. The teacher will then read aloud from the Handbook, pausing for answers which the pupils may be able to give to the questions.

The names in black-faced type, as ocean, surface, clouds, etc., should be pointed out on the chart or map when they are mentioned. This may be done either by the teacher or by the pupils in turn.

The illustrations should be drawn on the blackboard by the teacher, and by the children also, on their slates.

(In classes composed of very young children, the spelling and other exercises in small type may, at the discretion of the teacher, be omitted in the first course. The words in the spelling exercises should be written on slates by the pupils.)
The Earth's Surface.

1. If you should take a long walk from the city, town, or village in which you live, you might see people, houses, streets, roads, fields, trees, streams, ponds, mills, factories, horses, cows, sheep, and other animals; perhaps you would see a part of the ocean, on which great ships and steamers sail.

2. The ocean and fields are parts of the earth's surface. People, animals, trees, houses, ships, etc., are on the surface. When you see flies on an orange, you may say they are on its surface or outside part, just as people and animals are on the surface of the earth, which is round like an orange.

3. When you look upwards and around you, you may see the sky, the sun, and, perhaps, clouds; at night, you may see the moon and stars, and other bodies called planets, which look like stars.

4. All this time you are breathing—what? Air. Without air you could not live, nor could any animal, bird, or fish, or tree live. Sometimes the air is still, sometimes it moves gently and you are able to fly your kite; then, again, it rushes powerfully and fearfully, blowing down trees, fences, and houses, and sinking ships.

SPELL AND DEFINE—City, town, ship, village, trees, bird, stream, fish, surface, kite, mill, factory.
5. This we call wind. You feel the air, you breathe it, you see the effects of the wind, yet you have never seen air or wind. You admit that there is air and that there is wind, although both are invisible. What does invisible mean? Are houses and trees visible or invisible?

6. Now, as the earth is round (or very nearly so) like a great ball, and people travel or sail around on every part of it, what is it that keeps them from falling off from this great ball called the earth? It is something that is both useful and powerful. It is also invisible. When you throw your ball high in the air, it is brought back again by something which you cannot see, by this other invisible power; without this power your ball would never come back to you. When chestnuts are ripe, and when you throw a stone into an apple-tree in the autumn, the chestnuts and apples are brought to the ground by this same invisible power. Do you know what we call it? Attraction. Without this attraction which the earth has, those chestnuts and apples would be as likely to fly away toward the moon or the sun or some of the stars. Without this power which the earth has of drawing or attracting to itself (always downward), the farmer could not sow his seed, for it would be as likely to fly toward the clouds as to fall on the ground; the carpenter
and the mason would not be able to keep their boards and bricks just where they wanted them; the chairs, tables, and beds in your houses would be as likely to rest against the ceiling as on the floor; and your sleds would no longer rush down hill on the smooth snow in winter.

Blackboard drawing to illustrate Up and Down. The teacher may draw by means of a piece of cord twelve inches in length a circle to represent the Earth. On it mark arrows as shown in model, all pointing to the center, and, consequently, Downward; then mark other arrows pointing from the center, or Upward. Another circle may be similarly drawn, and on it trees be represented all pointing Upward. The directions to and from the center, or down and up, should be clearly explained to the class.

7. In what direction does the earth draw or attract objects? Downward, or toward its center. In what direction is up? From the center of the earth, or over your head. Point upward; downward.

8. Now, a knowledge of all these things, as well as of different countries, mountains, and places on the earth, and of the wonderful fitness

SPELL AND DEFINE—Air, wind, apple, earth, farmer, up, down, sled, snow, board, bricks.
of them for people's enjoyment and welfare, may be obtained by studying geography.

9. When we look at the sun, moon, and stars, we see they are round; and if there are people living on the moon now, they would look at this world or earth and see that it too is round.

Blackboard drawing to show Rotundity of the Earth. With chalk and a cord two feet long describe an arc as here shown. On the left draw a part of the coast of North America, with a lighthouse on Newfoundland; on the right, England, Ireland, and the coasts of Europe and Africa. From the top of the lighthouse draw a straight line touching the Arc or Surface of the Earth; then show ships on the Atlantic in different positions, one below the horizon, another partly above, and another wholly above it. The straight line is the Line of Vision to a man in the lighthouse, and the point where that line touches the arc or surface shows the extent of his Horizon. The lighthouse and masts all point from the center of the earth.

10. How have men proved the earth to be spherical, or round like a ball? Men have sailed around it as flies travel around an orange; then, again, the hull, or body of a distant ship coming toward you is not seen as soon as its topmast.

Which is the larger body, the sun or moon? The sun. Why does the sun not look much larger than the moon? Because it is a great deal further from us than the moon is.

SPELL AND DEFINE—Orange, round, spherical, hull, top-mast, center, geography, lighthouse.
11. The earth is larger than the moon, the sun is larger than the earth, and some of the stars are larger than the sun.

(Here the teacher may draw on the black-board a circle one inch in diameter to represent the moon; another, four inches in diameter to represent the earth; and for the sun, give them an idea of a ball 40 feet in diameter; thus showing their comparative size.)

12. If you can imagine a rope stretched from the earth to the sun, and 400 knots on it equally distant from each other, the place of the moon would be at the knot nearest the earth.

13. The earth moves around the sun, and the moon moves around the earth.

(To explain these motions, one of the pupils may represent the sun, another walk around him to represent the earth, and a third walk around the second, to represent the moon.)

14. If the earth did not move or revolve around the sun, we should have no change of seasons. Mention the seasons. What can you say of winter? Of spring? Of summer? Of autumn?

15. The earth has another motion: it turns around as a top spins, or as you might turn an apple around on a knitting-needle. This kind of turning is called rotation, and causes change from day to night, and from night to day.

SPELL AND DEFINE—Sun, moon, circle, spring, summer, autumn, winter, knot, knitting-needle.
16. I shall now show on the blackboard how day and night are caused. The lamp represents the sun, and the apple stands for the earth. The sun gives light to that side of the earth which is opposite it, as is shown by the bright side of the apple, which represents day. The side turned away from the sun is dark—there it is night. If the earth did not turn on its axis (or rotate) we would not have night and day as we now have them.

To be drawn on the blackboard to explain the succession of Day and Night. The lamp represents the Sun; the apple, the Earth; the needle on which the apple turns represents the Axis of the Earth.

(The teacher should now and then tell the children a story touching any of the points in the lessons.)

17. When you say the sun rises in the east in the morning, it only appears to rise. It is not the sun which moves from the east upward and nearly over your head, and then down in the west in the evening. It only appears to do so.
It is really the earth, or that part of it on which we live, that moves around the other way, toward the sun in the morning, and away from it all the afternoon; that is, from the west over to the east. When you are on a steamboat sailing swiftly and smoothly, the trees on the shore appear to move toward you, then past and behind you, yet you know it is the steamboat that moves—not the trees.

18. Without the sun we should have no heat or light. Would we not have wood to burn and give us light? We would not; for without the sun's heat trees would not grow. Would we not have the moon to shine for us? The moon would not give us any light, for it is the sun shining upon the moon that makes it bright and gives us moonlight nights. So, without the sun, there would be no light on the earth—no plants, trees, animals, birds, fishes, or people.

19. You have learned how important are the sun, air, and attraction. You will, in the next chapter, learn about rain, how it depends upon the sun, air, and winds, and how they all work together beautifully and continually in order that all people may have food to eat, water to drink, and pleasant places to live in.

SPELL AND DEFINE—Day, light, night, coal.
20. Suppose you should start some pleasant morning in a balloon that could move all the way around the world before dark the same day. Of course, that has never been done, for the distance is too great, but suppose it could be done. What would you see? (The teacher may here pause for answers.) Well, you would glide over an immense portion of land, called a continent, a portion of which you see in the chart (pointing to all the land). On this continent you would see mountains, hills, valleys, rivers, lakes, farms, and trees. You might see men at work in the fields, others building houses, or bridges, or railroads; some busy in great factories and mills making cloth, shoes, food, tools, wagons, and other things too numerous to mention. Here and there you would see cities, towns, and villages, and, beyond them, houses scattered here and there; then, perhaps, a forest, a wilderness or wild place, inhabited only by Indians and wild animals; then, perhaps, beautiful valleys, plains, streams, and busy towns; and all at once you might come to a body of water which extends much further than your eye could reach. That is an ocean. In it, dotted here and there, you might see islands, which also contain trees, hills, lakes, people, birds, animals, etc., all different in appearance from any you had seen before. And
you would wonder to find that, as you rush so rapidly over land and sea, some places have clear weather; others, cloudy; and still others rainy or stormy, all in the same day.

21. Now, after your return home, which you would be sure to reach if your balloon kept in the precise course it started out on, you would, probably, sit down and write about all the places, people, etc., you saw; and, for the instruction and pleasure of those boys and girls who were unable to take such a voyage, you would, perhaps, fill a book with your description: that would be geography, which is simply a description of the earth's surface. What is geography? What is an ocean? The largest division of water. What is a continent? The largest division of land.

22. How does an island resemble a continent? Both are surrounded by water. What is the difference between them? A continent is larger than an island.

24. In your description you would show drawings or maps something like this.

Here the teacher may draw on the blackboard (if not previously drawn) a map of his or her school, school-grounds and vicinity. (See pp. 38 and 39.)

SPELL AND DEFINE—Continent, island, balloon, voyage, people, write, ocean, geography.
CHAPTER II.

THE OCEAN.

(Observe the directions given at the head of Chapter I.)

1. The Ocean, often called the sea, covers three-fourths of the earth's surface. Its water is salt and in constant motion. In it live countless fishes, and on its surface very many ships sail from one country to another, carrying people, provisions, clothing, and various articles for use or ornament.


2. The ocean is useful to us not only in furnishing fish, and as a great highway for ships. There are many children who have never seen the ocean, or eaten any of its fish, or seen anything that was brought in a ship. Lest such children should therefore think that the ocean is of no use to them, and that it would have been better if the earth were made with pretty fields, farms, and gardens all over it, they should know that without the ocean no child, man, bird, or animal could live on the earth.

SPELL AND DEFINE—Earth, ocean, sea, fish, field, clouds, surface, island, provisions, mountain.
(The teacher may ask the children, in turn or together, to mention the different articles of food which people require. If the answer should be bread, then ask :)

3. What is bread made of, and how? What is flour? *Wheat ground in the mill.* Where is wheat obtained? *It is raised on a farm.*

(If others answer potatoes, apples, milk, beef, pork, etc., ask questions about each.)

4. Animals live mostly upon grass, vegetables, or grain of some kind, which grow on the *farms* and *fields*.

5. Would the grass, grain, and vegetables grow without rain? Where does the rain come from? *The clouds.* Where do the clouds come from? *The ocean.* How? *The heat of the sun causes vapor to rise from the ocean, and the wind blows the vapor or clouds over the land, and when they rise into high, cool air they fall in drops called rain.*

6. The *rain* waters the *fields* and *farms*, fills *streams, rivers, and lakes*, and furnishes drink for men and cattle and all creatures that live on the earth. When the vapor or moisture in the air freezes, it falls in the form of snow. When the drops of rain freeze before they reach the ground, they fall in the form of hail.

7. What rises from the *ocean? Vapor.* What causes it to rise? *The sun and air.* What does *vapor* form?

SPELL AND DEFINE—Flour, wheat, farm, field, river, lake, beef, pork, apple, vapor, freeze, hail.
Clouds. What drives vapor or clouds over the land? 

The wind. What causes the clouds to return and fall in the form of rain? The coldness of the air above us. If you should ascend far above the earth’s surface in a balloon or by traveling up a high mountain, what difference would you find in the air? We would find it cooler and cooler the higher we go.

8. From this you may readily understand how a certain drop of water may be changed to vapor, rise from the ocean, be carried by the winds far away and over the land, changed back to water, fall on the ground, sink down below the surface, find its way to a spring, reappear in the overflow, run down a hillside, and become part of a rill, rivulet, brook, or other little stream. The stream flows on, falls over steep places, forming cascades or waterfalls, turns mill-wheels, receives other streams, becomes deep enough and wide enough to float large steamboats, and at last finds its way into the ocean. Thus that little drop of water, after a long and curious journey, may return to the place it started from.

9. Can people live without water? Does the water you drink come from a spring, well, lake, reservoir, or river? From what is the well, spring, river, or lake supplied? Rain. From what does rain come? From what do clouds come?

SPELL AND DEFINE—Brook, wheel, steep, steamboat, cascade, balloon, rivulet.
10. As the land on the earth's surface is higher than the ocean, you all know that the water of the ocean could not run up and over the land.

11. Now, how do the waters which you find on the land, even on very high lands, such as springs, rivers, and lakes, get there? They are formed by rain or melting snow. Where do rain and snow come from? From vapor or clouds. Where do vapor and clouds come from? The ocean.

12. All of you who have seen a kettle or pot of water boiling have noticed that something white, like smoke, rose from the top of the water. It was not smoke, but vapor. Vapor is the water so thinned out by heat as to become light enough to rise in the air. Have you not also seen the inside of windows in cold weather all wet with drops? The vapor coming near the cold window is only changed back again to water.

13. If any of you should hold a cold substance, such as a pitcher filled with snow, or ice, or cold water, over boiling water, you would see the vapor rise, and as soon as it touched that cold substance it would be changed into drops. That is the way rain is formed.

SPELL AND DEFINE—Spring, kettle, smoke, rain, vapor, ice, snow, pitcher, window, boiling.
The Ocean; what it Supplies.

14. Now look at the chart, and you may see vapor, which is represented as rising from the ocean, blown or carried by the wind over the land (following with your pointer), and entering air that is cooled by these cold mountains. As cool air cannot hold as much vapor or moisture as warm, dry air, some of the moisture falls in the form of rain. That which falls on the land waters the fields and farms, and fills the streams and lakes.

One after another will now point to the ocean, the vapor, the clouds, the rain, streams and lakes.

15. The ocean, then, supplies or fills all the lakes, ponds, rivers, and streams; every drop of water on the surface or under the surface of the land, on the mountain top or in the deepest valleys; all the water of the wells and springs; all the moisture which floats in the air; and all rain, snow, hail, or dew.

Is the water of the ocean salt or fresh? Salt. Is the water of rain, lakes, rivers, and snow salt or fresh? Fresh.

If these are all supplied from the salt ocean, why are they fresh? Because when vapor rises from the ocean, the salt, too heavy to rise, remains behind.

From what besides the ocean does vapor rise? From lakes, rivers, ponds, and wet ground.

Does vapor rise from a cup of water? It does.

SPELL AND DEFINE—Well, lake, snow, valley.
16. If you should boil a kettle of salt water, the vapor passing off would be fresh. This you may prove by conducting the vapor through a tube or pipe cold enough to condense or change the vapor back again to water; this water will be fresh.

(The teacher may now draw on the blackboard this picture, of a size sufficiently large to be seen by the whole class; or, the drawings which enter into a certain day's lesson may be previously prepared on the blackboard.)

17. If you were at sea and without drinking-water, how could you obtain it? By boiling the salt water in a kettle and conducting the vapor into a cold pitcher or bowl, or through a pipe kept constantly cold. What becomes of the salt in the process of evaporation? It remains behind in the kettle.

SPELL AND DEFINE—Tube, boil, salt, kettle.
18. Suppose that the salt should rise from the ocean with the vapor; what would the rain be, fresh or salt? If rain were salt, what effect would it have on our grass, trees, grain, and flowers?

19. The changing of water into vapor is called evaporation. The changing of vapor into water is called condensation. Look at the chart again, and see the vapor rising from the salt water of the ocean and falling on the land far away as pure, fresh water.

The teacher may here write on the blackboard the above as a **Topical Diagram**.

(Salt springs and the manufacture of salt by evaporation here indicated will be treated in another lesson.)

20. The words ocean and sea are often used to refer to the whole body of salt water on the earth; which may be considered as divided into five parts, also called oceans. There are five oceans. I shall point on the map of the world, and all (or each in turn) will repeat each name after me—Pacific Ocean, Atlantic Ocean,

**SPELL AND DEFINE**—Bowl, pitcher, vapor, evaporation, Atlantic, Pacific, Arctic, Antarctic, Indian, vegetables, grain, flowers, condensation.
Indian Ocean, Arctic Ocean, Antarctic Ocean. Now I shall call their names, and some of you may point to them as I mention them. How many oceans are there? Name one, another, another, etc. Look at the map and tell which is the largest. What does Pacific mean? *Mild*. It is not so rough and stormy as the other oceans.

21. Now repeat after me the Grand Divisions of the land while I point to them—**North America**, where we live; **South America**, where South Americans live; **Europe**, where Europeans, or white people, live; **Asia**, where Asiatics, or yellow people, live; and **Africa**, where Africans live. You point as I call their names. As I point you mention their names. (The white people born in America are the descendants of Europeans, and the colored people born in America are the descendants of Africans.)

(Long before white men came to America from Europe, which was nearly 400 years ago, this part of the world, called **North America**, was inhabited by a copper-colored race of people, who lived mostly by hunting and fishing. Their descendants in the country now live much in

**SPELL AND DEFINE**—North, South, America, Europe, Asia, Africa, buffalo, descendants.
the same way, in the territories. Look at the chart, and you will see a picture of Indians hunting buffaloes. I may tell you more about the Indians, and their curious way of living, in another lesson.)

22. Which is the largest of these divisions? The smallest? In which do we live? What are we called? Americans. Look at the map and tell what three oceans surround North America. Which of them would you cross in sailing to Europe? Why do steamships and other vessels cross the ocean? To carry passengers, also articles which are grown or manufactured here.

Do those vessels return empty? They bring back articles which are raised or made in Europe, Asia, or Africa; they bring passengers also.

Can you name some things which are sent from this country across the Atlantic Ocean? Flour, wheat, cotton, provisions, oil, and tobacco.

Can you mention some articles we receive from Europe? Materials for making dresses and all kinds of cloths, besides knives and toys.

What do ships from South America bring to this country? Coffee and India-rubber.

What do we get from China and Japan? Tea, fans, and many fancy articles.

How long does it take steamships to cross the Atlantic from this country to Europe? About ten days.

Did you ever see a steamship? What is the difference between a steamship and a sailing vessel?

SPELL AND DEFINE Toy, tea, coffee, oil, wheat, cotton, knives, tobacco, provisions, passengers, India-rubber, steamship, sailing, knives.
(Show the difference on the chart.)

23. If you should cross the ocean, you would see nothing about your ship but the water and the sky; and, as the vessel would cut through the great rolling waves, it would go up and down like a rocking-chair. In a storm, however, the waves rise terribly high and beat over the ship, which tumbles and plunges and rolls violently, sometimes nearly covered over with the waves. Then the passengers must be downstairs or they would be washed overboard.

24. Are there any other dangers to be feared at sea? *Dangers from one ship running into another at night or against an iceberg, or from the ship taking fire.*

What is an iceberg? *A great mass of floating ice reaching far above and below the surface of the water.* Icebergs come from the cold regions of the Arctic Ocean and northern parts of North America.

25. Do men ever sail into those cold, dangerous regions, where they are constantly surrounded by ice and icebergs? *They do.* Why? *To find a new passage across the Arctic Ocean, or to reach the most northerly part of the earth, called the North Pole.*

26. What dangers attend these voyages? *Some ships have been crushed by fields of ice or by icebergs, and the crews perished from hunger and cold.* Mention a celebrated English explorer who was lost in the Arctic regions? *Sir John Franklin.*

Whales—How Captured.

In 1845, he left England with two ships and fine crews, to reach Asia by way of Baffin Bay and the Arctic Ocean. (Here point out the course on the map or globe.) Himself, his officers and crew of over 130 men, all perished.

27. How do natives and explorers in the Arctic regions travel over the ice and snow? In sledges drawn by dogs.

28. What huge animals (often, but improperly, called fish) are captured in the water of the cold regions? Whales. You can know them far off by their two great fountains or streams of water which they blow from their nostrils.

29. To capture whales men spend many months on long, cold voyages, and we frequently hear of ships being crushed by icebergs or floating fields of ice, and the crews frozen or starved to death. All this for what purpose? To get oil and whalebone from the whale. When the whalermen see a whale they hurry out of their ship and row in an open boat towards him, and when near enough, one of the men throws a kind of dart or spear, called a harpoon, with all his might into the whale. The huge creature becomes furious, and the men must look sharp to keep out of his way and to let out the long rope which is fastened to the harpoon, else their boat may be dashed to pieces or all pulled far under the water in an instant.

SPELL AND DEFINE—Crew, officer, Baffin, natives, sledges, captured, whales, whalebone, nostrils, voyage, starved, harpoon, England.
30. After a while the whale dies and floats at the top of the water. Then the men jump on him and cut out great quantities of the fat which is found right under the surface of the skin. They afterwards boil the fat, called blubber, and make it into oil, which they take home in barrels.

31. The whalebone, which is obtained from the inside of the upper jaw, is colored and prepared for use. For what is whalebone useful? Oil? The whale is an animal which lives always in the water, and is the largest of all animals I'll draw a picture of one on the blackboard.

A Whale. (Make the drawing on the blackboard 3 feet in length by 7 inches in greatest width.)

How long do you think a whale is? The larger ones are about 20 to 30 yards long and 10 yards around the body. (Here show these distances by comparing with your school-house, room, or some other object.)

SPELL AND DEFINE—Oil, whale, whalebone, animal, blubber, barrels, twenty, thirty, yard, float
32. There are other animals living in or near the water, which are captured in very large numbers every year in the cold regions. Can you name them? *Seals.* For what are seals captured? *Their fur.*

![Seal, 6 feet in length. Porpoise, 6 to 8 feet in length. Shark, 12 feet in length.]

Make blackboard drawing of seal and porpoise, each 2 feet long by 6 inches wide: of shark, 4 feet long by 10 inches wide. The shark is twice as long as the seal, and the whale is five times as long as the shark.

33. Here is drawn (or I shall draw) on the blackboard a picture of a seal. This animal is about two yards long. It has two fore paws, with which it paddles in the water or pulls itself along on the ice or the shore. Its hinder limbs serve only to steer and scull with. Its head resembles that of a dog.

**SPELL AND DEFINE**—Captured, fur, paddles, ice, porpoise, shark, two, yard, fore.
34. In Greenland, where it is very cold, many of the people depend upon the seal for almost everything: its flesh they use for food, of its skin they make their clothing, tents, and boats, and its fat furnishes them with oil for fuel and lamplight.

35. The seal is found on coasts and islands in many parts of the world, but especially in the cold regions. Around Alaska, Greenland, and Newfoundland thousands are captured every year.

36. The different species of the seal include the sea-lion, sea-elephant, sea-leopard, sea-bear, and the walrus. The sea-elephant is about 10 yards in length.

37. The seal is amphibious, because it can live in water or on land; it is a quadruped, because it has four paws or legs; like the whale, it is carnivorous, because it eats fish and the flesh of animals; it is gregarious, because it lives with others, in herds; it is migratory, because it moves from one part of the ocean to another; and is a mammal, because it suckles its young.

Seals, when in the water, must come to the surface at least every half hour to breathe; whales, about every hour.

Alaska was purchased from Russia by the United States for seven millions of dollars. It is noted for seals and fish.

SPELL AND DEFINE—Seal, paw, limbs, boats, flesh, steer, scull, tent, fuel, coast, island, clothing, paddle, sea-lion, sea-elephant, thousand, million.
Now I shall show you a picture of a porpoise.

38. The porpoise is an animal very much like the seal, but it has not fur like the seal. In size, each resembles a large hog. Leather is made of its skin, and oil of its fat.

39. Can you mention some kinds of fish that are caught in salt water and are used for food? Cod, mackerel, herring. These are caught in immense numbers near the coasts, and, when salted and cured, they are sent to all parts of the world. Famous fishing grounds are off the coasts of Maine, Massachusetts, Labrador, Nova Scotia, and Newfoundland, which I now point out on the map. Is Newfoundland surrounded by water? What is it, therefore? An Island. By what water is it surrounded? Mention other kinds of fishes.

SPELL AND DEFINE—Porpoise, leather, cod, mackerel, herring, Maine, New'sfoundland.
40. Here (pointing to the map, south of Newfoundland) are shoals or shallow places, called the banks of Newfoundland, where during several months in the year you may see hundreds of boats, and thousands of men of different nations, engaged in fishing.

41. Here is a picture of a codfish (drawing or showing it) of the ordinary size, two feet in length. Some are much larger. It is cured by being salted and dried.

42. This is a drawing of a mackerel, which is about 15 inches in length. It is caught by hook and line, and by a seine (pronounced seen) or net. It is salted in barrels.

43. Here is a drawing of a larger fish called halibut, which measures from 3 to 6 feet in length. (See p. 30.) This is a drawing of one, three feet in length and one in width. Curiously, both its eyes are on the same side of its head.

44. A very fine fish which comes from the south in the spring, entering the rivers and inlets of the States along the Atlantic Coast, is the shad. Those of the Delaware, Hudson, and Connecticut rivers are celebrated.

SPELL AND DEFINE—Shallow, hundred, thousand, salted, dried, caught, seine, halibut, eyes, coast, inlets, Delaware, Hudson, Connecticut.
45. You may have seen enclosed in tin boxes and packed in olive oil a great many very small fishes. Do you know their name? *Sardines.* They are caught in large quantities in the *Atlantic Ocean* and the *Mediterranean Sea.*

46. All the fish which we have mentioned are salt-water fish. I shall now show you a picture of some fresh-water fish which men and boys delight to catch, the pike and trout (see page 27).

47. This is a pike, 2 feet long and 3 inches wide; some are smaller and others larger. They are caught in streams and lakes, and are delicious for the table.

48. Another favorite fresh-water fish is the trout (here is a drawing of one about 16 inches in length). Trout are caught by hook and line in the streams of the *New England, Middle, and Western States,* and *Canada.* They are usually found in swiftly-running streams, swimming against the current.

49. Did you ever see any fresh-water fish caught? What kind? Where? Into what does that stream or lake empty? Did you ever see a salt-water fish caught? How? Where?

Name the different kinds of fishes you have ever seen. What is the most remarkable fish you have ever seen?

**SPELL AND DEFINE**—*Boxes, olives, sardines, inch, trout, pike, current, swimming.*
50. Did you ever see a flying-fish? I'll show you a picture of one on the blackboard, about ten inches in length. They are found in the **Mediterranean Sea**, the **Gulf of Mexico**, and warm parts of the ocean. Their long fins enable them to fly out of the water as high as the decks of ships, on which they sometimes fall.

51. Another singular fish is the **sword-fish**, 12 to 20 feet in length. (Here is a drawing of a very small one three feet long.)

It is so fierce, and so swift in motion, that it drives its sword, a long, sharp, bony substance, into a fish which it wishes to capture. It has been known to attack a ship and bury its weapon deep in the timbers.

SPELL AND DEFINE—Flying-fish, sword-fish, Mediterranean, Mexico, weapon, timbers, deck.
The sword-fish is found in the Atlantic Ocean and the Mediterranean Sea.

(Whenever the blackboard will admit of it, the drawings should be made full size.)

52. Here is still another very curious fish. It is a cuttle-fish, which has eight long arms for seizing other creatures which it captures for food. When pursued, it discolors the water all about it with an inky substance, which enables it to conceal itself and escape from its enemy. (See p. 27.)

53. Do fishes breathe air? They do. Do they come to the surface of the water for air, as whales, seals, and porpoises do? They do not. Where do they find air to breathe? In the water. Does all water contain air? It does. Fishes have gills; animals, lungs to breathe with. The blood of fishes is cold, while that of animals is warm.

54. There is a kind of fish caught in salt water called shell-fish. Can you name some of this kind? Oysters, clams, crabs, and lobsters. These are also found near shore in great quantities and sold almost everywhere, either fresh or preserved. Oysters are usually found adhering to rocks or in the sand in salt water.

Do any of you know what kind of a jewel, worn extensively by ladies, is found in some oysters? The pearl.

SPELL AND DEFINE—Shell-fish, cuttle-fish, captures, pursue, conceal, escape, enemy, breathe, crab, oyster, lobster, lungs.
55. There are other pretty ornaments made from the skeletons or kind of bony substance of small creatures which have died in the ocean in such large numbers as gradually to form islands. What is that substance? **Coral**.

56. There is another substance, not ornamental like the pearl or coral, but very useful. It looks like a sea plant, but is also the skeletons of what were once living creatures. It is very soft, and it adheres to rocks, shells, etc., under water. Mention it? **Sponge**.

57. For what is sponge useful? (Teachers should show the class a piece of sponge, coral, whalebone.)

58. I shall now draw on the blackboard the shape of the bottom of the ocean.

1, the shore; 2, the surface or level of the ocean; 3, the bottom of the ocean.

How deep do you think the ocean is? You? and you? etc. The highest trees (those in California) and church steeples in this country are about 300 feet high. How many of these, one on top of another, would reach from the bottom of the ocean to the top or surface? **Forty**.

SPELL AND DEFINE—Coral, sponge, pearl, shells, skeleton, ornaments, gradually, steeple.
59. Pearls are obtained by divers. Divers do not always go down head first. Sometimes one is lowered by a rope, on the end of which a stone is fastened to help him to sink. With his feet upon this stone and one hand holding on to the rope, the diver collects as many of the pearl-oysters as he can in a minute or half-minute, when he must ascend to breathe.

60. Pearls are beautiful and expensive, especially those as large as peas and larger. Philip II., King of Spain, had one which was valued at $75,000, and it is said that those in the ear-drops of Cleopatra, a celebrated Queen of Egypt, were valued at $400,000.

61. Among the most famous pearl fisheries are those near Ceylon and the east coast of Hindoostan. Pearls have been found also near Japan, Java, Sumatra, and in the Persian Gulf and the Bay of Panama. Mother-of-pearl is the inside lining of the shells. It is extensively used for making buttons, knife-handles, and for ornamenting boxes, furniture, etc.

62. Coral is also obtained by divers in various parts of the Mediterranean Sea. The finest is of a rose-pink color, and is found chiefly near the coasts of Italy.

63. A flourishing business has long been carried on in the manufacture and sale of coral ornaments in the cities of Naples, Leghorn, and Genoa. These divers for pearls and corals, when in the water, often see curious and frightful creatures, some of which are very dangerous (see p. 91).
The Earth’s Surface—Land and Water.

REVIEW.

What is the shape of the earth? *Round like a ball.*
What is its size? *The distance around it is about 5,000 miles.*
Of what is the earth’s surface mostly composed? *Water.*
Is the water of the ocean salt or fresh? *Salt.*
Mention some of its benefits or uses to people?
*People sail on it and get fish from it.* *It supplies rain.*
In what way does it supply rain?
*The heat of the sun changes some of it into vapor, the air lifts the vapor, the winds blow the vapor or clouds over the land, and cool air changes it back into drops of water.*
Review—Different Kinds of People.

Mention some of the uses of rain?
Rain waters the fields and gardens, forms springs and rivers and lakes, fills wells and cisterns, and supplies all the fresh water of the world.

What if the earth's surface were all land?
Then there would be no rain, no rivers, no grass, no trees, no food, no birds, no animals, no people.

The sea or whole body of water on the earth is divided into how many oceans?
Five: the Pacific, Atlantic, Indian, Arctic, and Antarctic Oceans.

Have you ever seen any of these oceans?
As rain comes from the salt ocean, why is it fresh?
Because salt is heavier than air; it remains behind in the ocean.

You have mentioned the five great bodies of water; now mention the great bodies of land.
North America, South America, Europe, Asia, Africa, and Australia.

In which of them do we live?
North America.

Do the inhabitants of these grand divisions of land look alike?
They do not; some are white, some black, some dark red, some dark yellow, and some brown.

Who are the white people of the earth?
Europeans and their descendants.

Who are the black people?
The inhabitants of Africa and their descendants (except those of the northern and northeastern countries, who are light brown).
Who are the red or copper-colored people?
_The Indians of America._
Who are the dark yellow people?
_The Chinese, Japanese, and other inhabitants of Asia._
Who are the brown people?
_The inhabitants of the islands in the Pacific Ocean._
In what other respects do people differ?
_In their dress, occupations, and laws._
Into what are North America, South America, Europe, Asia, and Africa divided?
_Countries._
Mention some of the countries in North America.
_The United States, Mexico, and Canada._
Mention some of the countries in South America.
_Brazil, Peru, and Chili._
Mention some countries in Europe.
_England, Germany, Russia, France, and Italy._
Mention some countries in Asia.
_China, Japan, Persia, and Arabia._
Mention some countries in Africa.
_Egypt, Morocco, Liberia, and Guinea._
Review—People, their Food, etc.

Which are the hottest countries in the world?
Arabia, Guinea, Brazil, and all other countries crossed by the Equator. (See map of the world.)
Which are the coldest countries in the world?
Russia, Greenland, and all other places around the Arctic and Antarctic Oceans.
What do the people in the coldest parts of the earth wear constantly?
Furs or skins of animals.
What kinds of animals are found in the cold regions?
Bears, seals, and reindeer.
What is the principal food of the people in the hot countries? Vegetables and fruits.
What do the people of the Arctic regions eat?
The flesh and fat of animals; also fish.
Can you tell me how a whale is caught? (p. 23). What is it useful for? What is its size? How large is a seal? (p. 25). Is it a fish, or an animal? Why are they captured? (p. 26). Point out on the map the places where seals are mostly captured.
What fish is so savage as to be called “man-eater”? The shark. How long is it? (p. 25).
Mention some of the kinds of salt-water fish which are used for food (p. 27). What parts of the North American coast are famous for cod, mackerel, and herring? What is there curious about the eyes of the halibut? Where is the shad mostly caught? (p. 28). When? Sardines? (p. 29). Mention some fresh-water fish. What can you say about the flying-fish? (p. 30). The sword-fish? The cuttle-fish? (p. 31). Shell-fish? Coral? (p. 32). Pearls? (p. 33).
The teacher may here drill the class in the directions or points of the compass, by pointing to, or asking them to point to, the east, west, north, south, etc. What objects in the vicinity (hill, pond, river, bridge, church, mill, village, etc.) are north, or east, or south, or southeast, etc., of their school-house.
The teacher may now draw on the blackboard a map showing his or her school grounds and vicinity, in the same way that the opposite picture is represented in this map.

First, mark in the center the ground-plan of the school building; then, as the case may be, the mountains, rivers, lakes, ponds, coast, bays, islands, railroads, villages, etc.

In like manner, the teacher may draw on the blackboard a map of his or her county, calling the attention of the class to the relative positions of the places marked. Then the outline of the State, with two or three of its largest rivers.

If you should look out over the ocean as represented in the chart, you would see that the sky appears to meet the water. If on the ocean with no land in view, the sky would appear to meet the water on a circle all around you. That circle is called the horizon.

**SPELLING LESSON.**

(To be written on slates or paper.)

East. island. railroad.

West. lake. building.

circle. strait. horizon.

point. isthmus. vicinity.

mouth. volcano. compass.
EXERCISES ON THE MAP.

How is the world or earth best represented?
By a sphere or globe.

What is a sphere or globe?
A round body, like a ball.

What is a hemisphere?
A half a sphere or half a globe.

How is the earth usually represented on a map?
In two hemispheres, the Eastern and Western.

On which hemisphere do we live?
The Western.

What two large bodies of land on the Western Hemisphere?
North America and South America.

Mention some of the islands on the Western Hemisphere.
New Zealand, Newfoundland, West Indies, and Sandwich Islands.

What very large bodies of land on the Eastern Hemisphere?
Europe, Asia, and Africa.

Mention some of the islands on the Eastern Hemisphere.
Australia, New Guinea, Borneo, Madagascar, and the British Isles.

What can you say of the size of Australia?
It is the largest island in the world; so large that it is sometimes called a continent.

What ocean east of North America?
The Atlantic Ocean.

What ocean west of North America?
The Pacific Ocean.

What ocean north of North America?
The Arctic Ocean.

What two oceans enclose South America?
The Atlantic and Pacific Oceans.

What two oceans wash the coasts of Europe?
The Atlantic and Arctic Oceans.

What two oceans wash the coasts of Africa?
The Atlantic and Indian Oceans.

What three oceans wash the coasts of Asia?
The Pacific, Indian, and Arctic Oceans.
CHAPTER III.

OCEAN CURRENTS—THE GULF STREAM.

1. The waters of the oceans are in constant motion, those of warm parts of the earth flowing toward the cold regions, and those from the cold parts flowing toward the hot regions.

2. The coldest parts of the earth are the most
northern and southern [the teacher pointing to them on a globe or map], and the hottest parts are midway between them, or on each side of a great circle called the Equator.

3. In the oceans are great streams or currents which flow like rivers. The warm stream is called the Equatorial Current, and the cold streams are called Arctic and Antarctic Currents.

4. One of the principal branches of the Equatorial Current is called the Gulf Stream, which, as you may see in the drawing, issues from the Gulf of Mexico.

5. Of course it is only that part of the great Equatorial Current which is turned northwest by the eastern part or elbow of South America, entering the Gulf of Mexico between Cuba and Yucatan, and leaving it between Cuba and Florida.

6. This Gulf Stream, flowing in a northeast direction across the Atlantic, is, therefore, a stream of warm water rushing through and over the cold waters of that part of the ocean.

7. The Gulf Stream and winds from the southwest carry heat all the way to the west coast of Europe, keeping the fields of England and Ireland fresh and green even in winter, and protecting those countries from a climate similar to that of Labrador, where for five or six months in the year the waters are frozen and the ground is all covered over
with snow. Observe that Labrador is no further from the Equator than are those countries.

8. The waters of the Gulf Stream moderate the winters also of Norway and Iceland.

9. You can readily see that a ship can sail from the United States to Europe with the Gulf Stream in a shorter time than it can from Europe to this country, against the stream.

10. The chief causes of these ocean currents are the heat of the sun and the revolution of the earth on its axis. The winds also have an effect on them.

11. There are other currents in the ocean; one in the North Pacific is similar to the Gulf Stream of the Atlantic. It carries warmth and fertility to the shores of California, Oregon, and Washington Territory.

12. Which are the coldest oceans? The Arctic and Antarctic.

What advantage is there in these movements of the waters of the ocean? They lessen the heat of the hottest parts of the earth and the cold of the coldest parts.

Of what benefit is the Gulf Stream to the countries of Western Europe? It tempers their winters, and its vapors supply their rains.

How are its vapors conveyed to those countries? By the westerly winds. (See pages 16, 17, and 18.)

What supplies the rains of California, Oregon, Washington Territory, and Alaska? Vapors from the Pacific Ocean.

Where do these warm streams come from? From the hottest or Equatorial parts of the earth's surface.

Where do the cold streams come from? From the coldest or Polar Regions.
CHAPTER IV.

SHIPS, SHIP-BUILDING, DOCKS, ETC.

1. On the sea-coast or on the bank of a river you will sometimes find a ship-yard, where ships are built. In the chart a ship-yard appears at the mouth of the large river, on its left bank.

2. To build a ship, men lay a great, long timber called the keel, on an inclined track or platform. To this keel are fastened the ribs, or curved timbers, which form the sides of the ship. The whole is supported and surrounded by a great frame called the stocks.
3. The ribs are then covered with thick planks, and those planks which are below the water-line are covered with plates or sheets of copper or other metal.

4. Steamships are now built wholly of iron and steel. The plates, instead of planks, are secured by bolts and rivets passing through their overlapping edges. Iron ships can carry larger cargoes than wooden ships.

5. When the body or hull of the ship is ready to be launched, long, slanting timbers are placed under it, reaching down into the water. These timbers or tracks are covered with grease and soap, some of the props removed, and the whole is made to slide down into the water. People take great pleasure in witnessing a launch.

6. After the ship is launched it receives its masts and sails, and is finished. If intended for a steamship, it is also provided with engines, furnaces, smoke-pipes, and perhaps paddle-wheels.

7. Instead of paddle-wheels, which you may see at the sides of steamboats, you will find that now most steamships are driven by a propeller, or huge iron screw, at its stern, or hinder part. When this propeller turns round and round very rapidly, its great, wide arms strike the water in such a way as to push the steamer ahead at the rate of about fifteen knots, or miles, every hour.
Blackboard Drawing. Names of sails, etc.: A, flying-gib; B, jib; C, foretop-mast-stay sail; D, foretop-gallant sail; E, foretop sail; F, fore-course; G, maintop-gallant sail; H, maintop sail; I, main-course; J, mizzen-spanker.

K, hull or body; L, keel; M, bow; N, rudder; O, bowsprit; P, jib-boom; Q, martingale; R, life-boat; S, buoy.

a, Foreroyal stay; c, foretop-gallant stay; d, foretop-mast stay; e, maintop-gallant stay; f, maintop-mast stay; h, main stay; i, foretop-gallant mast; j, maintop-gallant mast; k, mizzen-top mast.

8. Here is a ship (pointing to one on the chart). See with what ease she moves upon her way, her swelling sails urging her onward with the favoring breeze. What wonderful progress men have made from the time when the rude savage straddled his log and floated first along the shore!

9. Almost as primitive is the large earthen jar used by the fisherman at the mouth of the Ganges River. He
fishes as he floats, and puts the fish into the jar that is at once his support and his storehouse. Other races use rafts, bark canoes, hollow logs called dug-outs, and boats of basket-work covered with skins.

10. Then came the idea of a mast with a sail of skin or matting. As soon as men learned how to make planks they used them to make boats. These increased in size, as did their sails, until large enough to be called sloops or schooners or ships, which can carry hundreds of men and thousands of tons of merchandise for thousands of miles across a trackless ocean.

11. The immense quantities of cotton, corn, wheat, butter, cheese, petroleum, beef, pork, and other articles which are being shipped to Europe every year bring great wealth to this country.

12. When men discovered the power of steam, they made steamboats and steamships. These move over the water by means of the power of the vapor of water, that we call steam.
Blackboard Drawing. On the right is a furnace, on which is the boiler, partly filled with water. Steam collects in the curved top of the boiler, and is let into the cylinder, first at A, then at B, then A, then B, or one after another, so as to push the piston, E, up and down rapidly, thus moving the large working-beam, which sets the whole machinery in motion. C and D are exhaust-pipes.

13. Here is a rough drawing to show how the steam does its work. When the steam comes from boiling water it expands very much, and this expansion is the power we employ.

14. The cylinder is a strong vessel of iron or steel in shape like one joint of a stovepipe, but very much larger. The steam comes out very hot, as well as very powerful and expansive, and getting in under the piston, pushes it up, and, consequently, pushes the piston-rod which is attached to it. This rod sets the machinery in motion, and works the paddle-wheels of the steamboat or the great revolving screw or propeller of the steamship.

15. When the steam has pushed the piston up to the top of the cylinder the steam-pipe inlet is shut off below and let on above. At the
same time the exhaust-pipe outlet is closed above and opened below, so that by opening and shutting these outlets and inlets the piston is kept going up and down with power enough to force a large boat through the water, or a locomotive with many cars behind it along a railroad.

A Steamship and Sailing Vessels on the Ocean.

16. Men have also made steamers whose outside is entirely of iron. One of these, the Great Eastern, is like a small village in the number of persons it can carry.

17. War-steamers of iron have been built
with very thick sides so as to resist cannon-balls.

18. The Devastation, an English vessel of this class, has on her sides twelve inches of iron, backed by eighteen inches of wood, and the Dictator, an American vessel, has six inches of iron, backed by forty-two inches of wood, making a very formidable barrier.

The Ironclad "Merrimac."

19. Two of the most celebrated ironclad vessels of war were the Merrimac (or Virginia) and the Monitor.

20. The former, a Confederate war-vessel, with a sloping roof of railroad iron, attacked and destroyed the Union war-vessels (not ironclad) Cumberland and Congress, whose heavy cannon-balls glanced harmlessly off. Nothing then seemed easier than to destroy all the other Union vessels it could reach; but the little ironclad Monitor, less than one-fifth the weight of the Merrimac, arrived from New York just in the nick of time. The two ironclads went at each other, and for several hours they fought furiously. Five times the Merrimac tried to run down and sink her brave little antagonist; broadside after broadside was hurled at it, but its hull, its deck, and its
round, revolving turret (small tower) were too strongly covered with plates of iron. The *Merrimac* was compelled to retire from the contest, which was her last.

![The Monitor](image)

**The Monitor.**

21. The *Monitor's* two big guns were fired through openings in the tower. When fired, the cannons were brought back into the tower and the openings closed by heavy iron doors.

22. This famous engagement took place at the mouth of the *James River*, near the City of *Norfolk*, in 1862.

23. The length of the *Monitor* was 174 feet and its width 41 feet.

24. A dock is a part of a harbor or river which is enclosed between piers, wharves, or high banks, where vessels may enter to load or unload.

25. Some docks have gates to close tightly where it is necessary to prevent the water from running out with the falling tide.
26. A dry-dock is one from which the water may be shut out or pumped out.

27. Some dry-docks are floating docks like that shown in the chart and in the blackboard drawing. Such have cisterns or hollow spaces between their sides or under the floor, into which water is admitted until the dock sinks deep enough to admit a vessel needing repairs.

28. When the vessel is properly braced or
propped up, the water is pumped out by steam, and the dock, vessel and all, rise as you see in the drawing.

29. Some docks at low tide are entirely without water. Such are enclosed by strong gates, like those of canals, which keep the water in to float the vessels. These also are dry-docks, although not floating docks.

30. When a vessel needs repairing or cleaning, it sails in with the rising tide, and is then propped up. When the tide falls the gates are opened, and the water passes out; then the gates are closed, and the water is kept out until the vessel is ready to sail. These stationary dry-docks are constructed only in those rivers and bays in which the rise and fall of the tides are sufficient for the purpose.

31. The city of **London**, the largest city in the world, has such docks; its tides rise and fall about eighteen feet. Such, also, are the magnificent docks of the city of **Liverpool**, where the tides rise and fall fifteen feet. Much of that city's importance is due to these docks, in which can be seen at any time steamships and other vessels from almost every country in the world, loading or unloading their cargoes. The **Brooklyn** dry-dock is the finest in the United States.

32. How is a ship steered? *By means of a helm, or rudder.*

When sailors are far out at sea and no land is in sight, what guides have they in ascertaining the directions? *The stars and the mariner's compass.*
REVIEW OF CHAPTER IV.

What is a ship-yard?  *A place where ships are built?*

Where are ship-yards located?  *On the sea-coast or the bank of a river.*

Mention some of the parts of a ship.  *The keel, ribs, sides, deck, hull, masts, and sails.*

What is the difference between steamships and sailing vessels?  *Steamships go by steam and with the aid of sails; sailing vessels, only by means of the sails.*

Of what are steamships mostly built?  *Iron.*

What do ships carry from this country to Europe in large quantities?  *Cotton, corn, wheat, butter, cheese, petroleum, beef, and pork.*

What ocean do these ships cross?  *The Atlantic.*

In what direction do they sail going there?  *East.*

How long a time does it take a steamship to cross the Atlantic Ocean?  *About ten days.*

How long does it take a sailing vessel?  *A month or more.*

What warm stream in the ocean do these ships sail in or across?  *The Gulf Stream.*

Name some parts of a steamship's machinery?  *Furnaces, boilers, cylinder, working-beam, propeller or screw, the steam and smoke-pipes.*

Mention the largest steamship ever built?  *The Great Eastern.*

What is an iron-clad war vessel?  *A vessel with very thick sides covered with iron to resist cannon-balls.*


What is a dock?  *A place where ships load and unload.*

What is a dry-dock?  *One from which the water may be withdrawn.*
Exercises on the Map.

How is a dry-dock used? *It is filled with water to receive vessels, and emptied to repair them.*

What is a floating dry-dock? *One which is filled with water by sinking it, and emptied by raising it.*

What is a mariner's compass? *A box containing a card on which is marked all the points—north, east, south, west, etc., etc.—and over which a magnetic needle turns and points to the north.*

As the needle shows where the north is, it is easy to know where is the south, the east, or the west.

(See Wall Map, or p. 40.) In what direction do ships sail from the United States to Europe? *Northeast.*

To Africa, for ivory and ostrich-feathers? *Southeast.*

To the West Indies, for oranges and bananas? *South.*

To South America, for coffee and India-rubber? *Southeast.*

To the Arctic or cold regions for furs? *North.*

With each of above answers, the pupil should point towards the place mentioned.

EXERCISES ON THE MAP.

On the map of the world you may see lines crossing from east to west; they are (pointing to them on the Wall Map, or referring to p. 40), the Equator, Tropic of Cancer, Tropic of Capricorn, Arctic Circle, and Antarctic Circle. They are all circles, and appear so on all globes.

They divide the earth's surface into five belts or Zones, which differ greatly in the amount of their heat and cold.

The hot zone is this (pointing to it), the Torrid. In it are the hottest countries and islands of the world.

Between what two circles is the Torrid Zone? *The Tropic of Cancer and the Tropic of Capricorn.*

What great circle passes through the middle of the Torrid Zone? *The Equator.*
Mention some places in the hot or Torrid Zone? Nearly all of Africa and South America.

What part of North America is in the Torrid Zone? The Southern.

What part of Asia is in it? The Southern.

Is any part of Europe in it? (See p. 40.) Any part of Australia? Any part of Greenland?

Furthest from the hot zone are the two cold zones, the North Frigid and the South Frigid. In the center of one is the North Pole, which is the most northern point of the Earth's surface; and in the center of the other is the South Pole, which is the most southern point of the earth's surface.

The North Frigid Zone is limited or bounded by the Arctic Circle; and the South Frigid Zone by the Antarctic Circle. (See p. 40.)

What part of North America is in the North Frigid Zone? What part of Europe? What part of Asia?

The two zones which lie between the Torrid and the Frigid Zones are neither so hot as the one nor so cold as the others. They have a more temperate climate, and are called the North Temperate Zone and the South Temperate Zone.

Between what two circles is the North Temperate Zone? The Arctic Circle and the Tropic of Cancer.

Between what two circles is the South Temperate Zone? The Antarctic Circle and the Tropic of Capricorn.

In what zone is the greater part of North America, which includes the country we live in? (p. 40.)

In what zone is nearly all Europe and Asia? The southern part of South America? The most northern part of Africa? The most southern part of Africa? The southern part of Australia? The most of Greenland? The Sandwich Islands?

In what direction would you sail to find warm weather, with fruits and flowers growing in the open air, even in winter? South.

In what direction would you sail to find cold weather, ice-fields, and icebergs. even in summer? North.
SPELLING AND WRITING LESSON.

The pupils may copy the following exercise on their slates or papers, filling the blank spaces with the proper words.

I live on the Continent, which comprises and America.

I live in America, and in the Zone.

I am glad that my home is not in the Zone, which is too hot, or in either of the Zones, where it is too cold.

The name of my country is . It is between the and Oceans.

The hot and the cold parts of the world are very useful to us. From warm South America we get From the West Indies we get , and from the cold Arctic regions we get nice, soft
Rivers—How Formed.

CHAPTER V.
RIVERS, RAPIDS, CASCADES, ETC.

1. You would not ride far on a railroad without crossing one, perhaps several, rivers, which are streams of water always flowing toward lower ground. Do you know how they are formed, where they come from, where they go, and what good they do?

2. Look at the chart and you will see several rivers. Some are formed by rain which sinks into the ground and appears again at openings in lower ground as springs, and others are formed far up the sides of mountains merely by the melting of snow.
3. On the chart you may see a river formed by rain which falls on the hills; and on the left, in front, you may see a river which has its source, or beginning, or head, very far up a mountain, which is so high that its summit or top is always covered with snow. (See p. 14.)

4. Rivers at first are usually very small; almost any of you could jump or wade across them. In some places they tumble over precipices, where they are called cascades or waterfalls. But as they flow on and down, they are joined by other little streams coming from different directions, and little by little they grow larger and deeper.

5. In some places you would find boys and men having fine sport with their fishing-rods, lines, and hooks catching trout or other fish.

6. As you descend the stream, you may see a mill so built that the rushing water may turn a great wooden wheel. This wheel is made either with broad arms like the paddle-wheels of a steamboat, or with buckets at its outer edge, that the stream may so strike these arms or fill the buckets as to turn it round and round, as shown on the next page.
7. How this water-wheel turns other wheels and the stones inside the mill so as grind wheat into flour, corn into meal, or to saw logs into boards, you will learn in a lesson further on.

8. As the wheels of all mills are not turned by water in precisely the same way, you may see from the blackboard drawing three different ways of applying the water to the wheels.

9. The water-wheel on the left hand of the chart is called an overshot-wheel, because the water is shot over it.

10. When the water comes just abreast of the axle of the wheel it is called a breast-wheel.

11. One which is turned by a stream running under it is called an undershot-wheel.

12. Such a one is used by the washerwomen in Paris, where it is attached to the side of a large, stout boat that is held fast by anchors or cables, and does their work for them.
13. This stream that runs down hill is also very useful for carrying down logs. In the winter, when the farmers cannot plough or sow or reap, they go into the woods and cut down trees. The branches they cut off and draw home for firewood, but the trunks they cut up into logs of about thirteen feet or more in length, and then roll them to the bank of the stream, or drag them on the snow by means of oxen or horses. You may see some logs in the chart, on the bank of a stream.

14. Immense quantities of lumber are obtained every year from the forests of Michigan, Wisconsin, Minnesota, California, Oregon, Maine, and Canada.
15. As soon as the snow is melted and the streams are full, so that they have plenty of water to float them, the wood-choppers roll the logs into the stream, and away they go, helter-skelter, until they are stopped by a "boom" or stout log that is fastened there for that purpose. Then, one by one, they are dragged into the saw-mill, which gets all its power (either steam or water-power) from the same water that brought down the logs.

16. When a log is fixed securely in its place, the big saw begins to saw it up into boards. Sometimes what is called a "gang-saw" is set to work, which cuts up a log at once into good boards or planks.

17. A gang-saw is a frame full of saws set just the width of a board apart. For what are boards and planks used?
18. Some rivers carry from the lands through which they flow rapidly great quantities of soft earth or mud, called silt, which they deposit at or near their mouths.

19. Noted for this are the Mississippi, Nile, Ganges, Danube, Po, Rhone, and Rhine.

20. The mud deposited in this way divides the stream at its mouth, giving it several mouths; the land so filled between these mouths is called a delta.

21. The land on which the City of New Orleans stands, and for a long distance all around it and down to the Gulf of Mexico, was carried there by the Mississippi River and its branches.

22. Look at the Gulf of Mexico where the Mississippi flows into it and you will see that a large part of the Gulf has been filled up in this way. The State of Louisiana is, therefore, growing larger every year, and the mouth of that great river is getting further and further from the City of New Orleans. A like effect is caused by the River Nile where it flows into the Mediterranean Sea.

23. It is estimated that the Mississippi River carries down every five years an amount of silt sufficient to cover the whole of the State of Rhode Island twelve inches deep.
24. After long and heavy rains or the sudden melting of a winter's snow, some rivers become so full that they overflow their banks, and the rush of their water over the low lands causes great destruction. To prevent this on the lower Mississippi, men have constructed long, high banks, called levees.

Sometimes, however, a bank bursts or is washed away, and the overflow does immense damage to crops, houses, cattle, etc.

25. The overflow of the Ohio River in 1883 caused great damage and suffering to the inhabitants along its banks. Thousands of houses were lifted from their foundations and floated off by the rising waters.

26. Although damage is often done in this
way by inundations, they are not always destructive; indeed, in some places people could not live without them.

27. One of the oldest and most celebrated countries in the world owes its existence to the yearly rise and overflow of a river. That country is Egypt, and that river, the Nile.

28. Rain is almost unknown in Egypt, and, consequently, without the yearly rise of the Nile, that country would be a desert.

29. The Nile rises so high (30 to 35 feet) that very high banks have been constructed in Egypt.

30. Through gates or openings in these banks and by means of small canals or ditches, the farmers conduct the muddy water of the Nile to their farms and allow it to flow all over their land and cover it with that soft mud which makes the soil very fertile.

31. Dry and barren lands in Utah have been converted into rich and productive farms, orchards and gardens, simply by water conducted from mountain streams.

32. The Nile receives its water from the lakes of Central Africa, which are supplied by annual rains. This river begins to rise in Egypt in the month of June, and attains its greatest height in September.
33. Some rivers are, for long distances, confined between high, natural banks or bluffs, like the beautiful Rhine, which flows through Germany; others flow between very high mountains, and in deep gorges or ravines, called canons (kan'yons).

34. The Colorado River (kol-o-rah'do) is celebrated for its great canons in Colorado, Utah, and Arizona. Many other rivers in the Territories of the United States flow through canons.

35. Where the bed of a river is very rough,
rocky and sloping, the water rushes down violently and rapidly. Such parts of a river are called rapids. (See rapids in the chart.)

The **St. Lawrence River** contains the celebrated Lachine (lah-sheen') Rapids.

36. A lake is a body or collection of water which is formed and fed by one or more rivers; these are called its inlets. The water of most lakes is fresh; some lakes which have no outlets or outflowing streams are salt.

37. The largest fresh water lakes in the world are those between the United States and the Dominion of Canada; their names are Superior, Huron, Michigan, Erie, and Ontario. Great Salt Lake is in Utah. Observe from the chart that some lakes are on low and others on high ground.

38. Lakes and rivers are very useful in many ways; people sail on them to different parts of their State or Country, and on them they send and receive all sorts of things, such as food, clothing, and building materials, very easily and cheaply. On account of these advantages people have built cities, towns, and villages on or near the banks of rivers and lakes.

39. This buying, selling, and trading between people of different States or Countries is called commerce. Commerce is carried on also by way of railroads and canals and the great ocean or sea. (You will learn about canals in Chapter VIII.)
REVIEW OF CHAPTER V.

What is a river? How are rivers formed? How many banks has each river? Which is the right and which is the left bank? *As you descend it, the bank on your right hand is the right bank: the other is the left bank.*

Why are mills built on the bank of a river? How many kinds of water-wheels are there? How are rivers useful to lumber-men?

By what are overflows caused? What damage is caused by the sudden rise of some rivers? What is done to prevent overflows? Of what benefit is the Nile River to Egypt? Which is the largest river in the world? *Amazon.* Where is the Amazon River? *In South America.*


What is a Cañon? What are Rapids? Cascades? Where are the largest lakes in the world? Mention them.

SPELLING AND WRITING EXERCISE.

Cascade. Spring. Stream. bucket.
paddle. anchor. plough. thirteen.
saw-mill. delta. levee. overflow.
farmer. desert. ditch. inundation.
savine. lake. village. clothing.
muddy. winter. melting. unknown.

Write a composition on rivers; enough to fill one page of a copy-book.
Section of the Ground or Rock, showing how Wells are supplied.

A, Ground or rock through which the rain-water sinks.
C, Rock or clay, which the water does not enter.
B, The part in which the water rests or flows.

CHAPTER VI.
WELLS, SPRINGS, ETC.

1. You already know that people obtain fresh water from springs, lakes, and rivers. Where else is fresh water obtained? From wells.

2. When it rains, some of the water runs along on the surface or top of the ground and finds its way to a river; some of it is "dried up" or becomes vapor (page 16); and a great deal "soaks away," or sinks down into the ground. Where does that go? How far does it go? It finds its
way down either through soft, loose ground or gravel, or through crevices in the rock, and continues to sink until it is stopped by rock or clay, which it cannot penetrate. Therefore, if you should dig a pit or well down to a layer of sand in which the water rests or moves, some of it will, of course, flow into the well.

3. Water is brought up from a well by means of a bucket, or a chain pump, or a suction pump.

4. A chain pump is composed of an endless chain, which runs through a pipe.

5. A suction pump is one in which the water is made to rise by the weight or pressure of the air.

6. Air is everywhere, until it is displaced by something else; a cup or a pitcher, when said to be empty, is full of air.

7. Air has weight, and is moved just as water and sand have weight and are moved. Like water, air can be pumped.

8. Air rests or presses on the land and also on the water in the ocean, a cup, or a deep well.

9. If you should remove the air from any spot on the water, you would see the water suddenly rise just at that spot, showing the pressure of the air on the surrounding portions.
10. If you should suck the air from a straw which has one end in a cup of water, you would see the effect of air pressure in the rising of the water in the straw.

11. When a pump is thus placed in a well, and the air removed from it, the water rises, because the air which rests on the water in the well presses it up.

12. In the first drawing, the water in the well and that in the pump are on the same level, because air is pressing down equally on the water both inside and outside of the pump.

13. The pump is provided with two little trap-doors called valves, which fit tightly. The lower valve is fixed, the other is moved up and down by means of an iron rod attached to the handle. (See p. 49.)
14. The upper valve removes the air from the pump, and immediately the water is pressed up and flows out at the spout.

15. The valves are so made that the water and air by pressing upwards open them and rise above them, but by pressing downward close them; therefore, the valves prevent the return of the water through the pump into the well.

16. When the upper valve goes down, it is opened by the rush of air upward, but when it rises it is closed by the pressure of the air above it; a few strokes in this way remove the air from within the pump, and the consequence is that the air in the well, but outside of the pump, forces the water upward to fill the vac'‐u‐um.

17. Any space which contains nothing—not even air—is called a vacuum.
18. A vacuum may be formed by sucking the air from a small glass bottle, and the effect of the pressure of the surrounding air will be felt on your lips or tongue, perhaps painfully: and, if the glass be very thin, that pressure may crush the bottle.

19. A piece of leather, soaked in water and pressed down on a smooth pavement, adheres tightly to it by the pressure of the air on it. In this case a vacuum is formed between the leather or sucker and the pavement.

20. In some places men bore deep holes in the rock or ground, from which the water spurts up like fountains. Such are called Artesian Wells. They are not dug like common wells, but are drilled by long, sharp bars of iron or steel, about as thick as a man's arm.
21. These drilling or boring tools are lifted up into a high wooden tower by machinery, and let fall, as rocks are drilled for blasting. (Such a tower you may see in the large chart.)

22. As soon as the bore enters a seam or channel in which water is confined by surrounding rock or clay, the water is pressed upward through this small opening. The pressure is exerted by the water which lies in these same underground channels and reservoirs on higher ground.

23. The underground seams serve as great pipes in holding and conducting water to great distances; and an Artesian well is like a burst in a pipe.

24. Artesian wells have been bored to depths of hundreds and even thousands of feet. By means of them an abundance of water is obtained even in deserts.

25. It is from such wells as these that the oil called petroleum is obtained, which is used for oiling machinery and for burning in lamps. It is from this that kerosene is now made.

26. The oil wells of Pennsylvania, Ohio and West Virginia furnish Europe with about fifty million dollars' ($50,000,000) worth of oil every year.

27. The origin of petroleum or rock-oil is variously attributed to vegetable, animal and mineral substances, which may have sunk, many years ago, below the earth's surface (p. 148).

28. Some wells yield salt water, from which salt is obtained (pages 17 and 18). Large quantities of salt are thus made in New York, West Virginia and Michigan.
REVIEW OF CHAPTER VI.

Where do people obtain drinking water?
What is a spring? Water flowing out of the ground.
By what are springs formed? Does all the rain sink into the ground? What becomes of the rain? What is a well? How are wells usually made? If there were no rain or snow, would we have wells and springs?
If air had no weight, would pumps raise water as they do now? Does air press heavily on everything? It does. If you should take the air away from a portion of any body of water, what would be the result? Water would rise at the place from which the air was removed.
Why does water or any liquid rise in a straw when you suck it? Because the air is removed from the spot enclosed by the straw.
Why does water rise in a suction pump? Because the air is removed from within the pump.
What presses the water upwards through the pump? The air resting on the water outside of the pump.
What is an Artesian Well? How is it made? How deep have some been bored?
Do all wells and springs give fresh, cool water? Some give salt water, some give warm water, and some give oil.
Of what use is the oil which is obtained from wells? Of what use is the salt water? Salt is made from it by evaporation. (See pages 17 and 18.)

SPELLING AND WRITING EXERCISE.

Pump. crevice. suction. weight.
pitches. pressure. value. trap-door.
preclude. remove. upward. vacuum.

Write a composition on wells, springs and pumps; enough to fill one page of a copy-book or letter-paper.
CHAPTER VII.

CAPES, ISLANDS, PENINSULAS, ETC.

1. Points of land which project into the water are called Capes. A high cape is called a Promontory. A light-house is seen in the Chart on a Promontory: and another on one of the capes.

Two of the best known capes are Cape Horn and Cape Good Hope.

2. A narrow neck or strip of land is called an Isthmus; and a narrow passage of water is called a Strait, sometimes a Channel. A well known isthmus is that of Panama, or Darien, which joins North and South America. A well known strait is that of Gibraltar, which connects the Mediterranean Sea with the Atlantic Ocean; another is Behring Strait, which separates North America from Asia and connects the Arctic with the Pacific Ocean; another, called Davis Strait, connects Baffin Bay with the Atlantic; and another, called Hudson Strait, connects Hudson Bay with the Atlantic.

3. These straits received their names from distinguished navigators who discovered them.
4. Hudson entered Hudson Strait and discovered Hudson Bay, which he thought was the Pacific Ocean; but, of course, he was mistaken. He also explored Hudson River.

5. What is the difference between an Island and a Peninsula? *An Island is entirely surrounded by water, and a Peninsula is almost surrounded by water.*

Point out on a map of the world the following Islands:

6. **Australia**, which is the largest island in the world, and is celebrated for its rich gold mines and large flocks of sheep. **Borneo**, which is crossed by the Equator and is very hot. The **British Isles**, which include England, Scotland, Wales, and Ireland. The **Japan Islands**, which have almost as many inhabitants as the United States. The **West Indies**, which have a warm climate and produce sugar and oranges. The **Friendly** and the **Society Islands**, also warm, which produce bananas and cocoanuts.

7. A little west of the center of the Chart you may see a **Tunnel** cut through the solid rock for trains to pass through. A celebrated tunnel is in the western part of Massachusetts. It is cut through the mountains and is nearly five miles long; it is the Hoosac Tunnel. The Mount Cenis (se-ne') tunnel through the Alps is nearly eight miles long. Several tunnels
pass under the Thames, the river which flows through the city of London. It is proposed to construct a railroad tunnel under the Hudson River between New York and Jersey City.

[Image of emigrants crossing a mountain pass]

Emigrants crossing the Mountains—a Mountain Pass.

8. Not far from the tunnel you may see a company of emigrants* on their way west. They may be from some of the large cities of the States, or they may have lately arrived in this country from Germany, England, Sweden, Norway, or other part of Europe, intending to buy land in one of our Western States or Territories and become industrious farmers.

* In the Country or State which they leave they are called Emigrants; in that which they enter, Immigrants.
CHAPTER VIII.

CANALS.

1. In this part of the chart you see a canal with locks and gates. Here is a canal-boat drawn by horses. Canals are artificial rivers.

2. There is one in the State of New York that is three hundred and fifty-two miles long. It reaches from Lake Erie to the Hudson River; and this canal has done much to make the city, as well as the State, of New York so large and wealthy as it is.

3. If you will look at your map you will see that any kind of produce from the farms, the forests, or the mines can be brought by vessels from the far western shore of Lake Superior or of Lake Michigan, many hundreds of miles distant, all the way by water to Buffalo, thence by this long canal to the Hudson River, and down this river to the wharves of New York City, from which it can reach all the navigable waters in the world. This water-carriage is the cheapest of all. There are no rails to be paid for or to put down, but any man can move about wherever he chooses, up and down the navigable rivers, or to and fro for thousands of miles "over the broad bosom of the ocean."

4. Look at the map, and you will see that a sailing
voyage from Lake Superior or Lake Michigan includes Lake Huron and Lake Erie.

5. The only difficulty about some canals is that they will freeze up in winter. Then the railroads get the better of them, and carry large quantities of goods during the long winter months.

6. This large canal, however, which is called the Erie Canal, however, which is called the Erie Canal, is only about half as long as one in China, which runs from the great city of Pekin to the great river Yangtse Kiang. There are said to be about four hundred canals in China.

7. These are used not only as water highways to float goods or produce from place to place, but also for irrigation—that is, to water the fields, so that the plants may grow better, and thus yield a more abundant crop.

8. In Egypt, where it very seldom rains, the land is watered in this way by water from the Nile River.

9. In canals they have a curious way of making boats climb up hill; for canals must sometimes be made on ground that is high in one part and low in another. Where a high and a low level meet, as shown in the blackboard drawing, it is necessary to build what is called a lock, perhaps because it locks the parts together. This is a shaft or well-hole of stone, carefully laid in cement so as to be water-tight, extending down from the upper to the lower level.
of the canal with a gate on one side, at the bottom, opening into the lower level, and another on the opposite side, at the top, opening into the upper level. These gates or doors can be shut so as to be water-tight.

10. When a boat is to go up hill, the door at the top being closed, the one at the bottom is opened, and the boat floats through into the lock.

11. That door is then closed and the upper one, or a valve in it, is gradually opened, letting
the water run down into the lock until the water in the lock is on a level with that in the upper canal. The upper door or gate is then opened, and the boat floats out upon the upper level.

Upper gate, B, is opened, and the boat enters upper canal.

12. Where a canal passes through land which is hilly or sloping, there are sometimes so many locks as to resemble a flight of stairs, as shown on the chart, in the middle-ground.

13. Canal-boats going from Albany to Buffalo on the Erie Canal must ascend, as shown in the drawing above; so also on the Welland Canal, from Lake Ontario to Lake Erie; and on the Canal by which steamboats on their way from Montreal to Lake Ontario avoid the rapids in the St. Lawrence River.

14. Welland Canal is the only route by which boats can sail between Lakes Erie and Ontario, because the falls (160 feet high) in Niagara River render navigation between these two lakes impossible by way of that river.
How Canal-boats are Lowered.

15. When a boat is to go from a high to a low level, the order of opening and closing the gates is simply reversed.

16. When the boat reaches the upper, closed gates, the lower gates are closed; then the water is let into the lock until it is full. The upper gates are then swung open against the sides of the canal and the boat enters the lock.

17. It is now easy to see that by letting the water out of the lock and by opening the lower gates, the upper gates remaining closed, the boat settles down with the water and passes out on the lower level.
18. **Canals** are often built alongside of rivers which are not navigable. The water of the river may be too shallow, or its course too rapid or dangerous for boats.

19. We have many canals in this country, especially in **New York** and **Pennsylvania**.

20. They are numerous also in **Europe**. In **Amsterdam**, the largest city in **Holland**, and in the beautiful city of **Venice**, in **Italy**, they have canals instead of streets.

21. An important canal unites the **Red** with the **Mediterranean Sea**. It crosses the **Isthmus of Suez**, and shortens the route between **Europe, China**, and **India**, which formerly was by way of **Cape Good Hope**.
Aqueducts—How Constructed.

CHAPTER IX.

AQUEDUCTS.

1. On this part of the chart you see a reservoir (pointing to it). It receives fresh water from the lake beyond and above it, and supplies the city by means of an aqueduct, as shown in the blackboard drawings.

2. An aqueduct is a long pipe for conducting water. It is made of lead or iron or earthenware, or sometimes it is a large tube of masonry covered over smoothly with cement so as to be water-tight.

3. Near the reservoir is a tower or stand-pipe, into which water is pumped high enough to supply buildings which are higher than the reservoir.

4. A tube or pipe can conduct water downwards, then upwards as high as its source, but no higher, on the principle that "water always seeks a level."
5. A most extraordinary aqueduct supplies the City of Chicago with water. It runs under the bottom of Lake Michigan for two miles, and communicates with a large iron pipe, which rises nearly to the surface of the lake. (See blackboard drawing.) The City of Cleveland, Ohio, is supplied with pure water from Lake Erie in a similar manner.

Blackboard Drawing to show how Chicago is supplied with fresh water from Lake Michigan. The water enters the pipe at A, fills the aqueduct or tunnel, and rises as far as B, the level of the lake. From D, it is pumped up into the tower or stand-pipe, from which the city receives a supply.
CHAPTER X.

BRIDGES.

1. Here is a suspension bridge. It is made by building two tall piers or towers, and stretching large, strong ropes or cables, usually made of wire, across the tops of these. The cables necessarily sag by their own weight, so as to make a curve. Pieces of rope or iron rods are fastened to the cables, and, as they hang straight down, are fastened to the ends of beams, on which the floor of the bridge is laid. On this floor people walk, or wagons pass, or even locomotives with trains can cross when the bridges are made strong enough.

2. The oldest of these is said to have been made in China in the year 65. It was made of chain cables with a floor of wood.

3. The Indians in South America make them of bark ropes, and sometimes, instead of a floor for the traveler to walk on, there is a bas-
Suspension Bridges.

ket into which he is put, and in which he is pulled over from one side of a river to the other.

4. One of the finest suspension bridges in the world is at **Niagara**. It has a span of over 800 feet, and is nearly 250 feet above the **Niagara River**. This bridge is so strong that ordinary trains pass over it.

5. Another at **Cincinnati**, over the **Ohio River**, is more than 2,200 feet in length. Its height above the water is about 100 feet.

6. The largest suspension bridge, most probably, in the world is that now in process of construction between **New York** and **Brooklyn** over the **East River**. It is 3,475 feet long between the anchorages, with a clear span over the river of 1,595 feet. The bottom of it is 135 feet above the water.

7. Light suspension bridges are sometimes broken by too much vibration. This happened to a small bridge over the river **Loire**, in **France**, at a place called Angers.

8. A lieutenant in command of a party of soldiers marched them in the usual way, without causing them to break step. As their regular tramp, tramp was felt by the bridge, it began to swing, and went on swinging more and more, until it finally broke from its fastenings and precipitated those on it into the river, where several of them were killed.

9. Suspension bridges are so called because the floor or roadway is hung or suspended from the curved cables. Other bridges are built of stone, iron, wood, or brick; their roadways are usually over or alongside of the arches.
10. A most remarkable bridge (not suspension) is that which crosses the **Mississippi River** at the great city of **St. Louis**. This bridge is chiefly of steel, its three immense arches resting on four stone piers. Each span is over 500 feet in extent. There are two roadways, one above the other.

![One span of the St. Louis Bridge. Add the two other arches or spans, each ten inches on the blackboard and similar to this.](image)

In what direction does the Mississippi River flow? **South**. In what State does it rise or begin? **Minnesota**. In what State does it end? **Louisiana**. What large rivers flow into it? **Missouri, Arkansas, Red, and Ohio**.

11. When you look at the foundations of bridges, lighthouses, and stone piers which are under water, you doubtless wonder how the masons built them. I shall now tell you. One way is to sink or drive down heavy timbers or piles around the place selected for the foundation, fill all around and between these with stone, clay, and cement, and pump out the water from the enclosure; the workmen then descend and build the foundation.
12. Another way is simply for the workman to put on a peculiar kind of a suit made of India-rubber, which completely covers him and keeps out the water. Glass is fixed in the helmet for him to see through. Of course, he must have air to breathe; that is supplied by a hose or tube leading from the inside of his suit or covering up to a boat, where other men are carefully pumping air to him through the hose. In such suits, men go under the water to examine and repair ships, recover wrecks, sunken treasures, etc.

13. The diving-bell is another means by which men descend and work in the water.

14. Its principle is seen in pressing any vessel like a tumbler into the water, with its mouth downward.

15. The air confined in the tumbler keeps the water out and displaces it, just as a block or a stone would do.

16. Fresh air is pumped into the diving-bell as shown above.
REVIEW OF CHAPTERS VIII, IX, and X.

Are canals natural or artificial? *Artificial.*
Are rivers natural or artificial? *Natural.*
What are canals like? *Long, wide ditches.*
What are they built for? *For the use of boats.*
What do canal-boats carry? *Grain, coal, bricks, lumber, and other articles.*

By what other means are such articles carried? *By railroads and steamboats.*
What advantage have canals? *Cheapness.*
What important canal crosses the State of New York? *Erie Canal.*
What city at the west end of the Erie Canal? *Buffalo, on Lake Erie.*
What city at the east end? *Albany, on the Hudson.*
How are canal boats raised and lowered between different elevations? *By means of locks.*
How are some cities supplied with fresh water? *By means of aqueducts.*
What are usually selected as the source? *Springs or lakes on high ground.*
What natural law assists men in conducting water in aqueducts? *Water always seeks a level.*
When a lake or source is not high enough, what is necessary? *Pumping.*
Explain if you can how Chicago is supplied with fresh water from Lake Michigan.
In constructing a suspension bridge, what parts are built first? *The two high piers.*
What next? *Cables are passed over the piers and fastened in the ground or rock.*
What is the purpose of the cables? *To hold up the floor, which is made to hang from them.*

For review lessons in geography the teacher may require the pupils to give the situation of all the places which appear in the text in large, black type.
SPELLING AND WRITING LESSONS.

Michigan. building. Cleveland. cables.
Canal. source. Buffalo. suit.
Aqueduct. reservoir. Albany. wreck.
Coast. launch. ship-yard. heel.
Steamship. edge. cargoes. grease.
Receive. paddle. wheel. wheat.
Fifteen. breeze. thousand. rough.
Petroleum. steamboat. wealth. copper.
Cylinder. machinery. revolving. soap.

Products are conveyed from the interior to the coast by way of or or ; and from the coast to other countries by means of . Cities are supplied with fresh water from by means of . A splendid bridge crosses the River at St. Louis; another crosses the River at Cincinnati.
EXERCISES ON THE MAP OF NORTH AMERICA.

1. This division of the Earth (pointing to the map) is surrounded by what three oceans? Which is on the north? On the east? On the west?

2. What can you say about the Arctic Ocean? *It is the coldest of these oceans; it contains icebergs and ice-fields all the year; seals and white bears are numerous there.*

3. What can you say of the Atlantic Ocean? *Ships and steamers cross it between the United States and Europe.*

4. What can you say of the Pacific Ocean? *It is the largest ocean; it contains very many islands.*

5. In what country of North America do we live? *In the United States.* What oceans touch this country? What gulf south of it? What large river flows into the Gulf of Mexico? What other large rivers are in this country?


7. What minerals are found in the western part of this country? What part is celebrated for cotton, sugar, and oranges? For lumber, wheat, and corn?

8. What large bay in British America? What bay between British America and Greenland? What isthmus joins North and South America? In what three zones is North America? *The northern part is in the North Frigid or Cold Zone; the southern part, in the Torrid or Hot Zone; and the middle part, in the North Temperate Zone.* Mention the countries of North America,—some of the islands,—gulfs,—bays,—rivers,—straits.
9. You have heard that some countries are very warm at the same time that some other countries are very cold. That is true.

10. If two boys should start from this country in the month of March, one for Greenland and the other for South America, one would find it colder and colder, and the other warmer and warmer, every day.

11. If each should write a letter home from there on New Year's day, one might read like this:

"It is dreadfully cold here. All around, as far as I can see, are ice-fields, icebergs, and snow. Even in summer, it is so cold here that we must wear the warm furs of the seal or bear which men kill here."

12. The other boy would write from Brazil something like this:

"This is New Year's Day, the first of January, and it is so hot that I feel just like staying in the shade all the time fanning myself. I go in swimming every day. There are lots of nice oranges and
In North America are bears, buffaloes, wolves, foxes, rabbits, and many tame animals, but no wild lions or elephants or camels.

About four hundred years ago there were no white people in North or South America—none but Indians, some of whom were savage.

Indians had inhabited America no one knows how long; but it was in the year 1492 that Columbus first sailed across the Atlantic Ocean from Europe, with three ships and about one hundred Spaniards. They landed on one of the islands of the West Indies. Columbus was, therefore, the discoverer of America.

Many other people came here afterward—Spaniards, French, and British, nearly all of whom took possession of America without the slightest regard for the Indians, who were, of course, the first owners.

The Spaniards took Mexico; the British and French, nearly all the remaining portion of North America. (See p. 143, paragraph 13.)
CHAPTER XII.

TREES AND PLANTS, AND THEIR USES.

1. Trees and other plants are very useful to us, and we ought to be very grateful for them. We eat them, we wear them, we walk on them, we sit on them, we sleep on them, and are sheltered by them all day and all night. Our shirts and collars of muslin and of linen are given us by the cotton-plant and the flax. We sit down on chairs of oak or maple, or some other wood, which rest on a wooden floor, on which we walk. For our dinner-table the potato-plant has sent us its roots, or rather tubers; the wheat or rye gives us our bread; the tomato, the carrot, the turnip, the squash, the egg-plant, and a host of others all help to supply us with food, while apples, peaches, pears, grapes, and other delicious fruits are held out to us by many trees, bushes, and vines.

2. If we wish to build a carriage, omnibus, cart, wagon, car, or railroad, the oak, the ash, the
maple, the chestnut, the pine, and other trees supply us with materials for them all.

3. If we wish to go across the ocean, the trees supply us with materials for ships.

4. If we go as far as the island of Ceylon, one tree there, called the bread-fruit tree, will supply us with bread, which hangs in small loaves from the branches. All you have to do is to take it and bake it and eat it.

5. If you go to China or Japan, you will find the tea-plant, that gives us a pleasant drink, and you will find there also about twenty different kinds of rice. Besides these is a tallow-tree, that supplies materials for candles.

6. The tallow of which our candles are made is the suet or fat of such animals as the ox and sheep.

7. If you should sail to Brazil, Arabia, Abyssinia, or other warm countries, or to the Island of Java, you would see fields covered with evergreen plants bearing small berries which furnish a part of the breakfast for many millions of people every day. What is it? Coffee.

8. Besides the places mentioned, coffee grows in the West Indies, Central America, Venezuela, Guiana, Peru, Bolivia, Ceylon, and some of the islands in the Pacific Ocean.

9. Although the coffee-plant attains the height of 8 to 20 feet, it is usually kept pruned to 5 feet in height. The plants are raised from seed and transplanted. They are in
full bearing in the fifth year and continue to bear for about twenty years.

10. Coffee is named from a region south of Abyssinia, named Kaffa.

11. The best coffee is the Mocha, named from a place in Arabia, and the Java. Most of our coffee comes from Brazil, and much of it is marked Java.

12. Maracaybo (Mah-ra-ki'bo), which has given its name to one variety of coffee, is in Venezuela.

13. In Africa and Asia are many kinds of palm. These supply cocoanuts, palm-sugar, palm-wine, and palm-oil. The latter is used in this country to make soap, and perhaps some of you have washed your hands with this very palm-soap.

14. Some of you, perhaps, have eaten sago in pudding. Sago comes from a kind of palm, and a very wonderful tree it is.

15. A man can live for a year upon one of these trees. It seems rather funny for a man to eat up a tree, but so it is.

16. Its preparation consists in cutting off the branches and also the hard outside part of the trunk. The whole interior of the tree is composed of a highly nutritious substance held together by fibers. This is roughly grated or pounded into a pulp, which is made into flat cakes and baked.

17. One sago-tree supplies cakes enough to feed one man for a whole year.
18. The cocoanut-palm not only gives us this fruit, but supplies us with oil that makes the only soap that can be used with salt water. Another palm gives us millions of fans that are sold in this country for a few cents each, though brought all the way from Asia. Another palm gives wax to make candles. One kind of palm that grows in Brazil has leaves from thirty to fifty feet long. These are used for roofing houses there. Another gives us its leaf-stalks to make coarse brooms.

19. The cocoanut-palm grows only in warm countries, and on the islands of the Indian Ocean and the tropical parts of the Pacific Ocean.

20. It grows to the height of about one hundred feet, lives about one hundred years, and bears about one hundred cocoanuts every year.

21. Its leaves, which are only at the top of the tree, are about twenty feet in length.

Draw on blackboard the palm-leaf 2 feet long (one-tenth the full length), the maple 5 inches, and each of the others 7 inches (full length).

If the teacher direct, other leaves may be brought to school by the pupils, who will call the names of the leaves.

22. Another palm that grows in Egypt gives us a kind of gingerbread all ready for us to eat. It is called the Doum palm.

23. Some trees in South America and Africa are called cow-trees, because they give a kind of milk.

24. Besides the trees that furnish bread and milk, there are others that yield a substance like butter. Of these the African tree seems the best, for the butter from it is sweet, white, and firm, and will keep for a year without salting.

25. Besides bread, milk, and butter, plants yield also sugar. This we have from the sugar-cane, from the maple-tree, and from the beet-root. Enough is made from this latter in France to supply that whole country. It is just as clear and sweet as the best loaf-sugar manufactured from the sugar-cane. From the
sorghum we get a sweet syrup, and from potatoes and other vegetables a sweet liquid called glucose is obtained, which is sometimes used to adulterate sugars and syrups.

26. Sugar-cane is raised from cuttings planted every two or three years. It was first cultivated in Asia, then in Spain in the ninth century. Soon after the discovery of America it was introduced into Mexico, the West Indies, and Brazil.

27. Now it is cultivated in Louisiana, Texas, Florida, and the other States which border on the Gulf of Mexico; in Brazil, Guiana, Venezuela, Bolivia, the West Indies, Mexico, and Central America; in China, Japan, and Farther India; in Egypt, Liberia, and Zanguebar; and in the Sandwich Islands, Society Islands, and other islands which have a warm climate.
28. When the sugar-cane is cut it is taken to the mill, where it is crushed between large rollers. The juice is then heated in large pans or boilers; then it is transferred into coolers, and the molasses is drained off from the sugar, which is of a dark brown color. After this the sugar goes through a process called refining, which produces loaf and refined sugars and syrup.

29. Maple sugar and syrup are obtained by first boiling and then cooling the sap of the sugar-maple tree. A hole is bored into the tree and a tube is inserted, through which the sap trickles out and falls into a pail or other vessel.

30. The plants that poison us are very curious. Some men are dreadfully poisoned if they merely pass near some of them. Other men can handle these same plants without being at all affected by them. There is one tree in the West Indies from which, if the rain drips upon a man's skin, huge blotches are raised up immediately. Some of these poison plants kill us quietly, sending numbness all through our bodies, and others kill us with terrible convulsions.

31. There is one very curious plant that poisons us or nourishes us, according to the part we take. It is called the manioc, or cassava. It grows usually to the height of six or eight feet. Its roots are very large, sometimes weighing thirty pounds, and growing from three to eight in a cluster, usually from a foot to two feet long.
Like the other parts of the plant, these contain an acrid, milky juice, so poisonous as to cause death in a few minutes; but, as this is owing to the presence of a poisonous acid which is quickly driven out by heat, the juice, thickened by boiling, forms an excellent sauce called cassa-reep.

32. This is highly esteemed in Guiana, where it is used to flavor almost every dish, and it is even imported into Great Britain.

33. The root, grated or pounded into pulp, after yielding this deadly juice by pressure, is dried, and forms the well-known cassava-bread; or else, heated and stirred on metal plates, it forms the well-known tapioca, which is sold in our stores, and served up in our restaurants and in our families as tapioca pudding, which perhaps some in this class have eaten. Thus life or death comes to us from this plant, according to our knowing how to use it.

34. In the size of plants there is wonderful variety. There are some plants so small that we only know of their existence by their changing the color of the rocks and stones on which they grow. To see their stems and leaves it is necessary to use the microscope.

35. From these small specimens, plants vary in size up to the giant trees of California, that stand 90 or 100 feet in girth and tower up to the height of 300 or 400 feet.
36. The trunk of one of these trees when lying on the ground is thirty feet high, which is as high as an ordinary two-story house.

37. One man had the stump of one of these trees smoothed off and built a house on it. One of these huge trees became rotten at the heart and was blown down in a storm. The center was cut away so that a horse and wagon could be driven through it. They are called the Redwood trees.

38. The bark of some trees is used to cover houses; that of the cork-trees of Portugal and Spain gives us all our corks; a certain tree from Peru gives us, in its bark, the fever-curing medicines called quinine and cinchona. The slippery elm gives also a medicinal bark. Cassia and cinnamon are the bark of certain kinds of laurel that grow in the East Indies. The oak, the hemlock, and other trees enable us, by means of their bark, to make leather out of hides by a process called tanning. Boats also are made of bark; chiefly birch and spruce.

39. There are some plants that seem offended if you touch them, and close up their leaves immediately. These are called sensitive plants. The best one comes from Brazil. There is a plant of this kind in our Southern States, but it is not so sensitive.

40. There are also plants that give us soap besides the palm-soap which we have already mentioned. As you are walking along in California you will sometimes see what looks like an old paint-brush sticking up out of the ground.
If you should dig it up you could wash with its root as with a piece of soap. There are two kinds of soap-plant found in South America.

There is also a soap-plant in England, called soap-wort.

41. The plants which furnish us with most of our food are wheat, Indian corn, rice, and potatoes.

42. This country sends immense quantities of wheat and corn to Europe every year. They are cultivated extensively in California and the States which touch the Great Lakes and the Missouri River.

43. The States which are celebrated for wheat and corn are California, Illinois, Indiana, Ohio, Pennsylvania, New York, Michigan, Wisconsin, Minnesota, Iowa, Missouri, Kansas, and Nebraska.

44. Countries besides ours which are cele-
brated for wheat are Russia, France, and Austria.

45. Rice is said to be used for food more than any other grain. Millions of the inhabitants of China, India, and the islands off their coasts make it their chief article of agriculture and food.

46. It is also said that the excellent rice for which the state of South Carolina has long been celebrated is due to a few seeds left there by a vessel from the island of Madagascar over two hundred years ago.

47. Rice is cultivated also in Southern Europe, Africa, and the warm countries of North and South America. A wild kind of rice grows in the swamps and lakes of Minnesota.

48. Indian corn is, next to rice, the most used. Originating in America long before the discovery of this continent by Columbus, its cultivation has spread to almost every country in the world.

49. The potato is the most useful and the most extensively cultivated of all vegetables. It
is a native of **South America** and it still grows wild in **Peru** and **Chili**; it was first taken to Spain and England about three hundred years ago.

50. Potatoes are more extensively cultivated in New York than in any other state; they are largely used in the manufacture of starch.

51. There is another plant which is also very extensively used in all parts of the world, and which, like the potato, was first found and cultivated by the natives in America, before the discovery of America; it is tobacco. Tobacco grows best in warm countries; the ancient Mexicans raised large crops of it.

52. Now it is extensively cultivated in **Kentucky, Virginia, Pennsylvania, Ohio, Tennessee, N. Carolina, and Maryland**; also in **Cuba, China, Japan, Persia**, and Southern Europe.

53. Chocolate is prepared from the seeds of the chocolate or cacao tree, which grows abundantly in **Central** and **South America** and the **West Indies**.

54. Cacao is pronounced ka-kay’o or kay’ko. The cocoa (ko’ko) or cocoanut-tree is entirely different (p. 101).
55. Tea consists of the leaves of the tea-plant, dried first in the sun, then in heated pans, and rolled. The color depends chiefly upon the age of the leaves when plucked, and upon their preparation. Materials for coloring the leaves are often used.

56. The plant, which is kept pruned down to the height of about five feet, grows abundantly in China and Japan.
57. It is cultivated to some extent in the mild climates of California and the Gulf States.

58. The plants or shrubs are raised from seed, and are picked from the third to the tenth year.

59. Grapes flourish in countries which have warm or moderately warm climates.

60. The central and southern parts of France and Germany, and nearly all parts of Spain, Portugal, and Italy, are especially noted for their extensive vineyards, and for the great quantities of wine made from the grapes.

61. The vines are mostly kept trimmed down, and not allowed to grow as high as a man's head.

62. Wines have received their names from the places where they are made or shipped from, or where the grapes are cultivated; as, Champagne and Burgundy wines, from ancient provinces in France; Rhine wines, from the river Rhine; port wine, from the city of Oporto (in Portu-
Vineyards—Grapes—Wines.

gal), whence it is shipped; Bordeaux wine (bor-do'), from Bordeaux, the great wine port of France; Madeira wine, from the Madeira Islands, northwest of Africa; Sherry wine, from Jerez, a town in the south of Spain; California wines, from the State of California.

63. In the vintage season, or when the grapes are ripe, men, women, and children go into the vineyards and pluck off the bunches, filling their boxes or baskets, which are emptied into huge tubs. When these are full, they are hauled in carts by oxen to the press-house, where the
juice is pressed out and left to ferment, thus producing wine.

64. Vineyards cover about 700,000 acres of land in France, and the value of the wine produced there sometimes exceeds that of the whole cotton crop of the United States, which is about $200,000,000 annually.

65. Considerable wine is manufactured in the States of California, Ohio, New York, and Missouri.

66. Wine is made also from currants and berries.

67. New vines are raised from cuttings of the previous year's wood.

68. Brandy is made from wine by distilling it, which is done by evaporation and condensation. (See page 18.)

69. Grapes contain considerable sugar (about a fourth is sugar), which, when fermented, produces alcohol.

70. From Spain we get our raisins, which are grapes dried and prepared; and you will be surprised to hear that the currants which you have eaten in cakes and puddings are not the fruit of what we call currant bushes, but really a very small kind of grape which grows in Greece, and is prepared there for shipment to the United States and other countries.

71. Besides grapes, the countries of Southern Europe raise grain and vegetables in abundance; even between the rows of vines you may see wheat, or corn, or beet, or other plants growing. There are also great orchards or groves of mulberry trees, which feed the silk-
worm; of olive trees, from the fruit of which olive or sweet oil is made; and of orange and lemon trees.

72. Orange trees require a warm climate. They are killed by severe frost. In the United States they are cultivated in Florida, Louisiana, Texas, and in the southern part of California.

73. Most of the oranges sold in the United States are from the countries bordering on the Mediterranean Sea, and from the West Indies.

74. In cooler countries, apple trees grow abundantly. Introduced into America by the early settlers of New England, the apple is more extensively used in this country than any other fruit. Large quantities are sent to the cider-mill, pressed between rollers, and their juice converted into cider.

75. Of all the plants, one of the most useful and valuable is cotton. It grows only in temperate and warm climates, especially in our Southern States. Mississippi, and the other States which border on the Gulf of Mexico, yield the most.

76. It grows from seeds, and bears a pod or boll, which bursts open in the autumn from the
pressure of the soft, white, downy substance within, called cotton. This is picked out of the shell or boll, and sent to a mill to be ginned, or separated from the seeds. It is then pressed and packed in bales, and sent to the cotton mills to be spun into thread, then woven into muslin, calico, etc.

77. Large quantities are sent to the cotton mills of Massachusetts, New Hampshire, Rhode Island, and other States.

78. About one-half of the annual crop is sent to Europe, principally to England, where it is manufactured into cloth, then shipped to China, Japan, South America, and other places, and sold or exchanged for tea, silk, fancy articles, coffee, India-rubber, etc.
79. Now, however, the American manufacturers are gaining a market for their goods in each of those places.

80. The Southern States produce about 5,000,000 bales of cotton every year, worth about $200,000,000.

81. Cotton is cultivated also in Egypt, India, and the warm parts of South America.

82. The first cotton mill in the United States was built in Rhode Island.

83. The city which sends away the greatest quantities of cotton every year is New Orleans, and that which receives the most is Liverpool.
84. Besides cotton, there is another plant which is very useful in furnishing us with material for clothing. What is that? *Flax*, from which *linen* is made.

85. Linen is a kind of cloth made from a material obtained from the plant called flax. This grows to the height of two or three feet. It has slender stalks, which are covered with a bark or skin containing fibers or a thread-like substance. Flax grows from seed sown in the spring; it is pulled out by the roots in summer, and after drying, soaking, scutching or beating, and other processes, the fibers are separated from the other portions of the bark, spun into thread, and woven into cloth called linen, cambric, lawn, tablecloths, towels, etc.

86. The seeds of the flax are called linseed. Like those of the cotton plant, they yield a useful oil and a substance which is made into food for cattle.

87. Linen was known to the ancient Egyptians many hundred years ago, who exported it to Greece and Rome.

88. Ireland is celebrated for its fine linen.
89. The cultivation of flax and the manufacture of linen are carried on extensively, also, in Great Britain, Germany, Holland, France, Belgium, Russia, and several States of the Union.

90. The city of Belfast, in Ireland, manufactures more linen goods than any other city in the world.

91. You have learned something about the two plants which are celebrated for furnishing materials for clothing—cotton and linen. There is another plant, or rather a large tree, which yields a very useful substance; not fruit, nor its seeds, nor its bark, nor its roots, but its sap. In that respect it resembles the sugar maple tree, but we cannot eat any part of the tree. We wear articles made from it, yet it cannot be spun or woven like cotton or linen. Do you know what tree it is? The India-rubber tree.

92. India-rubber, or Caoutchouc (pronounced koo-chook'), is the milky sap of that tree. Cuts or gashes are made in the bark, into which cups are inserted for collecting the sap. This is afterwards hardened by heat, the smoke giving it a dark color. It is further hardened by sulphur.

93. Boots, shoes, car-springs, and a great variety of articles are made of it in Connecticut, Massachusetts, New York, and New Jersey.

94. The India-rubber brought to the United States is mostly from Brazil and Central America.
95. There is another tree which is valuable for its sap, called turpentine. This is obtained in a similar manner; when distilled (p. 113), it yields rosin or resin and the oil or spirits of turpentine, both of which are used in the manufacture of varnish, and for other purposes. What is the name of the tree, and where does it grow? *The pine, which grows extensively in the sandy soil of North Carolina and the neighboring States. It grows also in other parts of North America and in Europe.*

96. Some of these trees are cut down and their roots and branches piled up, covered with turf or earth, and set on fire, to make charcoal and tar; the latter is the sap, which runs into a large iron vessel underneath the pile, and is conducted by pipes into casks near by. This constitutes an important occupation in *North Carolina, Canada, and Sweden.*

97. Pitch, which is very useful in ship-building, is made from tar.

98. What is ivory? *A hard, white substance which forms the tusks of the elephant.* There is a kind of tree growing along some of the streams in the northern part of South America which is called the vegetable-ivory tree; its seeds or nuts contain a juice which hardens into a substance resembling ivory.
99. Those trees which yield wood used chiefly in the manufacture of pianos, boxes, furniture, etc., are the mahogany and rosewood, which come from Brazil, Central America, and the West Indies. Some of these trees are sawed into layers about one-eighth of an inch in thickness, called veneer, which is used to cover over cheaper woods.

100. Several thousand dollars have been paid for the logs from a single tree. The forests on the coast of Honduras supply large quantities of mahogany; but the best sorts, called Spanish mahogany, are found in Cuba and St. Domingo.

101. The first use known to have been made of mahogany was about 300 years ago, by Sir Walter Raleigh, who repaired his ships with it, at Trinidad, an island off the coast of Venezuela.

102. Box-wood is a hard, smooth wood used by wood-engravers; it comes from countries bordering the eastern part of the Mediterranean Sea.

103. Ebony is a hard, black wood, used for inlaid and other ornamental work; the tree grows in Madagascar and Ceylon.

104. The date-palm grows abundantly in Persia, Arabia, Asia Minor, Egypt, Tunis, Algeria, Morocco, and in the oases of Sahara, or the Great Desert. Its fruit forms the chief article of food in many parts of these countries. An oasis is a fertile spot in a desert.
105. The banyan tree is remarkable for its way of spreading itself. This is done by its branches, which shoot downward, take root in the ground, and become trunks. It is a native of India.

106. The trees which yield cloves, nutmegs, mace, ginger, cinnamon, and black pepper, grow in Java, Sumatra, Ceylon, the Spice and other islands south and southeast of Asia; some of them grow on the mainland also.


108. Bananas, pineapples, guava, and tamarinds, as well as oranges and lemons, abound in the West Indies.

109. Prunes are plums raised and prepared in France.

110. Cranberries grow on a little running shrub, in low, flat, sandy districts, which may, like rice-fields, be flooded; covering for a while the whole surface with water, and
making the meadows appear like ponds. They are exten-
vively cultivated in the eastern part of New Jersey.

111. We have before mentioned certain plants the use
of which is injurious to health. There are others. In
India, along the Ganges River, thousands and thou-
sands of acres of land are devoted to the cultivation of a
plant, on account of the juice or sap taken from its seed-
vessels; the plant is called the white poppy. The juice is
called opium, and it is extensively used by the Chinese,
who both smoke it and eat it for the peculiar, dreamy, and
quieting, or rather deadening, effect which it produces on
the feelings. Its use is very injurious to both body and
mind.

112. From opium, the drugs called laudanum and
mor'phia or mor'phine are derived. These are often pre-
scribed by physicians to allay pain or to produce sleep.
The opium used in the United States and in Europe is
mostly imported from Turkey in Asia and Persia.

113. There is another plant which yields a substance
called hasheesh or hashish; this also produces stupor and
dreaminess, and is extensively used in Asiatic countries.
The plant is hemp, from the fibres of which, rope, bag-
ging, etc., are made; it is raised chiefly in Russia.

114. Camphor is a substance obtained from the wood
and bark of the camphor trees of China, Japan, For-
mosa, Sumatra, and Borneo.

115. Rhubarb is the root of a plant which grows in
Central Asia, whence it is sent to Turkey and Rus-
sia, and then exported.

116. Castor oil is obtained from the seeds of the castor-
oil plant, which grows in Africa, America, and Europe.
Sap; how obtained and supplied. 123

117. All of you have seen an apple tree, and know the various forms of food into which its fruit can be made; but do you know where and how the tree gets the food which it lives upon? Let us talk about this.

118. The substances which supply it with its food or nourishment are in the ground and the air.

119. The principal substances are called carbon, hydrogen, and oxygen.

120. Many thousands of little mouths in the roots are ever on the alert for these substances, which go to make wood, leaves, and fruit; taking them in with the water in the soil, and sending sap upward to every branch, twig, and leaf.

121. The leaves, too, are at work all day long, breathing in through their countless pores, or mouths, moisture from the atmosphere, and, with the aid of sunlight, changing and preparing the sap. Then the sap returns toward the roots, supplying on its way what is needed for every part of the tree.

122: The roots, trunk, and branches, contain multitudes of little tubes or pipes, through which the sap flows; one set for the rising sap, and another set for the returning sap. The sap
is to a tree what blood is to an animal, and both the sap and blood are always in circulation.

123. Leaves not only inhale (breathe in) moisture, but they also exhale (breathe out) it. Some of the water which has brought up the nourishment to the leaves, being no longer required, is thus exhaled or evaporated through the pores of the leaves.

124. Does the apple tree enlarge on the inside, or outside; by the rising, or the returning sap? *The increase is on the outside of the hard wood, or just along the inner bark, and is supplied by the returning sap.*

125. Every year a layer is added; therefore, when such a tree is sawed across the trunk, the layers will appear like rings and show the age of the tree.

126. In counting the rings, the pith (1) and the bark (4), belonging to the first year's growth, are not to be included.

127. Trees which thus grow by additions to the outside of the hard wood, or externally, are called exogens (*ex'-o-jens*); such include apple, pear, maple, elm, and many other kinds of trees.

128. Trees and plants which increase by internal growth, showing no layers or rings like those
above named, are called _en'-do-gens_, such as palm-trees, Indian corn, _sugar-cane_, wheat, grasses, etc.

129. The newest wood of exogens is just under the bark, while that of endogens is in the center.

130. Endogenous trees and plants just described should not be mistaken for indigenous (_in-dij'-e-nus_), which means those which are native of a certain country or climate.

131. Trees and plants are multiplied in various ways: by seeds, as acorns, grain and cotton-seed; by cuttings, as the grape-vine, sugar-cane, and
126 How Vegetation is extended.

geraniums; by dividing or separating roots, tubers, and bulbs, as the strawberry, potato, dahlia, and hyacinth; and by grafting.

132. Grafting is the insertion of a cutting or bud of one plant into a branch or stem of another. This is often done with rose and fruit trees.

133. Vegetation is extended over the land not only by men, but also by the winds, streams, ocean-currents, birds, bees, etc.

134. Many seeds are provided with a kind of wing or some light substance, and are scattered far and wide by the winds, as those of the ash, elm, and maple trees, the thistle and the dandelion,
135. Plants are divided into two general classes, flowering and flowerless. Flowering plants and trees produce seeds, each containing an embryo or undeveloped plant. Flowerless plants, such as ferns, have spores instead of seeds. These appear like brown dust or spots on the leaves. Try to bring a fern leaf with spores on it to your teacher.

136. The origin or beginning of a plant is a seed, which is a wonderful combination of all the parts of that plant.

137. Placed in the ground, the seed sends down its roots to find food or nourishment and also to hold the plant firmly in its place. Then the stem appears above ground. When the plant is grown and perfect, it consists of these five parts: root, stem or trunk, leaves, flowers, and fruit. You may bring some specimens of seeds, and be prepared to mention the name of the tree or plant to which each belongs.
128 How an Oak grows from an Acorn.

138. At the end of every little root is a kind of mouth; and, as different kinds of plants require different kinds of nourishment, these little roots, which appear like bunches of threads, keep spreading themselves in the ground in search of the particular substances just suited to the plant which it is their duty to supply.

139. So you may consider the roots and their mouths to be the storehouse and food-gatherers; the long, narrow pipes in the stem or trunk, the channels or means of conveyance; and the leaves to be a kind of stomach or manufactory for preparing the food and making it fit for use. That is, all parts of a tree or plant act in harmony with each other for some good purpose.

140. There are different kinds of roots: 1st, those of forest trees, which extend in various directions and sometimes to greater distances than the trunk and its branches; 2d, those which appear like a bunch of threads or fibers, and which are called fibrous, as those of the hyacinth and grasses; 3d, those associated with tubers, like the potato, and which are called fleshy roots; 4th, those which taper downward and send out fibers from their sides, like the carrot and parsnip.
141. Roots are divided also into different kinds, according to their length of life; into annual, or those which live but one year; bi-en'ni-al, those which live but two years; and per-en'ni-al, those which live several years.


Some trees, like the oak, cedar, pine and olive, live for centuries.

143. Trees differ also in their stems or trunks; some grow up for a short distance from the ground and then branch out in every direction, like the apple tree; while others grow up almost in a straight line, ten times as high as any apple tree; such are the mammoth trees of California, the eucalyptus* trees of Australia, and the cocoanut trees of Africa and Asia.

The trees just named are remarkable for the great distance between the ground and their lower branches. The cocoanut and other palms have all their leaves at the top.

* [u-ka-lip'tus.]
144. Trees which lose their leaves in autumn are called de-cid’u-ous, which means falling off. Those which retain their leaves through the winter, or until new leaves appear, are called evergreen. An apple tree is deciduous, and a hemlock is evergreen.

145. Leaves differ from each other very greatly in their size, shape, color, and construction; some have smooth edges, while others have saw-like edges; some are long and narrow, like those of Indian corn and the sugar cane, while others are broad and round, like the cabbage and begonia. Leaves differ from each other also in regard to the number and arrangement of their veins.

146. Veins.—The first leaf above shows its stem or foot-stalk, called its pet’-i-ole (P), from which, at the base of the leaf, spring its veins, five in number.
147. Veinlets.—The next shows small branches from the veins, called veinlets.

148. At the end of some words, let signifies small; as leaflet, a small leaf; islet, a small island; streamlet, a small stream; rootlet, a small root; and veinlet, a small vein.

149. Veinulets, Net-veined.—The third shows finer branches from the veinlets, called veinulets. Such a leaf is said to be net-veined. With few exceptions, the leaves of exogens are net-veined.

150. Mid-veined.—Leaves having but one large vein, which is the continuation of the petiole (P), and runs from the base (b) of the leaf to the apex (a) through the middle, are called mid-veined.

151. Parallel-veined.—The veinlets which branch from the mid-vein are parallel with each other; the leaves are therefore said to be
parallel-veined. The leaves of most endogens are parallel-veined, as those of corn and lilies.

152. Fork-Veined.—Leaves whose veins divide and resemble forks are called fork-veined.

153. Serrate.—Leaves having a saw-like edge, the teeth pointing forwards, are called serrated. *Serra* means *saw*.

154. A Feather-Veined leaf is one in which its veinlets branch off from the mid-vein, thus resembling a feather.

155. A Hand-Shaped leaf is so called from its resemblance to the palm of the hand and fingers.

156. A Finger-Shaped leaf is one whose parts or divisions, called lobes, are more separated from each other than those of the hand-shaped leaf, and appear like fingers without the palm of the hand. When the leaf appears as if cut with scissors, it is said to be *Gashed*.
Leaves—Simple and Compound.

157. A Shield-Formed leaf is one which has its veins radiating from the petiole at or near the center of the leaf instead of its base.

158. Simple Leaves.—The twelve leaves just described are called simple leaves, because only one leaf is attached to each petiole.

159. The Gashed Leaf is but one leaf, cut or divided, and is therefore a simple leaf; such also are the finger-shaped and hand-shaped leaves.

160. Compound Leaves—Trifoliate.—When a petiole bears two or more distinct pieces or blades, the blades are called leaflets, and the group is called a compound leaf. Three leaflets together, or near together, on the same petiole, are called tri-fo'-li-ate (tri, three), as the clover.

161. [The pupils may collect from the woods or gardens as many of these varieties of leaves as they can; then classify them and name their different parts; or describe each leaf as the teacher holds it up; or attach one or more leaves to a piece of paper, write a short description of each, similar to that on the following page, and hand it to the teacher.]
Besides this, the pupils may write about any tree or plant, as a lesson in spelling and composition.

Seeds differ very greatly from each other. Some are inside of the fruit, like those of the apple; some are on the outside, like those of the strawberry; others are together, forming the fruit, like those of the blackberry.

Some seeds furnish us with flour, from which our bread is made, as wheat; or with
meal, as Indian corn; while many others are not used for food in any form.

165. Some seeds are enclosed in a pod, capsule, or case, like those of peas, pansies, violets, and lady-slippers; while others consist of a kernel and hard shell, like the hickory nut.
166. The wonderful way in which the beautiful flowers are increased in numbers and brilliancy by the habits and industry of bees, etc., you will find mentioned in the chapter on Insects.

167. To the pupils: You should observe and examine, when rambling in the woods and fields, some of the various plants, roots, leaves, flowers, fruits and seeds which you see. You will thus be easily led to the study of that delightful science called Botany, to which your attention has been directed in this chapter.

Note.—A new and very interesting work on Botany has been prepared by Professors Wood and Steele, published by A. S. Barnes & Co., from which several illustrations in this chapter have been taken.

Review of Chapter XII.

Mention some of the uses of trees and plants.
Which are the most useful for food? For clothing? For building houses and ships? For furniture?
What States and Countries are celebrated for wheat? Corn? Rice? Are these plants annual, biennial, or perennial?
How is wheat raised? Corn? Rice? To what order of plants do they belong? Grasses. What general name is given to
their seeds or fruit? *Grain or Cereals.* What other plants produce grain? *Rye, oats and barley.* What other very useful plant belongs to the order of grasses? *Sugar-cane.*

Which of these plants require the warmest climate? *Sugar-cane and rice.* What State is celebrated for sugar? Where else is sugar largely produced? *In South America and the West Indies.*

When wheat is ripe, what is done with it? *It is cut, threshed, and ground into flour; then the flour is mixed with water and a little yeast, forming dough; after the dough swells or rises, it is made into loaves, put into the oven and baked.*

Where is rice the principal food of the inhabitants?

When wheat, rye, oats, and barley are threshed, what are their stems or stalks called? *Straw.*

Which is the most useful garden vegetable? *The potato.* Where is it indigenous? How is it cultivated? What useful substance is made from the potato? *Starch.*

Where is the sugar-cane cultivated? How is sugar obtained from it? What is molasses? From what tree is a substance obtained which is manufactured into sugar? From what garden vegetable? How is sugar obtained from the maple tree?

What drinks are made from trees, plants and vines, or their products?


What liquor is made from grain by distillation? *Whiskey.* From the malt of barley or other grain? *Beer.* How is malt obtained? *By steeping the grain, and then drying it.*

What plants yield substances from which people manufacture clothing? How is cotton obtained? How manufactured? What does flax yield? How is linen obtained from flax? What oils are obtained from the seeds of these two plants? What States produce the most cotton? Where else is cotton cultivated? Where is cotton mostly manufactured into goods? *In England and the Northern States, especially New England.*

Are cotton and flax annual or perennial? Is tea an annual or a perennial plant?
What trees are valuable for their sap? India-rubber, sugar-maple, and the pine.

What is made from the sap of the India-rubber tree? Of the sugar-maple tree? Of the pine tree? Where is India-rubber largely produced? Turpentine and tar?

What tree is valuable for medicine obtained from its bark? Where does that tree grow? Mention some other plants which yield medicines. From what tree is bark obtained that is used in tanning leather? Hemlock. Is it a deciduous, or an evergreen tree?

What trees are very valuable for their wood used in making pianos, etc.

Where do mahogany and rosewood trees grow? How are these woods used? Mention some other ornamental woods.


What plant, although yielding no food, drink, clothing, medicine, shelter, or ornament, is used very extensively in nearly every country in the world? Tobacco. Where is it extensively cultivated?

Mention some poison plants. Which produces opium? Where is it mostly cultivated? Mostly used?

Upon what do trees and plants live? Mention the five parts of a tree or plant. What are the duties of the roots? Of the leaves? How does the sap get from the roots to the leaves? Does the sap always move in one direction? Is it the rising or the returning sap which provides the tree with nourishment and causes it to grow? In what part of an apple, a pear or a maple tree is the increase made? Between the hard wood and the bark. How can you ascertain the age of such a tree? Do all trees and plants grow in this way? Mention some which increase on the outside of the hard wood; on the inside. Which are ex’o-gens? En’do-gens?

In what different ways are seeds distributed over the earth? In what ways other than by seeds are some trees and plants increased in number?
WRITTEN REVIEW OF TREES AND PLANTS.

To be written on slates or papers, either at home or in school, as the teacher may direct. Write, in the form shown below, the names of the principal trees and plants from any part of which food, drink, clothing, etc., may be obtained, prepared, or manufactured.

<table>
<thead>
<tr>
<th>NAMES OF TREES AND PLANTS</th>
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Food.

Drink.

Clothing.

Also, those from which are obtained

Sugar, Useful Bark, Useful Sap, Oil, Medicine, Fruit, Poison, Building and Ornamental Wood.
SOUTH AMERICA

CARIBBEAN SEA

NORTH AMERICA

BAHIA

PART OF PANAMA

GULF OF DARIEN

C.GALLINAS

GULF OF URUGUAY

BAY OF PANAMA

VENEZUELA

UNITED STATES

BOGOTA

COLOMBIA

GUYANA

ORTHOVO R.

BRITISH

DUTCH

FRENCH

MT. CHIMBORAZO

quito

MT. SORATA

LA PAZ

BOLIVIA

MT. SORATA

LIMA

ARGENTINA

ANDES MTS.

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ARGENTINA

ANDES MTS.
1. This is a map of South America, which you see has three sides; two of them are washed by the Atlantic Ocean. The other and longest side is washed by the Pacific Ocean. On the extreme north is the Caribbe'an Sea, which is only an enclosed part of the Atlantic Ocean.

2. South America is noticeable for ending in a point (Cape Horn) in the south, and in a narrow neck (Isthmus of Panama) in the north.

3. All along its western coast rise huge mountains, many of which are volcanoes. What is the name of the range?

4. From these mountains flows the largest river in the world. What is its name, and into what does it flow?

5. In what country is the greater part of the Amazon River? What country is furthest south? What three are furthest north? What long, narrow country lies between the Andes Mountains and the Pacific Ocean?

6. You have now mentioned Brazil, Patagonia, the United States of Colombia, Venezuela, Guiana, and Chili—six countries. There are exactly six more; name one—another—another, etc.

Is South America an island, or a peninsula?

7. South America has higher mountains and more volcanoes than North America. It also has more heat, heavier rains, larger rivers, more trees and plants, more birds, insects, monkeys
Its Climate and History.

and snakes. Destructive earthquakes often occur there.

8. The greater part of South America, that lying near the line or circle called the Equator, has hot weather continually. Every day is like a day in summer with us, except among the mountains, where as you ascend you would find the climate colder and colder until you would reach perpetual snow.

9. The Equator is a great circle which is drawn around a globe from east to west. On maps it appears like a straight line. Near it are the hottest parts of the Earth. The southern countries of South America have summer when we have winter; spring, when we have autumn, etc.

10. When Columbus and other white men came to South America they found dark-colored people there too. All were not savage, however, for there were many living in the western part who had kings, princes, governments, magnificent temples, and palaces.

11. The riches of the natives—Peruvians—were coveted by the Spaniards, who, under the lead of Pizarro, made war against them. Pizarro betrayed the Peruvian Inca or King, and took him prisoner. The Inca offered piles of gold for his liberty. Pizarro agreed, took the gold (value over $15,000,000), but cruelly put the Inca to death.

12. Similar cruelties were practised only a few years before by Cortes, also a Spaniard, on the natives of Mexico, whose civilization was similar to that of the Peruvians. These events occurred about 360 years ago.
13. You now see how Spain came to own so much of North and South America—by discovery and conquest. In time, however, the Spanish descendants in Mexico and South America rebelled against Spain, and they have ever since ruled in all those countries; except in Brazil, which belongs to the descendants of Portuguese, and in Guiana, which belongs to the British, Dutch and French. Excepting Guiana and British America, all the countries of the Western Continent are now independent.

14. From Brazil we get nearly all our coffee and India rubber, and in Peru and Chili potatoes were first found. They grow wild there now.

15. Millions of wild cattle roam over the great grassy plains of the Argentine Republic. These animals are caught by means of the lasso; and the leather of which your shoes, boots and book-straps are made is probably made from their skins. (See Chapter XIX.)

16. South America has the largest bird of flight in the world—the Condor—and the largest snake, the Boa Constrictor. Besides these there are the Jag-u-ar' or American Tiger, the Ta'pir, Llama (lah'mah), Monkey, the American Ostrich, Toucan (too'kan), and vast varieties of beautiful birds and insects.

You will learn about all these in Chapters XVIII, XIX and XX.
CHAPTER XIII.

MINING: COAL, IRON, GOLD, SILVER, ETC.

1. To get coal, men must sink a shaft; that is, they must dig a great hole in the ground until they come to where the coal is best and most abundant. The hole or shaft must be large enough for very large buckets full of coal to be raised up from the bottom; and to raise these there must be a steam-engine at the mouth of the shaft. This must have a house built over it to protect the machinery and the workmen, and this is the house that you see in the chart.

2. Down below, at the bottom of the shaft, men are working away with pickaxes and shovels, making passages wherever they find coal. These passages are called galleries. In a coal-miner's life there are many dangers. Sometimes the sides or roof of the gallery fall on him.
and crush him; sometimes the choke-damp (coal-gas, or carbonic acid) comes and chokes him to death; and sometimes the "fire-damp" (explosive gas) comes, and blows him like a bullet along the gallery or up the shaft, and sometimes it is strong enough to blow the mine to pieces, shattering the steam-engine and breaking into little sticks the house that covers it.

3. Sir Humphry Davy, who was once a poor boy, invented a safety-lamp for the miners. He surrounded a common lamp with fine wire gauze; so that the flame could not get through it to set fire to the explosive gas; yet, strange to say, the gas will go through the wire gauze and burn quietly in the lamp, thus helping the miner by giving him light instead of blowing him to pieces.

4. This fire-damp that kills these miners is pretty much the same as the gas that burns so quietly in our houses (being carbureted hydrogen mixed with some olefiant gas). If, when ordinary gas (carbureted hydrogen) has been leaking to a certain extent in a room, any person enters that room with a lighted candle, just such an explosion takes place in that room as at the bottom of a mine. Explosions in mines happen every year in this country, especially in Pennsylvania, also in England and Wales, and many persons have been thus injured.

5. It is curious to get into one of these big coal-buckets and be lowered down to the bottom of the shaft. What seemed from the top to be like little stars or glow-worms moving about below, turn out to be little lamps fast-
ened in front of the miners' caps, so as to give them light and leave both their hands free to hold the pickaxe or the shovel.

6. When the coal has reached the top of the shaft, it is put into small cars that run on a sloping railroad or tramway, such as you can see in the large chart, until it reaches a railroad, along which it is drawn to some place where it is sold for use, or to some place where it can be put into canal-boats, or ships, and go wherever water goes.

7. Many coal-mines are reached from the side of a mountain or hill by way of a kind of tunnel instead of a shaft. Coal is brought from the inside of the mine to the opening, mostly in small cars which are moved by horses or mules and sometimes by the miners themselves.

8. One kind of coal, called first in Lan-
cashire, in England, cannel coal (that is, candle or can’le coal), will burn like pine wood. If you take a splinter of it and hold it in the flame of a candle, it will take fire and continue to burn, giving out a light like a candle. This kind of coal can also be turned in the turning-lathe as wood is turned, and sometimes snuff-boxes are made from it.

9. The gas we burn in our houses is made from coal, which, therefore, not only warms us in winter, but cooks our supper and gives us light to eat it by.

10. Many millions of tons of coal are produced every year. Our steamboats, ocean steamers, locomotives, and steam-engines use up many tons of this black fuel.

11. Coal has been in use in England for nearly six hundred years. In the reign of Edward I. (1272-1307) the use of coal was forbidden because its smoke was said to be injurious to health.

12. In this country what are called coal-fields have an extent of about 300,000 square miles. You must not imagine, however, that all this country looks black with coal. On the contrary, very little of it crops out on the surface, and you may have a very fine farm with all its trees and crops spread out over a valuable coal-mine, so that they may both be worked without interfering with one another.
13. You learned in the previous chapter how necessary leaves are to the life and growth of a tree, and how valuable some kinds are, such as those of the tea and the tobacco plant; but do you see any use in the leaves of the forest after they have withered and fallen in the autumn?

14. If you should dig down in the ground you would see that the soil at the top is black and rich, while deeper down it is light-colored and poor. The blackness and richness of the surface soil is due chiefly to the withered leaves which fell from year to year and went to decay; thus you may trace back the abundance of your bread, through large crops of wheat and rich soil, to dead leaves or dead grass.

15. That is not all: geologists* tell us, among many other wonderful and interesting things, that they have traced the coal which miners dig out of the earth away back to trees, plants, leaves, etc., which had become buried in great masses under the surface of the earth.

16. Just how all these immense beds of coal were made, learned men have not agreed. They appear to have been made in some mysterious manner, long, long ago, from trees, plants, and seeds (especially ferns and mosses), because the

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* Men who have studied the formation of the earth—its rocks, mountains, soils, etc.
remains and impressions of such have been found in them. It is also probable that the water on the earth, the heat inside of the earth, volcanic action, and several successive elevations and depressions of the surface had a good deal to do with the formation of coal.

17. Charcoal is made by covering, almost entirely, a large pile of wood with sod and earth and setting it on fire.
18. Coke bears the same relation to coal that charcoal does to wood. The coal is heated in air-tight iron vessels, from which tubes run into water, so that all the gas may bubble through into another vessel and be drawn thence to light our houses. Thus we contrive to make coke and gas at the same time.

19. The coke we burn in our grates to warm us; and the gas, in our gas-burners to give us light.

20. The annual coal production of the world is about 300,000,000 tons; one-half of which is obtained in Great Britain, one-sixth in the United States, one-sixth in Germany, and nearly all the rest in France, Belgium, and Austria. The deepest mines in the world are in England. They are more than 2,000 feet beneath the surface of the earth. One is over 2,400 feet in depth.

21. There are many things represented in the chart that are made of iron. Mention some of them.

22. Iron is the most useful metal in the world; it is far more useful to us than gold and silver. Iron is very seldom found pure. It is almost always mixed with other substances, and this mixture is called iron ore. To get the iron from this, men build large furnaces of fire-proof brick, and after they have built a very hot fire in the bottom of one of these they put in a quantity of iron ore, then about as much limestone broken up into a convenient size, and then on top of the limestone about as much coal.
23. Thus they keep putting in layers of ore, limestone, and coal until the whole furnace, which is sometimes sixty feet high, is filled up to the top. As the mass sinks down they put on more to keep the furnace always full. The fire burns all through this mass, so that the ore is melted; a part of which mixes with the heated limestone, making what is called slag, and leaving the iron free to run down below. This the iron is sure to do, because it is heavier than all the other things.

24. The fire in the furnace is kept up day and night, and on Sundays as well, because if they were to allow the fire to go out, it would take about a week to get it in order again. But the same men do not work at it all the time; there are two sets or gangs of them, and their time is arranged so that each gang shall have the same amount of night-work. Twice a day they let the melted iron run out of the furnace and conduct it along narrow earthen gutters into hollows or molds of sand or iron, about three feet long and three inches wide as well as deep.

25. These, from their lying side by side like a litter of pigs, are called pig-iron. This is again melted to make anything of cast-iron, and is poured into very smooth earthen molds of the desired shape. All our iron stoves are made of such castings.
26. To make wrought-iron, the pig-iron is melted, and a convenient quantity is lifted out and beaten with hammers continually while hot, and in every direction, until it is sufficiently thus "wrought," which makes it tough and flexible.

27. This is then made into bars or chains or any other shape that is preferred. It is also rolled while hot between rollers with grooves in them so as to make long bars of different shapes and thicknesses for different purposes. Wire also is made from wrought-iron.

28. To make steel, this iron is heated again with charcoal; part of the charcoal goes into the iron and makes it capable of being tempered in the fire, so as to be made very hard and very elastic, taking thus a finer edge when made into tools and ground. It is from this that we get all our knives, hatchets, axes, chisels, gouges, adzes, and other tools. Razors are made from the best and finest steel, and when carefully ground and sharpened have a very fine cutting edge.

29. More iron is obtained in England than in any other country in the world; and in Pennsylvania and Michigan, which furnish about one-half the quantity produced in the United States. (Census 1880.)

30. In Missouri is Iron Mountain, a mass of iron 200 feet high, covering an area of 500 acres.

31. The place most noted for the manufacture of knives is Sheffield, a town in England.
32. The salt-mines in the northern part of Austria are about 1,000 feet in depth and two miles in length. They contain many great rooms, galleries, and passages, all cut out by the miners. There are valuable salt-mines also in Russia, England, Germany, Italy, and Spain.

33. Salt is obtained not only from mines, but also from the water of the ocean, salt springs and wells, which you have already learned in the chapter on springs and wells.
34. Silver-mining is carried on very extensively in the States of Nevada and Colorado, where some men have become immensely rich almost in a single day, owing to the discovery of silver on their land.

35. Many of the mines are far up high mountains and reach to great distances within them.

36. Silver is found also in Utah, Montana, and other Territories of the United States. It was formerly found in large quantities in Mexico, Bolivia, and Peru.

37. It is said that many years ago an Indian hunter in South America, in pulling up a shrub, observed something white and shining clinging to the roots, and that this led to the discovery of a mountain almost filled with silver.
38. Gold, the most precious of all the metals is found not only in deep mines like those of iron, coal, or silver—

39. It has been found in the sands of streams, into which it has been carried from the crumbling rocks by rains, and from which it is obtained by washing. Considerable gold is obtained by directing a powerful stream of water against the rocks by means of a hose, which is supplied from large collections of water on higher ground. This is called hydraulic mining.

40. Pure gold is too soft for general use, therefore it is mixed with silver or copper, which are harder; it is then said to be alloyed, or reduced in purity.

41. For gilding, a portion of gold is hammered out into leaves so thin that several hundred of them together would be no thicker than one of the leaves of your book.

42. California, Nevada, and Australia have long been celebrated for gold.

43. Copper ore is found in several countries and States, especially in the Republic of Chili and in the State of Michigan, along the shores of Lake Superior.
44. Tin ore is obtained principally from the mines of England, Australia, the Malay Peninsula, and two islands, Banca and Billiton, which lie southeast of that peninsula.

45. In Cornwall, the most southwestern county in England, are hundreds of mines of tin and copper, some of which extend far out from the shore and under the bed of the ocean; in these the moaning of the restless waves overhead is always heard, and their roaring while a storm lasts is fearful to listen to.

46. Tin is white and bright, but too soft for ordinary use; therefore, sheets of iron are dipped into melted tin, enough of which adheres to the iron to form a thin white coating. Sheet-iron thus coated is the substance of which tin cups, pans, etc., are made, and with which the roofs of some houses are covered. You see, therefore, that a tin cup is really made of iron.

47. Bronze and bell-metal are made of copper and tin mixed together. Brass is made of copper and zinc mixed together. There are, consequently, no mines or ores of brass or bronze.

48. Zinc is a metal of a bluish gray tint. It is extensively mined in several countries in Europe, and in the states of Wisconsin, Missouri, New Jersey, and Pennsylvania.

49. Lead is mined very extensively in Wisconsin, Illinois, Iowa, and Missouri. It is used in roofing houses, lining tanks, and in making bullets, shot, and water-pipes.

50. Lead pencils are made of a mineral called plumbago, which is not lead, but a kind of coal. Extensive mines of this substance are found in England and Siberia.
REVIEW OF CHAPTER XIII.

What is a mine? *A pit or other opening dug in the earth from which men get coal, iron, or any other minerals.*

Mention some of the different parts of a mine and its works.

Which is the most useful of all the minerals? *Coal.* Mention some of its uses. How is coal taken out of a mine? What are the dangers of coal-mining? How do miners see to work in the dark mines?

Do you know what coal is made of? What is charcoal? What are made from coal?

Where does most of the coal used in the world come from? Where are the deepest coal mines?

Which is the most useful of all metals? *Iron.* Is iron taken out of the mine in a pure state? How is it separated from impurities?

What is pig iron? What is wrought iron? Of what kind of iron are stoves made? Of what kind are iron chains and horse-shoes made?

What is steel? What articles are made of steel? What state is celebrated for its coal and iron? *Pennsylvania.* In what direction is Pennsylvania from your state?

How is salt obtained from the earth? What countries contain valuable salt mines? Does all salt come out of the mines?

What states and territories are celebrated for their silver mines? What two countries in South America have long produced silver?

What is the most valuable of all metals? *Gold.* How is gold obtained? Where? What is gold leaf? Are gold watches, chains and rings usually made of pure gold? Why not? Where is California? Nevada? Australia?

Where are the richest copper mines? What are made of copper? Of brass? Is brass found in the earth as copper, iron, etc., are found? Of what two metals is copper made?

Where are the most extensive tin mines? Point to England, Australia? Malay Peninsula.

What is zinc used for? Where is it obtained? What states contain extensive lead mines? In what direction from your state is Wisconsin? Illinois? Iowa? Missouri?
SPELLING AND WRITING EXERCISES.

Coal-mine, gallery, engine, pickaxe.
grooves, knives, hatchets, razors.
adze, chisel, silver, copper.
machinery, necessary, abundance, mysterious.
charcoal, elevation, depression, mixture.
coke, limestone, furnace, horseshoe.

Write on slates or papers the names of the principal metals, and opposite them the names of the places where they are mostly obtained.

<table>
<thead>
<tr>
<th>Metals</th>
<th>Where Obtained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold</td>
<td></td>
</tr>
<tr>
<td>Silver</td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td></td>
</tr>
<tr>
<td>Lead</td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td></td>
</tr>
<tr>
<td>Zinc</td>
<td></td>
</tr>
<tr>
<td>Tin</td>
<td></td>
</tr>
</tbody>
</table>


Write what you know of Iron, Gold, Silver, Copper, Lead, Brass, Salt.
1. Most of the white people in the world live in Europe.

2. All the white people now in America either came from Europe or are descended from those who came; therefore they speak European languages and are more interested in the people and places of Europe than in those of Asia or Africa. Europe was inhabited by white people many centuries before America was discovered (in 1492).

3. The English language is spoken in the United States and Canada; the Spanish, in Mexico, Central America, and nearly all South America; the Portuguese, in Brazil; and the French, in parts of Canada.

4. You have already learned (on p. 97) that America was for a long time the home only of Indians, or until it was visited and settled by Europeans.

5. The nations of Europe have ever since continued to send ships to every part of the world to promote civilization and to establish trade. There is not a port or harbor in the world that is not visited by an English ship, nor a city, town or village where the English language is not heard.

6. The greatest nations in Europe are the British, the Germans, the French, and the Russians.

7. Europe is celebrated for its learned men, fine churches and schools, large cities, splendid palaces, extensive mines and factories, its kings, queens, princes, and powerful armies.
EXERCISES ON THE MAP.

What Grand Division is east of Europe? *Asia.*
What Grand Division south? *Africa.*

What ocean north of Europe? West? What great sea south? What smaller seas are connected with the Mediterranean Sea? What strait connects the Mediterranean Sea with the Atlantic Ocean? What sea east of Great Britain?

What is the largest country in Europe? What three seas touch Russia? What countries touch or border on Russia?

What countries of Europe form islands? *England, Scotland and Wales form the Island of Great Britain; Ireland is an Island.*

What country in the south is a peninsula? *Italy.* What two countries in the north form a peninsula? *Norway and Sweden.* What smaller country north of the German Empire is mostly a peninsula? *Denmark.* What two countries in the southwestern part of Europe form one peninsula? *Spain and Portugal.*

What two small countries lie between the German Empire and the North Sea? *Holland and Belgium.*

What small, mountainous country in Europe has no seacoast? *Switzerland.*

Which are the warm countries of Europe? *Those which border on the Mediterranean Sea.*

What fruits grow in the open air in those countries? *Oranges, lemons, olives and figs.*

What mountains between France and Spain? Between Switzerland and Italy?

What large river flows into the west side of the Black Sea? Into the Caspian Sea? What bay west of France?
About Great Britain:—Has possessions in Europe, Asia, Africa and America;—Formerly governed this country;—English language;—Extensive commerce;—Coal and iron mines; cotton, woolen and linen mills;—Contains London, the largest and richest city in the world.

About Germany:—People fond of learning and music;—Fine schools and universities; German language;—Beautiful River Rhine;—Old castles (p. 67);—Large vineyards;—Wine;—Linen;—Books;—Toys;—Berlin, a handsome city, about the size of New York.

About France:—Beautiful country;—Celebrated for silk, wine and fancy articles;—Paris the gayest city in the world—twice as large as New York;—Formerly an empire—now a republic;—French language.

About Russia:—Largest country in Europe;—Long, cold winters and deep snow;—Large army;—Empire, ruled by the Czar;—Principal city, St. Petersburg;—Principal crop, wheat;—Language, Russian.

About Holland:—Kingdom;—Ground flat and low;—Many canals and windmills;—Language, Dutch;—Largest city, Amsterdam.

About Spain:—Kingdom;—Spaniards first visited America;—Grapes, wine, oranges;—Music, dancing, and bull-fights;—Language, Spanish;—Largest city, Madrid.

About Italy:—Delightful climate—Beautiful lakes;—Its capital is the celebrated city of Rome, which contains St. Peter's, the most magnificent church in the world;—The Pope resides in Rome;—Fine statuary and paintings;—Silk;—Grapes;—Kingdom;—Language, Italian;—Largest city, Naples.

(The above characteristics may be used for study and drill—also as topics for composition.)
A Volcano and other Mountains.

**CHAPTER XIV.**

**MOUNTAINS, VOLCANOES, ETC.**

1. Here is a volcano, which is a burning mountain. Sometimes volcanoes throw out red-hot stones, sometimes melted stones called lava, sometimes smoke, and sometimes ashes. Most of them are along the Pacific coasts of Asia and South America. There are more than a thousand volcanoes in the world. They are useful in preventing earthquakes; in supplying us with sulphur, with some fine kinds of lava, from which bracelets and breast-pins are made, and with pumice-stone, which is the froth that floats sometimes on streams of lava.
2. In 1783 a volcano in Iceland sent out two streams of lava, one 40 miles long and 7 miles wide, and the other 50 miles long and 15 miles wide. These streams were from 100 to 600 feet deep. In this eruption 11,000 cows, 27,000 horses, and 186,000 sheep perished.

3. In the island of Java is a volcano (Papandayang) which, in 1772, threw out ashes and cinders so as to cover the earth fifty feet deep for a distance of seven miles all around the mountain, thus destroying forty villages and twenty thousand people.

4. Sometimes volcanoes rise from the sea. This happened in 1866, near the Navigators' Islands, in the Pacific. Stones, mud, and dust were thrown up 2,000 feet. Some of the stones going down met others coming up with a terrible crash. For half a mile around the water was in terrible commotion. Heaps of dead fish were washed ashore, and among them some strange monsters, from six to ten feet long, such as the natives had never seen before; while the atmosphere for miles around was heated and filled with smoke, ashes, and sulphurous vapors.

5. North of Sicily are the Lipari (lip'a-re) Islands. On one of these is a volcano named Stromboli (strom'-bo-le), which has given out lava for 2,000 years, and, from its constant light, has been called the light-house of the Mediterranean.

6. The best-known volcano in the world is Vesuvius, which is in Italy, near the city of Naples. This was not known to be a volcano until the year 79, or about eighteen centuries ago, when it suddenly burst forth and sent out such an immense quantity of ashes and cinders as to overwhelm two cities situated near it. These cities were named Herculaneum and
Pompeii (pom-pay'e). Almost all their inhabitants managed to escape. The ashes that fell upon Herculaneum were mixed with steam, so that the moist ashes gradually hardened into stone.

7. Pompeii was covered over with dry ashes so completely that nothing could be seen of it. Thus it remained buried until 1748, when it was accidentally discovered. Excavations were then commenced and have continued to the present day. About one-third of the city has been uncovered, and you can now walk along the streets and look into the houses, and see exactly how people lived in those days.

8. Vesuvius frequently pours out lava, and travelers often stand close by a stream of lava flowing from it, and see smoke issuing from its crater.

9. A story is told of a Roman soldier who was guarding one of the gates of that ancient city at the time it was destroyed. Although the people rushed wildly past him, in their anxiety to escape suffocation and death, he stood at his post, and, unfortunately, having no orders to leave it, he remained and perished. When the great heaps of ashes were carried away from that part of the city nearly seventeen centuries afterwards his skeleton was found on the spot, with his weapons beside it.

10. The ruins include those of dwellings, temples, theatres, statues, fountains, etc.
REVIEW OF CHAPTER XIV.

What is a mountain?  Land raised to a great height.
How high are the highest mountains?  About five miles above the level of the ocean.

- In what part of the world are the highest?  In Asia.
- With what are the tops of the highest mountains always covered?  Snow.
- With what are the sides of nearly all mountains covered?  Trees.
- What mountain in this country is named after our first president?  Mount Washington.
- What is the highest mountain in the United States?  Mount Whitney, in California.
- What great line, range or chain of mountains extends through the western part of the United States?  The Rocky Mountains.
- Mention other celebrated mountains of the world.  The Alps in Europe, and the Andes in South America.
- What is a volcano?  (See page 163.)  What do volcanoes throw out?  Along what coasts are most of the volcanoes?  About how many volcanoes are there in the world?
- Are any volcanoes in the state (or territory) in which you live?
- Are there any mountains?  Which is the most celebrated volcano in the world?  Where is Vesuvius?  How were two cities destroyed by it?  How long did these cities afterward remain completely under the ashes?  What volcano is called the "light-house of the Mediterranean?"  Why?  What volcano in Sicily?  Etna.

SPELLING AND WRITING EXERCISES.

Mountain.  volcano.  lava.  ashes.
earthquake.  sulphur.  Italy.  cinders.
Vesuvius.  centuries.  crater.  escape.

You may write a composition about any mountain which you have seen or read about; telling how it looks, how it is ascended —what may be seen in the ascent—what dangers attend traveling up mountains; or you may write a composition about the eruption of Vesuvius.  Write as much as will fill one page of a copy-book.
CHAPTER XV.

LIGHT-HOUSEES.

1. Light-houses are very necessary in saving ships. When the wind is blowing a ship towards the shore on a dark night, if there were no light-houses the ship would inevitably be destroyed.

2. The United States has many miles of sea-coast along the Atlantic and Pacific Oceans, as well as on the Gulf of Mexico, and also in the great lakes of the north; these lakes are like seas of fresh water.

3. To protect the shipping on all this long line of coast this country supported in 1873 six hundred and twenty light-houses.

4. Light-houses are built of stone, brick, or iron. To look at some of the rocks before a light-house is built on them, you would say that it was impossible to build anything on such a slippery, wave-washed place as that, for sometimes the rock can be seen for a short time only at low tide.
5. The ingenuity and patient thought of man can, however, overcome many difficulties, and one plan after another has been tried, until all obstacles have been overcome.

6. The next time it blows hard on a dark night, especially if the wind blow towards the shore, you can readily imagine every one on board a ship peering eagerly to see the wished-for light. When at length they see it, what joy spreads from stem to stern! The captain takes out his watch, and, after observing a little, says: "It is a revolving light, and it revolves in so many minutes; now I know which light it is, and I know just where we are."

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REVIEW OF CHAPTER XV.

What are light-houses built for? Of what materials are they built? On what are they built? On the coast, usually on capes and islands. If the keeper should neglect the light, what might be the consequence? How does he get up to the light? By means of stairs inside the light-house.

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SPELLING AND WRITING EXERCISE.

Light-house, shipping, slippery, impossible, destroy, patient, ingenuity, protect; obstacle, sea-coast, build, hundred,
CHAPTER XVI.

WINDMILLS.

1. Here is a windmill (pointing to it on the chart). This is a machine by means of which we take hold of the wind, that we cannot see, and make it do work that we can see. Windmills are often used in this country to grind wheat into flour, and corn into meal.

[Diagram of cog-wheels]

Black-board Drawing. Cog-wheels. Draw them by means of chalk and a piece of cord.

2. The large sails of the windmill turn a large shaft with a cog-wheel—that is, a strong iron wheel with teeth, called cogs, all around it. These teeth, or cogs, fit into the cogs of other wheels and make them go around, so that you can change in any way that is necessary the direction of the moving wheels. Thus a very large, round, and flat stone with a hole in the middle is made to turn around above another stone and very close to it.

3. If wheat is poured into the hole in the upper millstone it gets down between the stones,
and there, as this upper millstone turns around, the wheat is ground into flour, which drops out all around the edges of the stone. This flour is sifted, and put into barrels, and then sold to those who wish to make bread, biscuit, cakes, pies, or anything else from it.

4. Sometimes this is done by steam-mills, and one of those here in front may be a steam flouring-mill (see chart.)

5. The earth gives the grain; fire gives its power to the steam-mill, and is used in baking the bread; water must be mixed with the flour to make dough; air must be got into the dough so as to raise it up and make it light; air also helps the windmill to grind the flour; it is, therefore, clear that fire, air, earth, and water all contribute to the making of our bread.

6. In Holland, where the land in some places is lower than the surface of the sea, hundreds of windmills are placed along the dikes for the same purpose. They can also be seen in this country near some large country-seats, where they are used to pump up water, so that it may be had in the highest stories of the houses.

REVIEW OF CHAPTER XVI.

What are the uses of windmills? What moves their wheels? What are made from flour? How is bread made?

SPELLING AND WRITING EXERCISE.

Windmill, machine, barrel.
CHAPTER XVII.

BALLOONS.

1. Here is a balloon. The first balloons were made in 1783, of paper, and were made to rise by heated air coming from chopped straw that was burned in a wire grating below them. This heated air, being lighter than the common air about it, makes the balloon rise up, just as a cork does in water. (Afterwards pure hydrogen gas was used, and then carburetted hydrogen, which is what we use to burn in our houses.)

2. The first man who ever dared to go up in a balloon was a young Frenchman (named De Rozier), who was killed two years after (1785) by the burning of his balloon. Two persons crossed the Straits of Dover in a balloon in that same year. The first woman balloonist (Madame Blanchard), after several ascensions, attempted to set off some
fireworks while rising up from a garden near Paris in 1796. Her balloon caught fire, and she was dashed to pieces.

3. An English a'er-o-naut or balloonist made 1,400 ascensions, crossing the **English Channel** three times and falling into it twice. In the highest strata of air reached by balloons men suffer severely from cold, no matter how hot the day may be on the ground they leave. The breathing becomes difficult, the pulse much quickened, and the throat parched. The highest mountain in the world is 5½ miles high, but in 1862 two Englishmen ascended to the height of 37,000 feet, or 7 miles. Both, however, were nearly killed by the cold.

4. A balloon moves about very easily in the air, so that a very slight change of weight will affect it seriously.

5. Soon after the invention of balloons they were used in war, being held fast by a long rope, while some officers looked down from them to see what was going on in the enemy's camp.

6. In the last war in the United States a balloon corps (**kor**) was organized, and news was telegraphed from these balloons to headquarters.

7. On one occasion General Fitz-John Porter was observing the enemy's lines from a balloon, when the rope broke and he was carried rapidly towards the enemy. Pulling the valve-string, he caused an escape of gas. This admitted enough outside or heavier air, lowered the balloon and brought him into a different current of air, which fortunately took him back to where he started from.

8. When **Paris** was besieged by the Germans in 1870, fifty-four balloons were sent off at different times by the
Post-office Department. These carried millions of letters. Sixty-two were sent off in all during the siege, mostly at night, so as to escape the observation of their enemies, the Germans.

9. In spite of all precautions, several fell within the enemy's lines. One was fired at while crossing the Prussian outposts. Several were carried outside of France. One was swept into Norway, and landed 600 miles north of the city of Christiania. Three were never heard of after they set out, and were most probably lost in the Atlantic Ocean.

10. Some men who wished to get out of the besieged city went in these balloons as passengers. Among these was a member of the Provisional Government, the now famous Gambetta, who, voyaging safely through the air, arrived at the city of Tours, where he joined his colleagues in the government.

**SPELLING AND WRITING EXERCISE.**

<table>
<thead>
<tr>
<th>Balloon</th>
<th>heated</th>
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Why does a balloon rise in the air? What causes it to come down? What about the temperature of the air through which it ascends?
EXERCISES ON THE MAP OF ASIA.

What Ocean north of Asia? South? East?
What two Grand Divisions west and southwest of Asia?
What large country in the northern part of Asia? Siberia.

To what Empire does Siberia belong? To the Russian Empire.
What is the other part of the Russian Empire? Russia in Europe.
What city is the capital of the whole Empire? St. Petersburg.

What are many of its inhabitants? Prisoners sent from Russia in Europe.
Which is the larger, Siberia or the United States? Siberia.
Which of our States has as many inhabitants as the whole of Siberia? Pennsylvania.

What Empire in Asia is about as large as the United States? The Chinese Empire.
How many more inhabitants in the Chinese Empire than in the United States? The Chinese Empire contains ten times as many inhabitants as the United States.

What smaller Empire composed of islands east of the Chinese Empire? Japan.
Which one of our States is a little larger than the whole Empire of Japan? California.
How many inhabitants does Japan contain? As many as the United States, except New York and Pennsylvania.*

What is the color of the inhabitants of Asia? Brown or dark yellow.
What do the Chinese and Japanese send to this and other countries? Tea and silk.
What is the principal food of those people? Rice, which grows there very abundantly.

* Pop. of United States, 40,000,000; of Japan, 33,000,000.
The capital of the Chinese Empire is the largest city in Asia; what is its name? *Pekin, which is larger than New York and Brooklyn combined.*

Which are the most civilized people in Asia? *The Japanese and Chinese.* Which are the most friendly with white people? *The Japanese.*

What is the largest city in Japan? *Tokio, which is nearly as large as Philadelphia.*

Mention some of the countries in the southern part of Asia? In the western part?

What parts of Asia contain extensive deserts? *Arabia, Persia, and the northern part of the Chinese Empire.*

How do merchants or traders cross deserts? *In large companies, called caravans.* What animal is the most useful in crossing deserts? *The Camel.*

How do many people of Western Asia live? *They live in tents, and move from place to place to find pasture for their sheep, goats, horses, and camels.*

North of Hindostan are the highest mountains in the world,—what is their name? *The Himalaya Mountains.*

By what country is Hindostan governed? *England.*


What is the difference in climate between Siberia and the southern countries of Asia? *Siberia is very cold; Hindostan, Arabia and the other countries in the south are very hot.* What animals are found in Siberia? *The Reindeer, Wolf, and White Bear.* In Hindostan? *The Elephant, Tiger, Rhinoceros and Crocodile.*

* The highest peak in Asia is 29,000 feet above the level of the sea; in South America, 23,000 feet; in Africa, 20,000 feet; in North America, 18,000 feet; and in Europe, 15,000 feet.
CHAPTER XVIII.

ABOUT BIRDS.

1. Here is a bird which can rise in the air as high as any balloon, and can steer itself so as to go whither it wishes, which is more than the man in the balloon can do. For this purpose it is contrived with wonderful wisdom. Numberless air-cells are distributed throughout its body, extending even into its bones. These air-cells the bird can fill at pleasure, and thus rise more easily in the air, or it can empty them and make itself heavier, so as to descend more rapidly upon its prey. Its feathers are models of strength and lightness. It is an eagle (see chart).

2. The Eagle is a bird of prey—that is, it procures its food by violence or robbery, seizing not only other birds but also young fawns, raccoons, rabbits, wild turkeys, etc. Its height or
length is about three feet. Some eagles have been known to live more than a hundred years.

3. The Eagle is noted for its great strength and endurance, and it has been accepted as an emblem of the United States, also of Prussia, Austria, and other great nations.

4. Although eagles have been reported to be very fierce, and as having carried off young children, yet they have not always shown as much bravery and courage as some smaller birds.

5. On account of the eagle’s cowardice and tyranny Benjamin Franklin lamented that it should have been selected as the emblem of this country.

6. The young eagles, called eaglets, are driven from their eyrie (a‘re), or nest, by the old ones, so soon as they are able to provide for themselves.

7. The largest bird of flight is the Condor, which has its home in the Andes Mountains. It lives in the highest and loneliest places, and, like the eagle, it is a bird of prey. Two of
them, driven by hunger, do not hesitate to attack a horse, or a bull, or other large animal, which they tear to pieces with their strong, sharp beaks and talons (claws); and when they have killed it they so gorge themselves with its flesh that they are unable to fly. Men who wish to capture them take advantage of this greediness, and leave the dead body of a horse or other animal on the field until the condor has eaten so much as to become helpless. Its height is about four feet.

8. Humboldt, a celebrated German naturalist and traveller, once noticed a condor flying over the summit of Chimborazo (Chim-bo-rah'zo), a mountain in South America more than four miles high. Humboldt made very important explorations in the Old World, also in Mexico, the West Indies, the United States of Colombia, Ecuador, and Peru.

9. The Owl is remarkable for its large, round eyes, feathered ears, and fear of daylight. It flies about and seeks its food in the night-time, de-
10. The **Osprey**, or **Fish-hawk**, is said to be able to carry a fish of its own weight, but the eagle, when he sees the osprey carrying off a fish, pounces upon him, and, forcing him to let go, swoops down with wonderful swiftness, catching the falling fish before it can touch the water.

11. The birds of prey include the eagle, condor, vulture, falcon (*faw'ku*), hawk, and owl. Their characteristics are strength, hooked bill, strong, sharp talons, fierce look, and keen scent.

12. The **Falcon** obtains its prey while it is flying. It is trained to capture other birds. Its home is in Europe and America.

13. Birds vary in size, from the huge condor, that has a body four feet long, and wings which sometimes spread out fourteen feet in width, to the little humming-bird, which is not much larger than a big beetle.

14. The **Humming-bird** is small and very beautiful. It is remarkable for its long bill, which reaches honey and insects inside of flowers, for its feathers of rich green, red, purple, and brown, and for the quick motions of its wings, which cause the humming sound. Like
most other beautiful birds, they are more numerous in Brazil and other warm countries of South America than in the United States. There are about four hundred species of humming-birds.

15. Audubon, the celebrated American ornithologist, in describing the humming-bird, called it the "glittering fragment of the rainbow."

16. There is a bird that knows how to sew, and is therefore called the tailor-bird. He sews leaves together and thus forms his nest. Others take long grass or any other fibrous material, and weave it into a kind of coarse cloth, of which they make their nests.

17. We have one of these weaver-birds in our country. It is called the Baltimore Oriole, a beautiful bird covered with orange and black feathers.

18. This nest, as you see (referring to the drawing on the blackboard), is not only strongly woven together,
but kept from swaying too violently in the wind by cords that brace it in different directions.

19. The Baltimore oriole spends the winter in Mexico, Central America, and the West Indies, and returns north in the spring, flying all day and resting at night. It is known as far north as the New England States, and is sometimes called the "fire-bird," from its color, also "hang bird" and "golden robin."

20. Some birds are good plasterers, and fix their nests with mud or clay very neatly and securely in any favorable place. Some are so skilful as to make them adhere securely to the smooth surface of glass.

21. Our common Chimney-swallow is a very good plasterer.

22. He has, besides, a very curious arrangement in his head. There are two glands or bags in the back part of it, which are filled with liquid glue. After he has made a shelf of mud or clay he makes his nest of tender twigs, interlacing them and joining their ends smoothly together by means of this liquid glue, so that no rough ends may stick out on the inside. After being lined with feathers or any other soft material and securely plastered around on the outside, it is ready for the eggs.

23. Cuvier was one of the greatest naturalists that ever lived. His attention was first called to this study by some of these plasterers. When quite a young man he went one summer to spend his vacation in a little place near the sea. Just outside of his window two swallows had built their nest. One day a strange bird came and took possession of the nest, opposing its sharp beak to the
mother-bird when she came home. She and her mate chattered together for some time, and then flew away.

24. They came back soon, however, with a great many others. They chattered together for a little while, and then flew away again.

25. Presently they all reappeared, flying in a long file, one after the other, each bearing some mud in its claws. They flew close to the nest, where sat the strange bird in impudent security, and, as they passed, each threw the mud he carried directly into the face of the intruder, which was thus killed and buried in the very place of his crime—the nest he had stolen.

26. From that moment Cuvier devoted himself to the study of birds, fishes, insects, quadrupeds, and other animals, and became distinguished for his knowledge of natural history.

27. There are other birds which may be called miners, for they dig holes in the earth and make their nests at the end of these holes.

28. Such are the Sand Martins, which dig in a dry sand-bank horizontal galleries, at the ends of which they have their comfortable nests. They fly about in small flocks, and seem to make very pleasant and sociable little communities.

29. These things show that birds, though their heads are small, must have brains.

30. It is said by some naturalists that the Canary-bird has a larger brain in proportion to the size of its body than any other living creature; however, it is wonderful to see these bright little birds, after only a fortnight's training, act before an audience, fight mimic battles and duels, fire cannons, fall down as if shot, and, feigning death, be carried off by their companions with astonishing composure.
31. The birds trained by the Chinese to catch fish for their masters are called Cormorants.

32. Like the duck, goose, and swan, the cormorant has webbed feet and short legs. He is a very expert diver and swimmer, making use not only of his feet but also of his wings under the water.

33. The Toucan (too'kan) is remarkable for its large orange-red bill, which is more than half as long as its body.

34. The feathers of its back and wings are mostly black, and of its throat, white. It builds in the holes of trees, and feeds on fruits, small birds, reptiles, and insects.

35. Unlike eagles and condors, which live in pairs, the toucans live in flocks.

36. They are numerous in Brazil and other warm parts of South America.

37. The Bird-of-Paradise, from which long, beautiful feathers of brilliant colors—green,
Movements of Birds.

yellow, red, and purple—are obtained for ladies' hats, is a native of the island of Papua (pap'-oo-a), or New Guinea. It is found also on Celebes (sel'e-bees), the Philippine (fil'ip-pin), and other islands southeast of Asia. It is about as large as a pigeon, and feeds on seeds, grasshoppers, etc.

38. Other birds which are remarkable for the length and beauty of their tails are the Lyre-bird of Australia and the Trogan of the Torrid Zone.

39. The rapidity with which birds can move through the air is astonishing. Few persons have any idea of the force expended in the action of flight.

40. Some birds fly so rapidly that the strokes of the wing cannot be counted. The wings of the humming-bird when in motion cannot even be seen.

41. Let any one try to count the strokes of the wing of a pigeon or of the diving sea-fowl, and he will find that it is utterly impossible.
42. Still more astonishing is the wonderful power possessed by some birds of finding their way through the pathless air, with no apparent means of guiding their course. This has been turned to account by man in the case of the Carrier-pigeons, which are used in carrying letters to distant places.

43. When Paris was besieged by the Germans in 1870, a great many letters were carried to and fro by these birds.

44. Their general rate of flight does not usually exceed thirty miles per hour.

45. Some carrier-pigeons were let loose at Scranton, in Pennsylvania, in 1878, and they alighted on the coop of their owner in the city of New York, after flying a distance of one hundred and six miles, in about three hours.

46. Pigeon-hawks must, of course, fly faster than pigeons so as to catch them, and they are sometimes trained for that purpose, so that the letters carried by the carrier-pigeons may come into the possession of those for whom they were not intended.

47. Some birds, on the other hand, cannot fly at all. In this case their bones are as solid as ours. One of these, the Ostrich, is the tallest of living birds, being sometimes eight to ten feet high, and weighing from fifty to one hundred pounds.

48. They furnish us with very beautiful feathers. These are so valuable that men have
caught and tamed the ostriches, and you may now see in South Africa ostrich farms where these birds are reared.

49. There is an ostrich found in South America, but it is smaller than the African ostrich. It is called the Rhea. Its feathers are so much less beautiful that, in place of adorning the heads of our ladies, they are made into feather dusters.

50. During the day the heat of the sun aids in hatching the eggs of the African ostrich, but at night the male bird sits on the nest so as to protect the eggs from all assaults, and if attacked by a wild animal it will kill it by a kick. One of these eggs will weigh from two to three pounds, and is equal to about twenty-four such eggs as you sometimes have for breakfast.

51. The Cassowary of Eastern Asia and the Emu of Australia resemble the ostrich very much, but are not so large. They are very swift runners. The ostrich when pursued runs about thirty miles an hour, and is only captured by Arabs on swift horses after a chase of several hours.

52. Some eagles, hawks, and crows are so cunning as to have found out that a turtle or a clam, no matter how closely shut up, may be opened by being carried up high into the air and then let fall upon a rock.

53. The Mound-birds, that live in Australia, are cunning enough to have found out that fermenting vegetable matter gives out heat enough to hatch eggs; so, after scraping up grass and weeds in their claws, they throw them together so as to make a huge heap or mound,
sometimes seven feet high and twenty feet across. The heat of the interior of this is said to reach sometimes ninety-five degrees.

54. In this mound the birds make holes, in which they deposit their eggs, and leave them there to be hatched out by this internal heat.

55. Our domestic fowls, as well as many other birds, supply us with food. Others supply us with feathers for our pillows; others give us pens to write with. In some places men train hawks to catch other birds for them, and some large hawks are trained to kill even gazelles and small deer.

56. Birds also give men much amusement by the various tricks they are taught. Parrots and some other birds can be taught to pronounce words, and can be made to repeat whole sentences so naturally as to startle and surprise those people who hear them.

57. Birds are very useful to us, not only for food and their beautiful feathers, but also for destroying insects which would do great damage to trees and plants. They also devour snakes, lizards, etc.

58. The SERPENT BIRD of Africa will attack a large snake, making use of one of his strong wings as a shield and of the other as a weapon, with which he inflicts blow after blow until the reptile is overcome.
59. The Woodpecker appears to have a hard life when compared with that of birds which easily find their food on the ground, in the water, or among the leaves of the trees; for the worms and insects upon which he lives are hidden away in the trunks of trees. To get them he must tear away the bark and perhaps bore or drill deep holes in the hard wood. This he does with his long, strong bill, much faster than any of you could do it with a sharp knife.

60. The Woodpecker runs up and around the trunk of a tree, tapping with his bill as he goes, and when he hears a hollow sound, he knows a worm is there.

61. Some Woodpeckers also bore large holes in trees in which to build their nests.

62. The Pelican is remarkable for the great pouch or sack which is under its long bill and
The Heron.

which serves as a kind of scoop-net. This pouch will hold fish sufficient for the dinner of six men.

63. Pelicans are expert fishers. A number of them will surround a shoal of fishes and, gradually swimming closer together, drive them into shallow water, where they devour them in large quantities. Having webbed feet, they are excellent swimmers.

64. They feed their young with food which they had swallowed, and which they have the power of raising to their bills.

65. Pelicans are found in Florida, California and other parts of North America; also in Asia, Africa and Southeastern Europe. Some are white, and others brown.

66. Another excellent fisher is the Heron. It is remarkable for its long, curved neck, long bill, and long, straight legs, which are admirably adapted to its mode of life. Its feet are not webbed and, consequently, it is not a swimmer.

67. Its home is near swamps. Its food consists of fish, frogs, etc., which it catches by watching in dark, lonely spots. In this respect it differs from the Pelican, Gull, Petrel and Ibis, which are very active.
68. Another very tall bird similar in shape to the Heron is the Red Flamingo. It is a swimmer and wader. With its webbed feet it digs in the mud for worms, insects, and small fishes.

69. It is found in the marshes, lakes, and rivers of Asia, Africa, and the warm parts of Europe. It is about as tall as a man.

70. The White Stork is also a long-legged wader. It is noted for its intelligence and is very observing, readily judging of the feelings entertained toward it by the people on whose house-tops or chimney-tops it wishes to build its great, rough nest.

71. In Holland and Germany, which Storks visit every year, some of these birds become very tame and play with the children in the streets. Their feet are not webbed. Are Storks swimmers? You will observe that all birds which have webbed feet are good swimmers, but very clumsy walkers, as the Goose, Swan and Duck.

72. When the time arrives for Storks to leave their nests and migrate, they have been known to kill their sick; but, on the other hand, they are generally kind to each other, and the young have been noticed to watch anxiously over the aged and helpless of their kind, bringing them food and otherwise tenderly caring for them.

73. The Stork passes the winter in Egypt, where, like the Vulture, another large bird, it feeds on garbage, carrion and other such substances, thus preventing the spread of disease among the people who are too indolent to cleanse their streets. It is about as tall as a boy nine years of age—four feet.
74. The Crane is another long-necked, long-legged bird, very active, graceful, and intelligent. Like the Stork, it spends its winters in Egypt and other warm countries and its summers further north. Its food is fish, frogs, and vegetables.

75. The Swan, which has a long neck and short legs, is considered the most graceful of swimmers. Both father and mother carry their young on their backs and shelter them under their wings; and, should the safety of their brood be threatened, they do not hesitate to attack man, horse, fox, dog, or any other aggressor.

76. Swans belong to Europe, Asia and North America; their food consists chiefly of the roots and bulbs of water plants. It is said that some Swans live as long as an Elephant—one hundred years.

77. The Kingfisher, like the Gull, pounces upon its prey at the surface of the water; but unlike it, it sits alone on a branch which overhangs the water, while the Gull and the Stormy Petrel skim rapidly and almost unceasingly over the water in search of their food.
78. The *Snipe*, a much smaller bird than the Heron, has long legs and a long, slender bill, which are admirably adapted to procuring its food—insects and worms on coasts and marshes.

79. The Snipe belongs chiefly to North America and Europe. Included in this family are the *Woodcock* and *Plover*, which are highly prized by sportsmen. The *Penguin* of the Antarctic Regions, and the *Puffin* and *Auk* of the Arctic Regions sit upright when on shore.

80. The *Quail* has a short bill and feeds on grain, seeds, berries and insects, which it finds on the ground. It flies low and only when startled lights upon trees.

81. Quails pass the night on the ground, all huddled together in a circle, with their heads outward, the better to listen and fly if danger approaches.

82. Similar to the Quail are the Partridge, Pheasant, and Grouse; indeed, these names are sometimes applied indiscriminately to the same kind of bird.
REVIEW OF CHAPTER XVIII.

By what means does a bird rise in the air? Its wings and air cells. Where do birds obtain their food? In the air, on the ground, or in the water. Of what does their food chiefly consist? Seeds, fruits, insects, fish, and animal flesh.

What is a Bird of Prey? What bird is the emblem of this and some other countries? The Eagle. What is its size? How long do some Eagles live? What is a young Eagle? Eaglet. What can you say of the Eagle's strength? Of its bravery?

Which is the largest bird? The Ostrich.

Which is the largest bird that flies? The Condor. On what mountains do Condors live? The Andes. In what kind of places? What do they eat? How are they captured?

Which is the smallest bird? What does the Humming Bird eat?

Mention three celebrated naturalists? Cuvier (French), Humboldt (German), and Audubon (American).

How did Audubon describe the beauty of the Humming Bird?

What bird seeks its food at night? The Owl. What does the Owl eat? Birds, mice, rabbits, etc. In what kind of places does the Owl have its nest? In caves, walls, etc.

What kind of bills do Birds of Prey have? Hooked bills.

What large birds while flying catch fish for food? Fish Hawk and Gull. Name some birds which catch fish while wading or standing in the water. The Heron and Crane. What bird stands on the branch of a tree and watches for fish? The Kingfisher. Mention some birds which, while swimming or diving, catch fish. The Pelican and Cormorant. What bird catches fish for his master?


From what two birds are obtained long and beautiful feathers, worn by ladies? The Ostrich and the Bird of Paradise.
Review of Birds.

Where is the Ostrich found? The Bird of Paradise?

What large bird in South America is similar to the Ostrich? *The Rhea.*

What bird in Australia is similar to the Ostrich? *The Emu.*

What bird in Asia is similar to the Ostrich? *The Cassowary.*

How do these four birds move from place to place? *By walking and running.* How are Ostrich eggs hatched? How does an Ostrich try to escape? How does an Ostrich sometimes defend itself?

What birds are sometimes used as letter-carriers?

How are young birds usually hatched from the egg? *By the heat of the old bird which covers or sits upon the eggs.*

How are Mound Birds of Australia hatched? *By the heat of the mound or of the sand in which the eggs are laid.*

In what other way are eggs hatched without the aid of the old birds? *By placing the eggs in hot ovens.*

What reptiles lay their eggs in the sand, as Mound Birds do, to be hatched out by the sun’s heat? *Turtles.*

Mention some of the uses of birds. What birds are useful to us for their flesh? For their feathers? For their eggs?

What bird finds its food in the trunks of trees? *The Woodpecker.* How does it get the insects on which it feeds? How does it find the spot where the insect is?

What bird is remarkable for its great sack or pouch under its bill? For what does it use this sack? How do Pelicans catch fish? How do they feed their young? What kind of feet has the Pelican? What other birds have webbed feet?

What kind of a bird is the Heron? How does it catch fish? In what kind of places? What beautiful red bird resembles the Heron? *The Flamingo.* Where is the Flamingo found? *In Asia, Africa and Southern Europe.* What does it eat?

What large white bird resembles the Heron? *The White Stork.* Does the Stork always stay in one place? Where does it spend the winter? The summer? How does it build its nest? Is it an intelligent and observing bird? How do you know? Is it fond of children? How do you know? Is the young Stork fond of its parents and grandparents? How does it show its fondness
Review of Birds.

for them? What good is done to the people of Egypt by the Stork and Vulture? Which is the most graceful swimming-bird? The Swan. Where do they belong? What do they eat? How do they carry and protect their young?

What birds live on insects and worms found on the coasts and marshes? The Snipe.

What birds of the Arctic Regions swim, catch fish, and when on shore sit in an upright position? The Auk and Puffin.

What similar bird is found in great numbers in the Antarctic Regions? The Penguin. How are they captured? By clubs. Can these birds fly? They cannot.

What bird spends its time on the dry ground? The Quail. How does a family or a bevy of Quails spend the night? Do they fly upon trees? When? What do Quails eat?

From what places do birds migrate in the autumn? Those which have very cold winters. How far south do birds of our Northern States and Canada go? To our Southern States, Mexico, West Indies, Central and South America. When do they return? In the Spring. Do all birds migrate at the same time and in the same manner? They do not; some fly very high and seldom touch the ground; some both fly and swim; some go from forest to forest and from tree to tree; others walk all the way.

Where do birds of Northern Europe and Asia spend their winters? In Southern Europe, Southern Asia, and in Africa.

(It is said that small, feeble birds cross the Mediterranean Sea on the backs of Storks and other large birds.)

In what direction do birds of the southern or cold parts of South America and Australia fly to find warm countries? North.

How do singing birds of the forest usually pass the day? Rising before the sun, they sing their morning song; then breakfast; drink; bathe (either in water or dust or snow); rest; arrange feathers; fly about; assemble on accustomed perches; then sing their evening song.

Where are birds in the greatest variety and numbers? In the Torrid Zone.


Why do they leave in the fall? Partly because of the disappearance of seeds, fruits, and insects which formed their food. (There are other reasons which are too mysterious for man to find out.)
SPELLING AND WRITING EXERCISE.

BIRDS OF PREY—FLESH-EATERS—WITH HOOKED BILL AND SHARP TALONS:

Condor, Eagle, Vulture, Hawk, Owl.

CLIMBERS:

Parrot, Cockatoo, Woodpecker, Toucan.

RUNNERS (WINGS NOT ADAPTED TO FLYING):

Ostrich, Emu, Cassowary.

WADERS (LONG LEGS, NECK, AND BILL):

Heron, (F.*), Stork, (M.), Crane, (F.M.).

Ibis, (M.), Flamingo, (F.), Snipe, (M.).

SWIMMERS (WEB-FOOTED):

Goose, Duck, Swan, (M.), Flamingo, (F.M.).

Sull, (F.), Cormorant, (F.), Pelican, (F.), Stormy Petrel, (F.), Penguin, (F.), Auk, (F.), Albatross, (F.),

Puffin, (F.).

* Those marked (F.) are Fishers; (M.) Migratory or Birds of Passage.
Comparative Size of Birds; to be Drawn on the Blackboard, Slates or Papers.

All the Birds on this diagram are drawn according to a scale of feet shown on the margin, and may, therefore, be accurately measured and compared with each other in size and shape.

To measure or draw them, first mark the scale of feet on a slip of paper or card-board and apply it to the birds in the diagram. For example, the height of the Ostrich is about nine feet; of the Condor, four feet; and of the Eagle, three feet.

This scale may be used by the pupils in drawing the Birds on their slates or papers.

A larger size for the blackboard may be drawn simply by making another scale—one inch to a foot will be found convenient; so that the proper proportions will be preserved.

Where there is sufficient space on the blackboard, slates, or papers, the birds may be drawn separately and on the same level.

To make comparisons still more easy and impressive, a boy nine years of age or four feet in height is represented on the diagram.

Exercises on Comparative Size of Birds.

Which is the tallest and largest bird?
What is the height of the Ostrich? About nine feet.
How tall is a Man? About six feet. (These heights and lengths should be shown on the wall of the class-room.)
What is the length of the legs of the Ostrich? Of his neck? Of the Pelican’s bill?
How tall are you?
What bird is nearest to you in height?
What is the height of the Eagle? Of the Condor? Of the Cassowary? Of the Pelican? Of the Bird of Paradise? What is the length of its tail?
What four very large birds are about the same size? How tall is the Heron? The Penguin?
What is the length of the Owl? The Cormorant.

Names of Birds According to the Numbers.

2. Toucan. 11. Heron. 20. Stork.
6. Crow. 15. Swan. 24. Baltimore Ori-
9. Wild Duck. 18. Eagle. 27. A Boy 9 years
EXERCISES ON THE MAP OF AFRICA.

By what two oceans and two seas is Africa almost surrounded?

Into what ocean does the Mediterranean Sea open? Into what ocean does the Red Sea open? What isthmus between these two seas? By what canal is that isthmus now crossed? The Suez Canal. What two seas are connected by this canal?

For what is Africa remarkable? For its hot climate, its Great Desert, its tribes of savage inhabitants, and its great numbers of wild animals.

What can you say of the size of the Great Desert? It is nearly as large as the United States.

What part of Africa is the home of the Negro? Soudan and the region south of it. In what part is Soudan?

Of what color are the inhabitants of Northern Africa? Dark, but not black.


What country in the northeastern corner of Africa? Egypt. For what is Egypt remarkable? Having no rain, it would be a desert, but for the Nile River. How does the Nile prevent Egypt from becoming a desert? It rises very high every year, and its water spreads all over the people's farms and gardens. Why is the Sahara or Great Desert dry and barren? Because it has no rain.

What is that spot or portion of a desert called which contains springs, grass, and trees? An Oasis. Where does that water come from which forms those springs? From land beyond the Desert; the water runs underground for long distances.
What people of Africa were very rich and learned long before any of the inhabitants of Europe became civilized? The Egyptians. Mention the names of some celebrated men of ancient Egypt. Joseph, Moses, and the Pharaohs or kings of Egypt.

What cause the Nile to rise? Heavy rains in Abyssinia and the region south of it. What large lakes in the central part of Africa?


What three countries border on the Red Sea? What countries west of Soudan? What countries of Africa are furthest south? What two capes in the southern part of Africa? What large island southeast of Africa? What groups of islands northwest of Africa? What Birds come from one of those groups? What great general was banished to the Island of St. Helena and died there? Napoleon Bonaparte I. Where is that island?

Mention two celebrated explorers of Central Africa. Livingstone and Stanley.


What valuable article do we get from the Elephants of Africa? Ivory.

What grows extensively in Abyssinia? Coffee.

What large bird in Africa? The Ostrich. For what are they useful? Where are they raised in large numbers? (Page 187.)

In what parts of Africa do some white people live? On the northern, western, and south coasts.

Where do the savage and warlike Kaffirs and Zulus live? In the south.
Catching Cattle with the Lasso.

CHAPTER XIX.
ABOUT QUADRUPEDS.

1. Here is a herdsman riding rapidly after a herd of CATTLE and throwing a lasso (see chart). This is a rope about half an inch thick, made of strips of leather, and about thirty feet long, with a slip-noose at one end that runs very easily. The other end of the rope is fastened securely to the front of the saddle.

2. These men are so skillful in throwing the lasso that they can catch a bull by any one of his legs or by either horn. The horse is trained
to stand still as soon as the lasso is thrown, with his fore feet well braced to meet the shock. Sometimes a bull thus caught by the horns in full career turns a complete somerset, and, falling heavily on his back, is so thoroughly jarred that he is disposed to be very submissive, and trots on quietly with the herd.

3. Millions of cattle feed on the vast grassy plains of Texas, Mexico, and South America. Their value lies chiefly in their flesh, which is called beef; their hides, which are manufactured into leather; and their tallow, which is used in making soap and candles.

4. Cattle are numerous also in Russia, India, and our Western States and Territories.

What does the cow give us? What is made from milk? What is the flesh of calves called? Veal.

5. Leather is made from the hides and skins of cattle, horses, goats, sheep, deer, and buffalo. Its manufacture is one of the most important industries in the United States and England.

6. Here is a herd of Buffaloes, which are more properly called bisons. Indians are pursuing them. They are killed with guns, arrows, and spears (see chart). Their flesh is used for food.

7. An Indian has been known to send an arrow with such force that its head has gone entirely through the body of a buffalo. The dressed skin of the buffalo is called a buffalo robe, and many of them are used in this country in winter, when people go in sleighs over the snow.
8. The Indians use buffalo skins for clothing and for tents, as well as for making a peculiar kind of shoe called a moc'casin.

9. Buffaloes were formerly found as far east as the State of New York, but now none are found east of the Mississippi River, and they are constantly diminishing in numbers.

10. The American Buffalo, or Bison, is also hunted by wolves. These join in a pack and try to cut off one of the buffaloes from the herd.

11. The true buffalo has long horns, and resembles a cow. The buffalo, zebu, and yak, when tamed, work like the ox, or give milk like the cow.
12. The **Yak** is larger than common cattle. It has a bushy tail and long hair, from which tents and ropes are made. It is found in Thibet (*tib'et*) and other parts of Central Asia, both in the wild and the domestic state.

13. The **Zebu** resembles an ox, except that it has a large hump on its back over its shoulders. Some are wild and some are domesticated in Asia, Africa and the islands of the Indian Ocean. Hindoos consider the Zebu sacred.

14. The true **Buffaloes** inhabit Asia and Africa, where they run in herds and are fierce and strong. One is able to kill an elephant.

15. The **Gnu** of South Africa has a body like that of a horse, and a head and horns like those of an ox.

16. Of all animals the **Dog** shows the greatest affection for his master, whose smile, or frown.
or word, gives either pleasure or pain to this faithful companion of man.

17. He is ever ready to risk his life for his master; and so constant is he, that when death has entered his master's home, this devoted creature has been known to grieve his life away on the newly made grave.

18. Especially useful and intelligent are the shepherd's dog, the Newfoundland dog, St. Bernard dog, the fleet greyhound, the keen-scented hunting dog, the courageous bull-dog, and the rat-killing terrier.

19. Animals of the dog kind include the Wolf, which lives in a wild, savage state, and is always in search of plunder; the Fox, which is noted for its cunning, sly, and thieving disposition; and the Jackal, of Asia and Africa, which, like the wolf, hunts in bands or packs.

20. There is an interesting animal found upon the prairies, called the Prairie Dog. These little animals burrow in the ground like rabbits, and live in communities so numerous that their "dog town," as it is called, sometimes extends for miles.

21. Another very common animal is the Cat. Of this.
kind are the Wild Cat, Lion, Tiger, Leopard, Jag'uar, Puma, and Lynx.

22. The Lion is called the "king of beasts," lives in Asia and Africa, and is noted for its powerful claws and great courage; the Tiger inhabits the jungle-grass of Southern Asia, has a striped body and a fierce disposition, and does not hesitate to attack even the elephant or man; the Leopard of Asia and Africa resembles the Tiger, except that its beautiful and valuable skin is spotted; the Jag'uar or South American Tiger is spotted like the Leopard, and is strong enough to carry off a horse; the Puma is called the American lion; the Lynx resembles the cat.

23. Animals of the dog and the cat kind are eaters of flesh, and are therefore called carnivorous. Animals which are tame and live in or near people's houses, are domestic animals; others are wild.


24. The animal which most resembles man is the Gorilla. Its head and arms are longer than those of a man. Its mouth is very projecting. Some Gorillas are nearly as tall as a man, but they are usually seen in a bent or crouching posture. The coarse hair which covers them is either gray or blackish. A full grown Gorilla is savage and powerful, being feared even by the lion. When about to attack an enemy, he stands up,
beats his breast, and gives a loud and terrific roar. His food is vegetables, sugar-cane, berries, and fruits.

25. The Chimpanzee, the Baboon, Ape and Orang-outang are smaller than the Gorilla. The Gorilla and Chimpanzee have both been called "wild men of the woods."

26. The common Monkey has a flat face and long tail; it is a great mimic, quite ingenious and very mischievous. There are many varieties of monkeys. Some seem to be constantly chattering, crying, jumping and swinging, while others are grave and silent. In some parts of India a light-colored monkey is considered sacred by the natives.

27. Monkeys in South America have a curious way of crossing a stream. One holds on to a limb of a tree, and to him a long line of monkeys will fasten themselves by means of their arms and tails. When the line is long enough, they will swing themselves until the one at the other end of the line will swing across to a tree on the opposite bank, and take hold of it; then the first monkey lets go, and all swing across.

28. The Gorilla and Chimpanzee are found in the forests of Western Africa; the Monkeys, Apes, etc., in the warm parts of Asia, Africa, South America, and on the islands southeast of Asia.

29. The celebrated traveler Du Chaillu tells some very interesting stories about Gorillas, which he was the first to capture.
30. Here is one: "One day, I remember well, we were out for Gorillas, which we knew were to be found thereabouts by the presence of a certain kind of fruit of which the animal is fond.

"We beat the bush for two hours, when suddenly an immense Gorilla advanced out of the wood straight toward us, and gave vent, as he came up, to a terrible howl of rage, as much as to say, 'I am tired of being pursued, and will face you.'

"It was a lone male, the kind which is always most ferocious. This fellow made the woods resound with his roar, which is really an awful sound, resembling very much the rolling and muttering of distant thunder.

"He was about twenty yards or steps off when we first saw him. We at once gathered together, and stood in silence, gun in hand.

"The Gorilla looked at us for a minute or so out of his evil grey eyes, then beat his breast with his gigantic arms—and what arms he had!—then he gave another howl of defiance, and advanced upon us. How horrible he looked! I shall never forget it.

"Again he stopped, not more than fifteen steps or paces away. Again he advanced. Now he was not twelve yards off. I could see plainly his ferocious face. It was distorted with rage; his huge teeth ground against each other, so that we could hear the sound; the skin of his forehead was drawn forward and back rapidly, which made his hair move up and down, and gave a hideous expression to his face. Once more he gave out a roar which seemed to shake the woods like thunder. Looking us in the eyes and beating his broad breast, he advanced again.

"'Don't fire too soon,' said one of my hunters; 'if you do not kill him, he will kill you.' As the Gorilla came up,
'Now!' shouted the hunter, and before the Gorilla could utter the roar for which he was opening his mouth, three musket balls were in his body. He fell dead almost without a struggle.

"He was a monstrous beast, indeed, although not among the tallest. His height was five feet six inches. His arms had a spread of over seven feet. His chest measured fifty inches around. His arms seemed like immense bunches of muscles only; and his legs and claw-like feet were well fitted for grabbing, climbing and holding.

"The face of this Gorilla was intensely black. His body was covered with gray hair, except his chest, which was bare. While the animal approached us in his fierce way, walking on his hind legs and facing us, it really seemed to me to be a horrible likeness of a man."

31. The Elephant is the largest, strongest, and heaviest quadruped, or four-footed animal. His body is covered with a very thick hide, without hair. His legs are thick and clumsy.

32. He has a long trunk or nose, called a proboscis (*pro-bos'sis*), which can lift a large or a small object, even as small as a pin.

33. His trunk is very powerful. It is his means of defence and offence; with it this enormous creature conveys food and water to his mouth, which is just under it and at its base. He also draws water into his trunk, to wash himself with, which he does by blowing it out all over him.
34. His two long tusks of ivory project from the sides of his mouth; with these he digs in the ground for the roots and vegetables which constitute his principal food. He is also fond of sugar-cane.

35. The Elephant is brave and affectionate; he is also either grateful or revengeful, according as he is treated. He is fond of music. In India he has been taught to hunt the tiger, fight in battles, dance and perform tricks even on a tight-rope. Some elephants live to be one hundred years old.
36. Another very large animal, one that is much longer than the elephant, but not so high, is the HIP-PO-POT’A-MUS.

37. These animals are quite gentle, except when hungry; but if you could see their huge jaws open a distance of two feet in width, showing teeth a foot in length, you would be horrified, especially when you would see the immense quantities of vegetable food they require.

38. The warm waters of the Nile and other rivers of Africa are much frequented by them; and because they are able to live either on the land or in the water, they are said to be am-phil’i-ous.

39. The RHI-NOC’E-ROS is, like the hippopotamus, a very large, slow, stupid, amphibious animal. It is distinguished by its short, thick legs, heavy body, and large, curved horn at the end of its snout. Its hide is so hard, thick and folded that swords, spears, bullets, and the claws of the lion or the tiger have little or no effect. It is found in Africa, Asia, Java and Sumatra. The weight of a large
rhinoceros is about three tons; of an elephant, five tons.

40. The Beaver, also an amphibious animal, is remarkable for its activity, industry, and the wonderful instinct it possesses for building its house.

41. You cannot imagine how this is done. They commence by cutting or rather gnawing down trees, their only instrument being their teeth. They cut in such a way that the trees shall fall precisely where they want them. They next float them to the spot where they intend to fix their dwelling, and construct a dam. They always select trees which are up stream, so that the logs may be floated down by the current.

42. After the dam is completed, which is the common property of the beavers, they form into small societies and build their private residences! They make them very strong, by a sort of mortar or mud, which they know well how to mix. They are therefore masons and carpenters at the same time. This work is all done at night.

43. The beavers store bark for food in these houses, each apartment having its own storehouse. If danger comes to them, they sound the alarm with their tail, giving one to four blows.

44. The beaver inhabits northern Asia and America. It lives on the bank of a stream, has webbed hind feet, and is an excellent swimmer and diver. It is a little larger than a cat.

45. The fur of the beaver is very valuable.

46. The Muskrat is something like the beaver in its size, form, habits and disposition,
for both animals live in companies in the winter, build houses for their families, and are hunted for their fur.

47. The muskrat does not, however, lay up stores for the winter like the beaver, but simply makes a way under the snow by which it may go in and out for water and the roots upon which it feeds.

48. There is a very small animal, the size of a big, fat mouse, which burrows and lives in the ground all the time. It is the Ground Mole.

49. Unlike the beaver and the muskrat, it keeps always just under the surface of the ground: and, although it annoys farmers by raising long ridges in their fields and gardens, it does more good than harm in eating up worms and insects.

50. There is another very industrious little animal, which is like the beaver in laying up food for the coming winter, in the shape of nuts and acorns. Do any of you know its name? Yes, it is the Squirrel. It makes a funny appearance as it eats, using its paws for hands, and sitting up as you do at the dinner-table.

51. Squirrels are found in almost every country in the world; and sometimes they will migrate by thousands. (Migrate means to seek a new home).

52. It is said that neither rocks nor rivers nor forests nor mountains will stop them; and that if they find a river too wide for them to cross, they will go back into the forest and provide themselves each with a piece of bark,
and then they put out to sea, making their tails serve as sail and rudder.

53. It often happens, however, that they have ventured too far, and cannot contend against the waves, and therefore never reach the other side. The Laplanders watch for these misfortunes and seize them as a prize, not only because they can sell their skins, but for their flesh, which is good for food.

54. The **Flying Squirrel** is provided with a strip of skin which it spreads out to enable it to sail or glide easily from a high to a low place among the trees. It cannot use this wing-like skin as birds do. It seldom ventures out till after sunset.

Besides the beaver, muskrat and squirrel, can you mention some other and better known little animals which are remarkable for gnawing? **Rats and mice.**

55. The **Porcupine** which is about eighteen or twenty inches in length, also prefers the night for its movements.
Blackboard Drawing: Porcupine, 20 inches long; Flying Squirrel, 15 inches long.

It is very active in searching for food, which consists of roots, fruit and bark. It is remarkable for being covered with sharp, strong quills, which it has the power of straightening out in all directions, when attacked, thus causing great damage to the mouth of any animal bold enough to take hold of it.

56. The Camel is the best fitted of all animals for traveling in desert places, because, first, it can take a week’s supply of water in a peculiar arrangement of cells connected with the stomach, which can be supplied from them when the animal is thirsty; secondly, it can live on the scanty herbage of the desert; thirdly, under each foot is a large cushion-shaped substance to prevent it from sinking in the sand.

57. The camel has been called the “ship of the desert.” On the approach of a sand-storm in the desert, when clouds of fine sand are whirled about by high winds, the camel displays great sagacity in burying his nose in the sand to avoid suffocation. Its flesh and milk are used for
food, its skin for making leather, and its hair for making clothing; therefore the camel is to the Arabs what the seal is to the Esquimaux, and the reindeer to the Laplanders—their chief wealth.

58. Some camels have one hump (the Dromedary or Arabian Camel), and others two (the Bactrian Camel of China and Central Asia). The former is the one chiefly used in Africa. The latter is larger and is used more as a beast of burden in Asia.

59. A similar but much smaller animal is the LLAMA, found in the warm parts of South America. It has cushioned feet, but no hump, like the camel. Its flesh and milk are nourishing.
The tallest animal in the world is the **Giraffe** (ji-raf') or Ca-mel'o-pard, which belongs to the deserts of Africa.

It is especially remarkable for the great length of its neck and fore-legs. In the absence of grass, this animal can make its food of the leaves of the trees.

There is a beautiful animal in Southern Africa which is about the size and shape of a pony, but has black and yellow stripes running around its body and legs. What is its name? **Zebras** run wild in herds and are very difficult to tame.

Which is the most useful animal to man? The **Horse** is found in almost every country in the world where work is to be done; Arabia has long been celebrated for fine horses. The Arab loves and treats his horses as if they were his children.

There is an animal of the horse kind which is said to be the most obstinate and yet the most patient of all animals; what is it? The **Donkey** will, however, do more work for the smallest pay than any other animal,
except, perhaps, the camel. Although much smaller than a horse, he will take you on long journeys and over dangerous places, and be content with a little grass or even a few weeds. Donkeys are very useful to the poor people of Africa, Asia and Europe.

65. The Tapir of South America is all black or dark brown, and looks like a big fat hog; and, like the hog, it delights in wallowing in the mud. It has a short proboscis or trunk. Its height is between three and four feet; but the tapir of Asia is larger and has a white back.

66. Of all animals the slowest and laziest is said to be the Sloth, which lives in South and Central America.

67. While some animals and people too are idle from choice, this poor creature is almost helpless; the slightest movement seems to give it great pain, judging from the piteous cry it sets up. It is therefore to be pitied, not blamed. To take fifty steps would require a whole day. The sloth is about the size of a large cat. Its hair is coarse, its arms very long, and legs short, and it is always found hanging under a branch of a tree, even when asleep. It makes its food of leaves, fruit, and bark. Some sloths have two toes or claws and
68. Another very curious little animal found in South America is the ARMADILLO; it wears a kind of coat of mail or hard, horn-like case, into which it can retreat as the snail or the turtle does when it is attacked. In form, head, and tail, it resembles a very big rat, but it is as long as a cat. With its sharp claws, it burrows in the earth for worms and roots. Its flesh is used for food.

69. There is another animal which resembles a rat and is as big as a cat, and that is the OPOSSUM, which lives in North and South America. It usually hides away in the daytime in hollow trees or in the ground, and steals out at night in search of food—berries, fruit, eggs, birds, etc.; sometimes, too, killing chickens to suck their blood. It is very sly; when caught, it will make believe dead and cunningly watch its opportunity to escape; this is the origin of the expression "playing 'possum." This animal can cling tightly to the branch of a tree by means of its long, strong tail, which it winds around it when it wants to gather fruit or to seize a little bird for its supper; but
one of the funniest sights is that of a mother opossum running off with all her young ones on her back holding on by their tails, as shown in the blackboard drawing.

70. The animal which is remarkable for leaping or springing is the Kangaroo, of Australia.

71. Its fore-legs are short and like arms, while its lower limbs are very long, thus enabling it to take leaps or bounds, upwards of twenty feet in length. Its head resembles that of a deer. Its tail assists it in sitting—and is so powerful that a blow from it has been known to break the legs of a man.

72. When sitting, a full-grown kangaroo is as tall as a man. It is hunted for its skin and flesh.

73. Like some opossums, it has a pouch or pocket into which its young take refuge when alarmed.

74. A bear is more at home in a cold country and more comfortable in cold weather. The White or Polar Bear lives among icebergs and feeds chiefly on fishes and seals.

75. White bears are fierce and strong; and,
Esquimaux with their dogs, capturing a White Bear for his fur and flesh. Near the Icebergs are Walruses, which are hunted for their flesh, oil, skin, and tusks of ivory.

like all other bears, have powerful paws and long, sharp claws with which they soon tear another animal or a man to pieces. Savage and dangerous as they are, the Esquimaux of the Arctic Regions hunt and capture them with dogs and sharp spears.

76. The flesh of these animals is used for food, but their chief value lies in the long white furs. Perhaps some of you have seen such skins or robes in sleighs.
77. The common Black Bear of North America and the Brown Bear of Europe are very much alike. They prefer the mountain districts. They are not so large nor so fierce as some other bears, but when attacked, they rise upon their hind feet and, if not promptly dispatched with the long knife or the bullet, the assailant is at once hugged to death with their powerful arms or torn to shreds by their sharp claws.

78. Their food consists of flesh, wheat, corn, roots and vegetables; they are very fond of honey, often climbing high trees in search of it.

79. The Cinnamon Bear of Colorado and the region west of it, is named on account of its color, which is a yellowish red.

80. The most savage of all is the Grizzly Bear, whose home is in the Rocky Mountains. Grizzly means somewhat gray.

81. Its strength and endurance are very great, for it has been known to kill and carry off a buffalo, to chase a man for long distances, capture and devour him. When overtaken by hunters, and after receiving several of their bullets, it makes desperate efforts to escape by running and swimming.

82. In winter, some bears hide themselves in caves,

Blackboard drawing of Wolf's head, 10 inches long; of Bear's head, 15 inches; of Buffalo's head, 24 inches. (Full size.)
hollow logs, and holes in the ice or snow, and pass several weeks in a kind of sleep.

83. The affection of bears for their young is very remarkable. When one of her cubs is shot, the grief and cries of the mother, her frantic efforts to arouse it, and her refusal to leave it even when the bullets are whistling past, show her anxiety for her cub to be far greater than that for herself.

84. Deer are found in all parts of the world,—in cold, hot and temperate regions; in forest, jungle, swamp and prairie,—except in Australia.

85. Deer are not savage like bears, but very timid. Whenever their keen sight, hearing or scent detects the approach of an enemy it is off with the speed of a race-horse. When pursued, it usually takes refuge in a lake or a stream.
86. Like the buffaloes, they are hunted for their flesh, skins, and horns, but often only for sport.

87. The most useful of these animals is the Reindeer, which is a domestic animal in parts of the Arctic regions, and constitutes the chief wealth of the Laplander of Northern Europe. His herds supply him with milk, flesh and materials for clothing, and some of these animals are trained to drag his sledge swiftly and for long distances over the frozen snow.

88. In summer the reindeer lives on the scanty herbage and shrubs of those regions, and in winter, on the mosses which lie under the deep snow. These mosses are discovered by his sharp scent, and he is able to dig down to them through the snow, by means of his great branching horns. Some reindeer are wild and live in large herds.

89. Herd is a number of animals assembled together, as a herd of cattle, oxen, horses, camels, deer, elephants, or swine; flock refers chiefly to smaller animals and birds,
Deer—Hyena.

as sheep, goats, or pigeons; drove is a number of cattle driven to market.

90. Deer and some other animals chew the cud; that is, when grazing, they only partly chew the food before swallowing it, and, when they afterwards lie down or stand still, they bring up the same food into their mouths again to chew and swallow it a second time. Such animals are called Ruminating or Cud-chewing animals. They generally have horns and cloven or divided hoofs. They include the cow, ox, deer, camel, giraffe, goat, sheep and buffalo.

91. Animals of the deer-kind include the Antelope and Gazelle of Africa and Arabia, the Chamois (sham' me or sham-moi') of the Alps, and the Moose of North America.

92. The HYENA is a savage and untamable animal of Africa and the warm parts of Asia. It looks like a very large dog. Its teeth are wonderfully strong. It eats the flesh and bones of dead animals.

**REVIEW OF CHAPTER XIX.**

What is a quadruped? *A four-footed animal.*
What quadrupeds are most used for food?
From which do we get Beef? Pork? Mutton? Veal? Venison?
From what animals do we get furs? Bear, buffalo, beaver, seal, squirrel, fox and wolf.
About how much of the body of the ox or cow kind is used in one way or another? *Six-sevenths.*
What is its flesh used for? Food. Its skin? *For making leather.* Its bones? *They are ground and used for fertilizing the soil.*
What are made from the horns? Buttons, knife-handles, etc.
Review of Animals.

What places are celebrated for great numbers of cattle? South America, Mexico and Texas.

How are the cattle caught on the pampas and prairies? By means of the lasso. What is a lasso? How is it used?

How is the American Buffalo hunted? Where? Of what use is it? What is the difference between the American Buffalo (Bison) and the Buffalo of Asia?

What is the difference between a wild and a domestic animal? Mention some wild animals—domestic animals.

What animal is most familiar with people? Mention some kinds of Dogs. What wild animals resemble the Dog? What animal is said to be the most sly and cunning? Fox. Which is the most savage animal of the dog-kind? Wolf. What very savage animal somewhat resembles the Dog? Hyena.

What animal is called the "King of Beasts?" Where does the Lion live? To what kind or division of animals does it belong? The cat-kind. Why? Because, like the Cat, it has sharp claws, round head, short ears, and long whiskers; springs upon its prey, and seeks its food mostly at night.

What other animals belong to the cat-kind? Tiger, Leopard, Jaguar, Puma, and Lynx.

In what division of the Earth is the Lion found? The Tiger? The Leopard? The Jaguar? How is the Leopard easily distinguished from the Tiger? The Tiger is striped; the Leopard is spotted. What kind of food do animals of the dog and cat kinds prefer? Flesh.

What animals mostly resemble man? Gorilla and Chimpanzee. In what part of the world are they found? To what kind or division of animals do they belong? The monkey-kind.

Name some of the differences between the monkey-kind and man-kind? The monkey-kind is very ugly, has four hands instead of two hands and two feet, smaller brain, larger jaw, longer arms, body covered with hair and adapted only to a hot climate.

What animals belong to the monkey-kind? Where are Monkeys numerous? South America, Asia and Africa. What can you say of the Monkey? How does a Gorilla act when attacked?

Which is the largest and heaviest quadruped? Elephant. Which is the tallest? Giraffe. How much taller is the Giraffe than the
Elephant? (P. 232.) How does the Elephant use his trunk? What constitute his food? How does he obtain it? What kind of a disposition has he? Is he intelligent and obedient? What have some been taught to do? To what age do some Elephants live? What is the most valuable part of the Elephant? What are made of ivory? What Birds are said to live as long as an Elephant? Swan and Cockatoo.

What very large quadruped is longer than the Elephant? Hippopotamus. Where and how does the Hippopotamus live? Does it live on flesh, or vegetables?

What very large animal is noted for its thick, tough skin? Rhinoceros. Describe the Rhinoceros. What can you say of its skin? Where is the Rhinoceros found?

What is an amphibious animal?

What animal is noted for its activity and industry? Beaver. Does it always live on the land? What wonderful instinct does it possess? What kind of a place do Beavers select in which to build their houses? Where do they cut trees for that purpose, up or down stream? Why do they always cut trees which are up stream? With what do they cut them? How do they make their houses tight and strong? When do they mostly work? For what are Beavers hunted? What is the size of a Beaver? Where is it found? What can you say of its hind feet?

What animal resembles a Beaver in its size and habits? Musk-rat. What small animals besides the Beaver lays up food for winter? Squirrels. What and how do Squirrels eat? Do they always live in one place? For what are they valuable?

What animal is protected from the attacks of other animals by sharp quills? Porcupine. By a hard shell? Armadillo.

What animal is best fitted for traveling in the deserts? Camel. What are some of its advantages? How does it compare in height with the Elephant? With the Giraffe? With the Horse? What two kinds of Camels are there? For what is each mostly used? Where does each live chiefly? What smaller animal, similar to the Camel, is found in South America?

What animal is mostly used by men for work and pleasure? Horse. What useful animal resembles the Horse? Donkey. What can you say of the Donkey's disposition?
What wild animals of South America resemble a pony in form and size? Zebra and Quagga. How do they differ in appearance from the pony? They are striped.

Which is called the laziest animal? Sloth. Where is it found? How does it live? What does it eat? What is its length?

What animal about the size of a Cat is noted for cunning, especially when captured? Opossum. How does it get its food? In what curious manner does it travel with its young?

What animal is remarkable for its springing or jumping? Kangaroo. Where does the Kangaroo live? In Australia. How does it defend itself? For what is it hunted?

What animal prefers cold countries? Bear. Which is the largest and most savage kind? White or Polar Bear. How does it live? For what is it valuable? In what parts of the world is it found? In the Arctic Regions. What kinds of Bears are in this country? Grizzly, Black, and Cinnamon Bears. Which is the most savage of them? Grizzly Bears. What can you say of their strength and endurance? How do some bears pass the winter? Are Bears affectionate to their young? Give an instance.

What animals with large horns are hunted in nearly every part of the world? Deer. How do they often save themselves when hunted? What animals constitute the whole wealth of Laplanders? Reindeer. Where do Laplanders live? In the most northern parts of Europe.

What is a Ruminating or Cud-chewing animal? Name some of them.

SPELLING AND WRITING EXERCISE.

ANIMALS WHICH MOST RESEMBLE MAN:

Gorilla, Chimpanzee.

ANIMALS OF THE MONKEY-KIND (FOUR-HANDED INSTEAD OF FOUR-FOOTED):

Gorilla, Chimpanzee, Orang-outang, Ape, Baboon, Common Monkey.
ANIMALS OF THE DOG-KIND:

Dog, Wolf, Fox, Jackal.

THE CAT-KIND:

Cat, Lion, Tiger, Leopard.
Tuma, Jaguar, Lynx, Wild Cat.

EATERS OF FLESH:

The Dog-kind, the Cat-kind, besides the Bear, Raccoon, Hyena, Opossum, Seal.

EATERS OF GRASS, AND CUD-CHEWERS, WITH HORNS AND CLOVEN HOofs (TWO TOES):

Cow, Ox, Sheep, Goat, Llama,
Camel, Giraffe, Deer, Buffalo.

GNAWERS:

Rat, Squirrel, Beaver, Porcupine,
Mouse, Prairie-dog.

ANIMALS WITH FOUR SOLID HOofs:

Horse, Donkey, Mule, Zebra.

AMPHIBIOUS ANIMALS:

Beaver, Rhinoceros, Hippopotamus, Seal.

The Frog, Toad, Alligator and Crocodile (reptiles) are also amphibious.
Comparative Size of Animals; to be Drawn on the Blackboard, Slates or Papers.

All the Animals on this diagram are drawn according to a scale of feet shown on the margin, and may, therefore, be accurately measured and compared with each other in size and shape.

To measure or draw them, first mark the scale of feet on a slip of paper or card-board and apply it to each animal in the diagram. For example, the Elephant is nine feet in height and the Giraffe eighteen.

A larger size for the blackboard may be drawn simply by making a longer scale—one inch to a foot will be found convenient; so that whatever may be the actual size, the proper relative proportion will be preserved.

Where there is sufficient space, the animals may be drawn separately and on the same level.

**Names of Animals According to the Numbers.**

1. **Elephant.** 9. **Wolf.**
2. **Lion.** 10. **Squirrel.**
3. **Man.** 11. **Giraffe.**
4. **Crocodile.** 12. **Gorilla.**
5. **Bison, or** 13. **Zebra.**
6. **Buffalo.** 14. **Hyena.**
7. **Goat.** 15. **Kangaroo.**
8. **Bear.** 16. **Seal.**
9. **Tiger.** 17. **Camel.**

In dotted lines on the left is the **Hippopotamus;** on the right, the **Rhinoceros.**

**Exercises on Comparative Size of Animals.**

Which is the tallest animal? What is its height?
What is the height of the Elephant? How much higher is the Giraffe than the Elephant? *Twice as high.*
What is the height of the Camel to the top of his head? Of the Horse? Of the Buffalo or Bison?
What four animals are taller than the horse?
What five are longer (from nose to tail) than the Horse?
What savage animal is just as long as the Horse?
What is the height of a Lion? How tall are you?
How tall is the Man? The Gorilla?
What animal is just as long as the Reindeer?
What is the length of the Crocodile? Of the Hippopotamus? What animal is just as long as the Rhinoceros? What is its length? What animal is just as long as the Zebra? How long is it?

What six animals are taller than the Man?
The Whale, which is a fish-like animal, is the largest living creature; large Whales are from 60 to 90 feet in length; consequently one of the largest size is six times as long as the Crocodile, which is represented in the diagram 15 feet long, or ten times as long as a Horse.
CHAPTER XX.

ABOUT INSECTS.

1. INSECTS are everywhere about us. They are in great numbers and of great variety. They are in the air, in the water, and all over the Earth.

2. Those we know the best are the HOUSE-FLY, the BUTTERFLY, the MOSQUITO, the CATERPILLAR, the GRASSHOPPER, and the BEETLE.

3. Besides these, there are thousands upon thousands so small that they cannot be seen with the naked eye. There is scarcely a leaf on a tree that is not the home of myriads of these little beings.

4. If you should look at a drop of water with the aid of a microscope, you would be amazed
to see the number and variety of living creatures which it contains; some swimming like fish or eels, some jumping like frogs, and some dragging their bodies lazily along.

5. Just think of ten thousand (10,000) occupying the space of a grain of sand. Creatures which are so small as to be invisible, or nearly so, to the naked eye, are called An-i-mal’cules.

6. Insects are of many kinds; some have to creep about all their lives; some creep only for a little while, like the Caterpillar, and then undergo changes, taking to themselves beautiful wings.

7. The Caterpillar is the form which the insect takes just after leaving the egg; after a while it spins or makes for itself a kind of case or covering, called a cocoon; the insect is then called a Chrysalis. After remaining a
while thus enclosed, this cocoon bursts open, and out comes a beautiful Butterfly, changed from what was, only a short time before, a slow, crawling, and repulsive looking Worm.

8. So, you see that the forms and changes of such Insects are—1st, the Egg; 2d, the Worm, Grub or Caterpillar; 3d, the Chrysalis; and 4th, the Butterfly, or perfect Insect.

9. Some kinds of Insects are very troublesome and often do great damage to trees and plants. You all know how soon one or two Caterpillars can eat up all the leaves of a little plant or bush in your garden, and that swarms of Grasshoppers or Locusts have in a few hours eaten up acres upon acres of growing corn, besides grass and vegetables.

10. The increase in the numbers of Insects is wonderfully rapid; indeed, if it were not for the multitudes of the busy birds whose food consists wholly or mainly of Insects, man might be unable to prevent the entire destruction of his orchards and his crops.

11. Great numbers of Insects are devoured by other Insects, and also by Toads, Frogs, and Ground Moles.

12. You must not think, however, that all Insects, Caterpillars and Butterflies are our enemies, for there are some kinds that are constantly at work for us.
13. All the beautiful silk dresses, handkerchiefs and ribbons are made from the material which formed the case or cocoon of a Caterpillar, called the Silkworm.

14. The Silkworm is hatched from an egg about the size of a mustard seed; it eats the leaves of the mulberry tree, its only food, and grows rapidly. In two or three weeks it begins to spin a very fine silken thread, which it winds round and round itself until a ball, the size and shape of a pigeon's egg, is formed.

15. When it is done spinning, the silk must be carefully and promptly unwound, or the Butterfly would burst the cocoon and thus spoil the silk. To prevent this the cocoons are sometimes placed in hot water or in a hot oven, to kill the worm. By means of steam or hot vapor, the threads are loosened so that they may be easily unwound and the Silkworm saved. The manufacturer usually puts ten or twelve of these threads together to make one which would be strong enough for use in the factory.

16. It is not a little singular that this beautiful article thus made by one Insect receives its bright crimson and scarlet colors from another, the Cochineal Bug of Mexico.

17. The Silkworm is raised chiefly in China, Japan, France, Italy, and California. The Silkworm and other Caterpillars breathe through several openings in their sides.

18. Next to the Silkworm, the Insect which is the most useful to man is the Bee, which gives us delicious honey. This the Bees gather from nearly all flowers, and store away in nice little waxen cells, all of their own making.
19. **Honey-bees** are of three kinds: the Queens, the Working-bees, and the Drones.

20. The **Queen-bee** is the ruler of the hive—and the mother of all the young Bees in it.

![A Beehive.](image)

21. The **Workers** are very intelligent and industrious. They form themselves into companies. One division or company roams the fields and gardens in search of food; another builds the cells; another helps those which come back with heavy loads, or feed and nurse the young Bees. All make the most of their time, and of every inch of room, for their house answers both as nursery and storehouse. There are also house-cleaners, sentinels and fighters. Even in a single day they have been known to make 4,000 cells.

22. The royal cell which they build for their Queen, is made much larger than any of the others.

23. When the cells are ready, the Queen lays in them a great many eggs, from each of which comes a larva, grub, or worm (see paragraph 8). The food of bees consists chiefly of pollen and sweet juices or fluids of flowers.

24. The **Workers** have little brushes on their legs which also hold the pollen and otherwise help them in their work. They have feelers or arms which enable them to work and feel their way in the dark. By these feelers they seem to tell one another the news of the day. If the
Queen should die they select a young grub, which soon becomes their Queen. When the Queen and a number of her household agree to emigrate and form a new colony or "swarm," they select a new home, gather food, and make full preparations for the change. After bidding farewell to their brothers and sisters which remain in the old home, they fly away. Those left behind must select a new Queen or they all would die.

25. The Drones (all males) are very lazy. They collect no honey, make no wax, build no cells. Most of them do nothing but eat honey which the workers collect. So, as winter comes on, the Workers get out of patience with their idleness and fly at them, sting them to death, and at once remove the dead bodies from the hive.

26. The Working-bees live for several years. They are smaller and more numerous than the others. In a hive of 20,000 Bees, the Workers will number about 19,500. There is only one Queen for every hive. The Workers are assisted in building by a gummy or sticky substance which they gather from some trees. A Bee has four wings and six legs, and a kind of tongue or proboscis for gathering honey. All but the Drones have stings.

27. Bees, by going from flower to flower, gathering and mixing the pollen or powder-like substance of flowers, increase the varieties of fruits, flowers and plants, and in this way, also, they are of great advantage to us. This last work seems to be all the HUMBLE Bee is good for. It lays up no store of honey, usually builds in holes in the ground, and lives but one year. It does not associate with the Honey or Hive Bee.

28. The Wasp and Hornet are somewhat similar to the Bee. They build and live in little cells of a paper-
like substance, which they make from bark and plants. They have sharp stings, but do not gather honey or make wax like the Honey Bee.

29. Ants resemble Bees in their habits of order and industry, and in being divided into three kinds, Males, Females, and Workers.

30. The Ant Workers have charge of the eggs, cocoons, and young Ants, as well as of the house affairs.

31. If overtaken by a storm, or if their nests should be destroyed, their first duty is to save their eggs or young, and they are seen running to and fro with these little things in their mouths in search of places of safety for them. The workers have no wings; the others have for a time, but soon lose them.

32. The Common Ants are the Red and the Black; some have wings, others have none.

33. Ants of the same family or kind live together in great harmony, and are never weary of helping each other. If one is tired or sick, another will take him upon his back and tenderly carry him.

34. Although these little creatures make no sound, they seem to understand each other perfectly. By means of their feelers they give orders, directions and invitations, call for food, or discuss family affairs.

35. Their little jaws are hard and sharp, serving them as axe, scissors, pincers and sword.
36. Ants come forth in myriads about the first of April. Four or five months of the year that the Ant is supposed to live, some kinds spend in a torpid state.

37. Battles are sometimes fought between the different families or tribes, desperate battles, too; for although of a peaceful nature, they will not submit to imposition. Some are very thievish and do not stop with stealing the food of a neighboring tribe, but they seize also their eggs or their young ones, and carry them into captivity to become slaves to them. Then the injured Ants levy war. They form themselves into companies, battalions, and divisions, and station sentinels as soldiers do. Army meets army, they fight bravely and desperately; they kill and wound each other, punish spies and deserters, carry off prisoners and spoils, and when the battle is over they take care of the sick and wounded.

38. The Grasshopper is of the same order of Insects as the Locust, Cricket and Katydid, having long bodies, four wings, and three pairs of legs. Their food is grass and the leaves of plants.

39. Grasshoppers are of great variety; some are green, some black, and some variegated. Some make a chirping sound and some are always silent.

40. Their hind legs are much longer and stronger than the others, and are admirably fitted for jumping or leaping.
41. It is the male Grasshopper which does all the chirping. He does not, however, chirp or sing as a bird does, with his voice or his throat. He makes his peculiar sound with his wings, and partly, some people say, with his legs and a kind of little drum or cymbal.

42. In the autumn, the mother Grasshopper bores or digs little holes in the ground and lays a great many eggs in them, and on the approach of frost she dies. The eggs remain there all winter and are hatched out by the warm sun of spring. For a while the young ones hop only, and seem to be without wings, but these are really concealed on their sides and appear when the time comes.

43. Locusts are the most destructive of this kind of Insects. They fly in vast numbers, like clouds which hide the sun, and come down on the growing crops of spring as fast and as numberless as snowflakes in a winter's storm.

44. Their visits in Western Asia and Northern Africa are terrible, for they are sure to leave famine and desolation behind them. The Locusts, called also Grasshoppers, which they resemble, have at times done great damage to the corn of some of our Northwestern States and Territories.

45. Locusts are sold in the markets of Europe, Asia and Africa as an article of food.

46. The "Seventeen-Year Locust" (more correctly called Harvest Fly) has a thicker body and shorter legs than the Locust or the Grasshopper. It flies, but does not leap.
47. These Insects lay their eggs in the twigs of trees, and then die. From the eggs are hatched, during the same summer, little six-legged worms, so small that it would take sixteen of them to measure one inch in length. These remain in the ground seventeen years, feeding on the juices of roots. At the end of that time they enclose themselves in a shell or case, then crawl up the trunks and branches of trees, to which they cling until their shell or dry skin bursts open; and, finding themselves provided with wings, they fly away.

48. Crickets belong to the same order of Insects as the Locusts and Grasshoppers. They can dig underground passages for themselves, and their long hind legs enable them to take long leaps.

49. House Crickets and Field Crickets are deadly enemies to each other; in fact, Crickets generally are very quarrelsome and are always ready for a fight. In Germany, mischievous boys get up pitched battles between them, when these warlike Insects kick like horses, butt like rams, and scratch like cats, until one or the other runs away or is disabled.

50. One of the most annoying Insects is the Mosquito, which has a long, slender body, six legs, and two wings. It has also a little proboscis for piercing and sucking. This contains several lancets so small and so sharp that together they are finer and sharper than a needle.
51. Mosquitoes are produced from eggs which float on the water. When these are hatched they are little worms and seem to hang from the surface of the water head downward, when they are called "Wigglers." They change their skins several times, then become a kind of Chrysalis in a little case or cocoon, which, like the Caterpillar, they soon burst, and, drying their newly found wings, they fly away into the air in search of food.

52. They find their food in the dew and in the juices of flowers and plants. Some kinds are active by day, others by night. Those which attack man and beast for blood are the females only. The "Wigglers" feed ravenously on the animalcules in ponds and marshes, and thus aid in purifying the water.

53. The eggs become perfect Insects in three weeks, and many broods are hatched every warm season.

54. Mosquitoes infest forests and marshy places in every country and in every climate; in cold Siberia and Lapland, as well as in the hot valley of the Amazon.

55. The Gnat, House Fly, and Ox Fly belong to the same order of Insects as the Mosquito.

56. The Dragon Fly has a long, slender body and four long, narrow wings.

57. Its thin, crisp wings are as clear as glass, reflecting all the colors of the rainbow, and seem to be in rapid and almost constant motion. While flying, it catches multitudes of Mosquitoes, Gnats, Beetles, Flies, and other Insects.
58. They are therefore beneficial, and not in the least injurious to man or child (although it bears, in some places, the frightful name of "Devil's Darning Needle").

59. It undergoes changes from the egg to the worm and the chrysalis, in the water, occupying two years. When its wings are ready, it rises above its old home in the marsh or the pool, to fly, shine, chase, kill, eat, and die, all in a single season.

60. Butterflies, like other Insects which fly, have two long, slender horns or feelers, which they can turn in every direction.

61. When they lay their eggs, they fasten them to some plant or leaf, with a sort of glue of their own making. There they remain until hatched into a kind of worm, which is called a caterpillar if it has legs, or a grub if it has no legs.

62. The Caterpillar eats enormously, grows rapidly, and often changes its skin.
63. When about six weeks old it stops eating, and covers itself with a kind of cobweb or cocoon, which it fastens to a convenient branch. There it hangs as a chrysalis, until it bursts the case and sails into the air on beautifully colored wings to spend the rest of its short life in flitting among flowers and blossoms and sipping honey.

64. The microscope shows that the wings of the Butterfly are covered with numberless little scales of every variety of form and color, and that its eyes are composed of a great many smaller eyes.

65. Butterflies generally live but one season, although some live through the winter.

66. The House Fly has two wings, six legs, a sucking proboscis for taking its food, and two great eyes which are composed of 4,000 small eyes.

67. Its feet are remarkably formed to enable it to creep up smooth surfaces like glass or on ceilings.

68. It holds on by means of a gum or sticky substance with which its feet are supplied; some say it holds on by means of sharp little hooks on the feet; and others say its feet, when pressed against glass or the ceiling, form vacuums, and that the fly is held on by the pressure of the air (as explained on page 74).

69. Most Flies die when frost comes; but some of those which hide away in warm nooks and corners live just long enough to lay a great many eggs the next summer. In a few hours these eggs are hatched into little grubs which, in a few days, become flies.
REVIEW OF CHAPTER XX.

Mention the best known insects.

(The word insect means cut into; and these creatures are so called because they are composed of parts which seem almost separated from each other.)

What can you say of the vast numbers of insects? Do some insects change their forms? What is the first change? *From the egg to a Caterpillar.* The second? *From a Caterpillar to a Chrysalis.* The third? *From a Chrysalis to a Butterfly.* How long do most Butterflies live? House Flies? Grasshoppers?

Mention some very destructive insects. Some very annoying ones? Some very useful and valuable ones? What kinds are noted for their industry?

What can you say about the Locust and Grasshopper? Where have they been very destructive? About the Mosquito? About the Silkworm? About the Ant? How long do most Ants live?

How many kinds of Bees in every hive? What can you say of the Queen Bee? Of the Workers? Of the Drones? Of Humble Bees?

What insects are similar to the Grasshopper? What two kinds of Crickets are there? What can you say of Crickets?

Are Dragon Flies dangerous, or useful? How are they useful? How are Mosquitoes useful?

Describe the House Fly. What can you say of its eyes? How long does it live?

SPELLING AND WRITING EXERCISE.


Write a composition about *Insects,*—or *Locusts,*—or *Silkworms,*—or *Bees,*—or *Ants,* as the Teacher may direct.
EXERCISES ON THE MAP.

The country we live in is called the United States. It is the largest and most powerful Republic in the world.

It is composed of States, numbering thirty-eight, in 1881, besides several Territories and the "District of Columbia."

When a Territory is sufficiently inhabited, its people may apply to Congress for its admission into the Union as a State.

Do you live in a State, or a Territory? What is its name? What States (or what Territories) touch it?

Over what States would you pass if you should travel directly east to the Atlantic Ocean? If you should travel directly west to the Pacific Ocean? North? South?

Which is the largest State in the Union? Texas. Which is furthest northeast? South-east? West? What two are nearest the center?

What country north of this country? South-west? What ocean east? West? What large gulf south?

What large river flows south into the Gulf of Mexico? What large rivers flow into the Mississippi River?

What large lakes are north of the United States? Is the water of these and most other lakes fresh, or salt? Fresh. What lake in the west is full of salt water? Great Salt Lake.

Which contains the coldest water, Lake Superior, or the Gulf of Mexico? Lake Superior.

Why? Because it is further north.

Is it warmer in Texas, or Minnesota? In Maine, or Florida? At the head, or the mouth of the Mississippi?

If you should go to Florida or Texas, either in winter or summer, what fruit would you see on trees in the open air? *Oranges and lemons.*

Do oranges grow also in Maine or Minnesota in the open air during the winter? *They do not.* Why? *It is too cold there.*

This country is very large. Do you know how long it takes a fast train, moving day and night, to cross from the Atlantic to the Pacific Ocean? *One week.*

On its way the train would cross three chains of mountains. Which is the greatest of these chains? *The Rocky Mountains.*

What can you say of their height? *They are about fifty times as high as the highest tree or church steeple in the world.*

The tops of the highest are covered with snow, even in summer, because of their great height, which is from 14,000 to 15,000 feet above the level of the sea.

Who make the laws for the people of the United States? *Men who are elected by voters.*

How old must a man be before he is allowed to vote? *Twenty-one years.*

What are those men called who are elected to make laws for the Union? *Congressmen.*

In what city do they meet? *In Washington, which is therefore the capital of the United States.*

Whose duty is it to see that these laws are obeyed? *The President’s.*

What are those men together called who make laws for a State? *The Legislature.*

Who enforces the laws of a State or a Territory? *The Governor.*

What State has the largest area? *Texas.*

The smallest? *Rhode Island.*

Which has the largest population? *New York.* The smallest? *Nevada.*

What is the capital of your State (or Territory)?

Capitals are usually designated on maps by stars, thus *.
Into what is each State and Territory divided? *Into Counties.* Which is the larger, a County, or a State? *A State.*

For how many years have these States been governed by men elected by their own people? *Over one hundred years.*

Who governed this country before that? *Men sent here by the King of England.* What country of North America is still subject to Great Britain? *Canada.*

What are some of the causes of this country's greatness? *Its free government, its great extent, its fertile fields, its rich mines, its many mills, and its industrious people.*


Some cities extend over their counties, as the City and County of Philadelphia are the same in extent.

What State is north of this State? East? South? West? What county is north of this county? East? South? West?

You may draw a map of your County, on a piece of paper as large as your hand; marking first, the boundaries; next, the highest hills or mountains (if any); next, the streams which run through it; then the cities, towns, or villages, the churches, schoolhouses, railroads, bridges, etc., as shown on page 39. Then you may draw on a piece of paper, as large as a leaf in your copybook, a map of your State, showing its boundaries, highest mountains, largest rivers, its capital, and the part in which your County is situated. Observe that your County is but a small portion of your State.

* In Louisiana these divisions are called Parishes.
BIRD'S-EYE OR BALLOON VIEW OF THE UNITED STATES
AND BRITISH AMERICA.
About the United States.

into the Gulf of Mexico. The mouth of this river, or rather, mouth, opening

If you look at the picture you may see the

and its branches. The Mississippi River
which are drained by the Missouri River.
Mountains are great plains and fertile plains,

Between the Rocky and the Allegheny

nearly so high as those in the west,
are called the Allegheny Mountains, which

You may observe that in the eastern part of

the Pacific than the Rocky Mountains.

The Sierra Nevada (see-ran, no-vad-nah) are nearer.

The Rocky and Sierra Nevada

chains, the Rocky, and the Sierra Nevada

The highest mountains of this country are in

the Southern States, for cotton

on its way to New Orleans, the largest city in

streamship about to enter the Mississippi River,

On the Gulf of Mexico you may see a

steamship from Asia.

with tea, silk, and other things from Japan.

San Francisco about to enter the port of.

On the other side, you may see a steamer

England or France.

of wheat, corn, beef, pork, or peaches, for

New York with perhaps a full cargo

On this picture you may see a steamer

Japan.

of the western coast and China or

the broad Pacific, which is crossed by ships sail-

ing from Europe; and on the left hand, or west is the

Ocean, on which ships are sailing to or from

On the right hand, or east is the Atlantic

north.

the greater part of British America on the

with a part of Mexico on the southwest, and

Here is a picture of the United States.

The pupil should make frequent reference to the pic-

While reading or studying this page and the next,

MORE ABOUT THE UNITED STATES.
Do you remember what the land is called which is enclosed by the mouths of a river? (p. 64) The vast plains mentioned contain rich soil, and furnish food not only for Americans, but also for millions of people in Europe. You might travel for days and days with rich fields of grain and pasture land in view all the time.

This is why so many people emigrate from Europe, and become prosperous farmers here. Looking north (p. 252) of the great plains and prairies already mentioned, over that vast region which lies around and beyond Lake Superior, and contains Hudson Bay, Great Slave, and numerous other lakes (p. 94), you would see forests almost without end. There the winters are long and the snows deep. Looking south, over all that land which surrounds the Gulf of Mexico, you would see forests almost without end. What is called the "Sunny South," where little boys and girls never suffer from the cold, where boys and girls never suffer from the cold, where...
TOPICS FOR DRILL ON THE PICTORIAL CHART, AND FOR WRITING LETTERS.

The Teacher, in pointing to the various objects on the chart may describe and dwell on each topic to the extent best suited to the class.

Figures in parentheses correspond with those on the key to the chart.

The Ocean (1) covers how much of the Earth's surface,—What inhabit the ocean,—Which are the largest of these animals and fish—their sizes,—Which useful for oil—for furs—for food—each where caught,—Which are dangerous,—Which are very curious,—Shell-fish,—Pearls—where and how obtained—their value,—Corals,—Sponge,—Ocean voyages—how conducted,—Currents or streams in ocean,—Gulf Stream—its effects on England, Ireland, and other parts of Western Europe. Pages 21 to 33.


Rain (3), from what does it come—of what formed—effects and uses,—What are formed from it,—Where does it go,—Voyage of a drop of water. Pages 15 to 19.

Rivers—how formed,—Waterfalls (9),—Rapids (12)—turn mill-wheels, pages 60, 61,—float logs—saw-mills, pages 62, 63—wear channels in ground and rock, page 67,—Canons (11)—carry soft soil to mouths forming Deltas, See land between lower lake and ocean, in chart; also page 64—overflows,—Nile River, page 66—facilities for navigation, commerce, and manufacturing—sites for cities, towns, etc.
Ship-yards and Floating Docks (34) on bank of river,—Construction and uses of Floating and Dry Docks,—Name some. Page 53.

Ships—how built, — Steamships—how built, — a launch,—what is it,—how ships move,—how steamships move,—names of masts, sails, etc.,—what they carry,—Steam,—what is it,—how move wheels,—names of parts of machinery,—Great Eastern,—iron-clads,—battle between Monitor and Merrimac—In what time is the Atlantic Ocean crossed by steamships—by sailing vessels. Pages 45 to 56.

Canals (14, 15)—how built—their uses,—Locks—how boats are lowered and raised, pages 82 to 84,—Name some canals. Page 85.

Reservoirs (16),—What are they—their use,—Aqueducts,—What are they—their use—how water fills them —how Chicago and Cleveland are supplied with fresh water—where from. Page 86.

Straits and Channels (21),—What are they—what do they connect—what do they separate,—Mention some.

Mountains (4),—What are they—highest covered with what,—Melting snow forms what,—Minerals they contain—their trees, mines, and mountain streams,—How Mines (30) are constructed—coal, how obtained—how formed—charcoal—burning gas—dangers in mines—iron, how made,—silver, how obtained—gold—tin—lead—copper.

Salt—how and where obtained,—Chute or Shoot (31),—what use. Pages 144 to 156.

Mountain Lake (7)—from what formed,—Name the
largest lakes in the world—lakes at different elevations—lake fish—water fresh, or salt. *Pages 68 and 29.*

**Volcanoes** (5),—What are they—dangerous,—What celebrated volcano in Italy,—What cities destroyed—how. *Pages 163 to 165.*

**Island** (18) and **Peninsula** (19),—What are they—the difference between them—points of land called what,—Point to lighthouse on cape—on promontory—difference between cape and promontory—Mention some important islands. *Page 78.*

**Watershed** (29), a high ridge from which streams flow in different directions,—What is on watershed in the chart (53)—how a windmill works—its use—where numerous. *Page 169.*

**Mills** (35)—how built—where built—different kinds,—how flour is made,—how lumber is sawed,—Saw-mills—what kinds of trees are sawed into boards, etc.,—kinds of wood used for building houses, ships, railroads, furniture, pianos, fences, and wagons. *Page 98.*

**Trees,**—What kinds of trees are raised or kept for shade—for ornament—for their leaves—for their bark—for their sap—for their fruits—for medicines,—how trees begin to grow—how to tell the age of trees—what grow only in warm climates,—how sap moves,—uses of leaves.

**The Plains** in chart contain farms yielding useful crops,—Which are the most useful for food—for clothing—for sugar—for drinks,—crops sent to cities and towns on railroads, canals, and rivers,—What crops grow best in warm climates,—Can cotton grow as far north as wheat,—Do oranges and bananas grow as far north as apples.
and pears,—What is India-rubber,—Where obtained—mahogany and rosewood,—What country produces the most cotton—wheat and corn—tea—coffee. *Pages 98 to 127.*

**Lassoing Cattle (41)**—how—where—uses of cattle. *Pages 143 and 203.*

**On Western Plains** in the chart, Indians are hunting buffaloes (42),—how killed—what parts of the buffalo are useful to people—other animals of the buffalo kind,—Where do these Indians mostly live—their occupations,—how they look, dress, live—their dwellings—how they fight —how treated by white men. *Pages 97, 142, and 205.*

**Emigrants (40)** move by railroads and by wagons,—In what direction do most emigrants move in this country,—From what countries of Europe have many come,—Where settle—their occupation—benefits to Western States and Territories,—Which are being rapidly settled,—What large Southern State receives many emigrants. *Page 79.*

**Vineyard (46),**—What grow there—what made from grapes—what countries famous for grapes and wine—how grapes are gathered—how wine is made—different kinds of wine—raisins. *Page 111.*

**Wells and Pumps (52),** how drinking water is obtained—wells how dug—water how raised—how pumps work—chain pump—suction pump—vacuum—Artesian wells, how made, their depth—oil wells—salt wells. *Pages 70 to 75.*

**Bridges, Suspension Bridge (54)**—different kinds of bridges—how built—for what purpose—of what materials,—Mention some celebrated bridges,—How foundations are built under water—divers—diving-armor—diving-bells. *Pages 88 to 91.*
On Western ships, and of the sea. Elisham. Shown}

in the summer of 1848.