

Name: _____

Science: _____

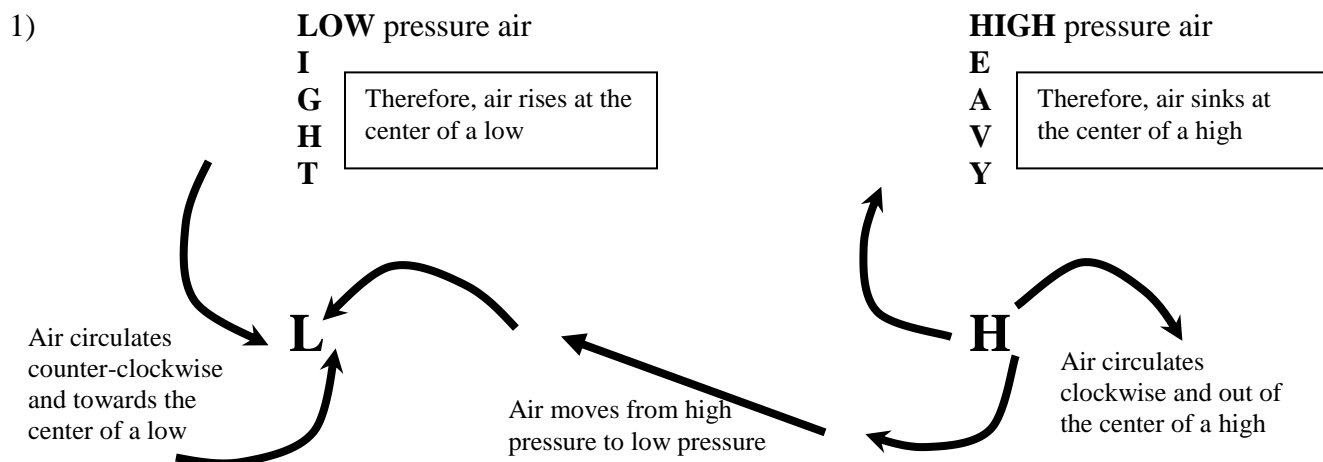
ES Regents Review - Top 100 Concepts and Skills

REMINDER: Make sure you have a couple of sharpened pencils, a couple of pens (black ink only), a calculator (non-graphing only), and a highlighter. Make sure your cell phone is turned OFF.

THINGS TO DO:

- 1) Remember to use your ESRT!!! Most questions can be answered successfully using the ESRT, or at the very least provide hints to the correct answers.
- 2) Go to Mr. Houston's website and use the Regents Review links that he posted under Class Links. Study for about a total of 30 to 60 minutes each night of this week.
- 3) Get a good night's sleep the night before the exam and eat a healthy breakfast.
- 4) If there are a few things that you have a hard time remembering, then at the very start of the exam write them out onto your sheet of scrap paper so you don't forget them while taking the exam.

REGENTS REVIEW:



- 2) **Wind moves the fastest** where isobars are closest and where there is a higher pressure gradient (i.e. a greater amount of change in air pressure over a given distance)
- 3) **Maritime Tropical (mT) air masses** are warm and moist; source region (where they originate from) would be Gulf of Mexico; This air mass would exist **behind a warm front**.
- 4) **Continental Polar (cP) air masses** are cold and dry; source region (where they originate from) would be Central Canada; This air mass would exist **behind a cold front**.
- 5) **Condensation** (gas to liquid); energy is released in this process; Cloud Formation takes place; Condensation begins when the air temperature = dewpoint temperature; relative humidity = 100%
Evaporation (liquid to gas); energy is gained in this process
Precipitation (ex. Rain or snow)
Transpiration = water loss from plants
Infiltration = occurs when water seeps into the soil
- 6) **Dewpoint and Relative Humidity Charts** are located on **pg. 12** of your ESRT.
Temperature and Air Pressure scales can be found on **pg. 13** of your ESRT.

7) **Air mass symbols, Weather front symbols, and Weather Station Model information** can be found on **pg. 13** of your ESRT.

8) **Information about the Earth's Atmosphere and Earth's Planetary Wind and Moisture Belts** can be found on **pg. 14** of your ESRT.

9) The **Altitude of Polaris (the North Star)** is equal to the **Latitude of the Observer**. For example, our Latitude in Baldwinsville is about 43°N (this means we are 43° north of the equator), therefore the Altitude of Polaris in Baldwinsville is also equal to 43° (this means Polaris would be 43° above the northern horizon). At the North Pole (90°N), the Altitude of Polaris is also equal to 90°. So, Polaris would be at your Zenith, directly above your head, if you were standing at the North Pole. Polaris is only visible in the Northern Hemisphere.

10) **Anemometers** measure wind speed, **Wind Vanes** tell us wind direction, **Thermometers** tell us temperature, **Psychrometers** tell us relative humidity and dewpoint temperature, and **Barometers** tell us air pressure.

11) **Glaciers (Ice)** deposits sediment in **unsorted and unlayered** mounds known as **moraines or drumlins**.

12) A **terminal moraine** marks the furthest advance of an ice sheet- it tells us where the ice sheet terminated or ended its advance.

13) **Outwash plains** are made up of **sorted sediments deposited by the melt water** from a glacier.

14) **Sediments deposited in WATER are sorted and layered**.

15) **Stream velocity** decreases as slope decreases. As stream velocity decreases, more sediments are deposited, with the largest, most dense sediments by deposited first and the smallest, least dense sediments being deposited last.

16) **Sediments carried long distances by streams** eventually take on a **rounded shape** due to **abrasion**.

17) We often find **sand dunes** forming in **deserts and along beaches** (or coastlines) due to **wind erosion and deposition**.

18) **Permeability (or Infiltration Rate)** is how easily water moves through a soil (happens best in soils made up of larger sediments with larger pore spaces).

Porosity is the total amount of open space in a soil

Capillarity (or capillary action) is the tendency of water to move upwards in a soil (happens best in soils made up of smaller sediments)

19) The Earth rotates **360° every day (24 hours)**. Therefore, **Earth rotates or spins 15° per hour**. The **Focault Pendulum** provides evidence that the Earth rotates or spins. **Coriolis Effect** occurs due to the Earth's rotation. Photographs of **Star Trails** are also the result of Earth's rotation (rotating at a rate of **15°/hour**), making it appear as though the stars revolve around us.

20) The **noon sun** always faces us from the south in New York State.

21) **Summer Solstice is June 21st** (North Pole is tilted towards the sun). This is when NY receives the **most daylight** and the **sun rises out of the northeast and sets in the northwest**. The **noon sun is at zenith at the Tropic of Cancer**. There is **24 hours of daylight** from the Arctic Circle (66.5°N) to the North Pole (90°N).

22) Winter Solstice is December 21st (North Pole is tilted away from the sun). This is when NY receives the **least daylight** and the **sun rises out of the southeast and sets in the southwest**. The **noon sun is at zenith at the Tropic of Capricorn**. There is **24 hours of nightfall** from the Arctic Circle (66.5°N) to the North Pole (90°N).

23) Fall Equinox is September 22nd and Spring Equinox is March 21st (neither of the Earth's poles are tilted towards or away from the sun): all places on Earth receive **equal amount of day (12 hours) and night (12 hours)**. The **sun rises directly out of the east and sets directly in the west**. The noon sun is at zenith at the Equator.

24) Shadows decrease in length as the sun rises towards solar noon. **Shadows increase in length** as the sun sets after solar noon.

25) Earthquakes most often occur along **plate boundaries or faults**.

26) We know what the inside of the Earth (see pg. 10 of ESRT) is made of based on the behavior of seismic waves after an earthquake.

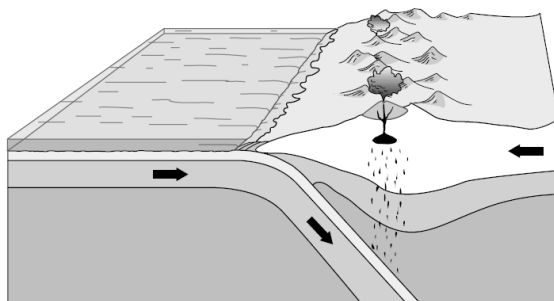
27) P-waves (also called primary waves) are the fastest moving seismic waves, always arrive first at seismic stations, and can travel through solids, liquids, and gases.

28) S-waves (also called secondary waves) are the slower moving seismic waves, always arrive second at seismic stations, and can only travel through solids. Way to remember: **S**-waves only travel through **S**olids.

29) Data from **at least 3 seismic stations** is needed to locate an **earthquake epicenter**.

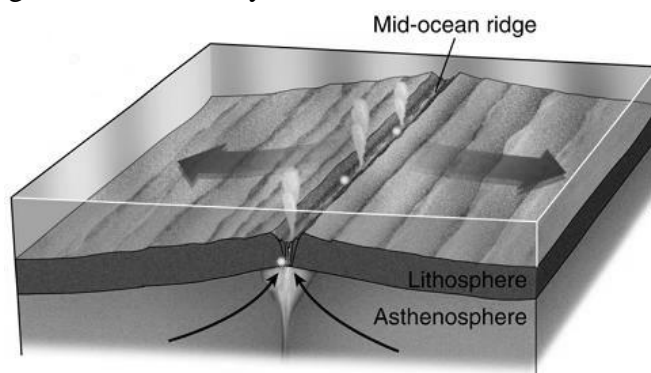
30) There are 3 types of plate boundaries between the Earth's tectonic plates:

A) Convergent Plate boundary



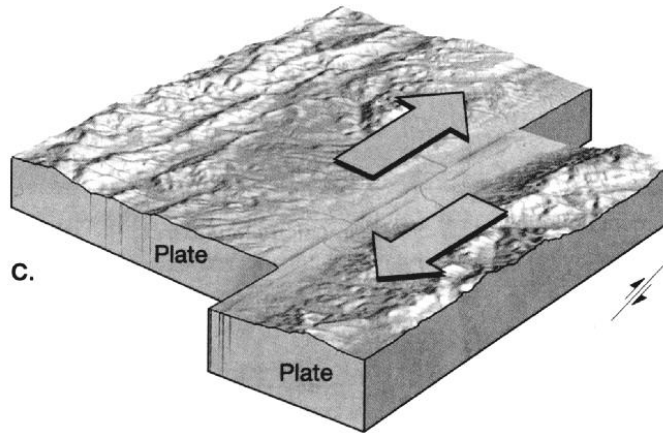
See pg. 5 of your ESRT to located places on Earth where **convergent boundaries** exist.

B) Divergent Plate boundary



See pg. 5 of your ESRT to located places on Earth where **divergent boundaries** exist.

C) Transform Plate boundary



See pg. 5 of your ESRT to located places on Earth where **transform boundaries** exist.

31) A **Hotspot** (try locating at least 3 hotspots on Earth using pg. 5 of your ESRT) is a location where a large amount of magma has accumulated and erupted onto the Earth's surface. The hotspot itself remains in the same location while a tectonic plate moves over it, usually creating a chain of volcanic landforms, like the Hawaiian Islands.

32) **Wind** is caused by differences in air pressure.

33) The greater the difference in air pressure over a shorter distance, the greater the wind speed. This type of condition results in a higher pressure gradient.

34) **Closely spaced isobars** on a weather map indicates **fast wind speeds**, whereas widely-spaced isobars on a weather map indicate slower wind speeds.

35) The majority of **gases in our atmosphere** are thought to have come from the **outgassing of volcanic eruptions**. The **oxygen** in our atmosphere is the result of **photosynthesis from plants**.

36) Air pressure decreases the higher you go in altitude (see the Selected Properties of the Atmosphere table on pg. 14 of the ESRT).

37) Earth's atmosphere is made up of layers or temperature zones, starting with the Troposphere and ending with the Thermosphere).

38) When air temperature is equal to dewpoint temperature, the relative humidity is 100%.

39) Condensation nuclei (examples: dust particles, pollen particles in the air) are necessary for clouds to form.

40) The **Coriolis Effect** provides evidence that the Earth spins or rotates. Air is deflected (curved) towards the right in the northern hemisphere and to the left in the southern hemisphere due to the Coriolis Effect.

41) The **Focault Pendulum** provides evidence that Earth spins or rotates.

42) Changes in the positions of the **constellations** from one season to the next provide **evidence that Earth revolves around the sun**.

43) The **ocean tides are cyclic**- there are 2 high tides and 2 low tides every day. The gravitational pull of the moon and sun influence the changing tides. Spring tides (extreme high and low tides) occur when the Earth, moon, and sun are aligned. Neap tides (very little high or low tides) occur when the Earth, moon, and sun are at a right angle to each other.

44) The **universe** is thought to be over 10 billion years old. The most supported theory on the formation of the universe is the big bang theory. The evidence supporting this theory include cosmic background radiation and the Doppler Effect (red shift suggests the universe is expanding).

45) The **force of gravity** between 2 objects becomes greater when the following is true:

- the mass of either or both objects increases.
- the distance between the 2 objects decreases.

46) The **phases of the moon** are **cyclic** (repeat in a predictable pattern). It takes about **29.5 days** to complete one cycle of phases (from one full moon to the next full moon), whereas it takes **27.3 days** for the moon to revolve around the Earth one time.

47) **Solar eclipses** (the sun is blocked by the moon) occur when the Sun-Moon-Earth are aligned, during a new moon phase.

48) **Lunar eclipses** (the Earth blocks sunlight from reaching the moon) occur when the Sun-Earth-Moon are aligned, during a full moon phase.

49) **The Solar System and Earth** are thought to be about **4.5 billion years old**.

50) **Nuclear fusion** between **hydrogen** atoms provides the **energy and light in stars**.

51) Small, low-mass stars live longer lives than large, high-mass stars because they burn their fuel more slowly.

52) Our sun is one of billions of stars that make up the **Milky Way Galaxy**, which is a **spiral** galaxy.

53) The **solar system** is thought to have formed from a nebula (a large cloud of dust and gas) that collapsed under the force of gravity.

54) The **terrestrial planets** are small, rocky and high density, whereas the **Jovian (gas giants)** planets are large, gaseous and low density.

55) Wind erosion most often occurs along beaches and in deserts, forming structures like sand dunes.

56) The closer a location is to a large body of water, the warmer the winter-time temperatures and the cooler the summer-time temperatures. Therefore, there is a smaller yearly temperature range the closer you are to a large body of water.

57) The absolute age (how old a rock or fossil is in years) can be determined through radioactive dating and half-lives. A half-life is the amount of time needed for half of a radioactive element to decay into a stable element (see page 1 of your ESRT). Carbon-14 dating only works well on fossils that are no more than 50,000 years old because Carbon-14's half-life is only 5,700 years.

58) Rules to follow when finding the **relative ages** (the age of a rock layer in comparison to another) of rock layers:

A) **Law of Superposition**- rock layers on the bottom are oldest; layers on top are the youngest.

B) **Cross-cutting rule**- any rock (i.e. igneous intrusion) that cuts across another rock is always younger in age.

C) **Faults** are always younger in age than the rocks they cut across.

D) Any **inclusion** (a broken piece of rock found within a newly formed rock) found within a rock is always older in age than the rock it occurs in.

59) Minerals are naturally occurring, inorganic solids, with a definite chemical composition and crystalline structure.

60) **Minerals** are identified based on the following properties:

1) **Streak**: the powder form of a mineral left behind on a streak plate.

2) **Hardness**: the ability of a mineral to scratch or be scratched (i.e. a mineral is harder than glass if it can scratch glass).

3) **Luster**: The way a mineral reflects light.

Metallic Luster- the mineral reflects light like a metal

Non-metallic Luster- the mineral reflects light like non-metal objects (i.e. glassy, waxy, pearly, etc..)

4) **Cleavage vs. Fracture**: Minerals that cleave will break along flat surfaces that are at repeating, symmetrical angles. Minerals that fracture will break in an asymmetrical, irregular pattern.

61) Approximately 70% of the Earth's surface is covered by water.

62) Asteroids, Comets, and Meteors orbit the sun. The **Asteroid belt** is located between the orbits of Mars and Jupiter. Many comets and asteroids have highly elliptical orbits.

63) **Asteroid impacts** on Earth have left behind large craters on the surface. A large asteroid impact is linked to the **extinction of the dinosaurs**, approximately 65 million years ago.

64) Compared to the history of the Earth (the past 4.5 billion years), **humans** have existed on Earth for only a brief amount of time (within the last 100,000 years).

65) **Index fossils** represent organisms that lived on Earth for a relatively short period of time, however while they were living covered a large geographic area. In other words, it's the fossil of an organism that lived in a lot of places, however only existed on earth for a short time.

66) **Convection currents** occur because of differences in heating, resulting in differences in density. As a substance is heated it becomes less dense and rises. Later it cools, becomes denser and sinks, completing the convection current. Convection currents in the Mantle are thought to drive the movement of the Earth's tectonic plates. Convection currents in Earth's atmosphere help to distribute air and energy.

67) **Prevailing winds** (also called planetary winds or jet stream winds) move and steer storm systems generally from southwestern parts of the U.S. to northeastern parts of the U.S.

68) **Oceanic crust** is thinner and denser than Continental crust.

69) **New oceanic crust** forms at **mid-ocean ridges**. The further away you move from a mid-ocean ridge, the older the oceanic crust.

70) **Closely spaced contour lines** indicate a steep slope.

71) **V-shaped contour lines** always point up-hill or up-stream.

72) The contour interval is the amount of change in elevation between each contour line.

73) **Landforms**, such as plains, valleys, mountains, and plateaus and stream drainage patterns take on their characteristics due to differences in climate, type of bedrock, and bedrock structure.

74) There are **2 types of weathering- physical and chemical**. An example of physical weathering is abrasion or frost action. An example of chemical weathering is the dissolving of limestone due to acidic water.

75) **Soils** form due to physical and chemical weathering and biologic (animal and plant) activity.

76) As sediments are transported long distances in a stream they become **rounded in shape** due to **abrasion**.

77) **Stream erosion** tends to form V-shaped valleys, whereas **glacial erosion** tends to form U-shaped valleys.

78) Glacial striations (or scratch marks) on bedrock and glacial erratics (large boulders of a different rock type and age than the surrounding bedrock) provide evidence of glacial activity in the past.

79) **Sedimentary rocks** form when sediments are compacted and cemented together.

80) Larger, heavier sediments (such as, pebbles or cobbles) always settle and deposit in water faster than smaller, lighter sediments (such as, silt or sand).

81) **Insolation** (stands for “Incoming Solar Radiation”) is the amount of sun’s energy that reaches the Earth’s surface. As the angle of insolation decreases (in other words, the sun is lower in the sky and closer to the horizon), the amount of solar energy received also decreases. As the angle of insolation increases, the amount of solar energy received also increases.

82) **Igneous rocks** form from the cooling and hardening (or solidification) of magma or lava.

83) **Intrusive** igneous rocks form when magma (hot, liquid rock inside of the Earth) cools and hardens slowly, allowing the crystals time to grow larger (coarse texture) in size.

84) **Extrusive** igneous rocks form when lava (hot, liquid rock outside of the Earth, on Earth’s surface) cools and hardens quickly, giving the crystals very little time to grow. Therefore, they are smaller (fine texture) in size.

85) **Metamorphic rocks** form when any pre-existing rock is subjected to heat and pressure, causing the rock to re-crystallize and change its form.

86) Some rocks (such as rock salt) and minerals (such as halite) form as chemical precipitates, when **seawater evaporates** rapidly and salt crystallizes in the water, leaving behind salt crystals.

87) **Lower latitudes** (locations closer to the equator) tend to have warmer climates than higher latitudes (locations closer to the poles) due to differences in the amount of insolation received.

88) Locations that are near **warm ocean currents** tend to have warmer climates, whereas locations that are near **cold ocean currents** tend to have cooler climates.

89) Locations with **high elevations** tend to have colder, moister climates than lower elevations.

90) The color and texture of a surface affects its ability to absorb or reflect sunlight. Dark-colored, rough surfaces (ex. Black-top pavement) absorb (take in or “soak up”) sunlight better than light-colored, smooth surfaces (ex. ice or snow).

91) Explosive **volcanic eruptions** can release large amounts of ash and dust into the atmosphere. This can reduce the **atmospheric transparency** (transparency is how easily light can travel through something), which reduces the amount of sunlight able to reach Earth’s surface, ultimately cooling temperatures on Earth.

92) The **greenhouse effect** is caused by **greenhouse gases** (such as carbon dioxide, methane, and water vapor) that allow visible light (shorter wavelength radiation) to pass through Earth’s atmosphere; however they trap infrared (heat) energy (longer wavelength radiation) from escaping. This ultimately causes the Earth’s atmosphere to warm-up.

93) **Sources of greenhouse gases** include the exhaust from cars, trucks, and gas-powered engines, coal-burning factories, and the burning of forests.

94) A warming Earth could cause **ice to melt at the Earth’s poles**, which in turn could cause **sea levels to rise**.

95) In the event of an **Earthquake**, you should get underneath a sturdy table or desk. If possible, make sure there is nothing overhead that could fall on you.

96) In the event of a **tornado**, get to the lowest ground possible- this includes a basement or low-lying ditch.

97) In the event of a **severe thunderstorm with lightning**, seek shelter/get indoors and to the lowest ground possible.

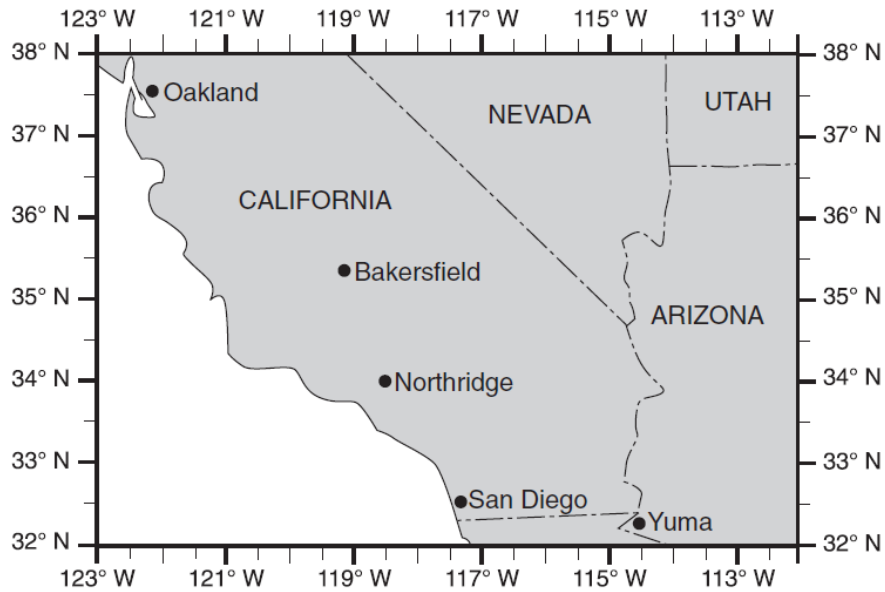
98) In the event of an approaching **hurricane**, evacuate far inland and/or seek a hurricane shelter due to destructive winds and storm surge (flooding).

99) In the event of an approaching **tsunami**, get to the highest ground possible as quickly as you can.

100) In the event of an approaching **blizzard or ice storm**, make sure you gather plenty of warm clothes and blankets, canned foods and water, flashlights with batteries, road salt, and candles due to possible power outages and/or becoming trapped within your home.

Skill-based activities:

I. Practice with Latitude and Longitude & Earthquakes



1) State the latitude and longitude of Northridge, California. Include the correct units and compass directions.

Latitude = _____ Longitude = _____

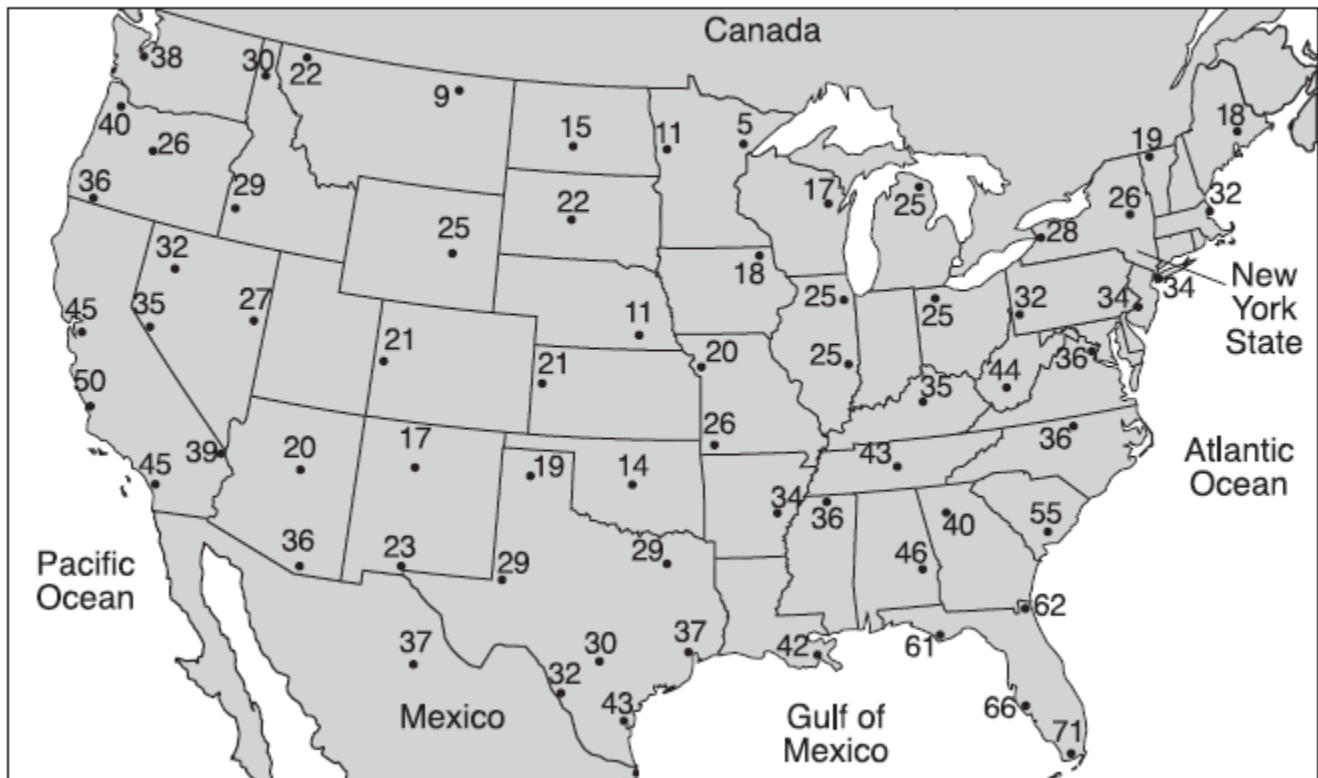
2) Explain why earthquakes are common in this region of California.

3) Of the cities shown on the map, explain why Oakland was the last city to receive *P*-waves from this earthquake.

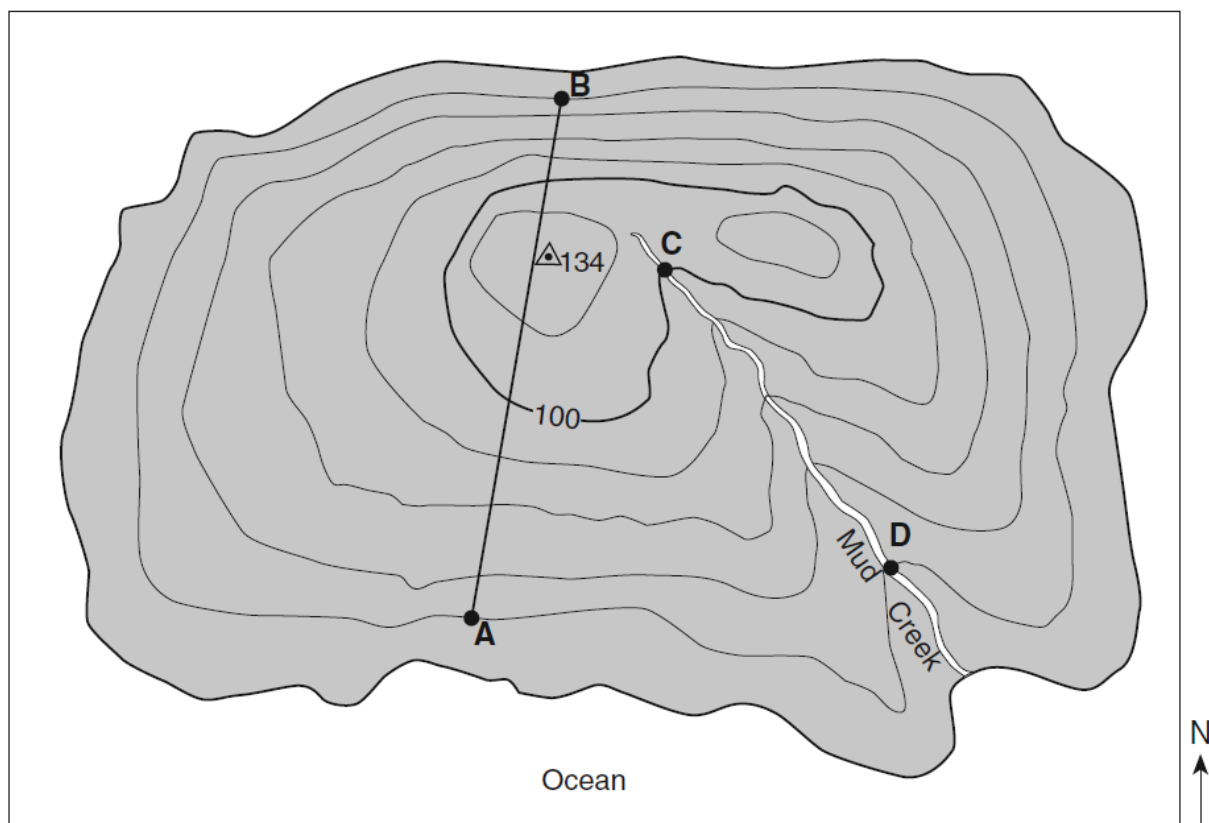
4) List *two* actions that a homeowner could take to prepare the home or family for the next earthquake.

II. On the map below draw the 32°F isotherm. Extend the isotherm to either the edge of the continent or map.

Map 1—Temperatures (°F)

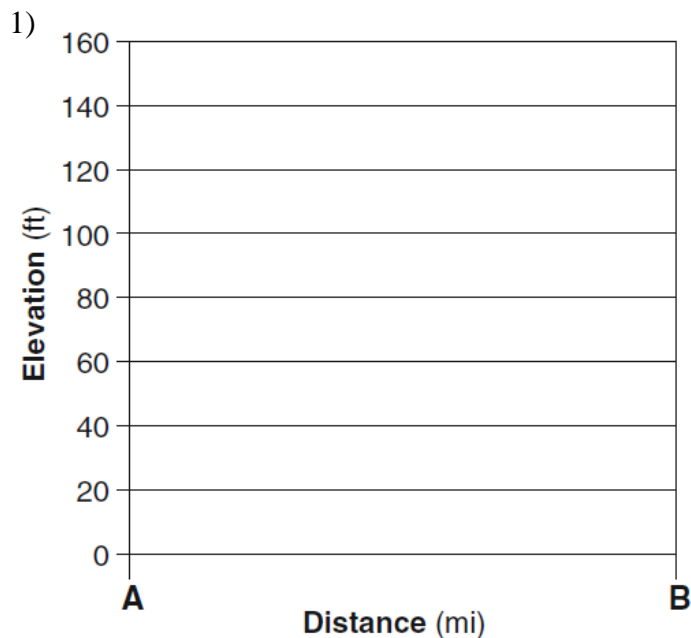


III. Practice Drawing a Profile, Reading a Topographic Map, and Calculating Gradient.



0 1 2 3 4 5 6 mi

Contour interval = 20 feet



3) Which side of the island has the steepest slope?

4) Which compass direction is Mud Creek flowing in?

2) Gradient = _____ (include correct units)

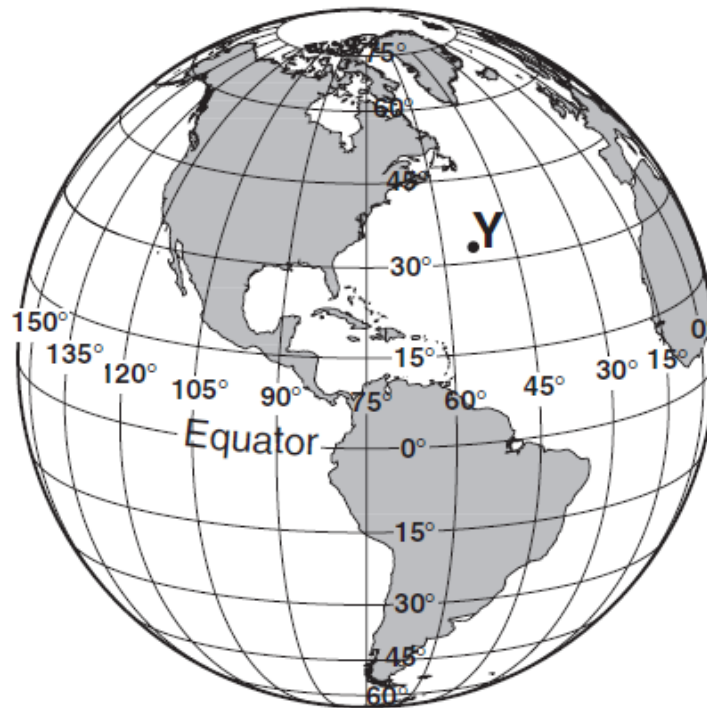
Show steps for calculating gradient below:

IV. Practice with Latitude and Longitude & Relationship between Time and Longitude

Directions: Base your answers to questions 1 and 2 on the diagram in your answer booklet, which shows the latitude/longitude grid on a model of Earth. Point *Y* is a location on Earth's surface.

- 1) On the diagram *below*, place an **X** at 15° S 30° W.
- 2) What is Earth's rate of rotation at point *Y*, in degrees per hour?

1)



2) _____ °/hr