

Plate Tectonics Study Guide KEY

Use this KEY to check your answers on your study guide. Answers do not need to be word-for-word the same, but details and key concepts should match.

Learning Goal 1: List characteristics of a model. Tell how they are developed, what makes them useful, and what happens if they are not accurate. Explain the difference between a physical and a mental model: give examples of each.

1. What two things are models based on?

MANY observations, AND the assumption that things keep acting how they did in the past

2. What are they useful for?

They explain how things work, help you make predictions, and help you think of new areas to investigate

3. What happens if a model is not accurate? (What do you do 1st? 2nd?)

First, fixed/change it to include new info/observations;
2nd, throw it away, but only as a last resort.

4. What is the difference between mental and physical models?

Physical models can be touched and manipulated; mental models cannot (they are just “mental pictures” or a collection of thoughts about a topic)

5. Give an example of a physical model: globe, photo

6. Give an example of a mental model: My thoughts about the statue of liberty, old people, teenagers, the “Think-A-Dot” game, any topic you can think of!

Learning Goal 2: Describe the Shrinking Earth Theory. Explain how new ideas and technology combined to replace it with the Theory of Plate Tectonics.

7. According to the “Shrinking Earth Theory”, why was the Earth’s surface “wrinkled”.

The Earth started off as a molten ball. As the ball cooled, it shrank and wrinkles formed. The mountains on Earth are the wrinkles

8. What major predictions did the “Shrinking Earth Theory” make about mountains, earthquakes, and volcanoes?

They would occur at random, all over the surface of the Earth

9. According to Alfred Wegener’s theory of Continental Drift, what causes mountains to form on Earth’s surface?

The continents are moving around on the surface of the Earth and that mountains are created when the continents collide with each other

10. What evidence did Alfred Wegener use to try to prove the theory of Continental drift was correct? (Name at least 3 types of evidence.)

Shape of continents, locations of mountains, plant/animal fossils, evidence of climate change (ancient glaciers),

11. Why didn't other scientists accept the theory of Continental Drift?

Wegener could not explain what caused the continents to move around, so other scientists rejected his theory.

12. Describe how technology was used to prove that the predictions of the "Shrinking Earth Theory" were incorrect.

-seismographs: seismographs showed earthquakes mostly occur at the edges of continents or in the center of oceans instead of randomly

-GPS: showed not all mountains are growing taller

-Sonar: The use of sonar led to the discovery of the mid-ocean ridges, which helped scientists discover how the continents moved apart (through seafloor spreading)

Learning Goal 3: Analyze the evidence that lithospheric plate movements occur.

13. What does the theory of Plate Tectonics state?

The Earth's crust is broken into about 15 large plates that move around on the surface of Earth.

14. According to the theory, what causes the plates to move?

Movement is caused by convection currents in the mantle

15. Describe the evidence that was used to prove this theory (6).

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|--|--------------------------------|
| • <u>Land features (continents' shapes)</u> | • <u>plant/animal fossils</u> |
| • <u>evidence of climate change (ancient glaciers)</u> | • <u>data from earthquakes</u> |
| • <u>data from volcanoes</u> | • <u>GPS measurements</u> |

Page(s): Learning Goal:

____ 4. Describe the properties and composition of the crust, mantle, and core.

16. What evidence did scientists use to figure out what the inside of the Earth was like? (2)

Crust:

17. What is its thickness and state of matter?

Thickness = between 5 to 70 km (or 3-43 miles)

18. Where is the crust the thickest?

At the continents/mountains/ continental crust

19. Where is the crust the thinnest?

At the oceans/oceanic crust

Mantle:

20. What is its total thickness?

The mantle's total thickness is 2,867 km (or about 1,781 miles)

21. Tell what forms the lithosphere and what its "state of matter" is.

It includes the crust and upper mantle- it is solid

22. Describe the lithosphere:

Same answer as number 21. Also, this is the part that moves due to convection currents in the mantle.

23. Describe the asthenosphere:

There is lots of heat and pressure at this layer. The rocks are solid but "plastic". They can flow.

Core:

24. Tell what the inner and outer cores are made of. Describe the difference between the two layers.

Both are made of mostly iron and nickel

The inner core is solid; outer core is liquid

Learning Goal 5: Tell what convection currents are and where they occur. Explain how they cause lithospheric plates to move across Earth's surface.

25. Where are convection currents located?

In the asthenosphere, which is a layer of the mantle

26. Describe how convection currents work. (Begin at the core and tell what happens when the materials heat and then cool).

Rocks near the core get heated, become less dense, and start to rise.

When the material hits the crust, it either goes through it to reach the surface or is deflected off to the side, where it slides along under the crust/lithosphere. When the rock cools, it becomes more dense and drops towards the core again. Then the cycle repeats.

27. Tell how the currents move the pieces of the crust around on the surface of the Earth.

As the material slides under the crust, it drags the crust along with it, causing it to move.

Learning Goal 6: Describe plate movement at convergent, divergent, and transform boundaries. Explain how the different plate boundaries form mountains, faults, rift valleys, trenches, and volcanoes.

28. Tell the direction that plates are moving at each of the three types of boundary.

Convergent
Move together

Divergent
Move apart

Transform
Slide side-by-side

29. What two factors determine the type of landform created at plate boundaries?

The type of plates involved and direction they are moving

30. Describe the two plate types: (Include thickness, density, and what they are made of)

Oceanic- thin, more dense, made of rocks like basalt

Continental- thicker, less dense, made of rocks like granite

31. Describe how density determines how a plate will behave at a plate boundary. (What will dense plates always do? What will less dense plates do?)

Denser material will always go downward, so dense plate will sink.

Less dense material will rise upward, so less dense plates will rise.

32. What landform and type of event are common along transform boundaries?

Landform = fault lines; event = earthquakes

33. Draw a diagram that shows what happens at the boundaries for each of the six boundary types. Include the types of crust, direction of movement, and landforms created at each boundary. (See the example.)

Oceanic-oceanic convergence

Oceanic-continental convergence

Continental-continental
convergence

Oceanic-oceanic divergence

Continental-continental divergence

Transform boundary