Take Test: Graded Quiz 2a

Test Information

Description	Worth 7% of course grade.
Instructions	This quiz WILL take you a while, so don't delay. Many of the questions require thinking and some require you to look up information. Feel free to use your notes, the internet and any books that you like. As with Quiz 1, you can have 2 attempts at this quiz as long as you complete both attempts before the closing date and time (11pm). Your highest score will count toward your Overall Course Grade. **Save** as you go, but don't **Submit** until you are sure you are done. When you begin 'Attempt 2' you won't see your previous answers from 'Attempt 1'. You will need to re-enter your answer for each question. Good luck!
Multiple Attempts	This test allows 2 attempts. This is attempt number 1.
Force Completion	This test can be saved and resumed later.

Question Completion Status:

Save All Answers | Close Window | Save and Submit

QUESTION 1

1 points Saved

Igneous rocks form by:

- a. lithification (rock formation) of sediments.
- b. hydrothermal circulation at mid-ocean ridges.
- c. chemical or biochemical precipitation of minerals.
- d. crystallisation of molten rock.
- e. solid state changes due to increased temperatures and/or pressures.

QUESTION 2

1 points Saved

The main factor determining the bulk composition of the planets in our Solar System and their satellites is _____.

- a. the size of the planet, because larger planets attract more Iron
- b. distance from the Sun, because the temperature in the solar nebula increased with distance from the Sun
- c. distance from the Sun, because the temperature in the solar nebula decreased with distance from the Sun
- d. the presence of a magnetic field, because magnetic fields attract Iron
- e. rotation rate of the planet, because planets with higher rotation speed attract more material

QUESTION 3

1 points Saved

The Perseid meteor shower is a yearly event. The photo (APOD; Fred Bruenjes) is a time exposure of the Perseids. The Perseid meteor shower occurs when:

- (•) a. the Earth passes through the debris trail left by Comet Swift-Tuttle.
- ( ) b. the Comet Swift-Tuttle enters the Earth's atmosphere
- ( ) c. the Perseid asteroids (part of the Apollo asteroid group) pass by the Earth and some enter the Earth's atmosphere.
- ( ) d. Perseus wants to remind us of his heroic deeds.

QUESTION 4

2 points Saved

Which of the following characteristics of the Moon are an expected result of the giant impact formation hypothesis?

There may be multiple correct answers; wrong answers are penalized.

- [x] a. The average composition of the Moon has a much lower proportion of iron and nickel than does the Earth.
- [x] b. The interior of the Moon contains almost no volatile compounds (such as water and carbon dioxide).
- [ ] c. The Moon's mantle is, proportionately, a very thin layer compared to its the metallic core.
- [x] d. The crust and the lithosphere (crust and uppermost mantle) of the Moon is much thicker than that of the Earth
- [ ] e. The Moon and Earth have very similar compositions (proportionately), which is consistent with the impact hypothesis.

QUESTION 5

2 points Saved

Which of the following points describing the Earth's magnetic field are true?

[There could be more than one answer - wrong answers penalized]

- [x] 1. the dipole axis is currently tilted approximately 10 degrees from the rotational axis.
- [ ] 2. The field intensity is constant over time (except during a reversal).
- [x] 3. approximately 90% of the Earth's field has the shape of a dipole field.
- [x] 4. The magnetic north pole is the location on the Earth's surface where the inclination (or dip) of the magnetic field is vertical.
- [x] 5. Averaged over a long period of time, the Earth's magnetic field looks like a dipole aligned with the Earth's rotation axis

QUESTION 6

1 points Saved

The inclination (or dip) of the Earth's magnetic field to the Earth's surface varies.
Which of the following is true?
The present inclination of the Earth's magnetic field is approximately: *[It may help to visualize the problem by sketching the dipole shape of the field around the Earth]*

- ( ) a. horizontal (or parallel to the Earth's surface) at the magnetic poles
- (•) b. vertical (or perpendicular to the Earth's surface) at the magnetic poles
- ( ) c. horizontal (or parallel to the Earth's surface) at the geographical (i.e. rotational) poles
- ( ) d. vertical (or perpendicular to the Earth's surface) at the geographical (i.e. rotational) poles
- ( ) e. equal to the declination

QUESTION 7

1 points Saved

The Earth's magnetic field is primarily:

- ( ) 1. generated by convection in the inner core
- ( ) 2. generated by currents flowing in the mantle
- (•) 3. generated by convection in the outer core
- ( ) 4. due to magnetisation in the cool crustal rocks
- ( ) 5. due to magnetisation in the inner core

QUESTION 8

1 points Saved

Parallel stripes or bands of the oceanic crust are observed to have alternating magnetisations. This is because the new crust formed at the mid-ocean ridges gets magnetised in the direction of the Earth's magnetic field as it solidifies. The stripes occur because:

- ( ) 1. of periodic variations in composition of new crust.
- (•) 2. the direction of the Earth's magnetic field reverses.
- ( ) 3. some of the material gets demagnetised later.
- ( ) 4. the temperature decreases symmetrically away from the ridgecrest.
- ( ) 5. spreading at mid-ocean ridges does not occur at a constant rate.

QUESTION 9

2 points Saved

The 'secular variation' of the Earth's magnetic field results in a number of different effects that we can observe, and its cause is reasonably well understood. Which of the following are observations associated with secular variation or cause(s) of the secular variation?

More than one answer may be correct - penalty for wrong answers

More than one answer may be correct - penalty for wrong answers.

- [x] a. declination (azimuth, or angle relative to geographic north) of the field
- [ ] b. the solar wind intensity
- [ ] c. the number of lightning strikes
- [ ] d. the distribution of ferromagnetic minerals in the convecting mantle
- [x] e. intensity or strength of the field
- [x] f. inclination (dip) of the field
- [x] g. the convective flow patterns in the outer core

QUESTION 10

2 points Saved

To have an active dipole magnetic field now, 4.6 billion years after forming, a planet or moon requires the following:
[More than one answer may be correct. Wrong answers are deducted]

- [ ] a. Temperature of the crust must be cool enough to allow remanent magnetisation to function.
- [ ] b. It must have ferromagnetic minerals in the crust for remanent magnetisation to play a role. It cannot have a fully 'ice' surface.
- [x] c. The planet needs to be large enough. Smaller bodies cool more quickly and as the planet or moon cools, less of the core is liquid (and eventually none is liquid).
- [x] d. The planet must rotate.
- [x] e. At least part of the core must be liquid and convecting.
- [x] f. A metallic core.

QUESTION 11

1 points Saved

In plate tectonics, the "plate" is:

- ( ) 1. The asthenosphere: a layer of the Earth which is warm and flows readily.
- ( ) 2. The lithosphere: a layer of the Earth which is warm and flows readily.
- ( ) 3. The asthenosphere: that part of the Earth which is cold and behaves rigidly.
- ( ) 4. The crust: that part of the Earth which is less dense and "floats" on the mantle.
- (•) 5. The lithosphere: that part of the Earth which is cold and behaves rigidly.
- ( ) 6. The crust: that part of the Earth which is cold and behaves rigidly.

QUESTION 12

1 points Saved

A key process in plate tectonics is called 'seafloor spreading'. That term describes:

- (•) 1. The creation of new crust at mid-ocean ridges due to divergent motion of the seafloor
- ( ) 2. The sinking of cold crust at mid-ocean ridges
- ( ) 3. Divergent motion between the seafloor and a continent
- ( ) 4. Convergent motion between the seafloor and a continent
- ( ) 5. Stretching of the seafloor by the motion of continents

QUESTION 13

1 points Saved

Slab pull is one of the forces driving plate motions. It occurs because subducting lithosphere is _____ than the surrounding asthenosphere and lower mantle.
You can answer this just by thinking about the differences in composition and properties of these layers

layers...

- a. hotter, and therefore less dense
- b. more mafic and therefore more dense
- c. cooler, and therefore less dense
- d. less mafic, and therefore less dense
- e. cooler, and therefore more dense
- f. hotter, and therefore more dense

QUESTION 14

2 points Saved

Another main driver of plate motion is dubbed 'ridge push'. The name, however, is slightly misleading. Which of the following statements describing 'ridge push' are **correct**?

More than one answer may be correct

- [ ] a. Continent collision generates large mountain belts (ridges). The collisions 'push' the plates apart, allowing magma to fill in the gap.
- [ ] b. The asthenosphere convects below the oceanic lithosphere, dragging the plates along above. This pulls apart the plates.
- [x] c. The heat of the rising rock below the spreading center means the rock in the region expands. Therefore, there is a high ridge at the spreading center. The plates are pulled down and away from the ridge by gravity.
- [ ] d. Magma rising from the mantle forces the plates apart.

QUESTION 15

2 points Saved

The **North American plate** is bounded by what kind or kinds of plate boundaries? (It may help to look at a map of the plates.)
More than one answer is possible on this one.

- [x] a. divergent
- [x] b. convergent
- [ ] c. passive
- [x] d. transform

QUESTION 16

2 points Saved

The relatively abrupt transition from continental to oceanic crust is called the continental margin. Which of the following are **active** margins?
[Hint: Look at earthquake maps... or maps of plates and their motions]

Select all *correct* answers (there may be more than one correct answer, penalties for errors).

- [ ] 1. The south coast of India/Sri Lanka
- [x] 2. The west coast of Costa Rica
- [ ] 3. Hawaii (the big island)
- [x] 4. The eastern coast of New Zealand's North Island
- [ ] 5. The west coast of southern California.
- [ ] 6. The east coast of Newfoundland
- [ ] 7. The east coast of South America

QUESTION 17

1 points Saved

Rates of plate convergence or divergence have:

- a. been constant through time.
- b. changed through time, but are always the same everywhere on Earth.
- c. changed through time, but currently average approximately 4 cm/year
- d. changed through time, but currently average approximately 4 m/year
- e. changed through time, but currently average approximately 4 km/year

QUESTION 18

2 points Saved

At a subduction zone, the 'plate' that sinks down into the mantle:
(Only one answer is correct)

- a. is always continental lithosphere
- b. is always oceanic lithosphere
- c. is always oceanic crust
- d. is either oceanic or continental lithosphere
- e. is either oceanic or continental crust.
- f. is always continental crust

QUESTION 19

1 points Saved

You pour a hot cup of tea. An example of conduction dominating the transfer of heat is:

- a. your hand gets warm as you hold the cup.
- b. your hand gets warm as you hold your hand beside (but not touching) the cup.
- c. your hand gets warm as you spill the tea.
- d. your hand gets warm as you hold your hand above (but not touching) the cup.
- e. the tea cools faster as you blow across the top of the cup.

QUESTION 20

1 points Saved

You are sitting outside at a cafe. Every once and a while, the breeze immerses you in the wonderful aroma coming from the bakery a few stores down the block. You realise that is an example of:

- a. convection
- b. radiation
- c. advection
- d. conduction

QUESTION 21

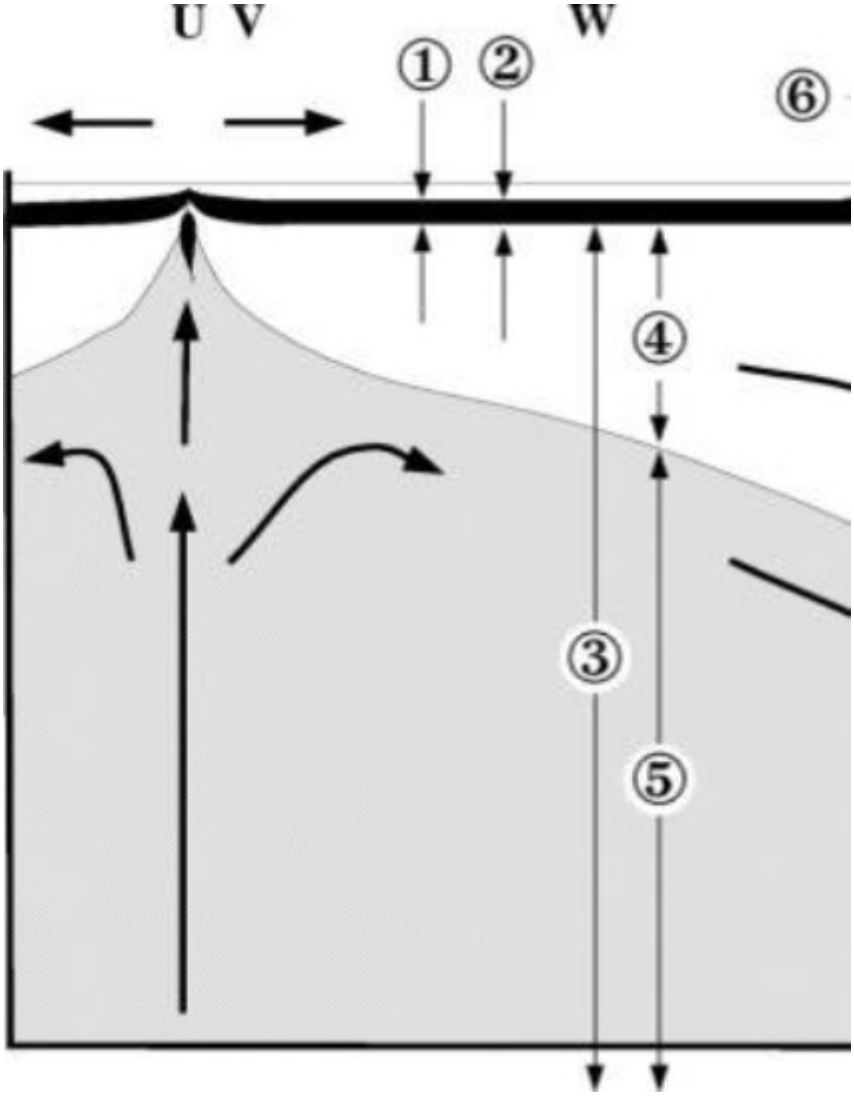
2 points Saved

QUESTION 21

2 points Saved

The figure shows a simple cross-section through a ridgecrest. The vertical axis goes from sealevel down to about 200 km. The crust is shown in black, the white zone is the mantle portion of the lithosphere, and the grey is the mantle below the base of the lithosphere.
As you move away from the ridgecrest (from U to V to W), the mantle portion of the lithosphere (the zone labelled 4) gets thicker and thicker. This is because:

[Only one answer is correct]



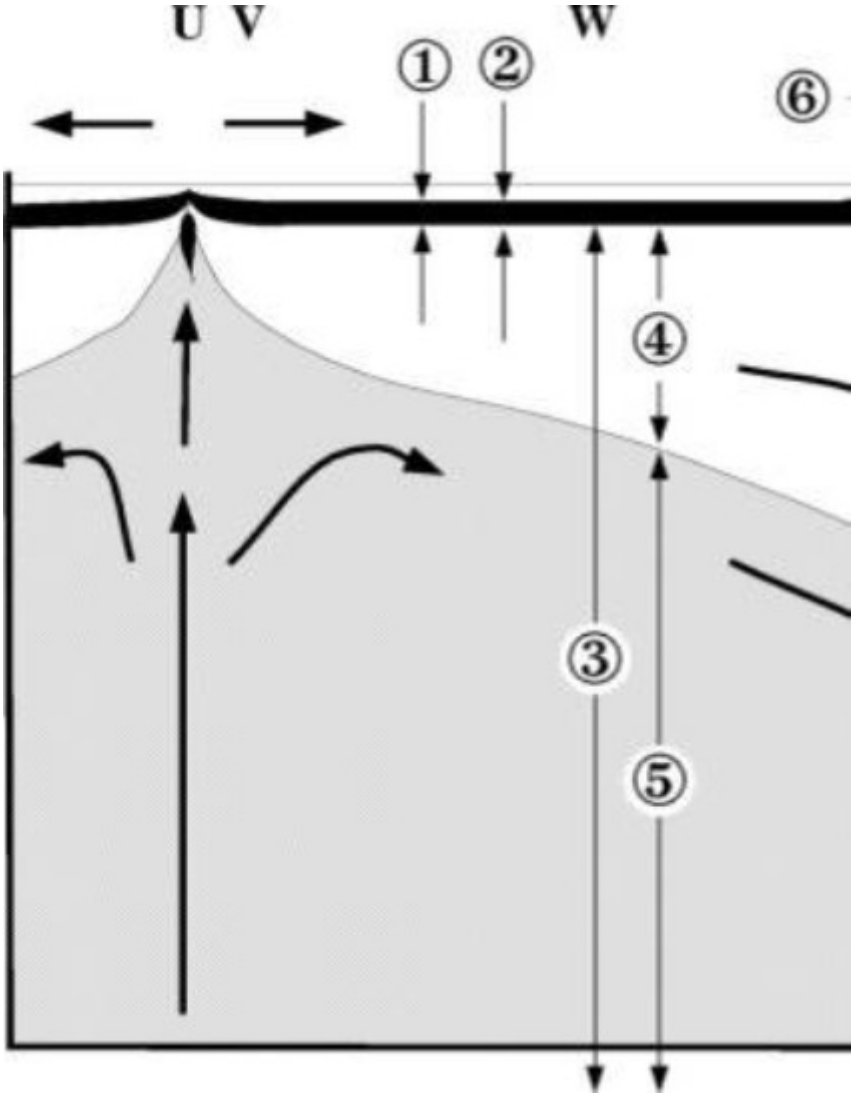
- a. More and more intrusive igneous rocks are gradually added to the plate.
- b. As the plate slides away from the hot ridge where its crust is formed, the plate cools. Flow in the asthenosphere is also moving away with the plate above, gradually cooling. Essentially, the upper asthenosphere cools by conduction and becomes lower lithosphere. Gradually, the lithosphere thickens.
- c. Basal drag of the asthenosphere against the base of the lithosphere adds mantle rock to the lithosphere.
- d. Less partial melt is available away from the ridgecrest.
- e. It is an accretionary wedge that thickens away from the ridgecrest.

QUESTION 22

1 points Saved

The figure shows a simple cross-section through a ridgecrest. The vertical axis goes from sealevel down to about 200 km. The crust is shown in black, the white zone is the mantle portion of the lithosphere, and the grey is the mantle below the base of the lithosphere.
The heat transferred from the top of the oceanic crust into the ocean water is different at the seafloor below V as compared with that measured at the seafloor below W. Which one of the following

below V as compared with that measured at the seafloor below W. Which one of the following statements is **WRONG**? *[Select only one answer]*

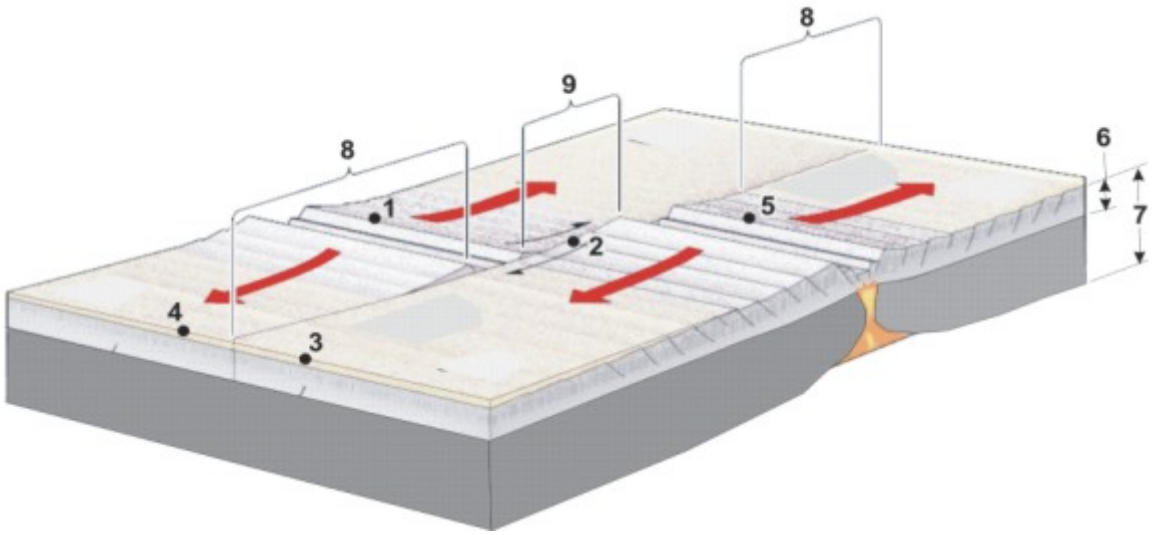


- a. Hydrothermal circulation efficiently cools the hot, young crust near the ridgecrest.
- b. Sediments increasingly blanket the crust with time, sealing off hydrothermal circulation paths
- c. The oceanic crust is older at W than at V, so has had more time to warm through radioactive decay.
- d. Conduction occurs everywhere from the top of the oceanic crust but convection only occurs in specific places.

QUESTION 23

2 points Saved

The sketch below is a cross-section of an oceanic ridgecrest and transform fault (that offsets the ridge). If you look at a map of the seafloor where there is a spreading ridge, you'll see many of these types of offsets (take a look on Google Earth or in the textbook).
Which of the following is true? *[There are several correct answers]*

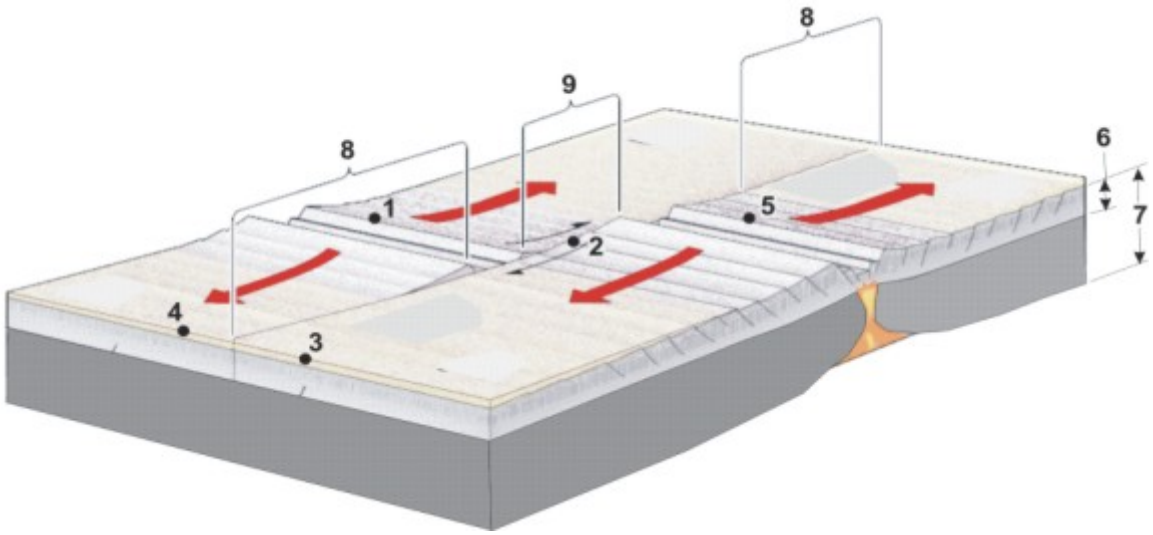


- [x] a. Location 3 is on the same plate as location 4
- [ ] b. Location 3 is on a different plate than location 4
- [x] c. Rock at location 4 is younger than rock at location 3
- [ ] d. Rock at location 4 is older than rock at location 3
- [ ] e. Rock at location 1 is older than rock at location 3

QUESTION 24

1 points Saved

Which of these statements is correct? *[Select only one answer]*



- ( ) a. The temperature of the crust at location 3 is warmer than at location 4
- (•) b. The temperature of the crust at location 3 is cooler than at location 4
- ( ) c. The temperatures of location 3 and 4 should be about the same since they are on the same plate

QUESTION 25

2 points Saved

Match the type of fault to the style of deformation that causes it.

A. Normal fault

C. Thrust (or reverse) fault

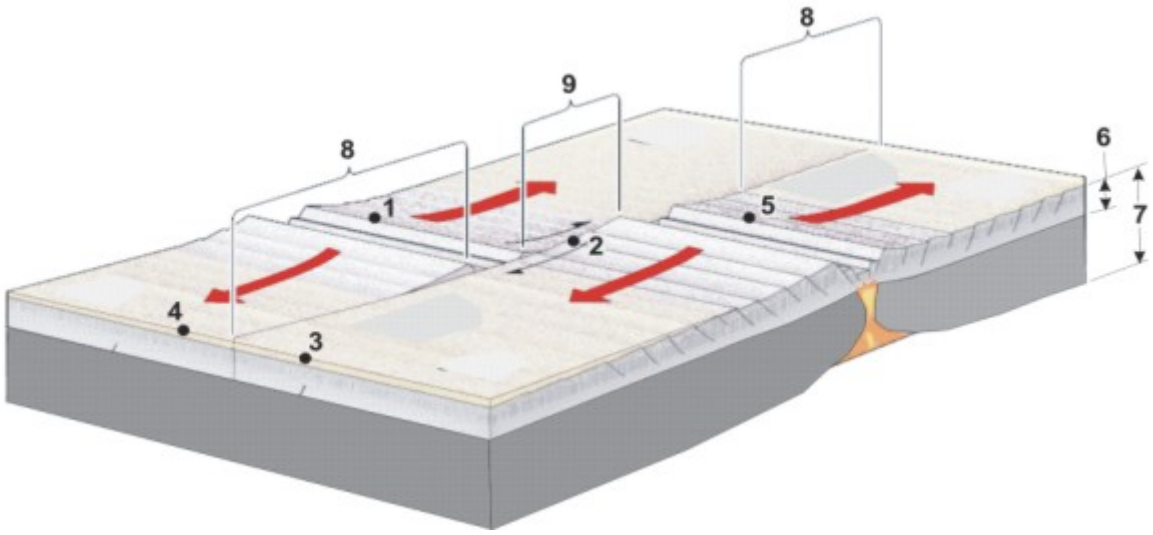
B. Strike-slip fault

A. Extension
B. Regional shear
C. Compression

QUESTION 26

1 points Saved

The sketch below is a cross-section of an oceanic ridgecrest and transform fault (that offsets the ridge).
Where would transform fault earthquakes occur? *[Select one answer]*



a. region 8
b. region 9
c. regions 8 and 9
d. regions 1 and 5
e. regions 1, 5, 8, and 9

QUESTION 27

2 points Saved

On January 22nd, 2013 there was a M4.4 quake beneath Chile.

For more information, see:
Antofagasta, Chile

There are maps and other information (like depth) on those pages (including historical seismicity maps).

From the location of the earthquake and its depth (see the map, you could plug the coordinates into Google Earth if you like), it was most likely related to:

a. Ridgecrest spreading (normal faulting)

b. Subduction thrusting in the overriding plate.

c. Subduction thrusting on the plate interface

d. Transform motion (strike-slip faulting)

e. Subduction-related faulting within the downgoing plate

e. Subduction related faulting within the downgoing plate

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