

The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

PHYSICAL SETTING
EARTH SCIENCE

Tuesday, June 18, 2002 — 9:15 a.m. to 12:15 p.m., only

This is a test of your knowledge of Earth science. Use that knowledge to answer all questions in this examination. Some questions may require the use of the *Earth Science Reference Tables*. The *Earth Science Reference Tables* are supplied separately. Be certain you have a copy of the 2001 edition of these reference tables before you begin the examination.

Your answer sheet for Part A and Part B–1 is the last page of this examination booklet. Turn to the last page and fold it along the perforations. Then, slowly and carefully, tear off your answer sheet and fill in the heading.

Your answer booklet for Part B–2 and Part C is stapled in the center of this examination booklet. Open the examination booklet, carefully remove your answer booklet, and close the examination booklet. Then fill in the heading of your answer booklet.

You are to answer *all* questions in all parts of this examination according to the directions provided in the examination booklet. Record your answers to the Part A and Part B–1 multiple-choice questions on your separate answer sheet. Write your answers to the Part B–2 and Part C questions in your answer booklet. All work should be written in pen, except for graphs and drawings, which should be done in pencil. You may use scrap paper to work out the answers to the questions, but be sure to record all your answers on your answer sheet and answer booklet.

When you have completed the examination, you must sign the statement printed at the end of your separate answer sheet, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during the examination. Your answer sheet and answer booklet cannot be accepted if you fail to sign this declaration.

Notice. . .

A four-function or scientific calculator and a copy of the 2001 *Earth Science Reference Tables* must be available for your use while taking this examination.

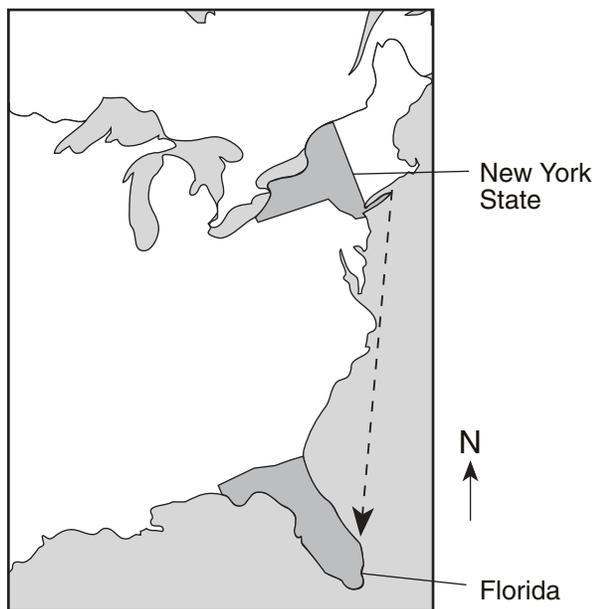
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

Part A

Answer all questions in this part.

Directions (1–35): For *each* statement or question, write on your separate answer sheet the *number* of the word or expression that, of those given, best completes the statement or answers the question. Some questions may require the use of the *Earth Science Reference Tables*.

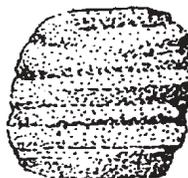
- 1 The dashed line on the map below shows a ship's route from Long Island, New York, to Florida. As the ship travels south, the star *Polaris* appears lower in the northern sky each night.



The best explanation for this observation is that *Polaris*

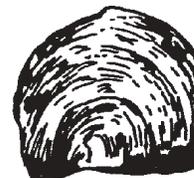
- (1) rises and sets at different locations each day
(2) has an elliptical orbit around Earth
(3) is located directly over Earth's Equator
(4) is located directly over Earth's North Pole
- 2 When the dry-bulb temperature is 22°C and the wet-bulb temperature is 13°C, the relative humidity is
- (1) 10% (3) 41%
(2) 33% (4) 59%
- 3 As the altitude increases within Earth's stratosphere, air temperature generally
- (1) decreases, only
(2) increases, only
(3) decreases, then increases
(4) increases, then decreases

- 4 The diagrams below represent four rock samples. Which rock was formed by rapid cooling in a volcanic lava flow? [The diagrams are not to scale.]



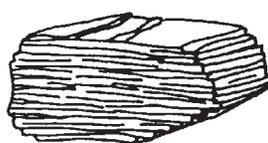
Bands of alternating light and dark minerals

(1)



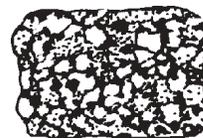
Glassy black rock that breaks with a shell-shape fracture

(3)



Easily split layers of 0.0001-cm-diameter particles cemented together

(2)

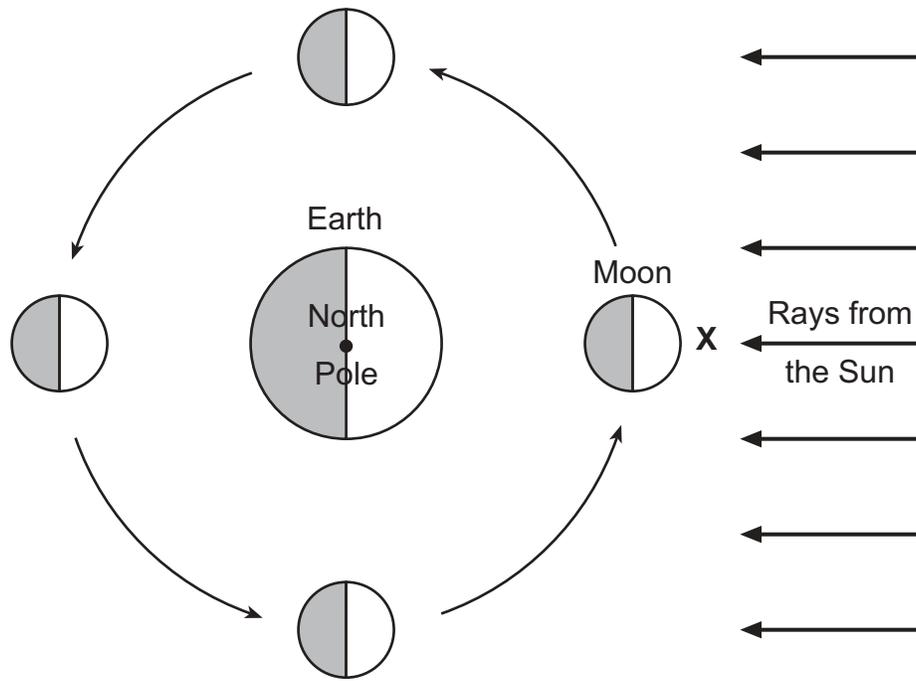


Interlocking 0.5-cm-diameter crystals of various colors

(4)

- 5 On June 21, some Earth locations have 24 hours of daylight. These locations are all between the latitudes of
- (1) 0° and 23½° N
(2) 23½° N and 47° N
(3) 47° N and 66½° N
(4) 66½° N and 90° N
- 6 The Milky Way galaxy is best described as
- (1) a type of solar system
(2) a constellation visible to everyone on Earth
(3) a region in space between the orbits of Mars and Jupiter
(4) a spiral-shaped formation composed of billions of stars

7 The diagram below shows the Moon at four positions in its orbit around Earth as viewed from above the North Pole.

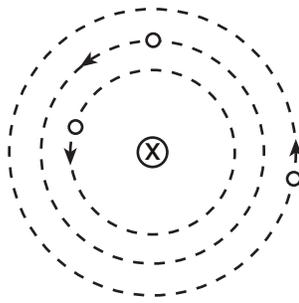


(Not drawn to scale)

Beginning with the Moon at position X (the new-Moon phase), which sequence of Moon phases would be seen by an observer on Earth during 1 month?

- (1)
- (2)
- (3)
- (4)

- 8 The diagram below represents a simple geocentric model. Which object is represented by the letter X?

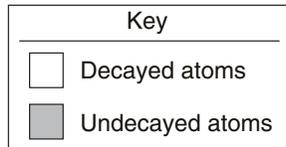
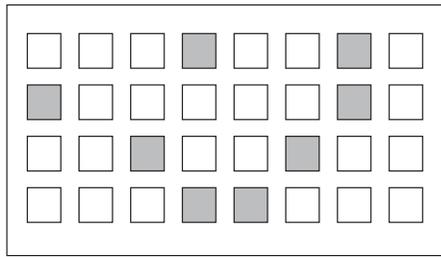


(Not drawn to scale)

- (1) Earth (3) Moon
(2) Sun (4) *Polaris*
- 9 Which condition would cause surface runoff to increase in a particular location?
- (1) covering a dirt road with pavement
(2) reducing the gradient of a steep hill
(3) planting grasses and shrubs on a hillside
(4) having a decrease in the annual rainfall
- 10 An increase in which gas would cause the most greenhouse warming of Earth's atmosphere?
- (1) nitrogen (3) carbon dioxide
(2) oxygen (4) hydrogen
- 11 Scientists believe that Earth's early atmosphere changed in composition as a result of
- (1) the appearance of oxygen-producing organisms
(2) the drifting of the continents
(3) the changes in Earth's magnetic field
(4) a transfer of gases from the Sun
- 12 Which atmospheric conditions would cause smoke from a campfire on a beach to blow toward the ocean?
- (1) warm air over the land and cool air over the ocean
(2) humid air over the land and dry air over the ocean
(3) low-density air over the land and high-density air over the ocean
(4) high air pressure over the land and low air pressure over the ocean

- 13 Which characteristics of a building material would provide the most energy-absorbing exterior covering for a house?
- (1) dark colored and smooth textured
(2) dark colored and rough textured
(3) light colored and smooth textured
(4) light colored and rough textured
- 14 When the time of day for a certain ship at sea is 12 noon, the time of day at the Prime Meridian (0° longitude) is 5 p.m. What is the ship's longitude?
- (1) 45° W (3) 75° W
(2) 45° E (4) 75° E
- 15 The occurrence of parallel scratches on bedrock in a U-shaped valley indicates that the area has most likely been eroded by
- (1) a glacier (3) waves
(2) a stream (4) wind
- 16 Which weather change usually occurs when the difference between the air temperature and the dewpoint temperature is *decreasing*?
- (1) The amount of cloud cover decreases.
(2) The probability of precipitation decreases.
(3) The relative humidity increases.
(4) The barometric pressure increases.
- 17 In which list are the forms of electromagnetic energy arranged in order from longest to shortest wavelengths?
- (1) gamma rays, x rays, ultraviolet rays, visible light
(2) radio waves, infrared rays, visible light, ultraviolet rays
(3) x rays, infrared rays, blue light, gamma rays
(4) infrared rays, radio waves, blue light, red light
- 18 On a clear summer day, the surface of land is usually warmer than the surface of a nearby body of water because the water
- (1) receives less insolation
(2) reflects less insolation
(3) has a higher density
(4) has a higher specific heat

- 19 The diagram below represents the present number of decayed and undecayed atoms in a sample that was originally 100% radioactive material.



If the half-life of the radioactive material is 1,000 years, what is the age of the sample represented by the diagram?

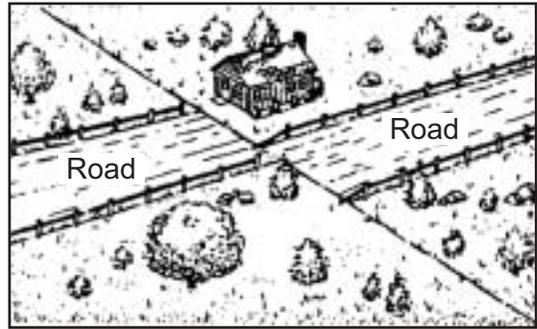
- (1) 1,000 yr (3) 3,000 yr
 (2) 2,000 yr (4) 4,000 yr
- 20 Earth's outer core is best inferred to be
- (1) liquid, with an average density of approximately 4 g/cm³
 (2) liquid, with an average density of approximately 11 g/cm³
 (3) solid, with an average density of approximately 4 g/cm³
 (4) solid, with an average density of approximately 11 g/cm³
- 21 The table below shows the rate of erosion and the rate of deposition at four stream locations.

Location	Rate of Erosion (tons/year)	Rate of Deposition (tons/year)
A	3.00	3.25
B	4.00	4.00
C	4.50	4.65
D	5.60	5.20

A state of dynamic equilibrium exists at location

- (1) A (3) C
 (2) B (4) D

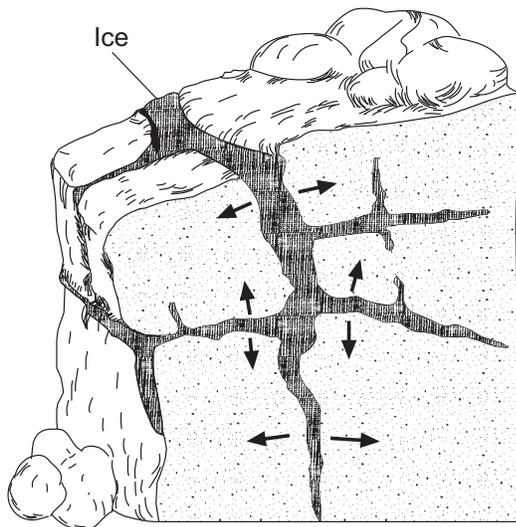
- 22 The diagram below shows land features that have been disrupted by an earthquake.



Which type of crustal movement most likely caused the displacement of features in this area?

- (1) vertical lifting of surface rock
 (2) folding of surface rock
 (3) down-warping of the crust
 (4) movement along a transform fault
- 23 The Coriolis effect provides evidence that Earth
- (1) rotates (3) has seasons
 (2) has a tilted axis (4) revolves
- 24 Which interaction between the atmosphere and the hydrosphere causes most surface ocean currents?
- (1) cooling of rising air above the ocean surface
 (2) evaporation of water from the ocean surface
 (3) friction from planetary winds on the ocean surface
 (4) seismic waves on the ocean surface
- 25 On a field trip 40 kilometers east of the Finger Lakes, students observed a boulder of gneiss on the surface bedrock. This observation best supports the inference that the
- (1) surface sedimentary bedrock was weathered to form a boulder of gneiss
 (2) surface sedimentary bedrock melted and solidified to form a boulder of gneiss
 (3) gneiss boulder was formed from sediments that were compacted and cemented together
 (4) gneiss boulder was transported from its original area of formation

- 26 The diagram below shows granite bedrock with cracks. Water has seeped into the cracks and frozen. The arrows represent the directions in which the cracks have widened due to weathering.



Which statement best describes the physical weathering shown by the diagram?

- (1) Enlargement of the cracks occurs because water expands when it freezes.
- (2) This type of weathering occurs only in bedrock composed of granite.
- (3) The cracks become wider because of chemical reactions between water and the rock.
- (4) This type of weathering is common in regions of primarily warm and humid climates.

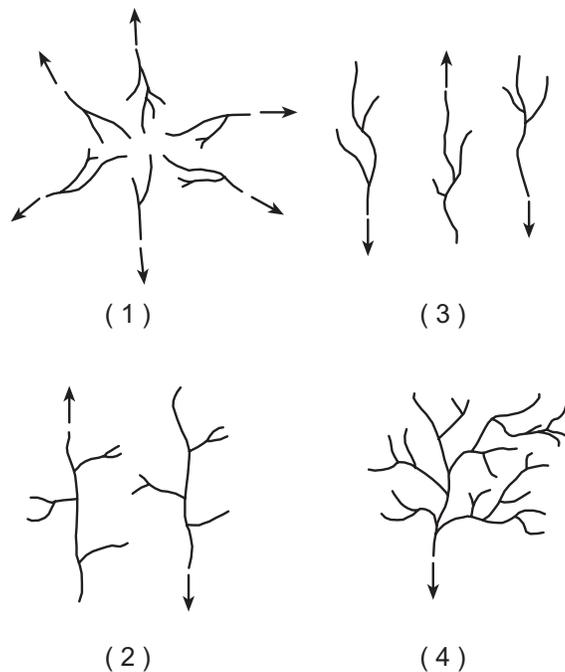
- 27 The table below shows the density of four mineral samples.

Mineral	Density (g/cm ³)
Cinnabar	8.2
Magnetite	5.2
Quartz	2.7
Siderite	3.9

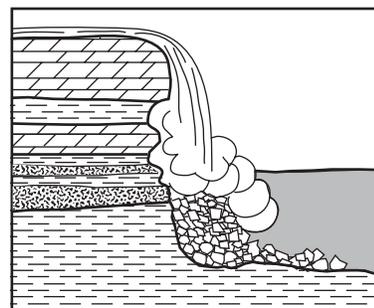
If the shape and size of the four mineral samples are the same, which mineral will settle most *slowly* in water?

- (1) cinnabar
- (2) magnetite
- (3) quartz
- (4) siderite

- 28 Which stream-drainage pattern most likely developed on the surface of a newly formed volcanic mountain?



- 29 The cross section below shows sedimentary rocks being eroded by water at a waterfall.



The sedimentary rock layers are being weathered and eroded at different rates primarily because the rock layers

- (1) formed during different time periods
- (2) contain different fossils
- (3) have different compositions
- (4) are horizontal

Base your answers to questions 30 and 31 on the photograph below, which shows an outcrop of sedimentary rock layers that have been tilted and slightly metamorphosed.



30 The tilted rock structure shown in the photograph is most likely the result of the

- (1) deposition of rock fragments on a mountain slope
- (2) reversal of past magnetic poles
- (3) passage of seismic waves
- (4) collision of crustal plates

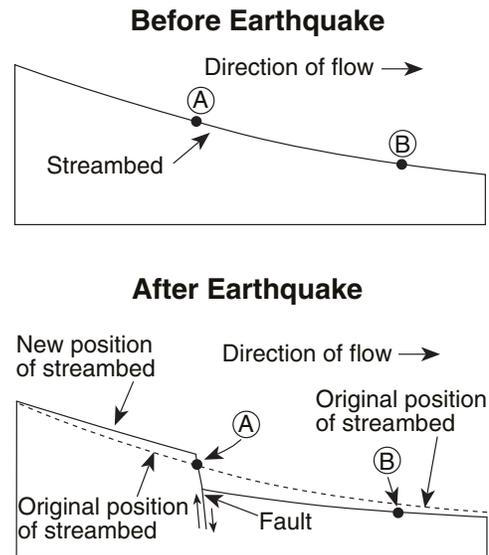
31 Tilted, slightly metamorphosed rock layers such as these are typically found in which New York State landscape region?

- (1) Taconic Mountains
- (2) Atlantic Coastal Plain
- (3) Tug Hill Plateau
- (4) Erie-Ontario Lowlands

32 A stream with a water velocity of 150 centimeters per second decreases to a velocity of 100 centimeters per second. Which sediment size will most likely be deposited?

- | | |
|-------------|--------------|
| (1) pebbles | (3) boulders |
| (2) sand | (4) cobbles |

33 The diagram below shows a stream profile before and after an earthquake. Points A and B are locations along the streambed.



What is the probable relationship between erosion and deposition at points A and B after the earthquake?

- (1) There is more deposition at point A and more erosion at point B.
- (2) There is more erosion at point A and more deposition at point B.
- (3) There is more deposition than erosion at points A and B.
- (4) There is more erosion than deposition at points A and B.

Note that questions 34 and 35 have only three choices.

34 As air on the surface of Earth warms, the density of the air

- (1) decreases
- (2) increases
- (3) remains the same

35 Compared to the average density of the terrestrial planets (Mercury, Venus, Earth, and Mars), the average density of the Jovian planets (Jupiter, Saturn, Uranus, and Neptune) is

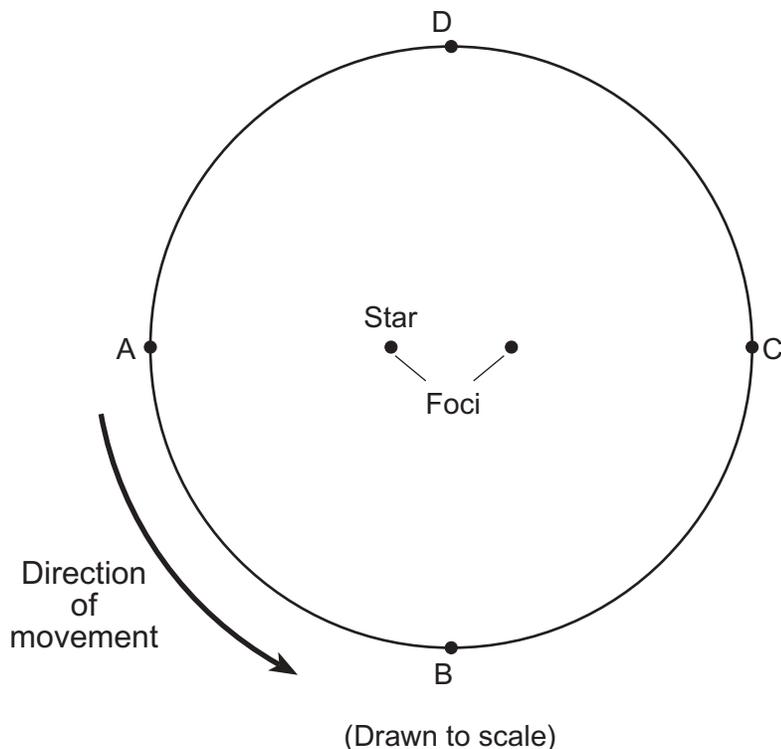
- (1) less
- (2) greater
- (3) the same

Part B-1

Answer all questions in this part.

Directions (36–50): For *each* statement or question, write on your separate answer sheet the *number* of the word or expression that, of those given, best completes the statement or answers the question. Some questions may require the use of the *Earth Science Reference Tables*.

Base your answers to questions 36 through 38 on the diagram below, which represents the elliptical orbit of a planet traveling around a star. Points *A*, *B*, *C*, and *D* are four positions of this planet in its orbit.



36 The calculated eccentricity of this orbit is approximately

- (1) 0.1
- (2) 0.2
- (3) 0.3
- (4) 0.4

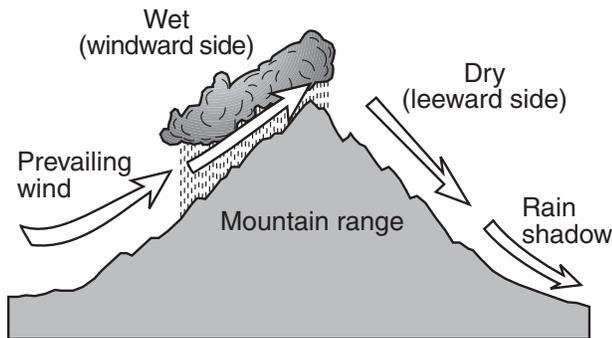
37 The gravitational attraction between the star and the planet will be greatest at position

- (1) A
- (2) B
- (3) C
- (4) D

38 As the planet revolves in orbit from position *A* to position *D*, the orbital velocity will

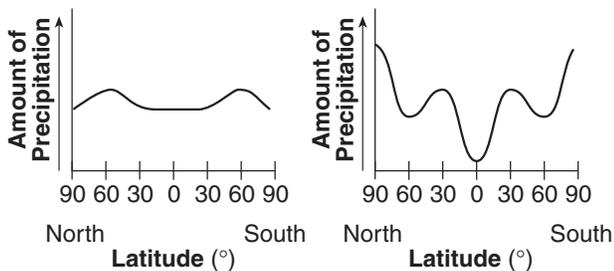
- (1) continually decrease
- (2) continually increase
- (3) decrease, then increase
- (4) increase, then decrease

- 39 The cross section below shows how prevailing winds have caused different climates on the windward and leeward sides of a mountain range.

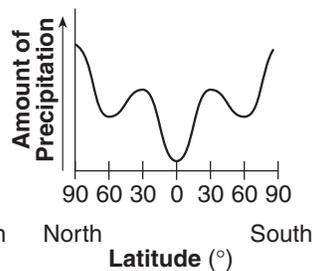


Why does the windward side of this mountain have a wet climate?

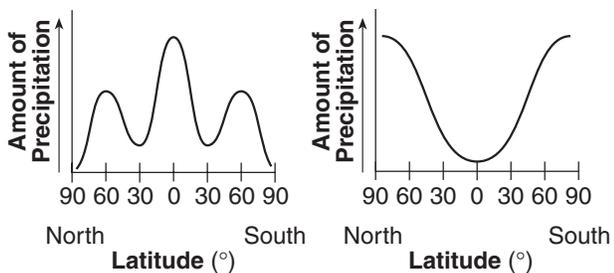
- (1) Rising air compresses and cools, causing the water droplets to evaporate.
 - (2) Rising air compresses and warms, causing the water vapor to condense.
 - (3) Rising air expands and cools, causing the water vapor to condense.
 - (4) Rising air expands and warms, causing the water droplets to evaporate.
- 40 Which graph best shows the average annual amounts of precipitation received at different latitudes on Earth?



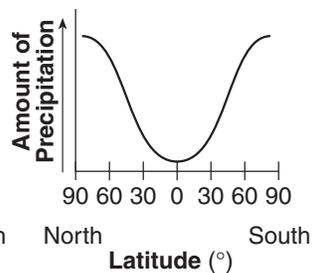
(1)



(3)



(2)

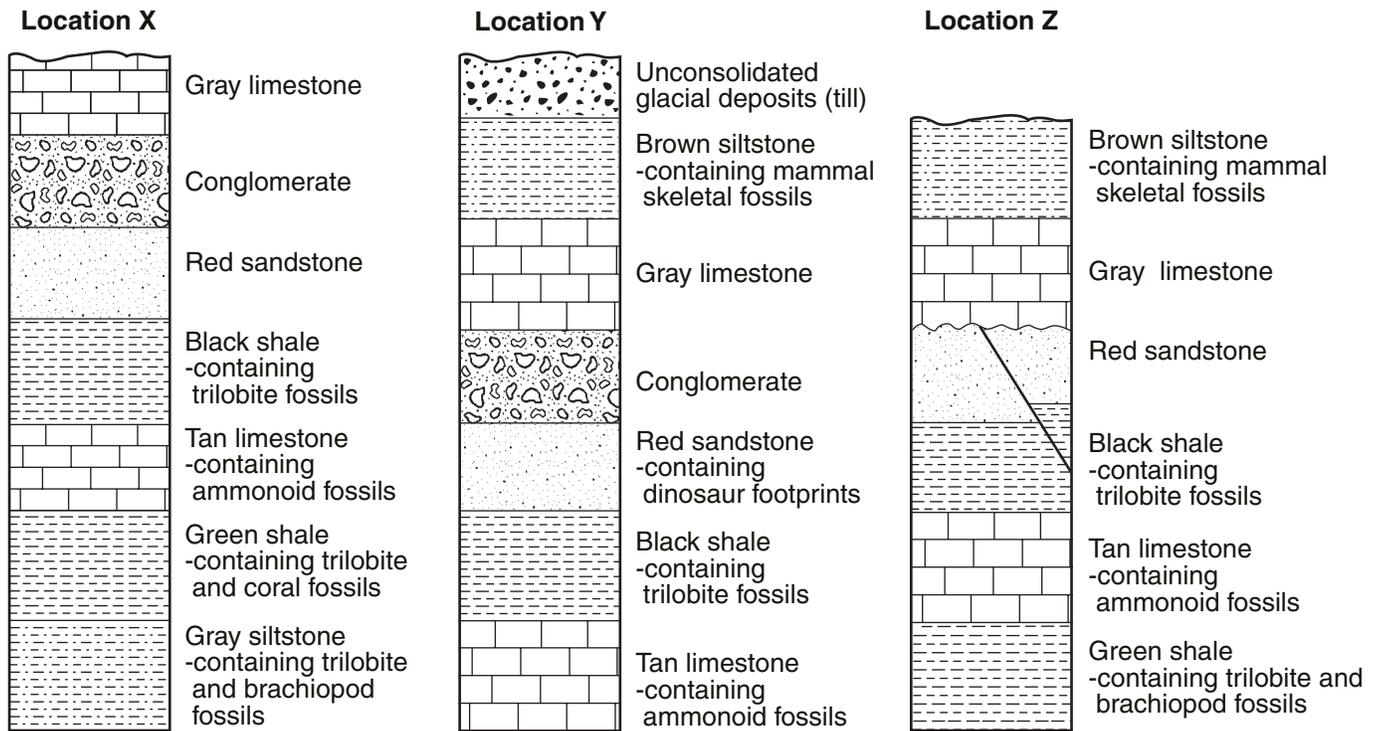


(4)

Base your answers to questions 41 through 44 on the "Properties of Common Minerals" chart in the *Earth Science Reference Tables*.

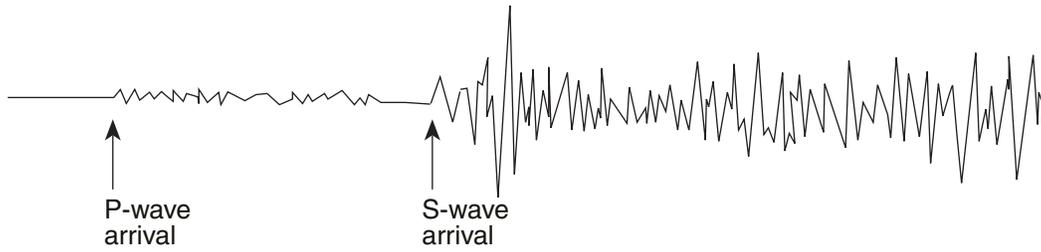
- 41 Which mineral leaves a green-black powder when rubbed against an unglazed porcelain plate?
- (1) galena
 - (2) graphite
 - (3) hematite
 - (4) pyrite
- 42 Which mineral scratches dolomite and is scratched by olivine?
- (1) galena
 - (2) quartz
 - (3) potassium feldspar
 - (4) muscovite mica
- 43 Which statement about the minerals plagioclase feldspar, gypsum, biotite mica, and talc can best be inferred from the chart?
- (1) These minerals have the same chemical and physical properties.
 - (2) These minerals have different chemical properties, but they have similar physical properties.
 - (3) These minerals have different physical and chemical properties, but they have identical uses.
 - (4) The physical and chemical properties of these minerals determine how humans use them.
- 44 Minerals from this chart are found in several different rocks. Which two rocks are primarily composed of a mineral that bubbles with acid?
- (1) limestone and marble
 - (2) granite and dolostone
 - (3) sandstone and quartzite
 - (4) slate and conglomerate

Base your answers to questions 45 through 49 on the cross sections below, which show widely separated outcrops at locations X, Y, and Z.

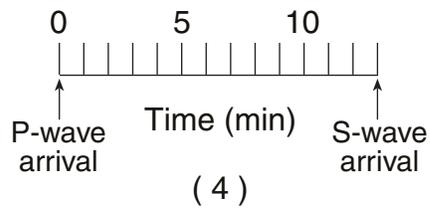
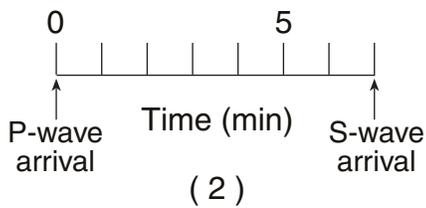
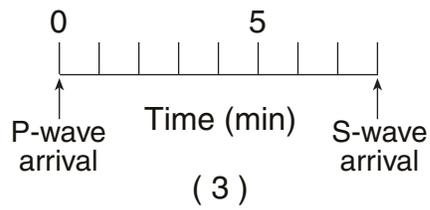
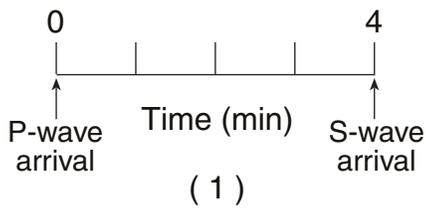


- 45 Which rock layer is oldest?
- (1) gray siltstone
 - (2) green shale
 - (3) tan limestone
 - (4) brown siltstone
- 46 At location Y, the boundary between the red sandstone and the black shale marks the
- (1) beginning of the Cenozoic Era
 - (2) beginning of the Mesozoic Era
 - (3) end of the Cenozoic Era
 - (4) end of the Mesozoic Era
- 47 An unconformity can be observed at location Z. Which rock layer was most probably removed by erosion during the time represented by the unconformity?
- (1) conglomerate
 - (2) gray siltstone
 - (3) black shale
 - (4) brown siltstone
- 48 The fossils in the rock formations at location X indicate that this area was often covered by
- (1) tropical rain forests
 - (2) glacial ice
 - (3) desert sand
 - (4) seawater
- 49 Which rock layer was formed by the compaction and cementation of particles that were all less than 0.0004 centimeter in diameter?
- (1) red sandstone
 - (2) green shale
 - (3) brown siltstone
 - (4) conglomerate

50 The diagram below is a seismogram of the famous San Francisco earthquake of 1906, recorded at a seismic station located 6,400 kilometers from San Francisco.



Which time scale best represents the arrival-time difference between *P*-waves and *S*-waves at this station?



Part B–2

Answer all questions in this part.

Directions (51–60): Record your answers in the spaces provided in your answer booklet. Some questions may require the use of the *Earth Science Reference Tables*.

- 51 Using the proper format, place the following data on the weather station model provided in your answer booklet. [2]

Dewpoint = 74°F

Cloud cover = 100%

Base your answers to questions 52 through 54 on the data table below, which shows one cycle of equinoxes and solstices for the northern hemispheres of several planets in the solar system and the tilt of each planet's axis. Data for the planets are based on Earth's time system.

Data Table

Planet	Spring Equinox	Summer Solstice	Autumn Equinox	Winter Solstice	Tilt of Axis (degrees)
Venus	June 25	August 21	October 16	December 11	3.0
Earth	March 21	June 21	September 23	December 22	23.5
Jupiter	1997	2000	2003	2006	3.0
Saturn	1980	1987	1995	2002	26.8
Uranus	1922	1943	1964	1985	82.0
Neptune	1880	1921	1962	2003	28.5

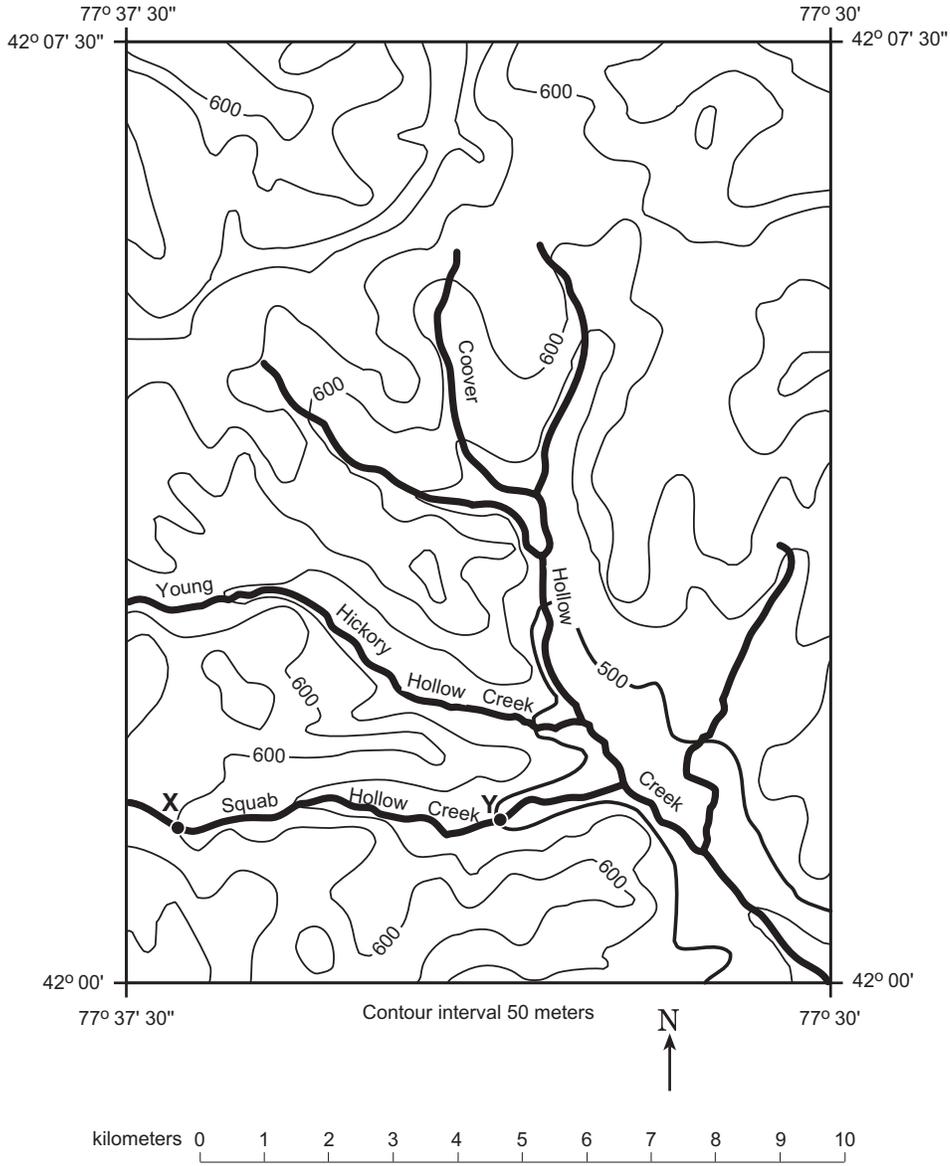
- 52 State the length, in years, of the spring season on Uranus. [1]
- 53 Describe the relationship between a planet's distance from the Sun and the length of a season on that planet. [1]
- 54 Identify *two* factors that cause seasons on Earth. [2]
-

Base your answers to questions 55 and 56 on the data table below, which shows the volume and mass of three different samples, A, B, and C, of the mineral pyrite.

Pyrite		
Sample	Volume (cm ³)	Mass (g)
A	2.5	12.5
B	6.0	30.0
C	20.0	100.0

- 55 On the grid provided in your answer booklet, plot the data (volume and mass) for the *three* samples of pyrite and connect the points with a line. [2]
- 56 State the mass of a 10.0-cm³ sample of pyrite. [1]
-

Base your answers to questions 57 through 59 on the topographic map below of an area in New York State. Points X and Y are locations on Squab Hollow Creek.



- 57 In the space provided in *your answer booklet*, determine the gradient of Squab Hollow Creek between point X and point Y by following the directions below.
- a Using the *Earth Science Reference Tables*, write the equation used to determine the gradient. [1]
 - b Substitute values into the equation. [1]
 - c Solve the equation and label the answer with the correct units. [2]
- 58 Describe one way to determine the direction of flow of Coover Hollow Creek from information shown on the map. [1]
- 59 Based on the latitude and longitude coordinates given, identify the New York State landscape region in which this map region is located. [1]

60 Some marine organisms swim or float in the ocean, and others live on or in the sediment of the ocean floor. A group of floating organisms called graptolites were common in some ancient seas that covered New York State and are found in some New York State bedrock.



Floating graptolites

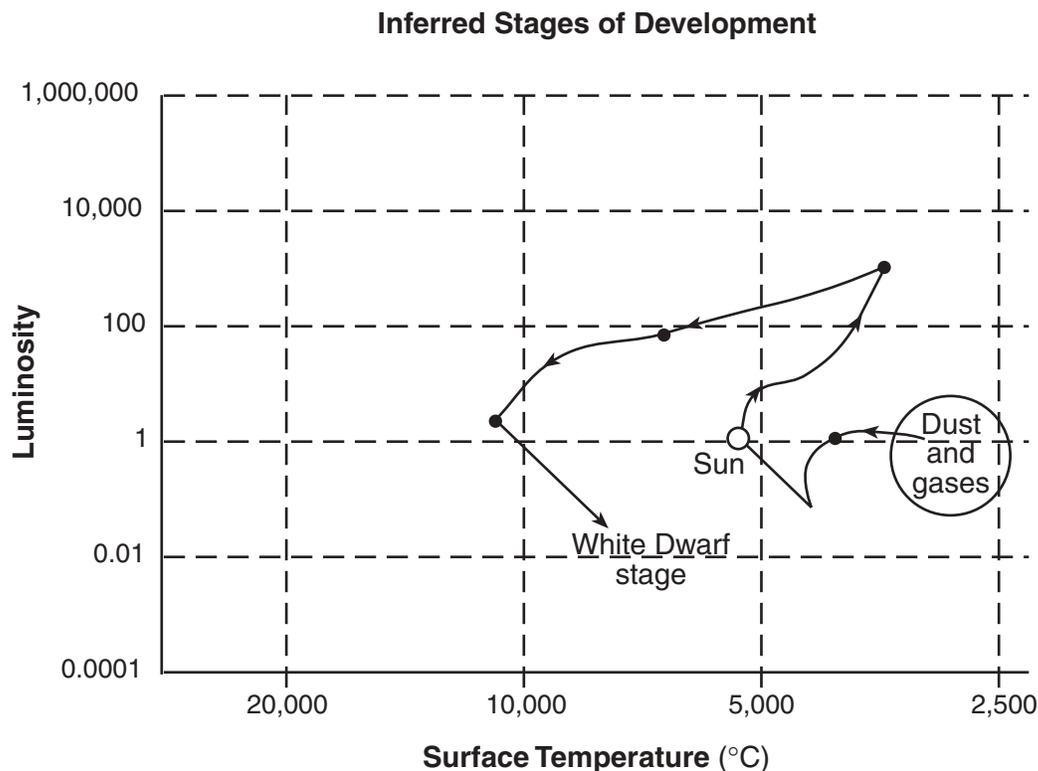
State one reason why certain species of graptolites are used as an index fossil. [1]

Part C

Answer all questions in this part.

Directions (61–72): Record your answers in the spaces provided in your answer booklet. Some questions may require the use of the *Earth Science Reference Tables*.

Base your answers to questions 61 and 62 on the graph below and on the “Luminosity and Temperature of Stars” graph in the *Earth Science Reference Tables*. The graph below shows the inferred stages of development of the Sun, showing luminosity and surface temperature at various stages.



- 61 Describe the changes in luminosity of the Sun that will occur from its current Main Sequence stage to its final White Dwarf stage. [1]
- 62 Which star shown on the “Luminosity and Temperature of Stars” graph in the *Earth Science Reference Tables* is currently at the Sun’s final predicted stage of development? [1]
-

Base your answers to questions 63 and 64 in part on the news article and map below. Points A and B on the map are reference points.

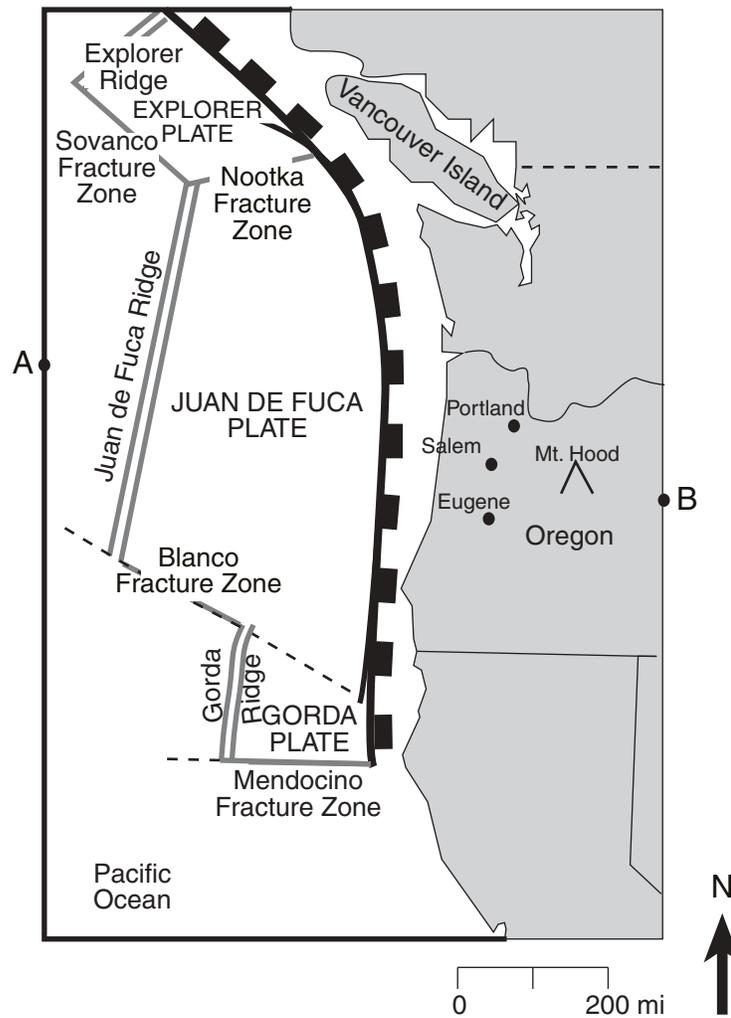
Huge Quake Possible in Oregon Valley

Scientists have warned for years that a magnitude 8 or 9 earthquake could strike about 30 miles off the Oregon coast, causing huge tsunamis (large ocean waves) and tremendous damage.

Now scientists say these earthquakes could be centered much farther inland and cause severe damage to a larger area, including cities in Oregon such as Portland, Salem, and Eugene.

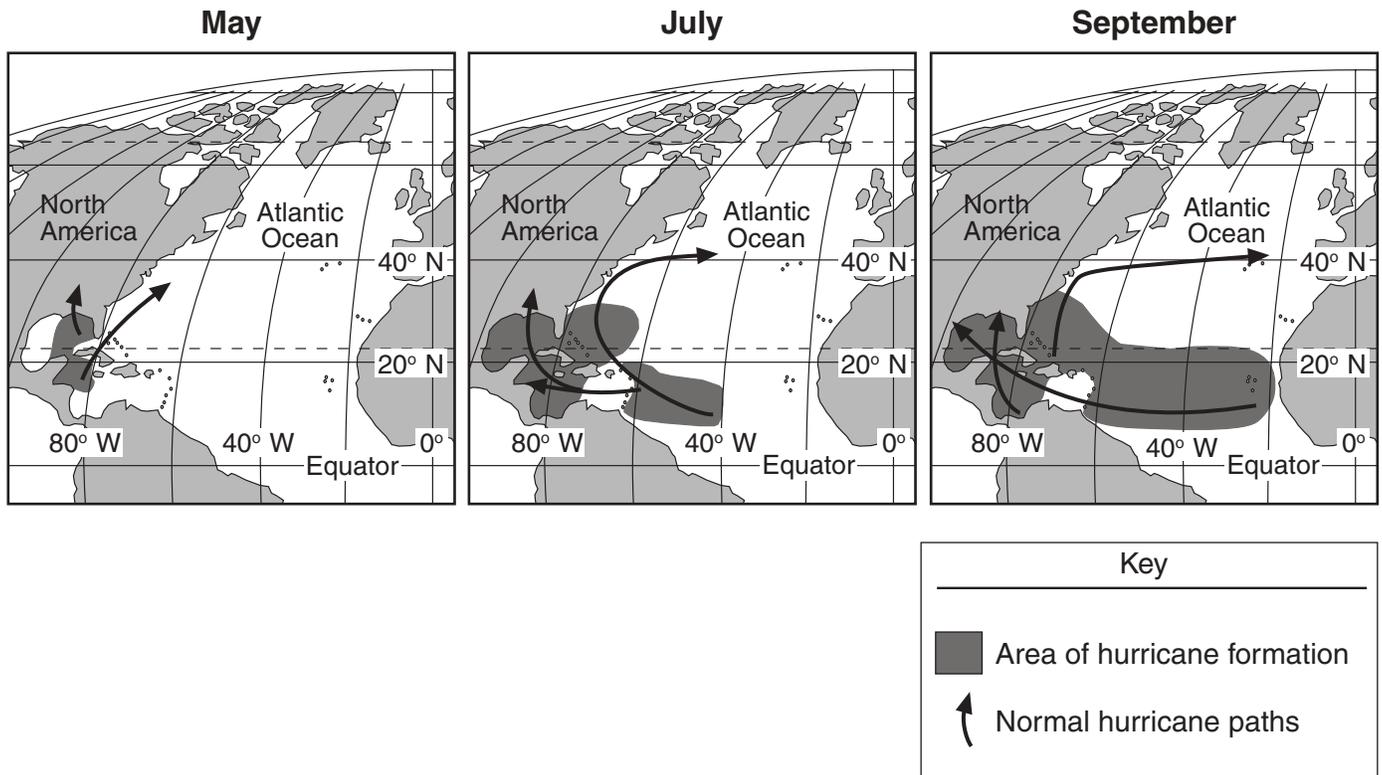
Geologic evidence suggests that strong quakes in this area occur about every 400 years, plus or minus 200 years. The last one, believed to be a magnitude 9, occurred 300 years ago.

A magnitude 8 quake can cause tremendous damage. The San Francisco quake of 1906 has been estimated at 7.9. The Mexico City quake of 1985 that left thousands dead was measured at 8.1.



- 63 The cross section in your answer booklet shows the lithosphere and asthenosphere between points *A* and *B* on the map.
- On the cross section provided in your answer booklet, draw an arrow in the Juan de Fuca Plate to indicate the direction of the relative movement of the plate. [1]
 - Identify the type of tectonic plate boundary that exists at the Juan de Fuca Ridge. [1]
 - Identify the name of the plate in the cross section labeled *x*. [1]
 - How does the average earthquake depth beneath the Oregon coastline compare to the average earthquake depth beneath Mt. Hood? [1]
- 64 An emergency management specialist in Portland, Oregon, is developing a plan that would help save lives or prevent property damage in the event of a future earthquake. Describe *two* actions or ideas that should be included in the plan. [2]
-

Base your answers to questions 65 and 66 in part on the maps below, which show areas of hurricane formation and normal hurricane paths in the Atlantic Ocean during May, July, and September. The areas of hurricane formation usually have surface ocean-water temperatures greater than 80°F.



- 65 How does the area of hurricane formation change from May to September? [1]
- 66 State one reason why most hurricane paths curve northeastward as hurricanes move north of 30° N latitude. [1]
-

Base your answers to questions 67 through 69 on the weather map provided in your answer booklet. The weather map shows a low-pressure system over part of North America. Five weather stations are shown on the map. Lines *AB*, *BC*, and *BD* represent surface frontal boundaries. Line *AB* represents an occluded front that marks the center of a low-pressure system. Symbols cP and mT represent different air masses.

- 67 On the weather map provided in *your answer booklet*, place the proper front symbols on lines *AB*, *BC*, and *BD*. Place the front symbols on the correct side of each line to show the direction of front movement. [3]
- 68 Name the geographic region over which the mT air mass most likely formed. [1]
- 69 Other than low pressure, state *two* weather conditions associated with a low-pressure center. [2]
-

Base your answers to questions 70 through 72 in part on the newspaper article shown below, taken and adapted from the *Los Angeles Times*.

Volcanic Blast Shaped Earth

*Study finds eruption split an ancient continent,
creating Atlantic Ocean*

The largest volcanic eruption in Earth's history — so powerful it split an ancient super-continent and created the Atlantic Ocean — spewed millions of square miles of searing lava that extinguished much of life on ancient Earth.

From hundreds of basalt outcrops that rim the Atlantic coasts, scientists have pieced together evidence of the titanic eruption 200 million years ago. Researchers said that the eruption set the fractured landmasses adrift and, by wedging them apart, gradually opened the gulf that created the Atlantic — giving the map of the world the form it has today.

“This is one of the biggest things that has ever happened in Earth's history. This is a gigantic, igneous event and it all seems to have occurred in an amazingly brief amount of time.”

To reconstruct the ancient catastrophe, a team of scientists analyzed basalt dikes, sills, and lavas from the New Jersey Palisades, the Brazilian Amazon, Spain, and West Africa.

By studying the chemical composition and dating the residual radioisotopes in the basaltic rocks, the researchers determined that the rocks all originated from the same eruption. Once they realized the outcrops were linked, they were able to determine that, in the distant past, the rocks all had been located together at the center of an immense continent called Pangea that once stretched, unbroken, from pole to pole.

- 70 Name the geologic time period when this major volcanic eruption initially opened the Atlantic Ocean. [1]
- 71 Scientists stated that rocks from the volcanic eruption that separated the continents are basalt. List *two* observable characteristics that are normally used to identify basaltic rock. [2]
- 72 Basaltic outcrops are not the only evidence of this ancient continental splitting. Describe another piece of evidence that supports the idea that the present-day continents were once part of the large ancient continent, Pangea, that split apart. [1]
-

Tear Here

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

PHYSICAL SETTING
EARTH SCIENCE

Tuesday, June 18, 2002 — 9:15 a.m. to 12:15 p.m., only

ANSWER SHEET

Student Sex: Male Female Grade

Teacher School

Record your answers to Part A and Part B-1 on this answer sheet.

Part A

- 1 13 25
- 2 14 26
- 3 15 27
- 4 16 28
- 5 17 29
- 6 18 30
- 7 19 31
- 8 20 32
- 9 21 33
- 10 22 34
- 11 23 35
- 12 24

Part A Score

Part B-1

- 36 44
- 37 45
- 38 46
- 39 47
- 40 48
- 41 49
- 42 50
- 43

Part B-1 Score

Write your answers to Part B-2 and Part C in your answer booklet.

The declaration below should be signed when you have completed the examination.

I do hereby affirm, at the close of this examination, that I had no unlawful knowledge of the questions or answers prior to the examination and that I have neither given nor received assistance in answering any of the questions during the examination.

Signature

Tear Here

**PHYSICAL SETTING
 EARTH SCIENCE**

Tuesday, June 18, 2002 — 9:15 a.m. to 12:15 p.m., only

ANSWER BOOKLET

Male

Student Sex: Female

Teacher

School Grade

Answer all questions in Part B-2 and Part C. Record your answers in this booklet.

Performance Test Score
 (Maximum Score: 23)

Part	Maximum Score	Student's Score
A	35	
B-1	15	
B-2	15	
C	20	

Total Written Test Score
 (Maximum Raw Score: 85)

Final Score
 (from conversion chart)

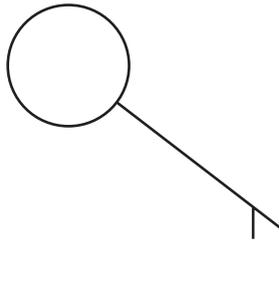
Raters' Initials:

Rater 1 Rater 2

Part B-2

For Raters Only

51



51

52 _____ years

52

53 _____

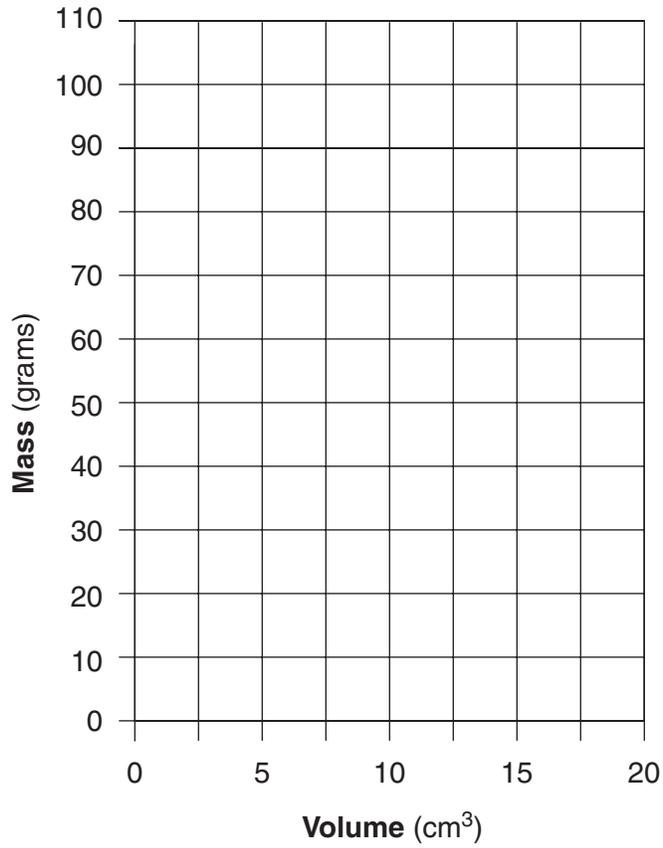
53

54 (1) _____

54

(2) _____

55



55

56 _____ grams

56

57

a
Gradient =
b
Gradient =
c
Gradient =

57b

c

For Raters Only

58

59

60

Total Score for Part B-2

58

59

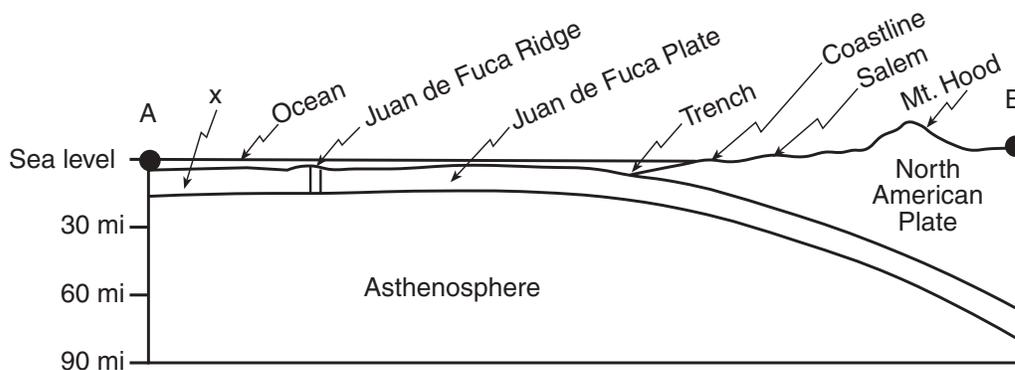
60

Part C

61

62

63 a



61

62

63a

b _____ plate boundary

b

c _____ Plate

c

d _____

d

64 (1) _____

(2) _____

64

For Raters Only

65

65

66

66

67



67

68

68

69

(1)

(2)

69

70

_____ Period

70

71

(1)

(2)

71

72

72

[d]

Total Score for Part C



THE STATE EDUCATION DEPARTMENT / THE UNIVERSITY OF THE STATE OF NEW YORK / ALBANY, NY 12234

Office of State Assessment
Tel. (518) 474-5099
Fax (518) 474-1989

IMPORTANT NOTICE TO TEACHERS

Physical Setting/Earth Science Regents Examination

Tuesday, June 18, 2002

The following information concerns the rating of question 67 of the June 2002 Physical Setting/Earth Science Regents Examination.

There is an error in the last line of the scoring key. The scoring key should read as follows:

Allow 1 credit for any front symbols (correct or incorrect) drawn on the proper side of the *three* frontal boundaries.

Please communicate this information to all persons responsible for scoring the Physical Setting/Earth Science Regents Examination.

FOR TEACHERS ONLY

The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

PS-ES PHYSICAL SETTING/EARTH SCIENCE

Tuesday, June 18, 2002 — 9:15 a.m. to 12:15 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

Refer to the directions on page 3 before rating student papers.

Part A and Part B-1
Allow 1 credit for each correct response.

Part A			Part B-1	
1 4	13 2	25 4	36 2	44 1
2 2	14 3	26 1	37 1	45 1
3 2	15 1	27 3	38 3	46 2
4 3	16 3	28 1	39 3	47 1
5 4	17 2	29 3	40 2	48 4
6 4	18 4	30 4	41 4	49 2
7 2	19 2	31 1	42 3	50 3
8 1	20 2	32 1	43 4	
9 1	21 2	33 2		
10 3	22 4	34 1		
11 1	23 1	35 1		
12 4	24 3			

Directions to the Teacher

Follow the procedures below for scoring student answer papers for the Physical Setting/Earth Science examination. Additional information about scoring is provided in the publication *Information Booklet for Administering and Scoring Regents Examinations in the Sciences*.

Use only *red* ink or *red* pencil in rating Regents papers. Do *not* correct the student's work by making insertions or changes of any kind.

On the detachable answer sheet for Part A and Part B–1, indicate by means of a checkmark each incorrect or omitted answer. In the box provided at the end of each part, record the number of questions the student answered correctly for that part.

At least two science teachers must participate in the scoring of each student's responses to the Part B–2 and Part C open-ended questions. Each of these teachers should be responsible for scoring a selected number of the open-ended questions on each answer paper. No one teacher is to score all the open-ended questions on a student's answer paper.

Students' responses must be scored strictly according to the Scoring Key and Rating Guide. For open-ended questions, credit may be allowed for responses other than those given in the rating guide if the response is a scientifically accurate answer to the question and demonstrates adequate knowledge as indicated by the examples in the rating guide. In the student's answer booklet, record the number of credits earned for each answer in the box printed to the right of the answer lines or spaces for that question.

Fractional credit is *not* allowed. Only whole-number credit may be given to a response. Units need not be given when the wording of the questions allows such omissions.

Raters should enter the scores earned for Part A, Part B–1, Part B–2, and Part C on the appropriate lines in the box printed on the answer booklet and then should add these four scores and enter the total in the box labeled "Total Written Test Score." The student's score for the Earth Science Performance Test should be entered in the space provided. Then, the student's raw scores on the performance test and written test should be converted to a scaled score by using the conversion chart printed at the end of this Scoring Key and Rating Guide. The student's scaled score should be entered in the labeled box on the student's answer booklet. The scaled score is the student's final examination score.

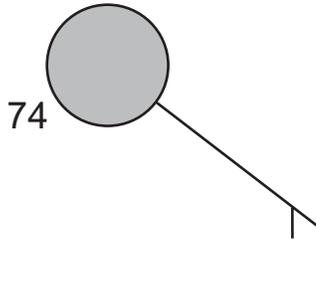
All student answer papers that receive a scaled score of 60 through 64 **must** be scored a second time. For the second scoring, a different committee of teachers may score the student's paper or the original committee may score the paper, except that no teacher may score the same open-ended questions that he/she scored in the first rating of the paper. The school principal is responsible for assuring that the student's final examination score is based on a fair, accurate, and reliable scoring of the student's answer paper.

Because scaled scores corresponding to raw scores in the conversion chart may change from one examination to another, it is crucial that for each administration, the conversion chart provided in the scoring key for that administration be used to determine the student's final score. The chart in this scoring key is usable only for this administration of the examination.

Part B–2

Allow a total of 15 credits for this part. The student must answer all questions in this part.

51 [2]



Allow 1 credit for placing 74 in the proper location. Do *not* allow credit for 74° or 74°F.

and

Allow 1 credit for shading in the station circle completely.

52 [1] Allow 1 credit for **20** or **21** or **22** years.

53 [1] Allow 1 credit for a response that indicates that the length of a planet's season increases with increasing distance from the Sun.

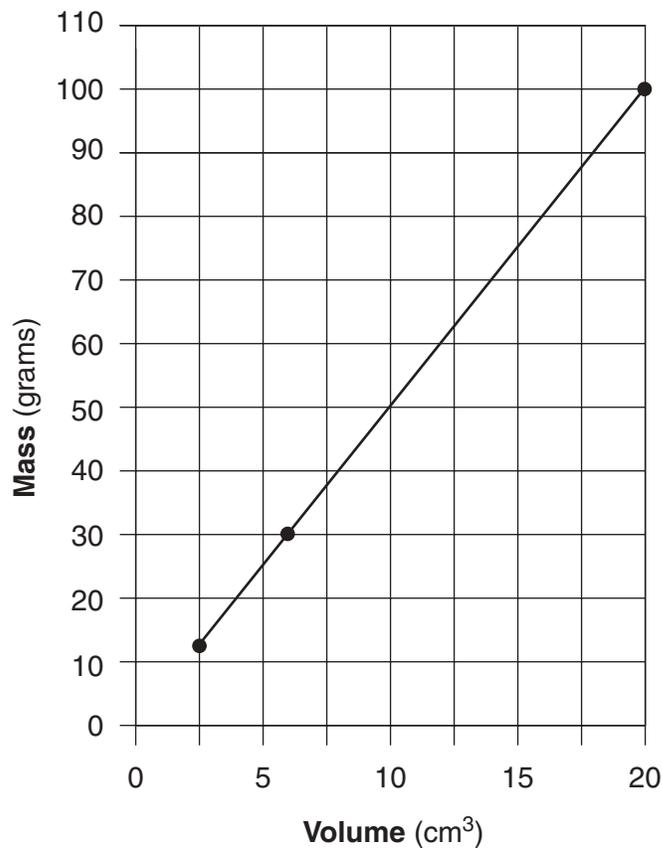
54 [2] Allow 2 credits, 1 credit for *each* of two correct responses. Acceptable responses include, but are not limited to, these examples:

tilt of Earth's axis

parallelism of Earth's axis

Earth's revolution around the Sun

55 [2]



Allow 1 credit if all three points are plotted correctly for the pyrite samples (± 2 units).

and

Allow 1 credit for correctly connecting with a line all three points plotted by the student.

56 [1] Allow 1 credit for **50.0** grams or **50 g**.

or

Allow 1 credit for a response that is consistent with the student's graph in question 55.

- 57** [3] **a** Allow no credit for writing the equation.
- b** Allow 1 credit for substituting the value of both acceptable measurements into the equation given in part *a*. Allow ± 0.7 km. Allow credit even if the units are not given. Acceptable responses include, but are not limited to, these examples:

$$g = \frac{600 \text{ m} - 500 \text{ m}}{5 \text{ km}}$$

$$g = \frac{100 \text{ m}}{5 \text{ km}}$$

- c** Allow 1 credit for a response that correctly solves the equation with the numerical substitutions that are consistent with the student's answer to part *b*.

and

Allow 1 credit for the correct units (m/km) that are consistent with the student's answer to part *b*. Acceptable responses include, but are not limited to, these examples:

$$\text{gradient} = 20 \text{ m/km}$$

$$g = 20 \text{ m/km}$$

- 58** [1] Allow 1 credit for a correct response. Acceptable responses should indicate an understanding of map reading. Acceptable responses include, but are not limited to, these examples:

Contour lines bend upstream when crossing the creek.

The stream flows from higher elevations toward lower elevations.

Note: Do *not* allow credit for water flows downhill from the source toward the mouth.

- 59** [1] Allow 1 credit for **Allegheny Plateau** or **Appalachian Plateau**.

- 60** [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

Graptolites floated freely in the ocean and could distribute themselves easily over a wide geographic area.

Certain species of graptolite existed for a limited geologic time.

Certain species of graptolite are unique and easily identified.

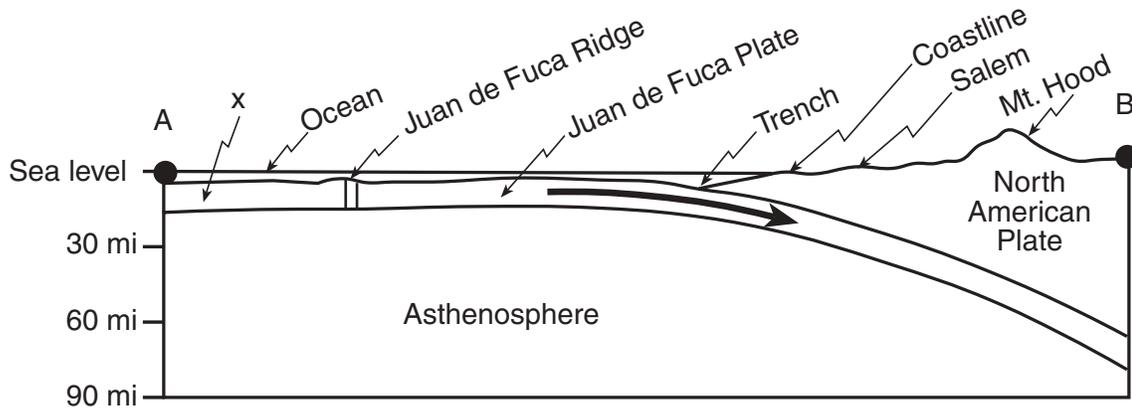
Part C

Allow a total of 20 credits for this part. The student must answer all questions in this part.

61 [1] Allow 1 credit for a response that states that **luminosity increases, then decreases**.

62 [1] Allow 1 credit for ***Procyon B***.

63 [4]



a Allow 1 credit for correctly drawing an arrow in the direction of the relative movement in the Juan de Fuca Plate. Student answers should appear generally like the diagram.

b Allow 1 credit for **divergent** or **mid-ocean ridge** plate boundary.

c Allow 1 credit for the **Pacific** Plate.

d Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, this example:

Earthquakes along the Oregon coastline are not as deep as earthquakes that occur beneath Mt. Hood.

64 [2] Allow 2 credits, 1 credit for *each* of two correct responses. Acceptable responses include, but are not limited to, these examples:

- plan evacuation routes
- identifying relative earthquake hazard zones or areas that are subject to damage during an earthquake
- plan emergency communication procedures (radio broadcast)
- developing emergency information brochures
- store food, supplies, and fresh water
- build earthquake-proof structures
- practice emergency rescue drills
- identify shelter locations

- 65 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

The area of hurricane formation increases from May to September.

The area spreads eastward.

- 66 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:

Hurricanes turn northeast due to the planetary wind belt they move into.

The jet stream causes the path of most hurricanes to curve toward the northeast.

- 67 [3]



Line *AB* is an occluded front.

Line *BC* is a cold front.

Line *BD* is a warm front.

Allow 2 credits for the placement of the correct symbol on all three fronts, regardless of which side of the line the symbols are on.

Allow only 1 credit for the placement of the correct symbol on only one or two of the three fronts, regardless of which side of the line the symbols are on.

and

Allow 1 credit for placing all three correct front symbols on the correct side of the line.

- 68 [1] Allow 1 credit for **Gulf of Mexico** or **Atlantic Ocean**.
- 69 [2] Allow 2 credits, 1 credit for *each* of two correct responses. Acceptable responses include, but are not limited to, these examples:
- high relative humidity
 - greater cloud cover
 - increased precipitation
- 70 [1] Allow 1 credit for **Jurassic** Period.
- 71 [2] Allow 2 credits, 1 credit for *each* of two correct responses. Acceptable responses include, but are not limited to, these examples:
- fine grained (crystals less than 1 mm)
 - glassy texture
 - vesicular texture
 - dark colored
 - mafic (high Fe and Mg content)
 - high density (3.0 g/cm^3)
 - mineral composition:
 - plagioclase feldspar
 - pyroxene
 - olivine
 - amphibole
- 72 [1] Allow 1 credit for a correct response. Acceptable responses include, but are not limited to, these examples:
- Continents fit together like puzzle pieces.
 - Continents have matching bedrock types along coastlines.
 - Continents have correlating fossils.
 - strips of magnetic reversals found in ocean bedrock

Regents Examination in Physical Setting/Earth Science —June 2002

Chart for Determining the Final Examination Score

(Use for June 2002 examination only.)

To determine the student's final examination score, locate the student's total performance test score across the top of the chart and the student's total written test score down the side of the chart. The point where those two scores intersect is the student's final examination score. For example, a student receiving a total performance test score of 14 and a total written test score of 68 would receive a final examination score of 85.

Total Performance Test Score

		Total Performance Test Score																							
		23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Total Written Test Score	85	100	99	98	97	97	97	97	96	96	95	95	94	94	93	92	92	91	90	89	89	88	87	86	85
	84	99	98	97	97	96	96	96	95	95	94	94	93	93	92	92	91	90	89	89	88	87	86	85	84
	83	99	98	97	97	96	96	96	95	95	94	94	93	93	92	92	91	90	89	89	88	87	86	85	84
	82	98	97	96	96	96	95	95	94	94	94	93	93	92	91	91	90	89	89	88	87	86	85	84	83
	81	97	96	95	95	95	94	94	94	93	93	92	92	91	90	90	89	88	88	87	86	85	84	83	82
	80	97	96	95	95	95	94	94	94	93	93	92	92	91	90	90	89	88	88	87	86	85	84	83	82
	79	97	96	94	94	94	93	93	93	92	92	91	91	90	90	89	88	88	87	86	85	84	83	82	81
	78	96	95	94	93	93	93	92	92	91	91	91	90	89	89	88	87	87	86	85	84	84	83	82	81
	77	96	95	94	93	93	93	92	92	91	91	91	90	89	89	88	87	87	86	85	84	84	83	82	81
	76	95	94	93	92	92	92	91	91	90	90	89	89	88	87	87	86	85	84	84	83	83	82	81	80
	75	94	93	92	92	91	91	91	90	90	89	89	88	88	87	86	86	85	84	84	83	82	81	80	79
	74	94	93	92	92	91	91	91	90	90	89	89	88	88	87	86	86	85	84	84	83	82	81	80	79
	73	93	92	91	91	90	90	90	89	89	88	88	87	87	86	86	85	84	83	83	82	81	80	79	78
	72	92	91	90	90	90	89	89	88	88	88	87	87	86	85	85	84	83	83	82	81	80	79	78	77
	71	92	90	89	89	89	88	88	88	87	87	86	86	85	85	84	83	83	82	81	80	79	78	77	77
	70	92	90	89	89	89	88	88	88	87	87	86	86	85	85	84	83	83	82	81	80	79	78	77	77
	69	91	90	88	88	88	88	87	87	86	86	85	85	84	84	83	82	82	81	80	79	78	78	77	76
	68	90	89	88	87	87	87	86	86	86	85	85	84	83	83	82	82	81	80	79	78	78	77	76	75
	67	89	88	87	86	86	86	85	85	85	84	84	83	83	82	81	81	80	79	78	77	77	76	75	74
	66	89	88	87	86	86	86	85	85	85	84	84	83	83	82	81	81	80	79	78	77	77	76	75	74
65	88	87	86	86	85	85	85	84	84	83	83	82	82	81	80	80	79	78	77	76	75	74	73	73	
64	87	86	85	85	84	84	84	83	83	82	82	81	81	80	80	79	78	77	76	75	74	73	72	72	
63	86	85	84	84	84	83	83	83	82	82	81	81	80	79	79	78	77	77	76	75	74	73	72	71	
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61	86	85	83	83	83	82	82	82	81	81	80	80	79	79	78	77	77	76	75	74	73	72	72	71	
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58	83	82	81	80	80	80	80	79	79	78	78	77	77	76	75	75	74	73	72	72	71	70	69	68	
57	82	81	80	80	79	79	79	78	78	77	77	76	76	75	75	74	73	72	72	71	70	69	68	67	
56	81	80	79	79	79	78	78	77	77	77	76	76	75	74	74	73	72	72	71	70	69	68	67	66	
55	80	79	78	78	78	77	77	77	76	76	75	75	74	73	73	72	71	71	70	69	68	67	66	65	
54	80	79	77	77	77	76	76	76	75	75	74	74	73	73	72	71	71	70	69	68	67	66	65	65	
53	79	78	77	76	76	76	75	75	74	74	74	73	72	72	71	70	70	69	68	67	67	66	65	64	
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51	78	77	76	75	75	75	74	74	74	73	73	72	72	71	70	70	69	68	67	67	66	65	64	63	
50	77	76	75	75	74	74	74	73	73	72	72	71	71	70	69	69	68	67	67	66	65	64	63	62	
49	76	75	74	74	73	73	73	72	72	71	71	70	70	69	69	68	67	66	66	65	64	63	62	61	
48	75	74	73	73	73	72	72	71	71	71	70	70	69	68	68	67	66	66	65	64	63	62	61	60	
47	75	73	72	72	72	71	71	71	70	70	69	69	68	68	67	66	66	65	64	63	62	61	60	60	
46	74	73	71	71	71	71	70	70	69	69	68	68	67	67	66	65	65	64	63	62	61	61	60	59	
45	73	72	71	70	70	70	69	69	68	68	67	66	66	65	65	64	63	62	61	61	60	59	58	58	
44	71	70	69	69	68	68	68	67	67	66	66	65	65	64	63	62	61	61	60	59	58	57	56	56	

Regents Examination in Physical Setting/Earth Science —June 2002
Chart for Determining the Final Examination Score
 (Use for June 2002 examination only.)

Total Performance Test Score

	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
43	70	69	68	68	67	67	67	66	66	65	65	64	64	63	63	62	61	61	60	59	58	57	56	55
42	69	68	67	67	67	66	66	66	65	65	64	64	63	62	62	61	60	60	59	58	57	56	55	54
41	69	68	66	66	66	65	65	65	64	64	63	63	62	62	61	60	60	59	58	57	56	55	54	54
40	68	67	65	65	65	65	64	64	63	63	62	62	61	61	60	59	59	58	57	56	55	54	53	53
39	67	66	65	64	64	64	63	63	63	62	62	61	60	60	59	59	58	57	56	55	54	53	52	52
38	66	65	64	63	63	63	63	62	62	61	61	60	60	59	58	58	57	56	55	54	53	52	51	51
37	65	64	63	63	62	62	61	61	60	60	59	59	58	58	57	56	55	54	53	52	51	50	49	49
36	63	62	61	61	61	60	60	59	59	58	58	57	56	56	55	54	54	53	52	51	50	49	48	48
35	63	62	60	60	60	59	59	59	58	58	57	57	56	56	55	54	54	53	52	51	50	49	48	48
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3	20	19	18	18	17	17	17	16	16	15	15	14	14	13	12	12	11	10	10	9	8	7	6	5
2	18	17	16	16	16	15	15	15	14	14	13	13	12	11	11	10	9	9	8	7	6	5	4	3
1	17	16	14	14	14	14	13	13	12	12	11	11	10	10	9	8	8	7	6	5	4	3	2	2
0	15	14	13	12	12	12	12	11	11	10	10	9	9	8	7	7	6	5	4	4	3	2	1	0

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Math Key Idea 2	14,17,27,32	37,38,40,49,50,53,56,58	61,62
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Sci. Inq Key Idea 1	5,8	54,60	63,65,70,71,72
Sci. Inq Key Idea 2			
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ESRT 2001 edition	2,3,4,11,14,16,17,18,20,25,31,32,35	36,40,41,42,43,44,46,47,48,49,50,51,53,56,57,59	61,62,63,66,67,68,70,71



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IMPORTANT NOTICE TO TEACHERS

Physical Setting/Earth Science Regents Examination

Tuesday, June 18, 2002

The following information concerns the rating of question 67 of the June 2002 Physical Setting/Earth Science Regents Examination.

There is an error in the last line of the scoring key. The scoring key should read as follows:

Allow 1 credit for any front symbols (correct or incorrect) drawn on the proper side of the *three* frontal boundaries.

Please communicate this information to all persons responsible for scoring the Physical Setting/Earth Science Regents Examination.