The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

PHYSICAL SETTING

EARTH SCIENCE

Wednesday, January 23, 2008 — 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 (Revised November 2006) 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.

The answers to the questions in Part B–2 and Part C are to be written in your separate answer booklet. Be sure to fill in the heading on the front 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 separate answer sheet and in your 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 (Revised November 2006) must be available for you to use while taking this examination.

The use of any communications device is strictly prohibited when taking this examination. If you use any communications device, no matter how briefly, your examination will be invalidated and no score will be calculated for you.

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. One factor responsible for the strength of gravitational attraction between a planet and the Sun is the
   (1) degree of tilt of the planet's axis
   (2) distance between the planet and the Sun
   (3) planet's period of rotation
   (4) amount of insolation given off by the Sun

2. Which planet is located approximately ten times farther from the Sun than Earth is from the Sun?
   (1) Mars
   (2) Jupiter
   (3) Saturn
   (4) Uranus

3. Large craters found on Earth support the hypothesis that impact events have caused
   (1) a decrease in the number of earthquakes and an increase in sea level
   (2) an increase in solar radiation and a decrease in Earth radiation
   (3) the red shift of light from distant stars and the blue shift of light from nearby stars
   (4) mass extinctions of life-forms and global climate changes

4. What is the inferred age of our solar system, in millions of years?
   (1) 544
   (2) 1300
   (3) 4600
   (4) 10,000

5. The water table usually rises when there is
   (1) a decrease in the amount of infiltration
   (2) a decrease in the amount of surface area covered by vegetation
   (3) an increase in the amount of precipitation
   (4) an increase in the slope of the land

6. What causes the Coriolis effect?
   (1) Earth's tilt on its axis
   (2) the spin of Earth on its axis
   (3) the orbital motion of the Moon around Earth
   (4) the orbital motion of Earth around the Sun

7. What is the relative humidity when the dry-bulb temperature is 16°C and the wet-bulb temperature is 14°C?
   (1) 90%
   (2) 80%
   (3) 14%
   (4) 13%

8. Which weather instrument is used to measure wind speed?
   (1) anemometer
   (2) wind vane
   (3) psychrometer
   (4) thermometer

9. A weather station model is shown below.

   What is the barometric pressure indicated by this station model?
   (1) 0.029 mb
   (2) 902.9 mb
   (3) 1002.9 mb
   (4) 1029.0 mb

10. The upward movement of air in the atmosphere generally causes the temperature of that air to
    (1) decrease and become closer to the dewpoint
    (2) decrease and become farther from the dewpoint
    (3) increase and become closer to the dewpoint
    (4) increase and become farther from the dewpoint
11 Which bar graph correctly shows the orbital eccentricity of the planets in our solar system?

12 The diagram below shows Earth in its orbit around the Sun. Positions A, B, C, and D represent Earth at the beginning of each season.

At which lettered position of Earth does New York State experience the first day of summer?

(1) A  (3) C
(2) B  (4) D
13 The cross section below shows a house on the shore of Lake Ontario in August.

Under which conditions would the wind shown in the cross section most likely occur?
(1) at 2 a.m., when the air over land is 70°F and the air over the lake is 80°F
(2) at 6 a.m., when the air over land is 70°F and the air over the lake is 70°F
(3) at 2 p.m., when the air over land is 80°F and the air over the lake is 70°F
(4) at 10 p.m., when the air over land is 70°F and the air over the lake is 72°F

14 Which type of surface absorbs the greatest amount of electromagnetic energy from the Sun?
(1) smooth, shiny, and light colored
(2) smooth, shiny, and dark colored
(3) rough, dull, and light colored
(4) rough, dull, and dark colored

15 Which New York State location is most likely to experience the heaviest winter snowfall when the surface winds are blowing from the west or northwest?
(1) New York City
(2) Binghamton
(3) Oswego
(4) Plattsburgh

16 The largest particles that a stream deposits as it enters a pond are 8 centimeters in diameter. The minimum velocity of the stream is approximately
(1) 100 cm/sec
(2) 200 cm/sec
(3) 300 cm/sec
(4) 400 cm/sec

17 Which ocean current transports warm water away from Earth’s equatorial region?
(1) Brazil Current
(2) Guinea Current
(3) Falkland Current
(4) California Current

18 The data table below shows the density of four different mineral samples.

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Density (g/cm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>corundum</td>
<td>4.0</td>
</tr>
<tr>
<td>galena</td>
<td>7.6</td>
</tr>
<tr>
<td>hematite</td>
<td>5.3</td>
</tr>
<tr>
<td>quartz</td>
<td>2.7</td>
</tr>
</tbody>
</table>

A student accurately measured the mass of a sample of one of the four minerals to be 294.4 grams and its volume to be 73.6 cm³. Which mineral sample did the student measure?
(1) corundum
(2) galena
(3) hematite
(4) quartz

19 Which mineral has a metallic luster, a black streak, and is an ore of iron?
(1) galena
(2) magnetite
(3) pyroxene
(4) graphite

20 The edges of most lithospheric plates are characterized by
(1) reversed magnetic orientation
(2) unusually rapid radioactive decay
(3) frequent volcanic activity
(4) low P-wave and high S-wave velocity

21 Compared to Earth’s continental crust, Earth’s oceanic crust is
(1) thinner and more dense
(2) thinner and less dense
(3) thicker and more dense
(4) thicker and less dense
22 In which set are the rock drawings labeled with their correct rock types?

<table>
<thead>
<tr>
<th></th>
<th>Igneous</th>
<th>Sedimentary</th>
<th>Metamorphic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>![Image 1]</td>
<td>![Image 2]</td>
<td>![Image 3]</td>
</tr>
<tr>
<td>3</td>
<td>![Image 7]</td>
<td>![Image 8]</td>
<td>![Image 9]</td>
</tr>
<tr>
<td>4</td>
<td>![Image 10]</td>
<td>![Image 11]</td>
<td>![Image 12]</td>
</tr>
</tbody>
</table>

23 The topographic map below shows a lake and two rivers.

In which direction does each of the rivers flow?

(1) The Sapphire River and the Garnet River both flow east.
(2) The Sapphire River and the Garnet River both flow west.
(3) The Sapphire River flows east and the Garnet River flows west.
(4) The Sapphire River flows west and the Garnet River flows east.
24. The map below shows the northern section of the boundary between the Arabian Plate and the African Plate. Arrows show the relative direction of plate motion.

![Map of the Arabian Plate and African Plate](image)

Which type of plate boundary is located at the Jordan Fault?
(1) divergent  (3) convergent
(2) subduction  (4) transform

25. A seismograph station recorded the arrival of the first P-wave at 7:32 p.m. from an earthquake that occurred 4000 kilometers away. What time was it at the station when the earthquake occurred?
(1) 7:20 p.m.  (3) 7:32 p.m.
(2) 7:25 p.m.  (4) 7:39 p.m.

26. Which temperature is inferred to exist in Earth's plastic mantle?
(1) 2000°C  (3) 5000°C
(2) 3000°C  (4) 6000°C

27. Which statement correctly compares seismic P-waves with seismic S-waves?
(1) P-waves travel faster than S-waves and pass through Earth's liquid zones.
(2) P-waves travel faster than S-waves and do not pass through Earth's liquid zones.
(3) P-waves travel slower than S-waves and pass through Earth's liquid zones.
(4) P-waves travel slower than S-waves and do not pass through Earth's liquid zones.

28. What is the geologic age sequence of the surface bedrock from Ithaca, New York, to Watertown, New York?
(1) Ordovician, Taconic, Cambrian
(2) Ordovician, Tertiary, Pleistocene
(3) Devonian, Silurian, Cambrian
(4) Devonian, Silurian, Ordovician

29. A whalebone that originally contained 200 grams of radioactive carbon-14 now contains 25 grams of carbon-14. How many carbon-14 half-lives have passed since this whale was alive?
(1) 1  (3) 3
(2) 2  (4) 4

30. Which geologic event occurred during the same geologic period as the first appearance of modern corals in Earth's oceans?
(1) Grenville Orogeny
(2) Acadian Orogeny
(3) intrusion of the Palisades Sill
(4) formation of the Catskill Delta

31. The presence of eurypterid fossils in New York State bedrock indicates that
(1) eurypterids lived in land environments
(2) eurypterids first appeared on Earth during the Devonian Period
(3) most of New York State was once a mountainous region
(4) areas of New York State were once covered with shallow seas
32 Which sequence of New York State index fossils shows the order in which the organisms appeared on Earth?

33 The generalized landscape regions of New York State are classified according to

1. bedrock structure and elevation  
2. bedrock type and index fossils  
3. latitude and longitude  
4. climate and topography
34 Point X is a location on the topographic map below. Elevations are measured in meters.

What is a possible elevation, in meters, of point X?

(1) 55  
(2) 57  
(3) 68  
(4) 70

35 The topographic map below shows two hills labeled A and B. The tributary streams labeled X and Y have the same volume of water.

Which statement is best supported by the map?

(1) Hill A is higher than hill B.  
(2) Hill B is higher than hill A.  
(3) Stream X flows faster than stream Y.  
(4) Stream Y flows faster than stream X.
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 and 37 on the map below, which represents an imaginary continent. Locations A and B are on opposite sides of a mountain range on a planet similar to Earth. Location C is on the planet’s equator.

36 Compared to the climate at location A, the climate at location B would most likely be
(1) warmer and more humid
(2) warmer and less humid
(3) cooler and more humid
(4) cooler and less humid

37 Location C most likely experiences
(1) low air pressure and low precipitation
(2) low air pressure and high precipitation
(3) high air pressure and low precipitation
(4) high air pressure and high precipitation
Base your answers to questions 38 through 40 on the flowchart below, which shows a general overview of the processes and substances involved in the weathering of rocks at Earth’s surface. Letter X represents an important substance involved in both major types of weathering, labeled A and B on the flowchart. Some weathering processes are defined below the flowchart.

38 Which term best identifies the type of weathering represented by A?
(1) physical (3) chemical
(2) biological (4) glacial

39 Which substance is represented by X on both sides of the flowchart?
(1) potassium feldspar (3) hydrochloric acid
(2) air (4) water

40 Which weathering process is most common in a hot, dry environment?
(1) abrasion (3) frost action
(2) carbonation (4) hydrolysis
Base your answers to questions 41 through 44 on the map below, which shows areas where certain minerals were mined in significant amounts during 1989.

41 In which New York State landscape region was most of the garnet mined?
   (1) Catskills
   (2) Adirondack Mountains
   (3) Tug Hill Plateau
   (4) Erie-Ontario Lowlands

42 What is a common use for the mineral that is mined at the southern end of the two largest Finger Lakes?
   (1) making talcum powder
   (2) vulcanizing rubber
   (3) polishing jewelry
   (4) melting ice

43 The gypsum deposits in New York State were formed
   (1) as a result of volcanic eruptions
   (2) as a result of metamorphism
   (3) in a shallow ocean
   (4) in a glacial outwash plain

44 The mineral wollastonite has a hardness of 4.5 to 5. Which New York State mineral could easily scratch wollastonite?
   (1) garnet
   (2) halite
   (3) talc
   (4) gypsum
Base your answers to questions 45 and 46 on the cross section below, which shows an underwater mountain range in the Atlantic Ocean. The oceanic bedrock is composed mainly of basalt. Points X and Y are locations in the bedrock that have been diverging at the same rate. The movement of the North American Plate and Eurasian Plate is shown by the two arrows.

45 Which statements best describe the age and magnetic orientation of the basalts found at locations X and Y?

(1) The basalt at location X is younger than the basalt at location Y. Both locations have the same magnetic orientation.
(2) The basalts at locations X and Y are the same age. Both locations have the same magnetic orientation.
(3) The basalts at locations X and Y are the same age. Location X has normal magnetic orientation and location Y has reversed magnetic orientation.
(4) The basalt at location X is older than the basalt at location Y. Location X has reversed magnetic orientation and location Y has normal magnetic orientation.
46 Which cross section best represents the relative locations of Earth’s asthenosphere, rigid mantle, and stiffer mantle? (The cross sections are not drawn to scale.)
Base your answers to questions 47 through 50 on the diagram below, which represents the Sun’s apparent paths and the solar noon positions for an observer at 42° N latitude on December 21, September 23, and June 21.

47 In which direction will sunrise occur on June 21?
   (1) north of due west          (3) south of due west
   (2) north of due east          (4) south of due east

48 How many hours occurred between sunrise and solar noon on September 23?
   (1) 6                         (3) 12
   (2) 8                         (4) 24

49 Which diagram best shows the location of Polaris relative to the observer?

(1)  
(2)  
(3)  
(4)  
Which graph best shows the altitude of the Sun, as measured by the observer located at 42° N, at various times on December 21?
Part B–2

Answer all questions in this part.

Directions (51–65): 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 51 through 53 on the block diagram below, which shows the landscape features of an area of Earth’s crust. Two sedimentary rock layers, A and B, are labeled in the diagram. The rock symbol for layer B has been omitted.

51 Identify the most abundant mineral in rock layer A. [1]

52 Describe how the caverns formed in rock layer A. [1]

53 The graph below shows the particle sizes that compose the clastic sedimentary rock in layer B.

In the box in your answer booklet, draw the map symbol from the Earth Science Reference Tables that represents rock layer B. [1]
Base your answers to questions 54 through 56 on the table below, which lists the location of some earthquakes, their Richter magnitude, and their year of occurrence.

<table>
<thead>
<tr>
<th>Location</th>
<th>Richter Magnitude</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Francisco, United States</td>
<td>7.8</td>
<td>1906</td>
</tr>
<tr>
<td>Messina, Italy</td>
<td>7.5</td>
<td>1908</td>
</tr>
<tr>
<td>Tokyo, Japan</td>
<td>8.3</td>
<td>1923</td>
</tr>
<tr>
<td>San Francisco, United States</td>
<td>7.1</td>
<td>1989</td>
</tr>
</tbody>
</table>

54 What data do scientists use to determine the magnitude of earthquakes without visiting the actual sites? [1]

55 The locations of the earthquakes listed in the table are shown on the map below.

Explain how the locations of these earthquakes are related to tectonic plates. [1]

56 Identify the process in Earth’s asthenosphere that is inferred to be the cause of tectonic plate motion. [1]
Base your answers to questions 57 through 60 on the diagram below, which shows Earth as viewed from above the North Pole. The nighttime side of Earth has been shaded. The Moon is shown at eight positions in its orbit around Earth. The name of each Moon phase is indicated at each Moon position. The dark portion of each Moon position has not been shaded.

57 On the diagram in your answer booklet, shade the portion of the Moon that is in darkness to show the last quarter phase as viewed from New York State. [1]

58 Explain what causes the Moon’s phases when viewed from Earth. [1]

59 Which Moon phase occurs approximately one week after the New Moon phase? [1]

60 Explain why the same side of the Moon always faces Earth. [1]

61 Complete the table in your answer booklet by identifying the color and classification of the star Procyon B. The data for the Sun have been completed as an example. [1]
Base your answers to questions 62 through 65 on the cross section in your answer booklet which shows a portion of Earth’s crust. Letters A through J represent rock units or geologic structures. The rock units have not been overturned.

62 On the cross section *in your answer booklet*, draw a circle around the letter of the oldest rock unit shown. [1]

63 On the same cross section, place an X to indicate a location where the rock, marble, was formed. [1]

64 Describe one piece of evidence shown in the cross section that suggests rock unit D is younger than rock unit F. [1]

65 Explain why rock unit H is *not* one continuous layer. [1]
Part C

Answer all questions in this part.

Directions (66–84): 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 66 through 70 on the weather map in your answer booklet. The isobars show air pressures, in millibars. Points A and B indicate locations on the map.

66 On the weather map in your answer booklet, place an X centered on the geographic region that was most likely the source of the mT air mass. [1]

67 Calculate the pressure gradient along a straight line between point A and point B on the map. Label your answer with the correct units. [2]

68 Describe the evidence shown on the map that indicates strong winds were blowing between Miles City and Pierre. [1]

69 In the table in your answer booklet, write the names of the cities listed below in sequence from lowest relative humidity to highest relative humidity. [1]
   
   Albuquerque
   Chicago
   New York City

70 Describe the pattern of the surface winds around the center of the low-pressure system (L). [1]
Base your answers to questions 71 and 72 on the passage and time zones map shown below.

**Time Zones**

In 1883, Earth was divided into 24 time zones. The United States (excluding Alaska and Hawaii) has four time zones, which are indicated by different shadings on the map. Each zone is roughly centered on lines of longitude that are 15° apart. These lines are shown as dashed lines on the map. Most locations within a time zone have the same time. This time is called standard time. As you move to the west, the time in each zone is one hour earlier than the previous time zone.

71 When it is 1 a.m. in New York City, what time is it in Denver? [1]

72 Explain, in terms of Earth’s rotation, why the time zones are 15° of longitude apart. [1]
Base your answers to questions 73 and 74 on the data table below, which shows the average number of days with thunderstorms that occur over land areas at different latitudes each year.

<table>
<thead>
<tr>
<th>Latitude</th>
<th>Average Number of Days a Thunderstorm Occurs Over Land</th>
</tr>
</thead>
<tbody>
<tr>
<td>60° N</td>
<td>5</td>
</tr>
<tr>
<td>45° N</td>
<td>14</td>
</tr>
<tr>
<td>30° N</td>
<td>19</td>
</tr>
<tr>
<td>15° N</td>
<td>30</td>
</tr>
<tr>
<td>0° (equator)</td>
<td>56</td>
</tr>
<tr>
<td>15° S</td>
<td>44</td>
</tr>
<tr>
<td>30° S</td>
<td>21</td>
</tr>
<tr>
<td>45° S</td>
<td>8</td>
</tr>
<tr>
<td>60° S</td>
<td>0</td>
</tr>
</tbody>
</table>

73 On the grid in your answer booklet, plot, with an X, the average number of days per year a thunderstorm occurs over a land area for each latitude shown on the data table. Connect the centers of the Xs with a line. [1]

74 State the relationship between latitude and the average number of days each year that thunderstorms occur over a land area. [1]
Base your answers to questions 75 through 79 on the cross section below, which shows the general pattern of water movement in the water cycle. Letter X represents a water-cycle process.

75 What process of the water cycle is represented by X?  [1]

76 Describe the process of condensation.  [1]

77 Describe one surface condition that would allow runoff to occur.  [1]

78 Explain one role of plants in the water cycle.  [1]

79 As the lake surface freezes in the winter, how many calories of heat are released by each gram of water?  [1]
Base your answers to questions 80 through 84 on the passage and map below. The map shows a portion of the continent of Antarctica.

**Antarctica’s Ice Sheet**

The size and shape of the West Antarctic Ice Sheet depends on many factors, including melting and freezing beneath the glacier, the amount of snowfall, snow removal by wind, iceberg formation, and the rate of ice flow. Glacial moraines are found in the Executive Committee Mountains shown on the map. Moraines are located up to 100 meters in elevation above the present ice sheet surface, which indicates that a thicker ice sheet existed 20,000 years ago.

The world’s oceans and climate are influenced by Antarctica’s ice. Even a small increase in sea level from melting glaciers would be a disaster for the nearly two billion people who live near coastal areas.

80 Identify one piece of evidence found on the sides of some Antarctic mountains that indicates that an ice sheet, hundreds of meters thicker than the current ice sheet, existed in the past. [1]

81 What is the duration of insolation on December 21 at McMurdo Station? [1]
82 State the latitude and longitude of Byrd Station. Your answer must include both the units and the compass directions. [1]

83 Describe the arrangement of sediment found in a glacial moraine. [1]

84 Identify one change that would cause a decrease in the size of the West Antarctic Ice Sheet. [1]
The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

PHYSICAL SETTING
EARTH SCIENCE

Wednesday, January 23, 2008 — 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
The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

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EARTH SCIENCE

Wednesday, January 23, 2008 — 9:15 a.m. to 12:15 p.m., only

ANSWER BOOKLET

Student __________________________ Sex: □ Female
Teacher __________________________ Grade ________
School __________________________

Performance Test Score
(Maximum Score: 23)

<table>
<thead>
<tr>
<th>Part</th>
<th>Maximum Score</th>
<th>Student’s Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>B–1</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>B–2</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

Total Written Test Score
(Maximum Raw Score: 85)

Final Score
(from conversion chart)

Raters’ Initials:
Rater 1 . . . . . . . . . . Rater 2 . . . . . . . . . . . .

Part B–2

51 ________________________________

52 ________________________________

53 ________________________________

54 ________________________________

55 ________________________________

56 ________________________________

For Raters Only

51 □

52 □

53 □

54 □

55 □

56 □

Answer all questions in Part B–2 and Part C. Record your answers in this booklet.
<table>
<thead>
<tr>
<th>Star</th>
<th>Color</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun</td>
<td>yellow</td>
<td>main sequence</td>
</tr>
<tr>
<td>Procyon B</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Part C

Gradient = _______________________

67

68 ____________________________________________
For Raters Only

69

70

71

72

73

Average Number of Days a Thunderstorm Occurs Over Land

74

[5]

[OVER]
75 _______________________

76 _______________________

77 _______________________

78 _______________________

79 ______________ calories/gram

80 _______________________

81 ____________ hr

82 Latitude: _________________________

   Longitude: _________________________

83 _______________________

84 _______________________

Total Score for Part C
FOR TEACHERS ONLY

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

PS-ES PHYSICAL SETTING/EARTH SCIENCE

Wednesday, January 23, 2008 — 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.

Updated information regarding the rating of this examination may be posted on the New York State Education Department’s web site during the rating period. Check this web site http://www.emsc.nysed.gov/osa/ and select the link “Examination Scoring Information” for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and several times throughout the Regents examination period.

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

<table>
<thead>
<tr>
<th>Part A</th>
<th>Part B–1</th>
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</thead>
<tbody>
<tr>
<td>1 . . . 2 . . . 13 . . . 3 . . . 25 . . . 2 . . .</td>
<td>36 . . . 2 . . . 44 . . . 1 . . .</td>
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<tr>
<td>2 . . . 3 . . . 14 . . . 4 . . . 26 . . . 1 . . .</td>
<td>37 . . . 2 . . . 45 . . . 2 . . .</td>
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<tr>
<td>3 . . . 4 . . . 15 . . . 3 . . . 27 . . . 1 . . .</td>
<td>38 . . . 3 . . . 46 . . . 1 . . .</td>
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<tr>
<td>4 . . . 3 . . . 16 . . . 2 . . . 28 . . . 4 . . .</td>
<td>39 . . . 4 . . . 47 . . . 2 . . .</td>
</tr>
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<td>5 . . . 3 . . . 17 . . . 1 . . . 29 . . . 3 . . .</td>
<td>40 . . . 1 . . . 48 . . . 1 . . .</td>
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<td>6 . . . 2 . . . 18 . . . 1 . . . 30 . . . 3 . . .</td>
<td>41 . . . 2 . . . 49 . . . 3 . . .</td>
</tr>
<tr>
<td>7 . . . 2 . . . 19 . . . 2 . . . 31 . . . 4 . . .</td>
<td>42 . . . 4 . . . 50 . . . 4 . . .</td>
</tr>
<tr>
<td>8 . . . 1 . . . 20 . . . 3 . . . 32 . . . 4 . . .</td>
<td>43 . . . 3 . . .</td>
</tr>
<tr>
<td>9 . . . 3 . . . 21 . . . 1 . . . 33 . . . 1 . . .</td>
<td>44 . . .</td>
</tr>
<tr>
<td>10 . . . 1 . . . 22 . . . 4 . . . 34 . . . 2 . . .</td>
<td>45 . . .</td>
</tr>
<tr>
<td>11 . . . 1 . . . 23 . . . 1 . . . 35 . . . 4 . . .</td>
<td>46 . . .</td>
</tr>
<tr>
<td>12 . . . 3 . . . 24 . . . 4 . . .</td>
<td>47 . . .</td>
</tr>
</tbody>
</table>
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 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 check mark 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 that will be posted on the Department’s web site http://www.emsc.nysed.gov/osa/ on Wednesday, January 23, 2008. 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 for that administration be used to determine the student’s final score.
Part B–2

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

51 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
   — calcite
   — CaCO₃

52 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
   — Limestone reacts with acids in groundwater.
   — Acids in water cause limestone to dissolve.
   — chemical weathering of limestone
   — Water flowing through cracks removes limestone.

53 [1] Allow 1 credit for [ ]

54 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
   — seismic wave recordings
   — P-waves and S-waves
   — seismograms
   — damage reports

55 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
   — They are all located at or near tectonic plate boundaries.
   — They are located where crustal plates meet.

56 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
   — convection currents
   — convection
   — density currents
Allow 1 credit if approximately ½ of the Moon is shaded on the right-hand side.

Examples of 1-credit responses:

- Moon phases are caused by the Moon revolving around Earth.
- The Moon traveling around Earth causes the Moon to show a cycle of phases.
- Different amounts of the lighted half of the Moon are seen from Earth.

Allow 1 credit for first quarter.

Allow 1 credit. Acceptable responses include, but are not limited to:

- The Moon’s rate of rotation equals the Moon’s rate of revolution.
- The Moon completes one spin on its axis in the same amount of time it takes to complete one orbit around Earth.
Allow 1 credit if both the color and classification are correct.

**Example of a 1-credit response:**

<table>
<thead>
<tr>
<th>Star</th>
<th>Color</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Procyon B</em></td>
<td>yellow or yellow white</td>
<td>white dwarf</td>
</tr>
</tbody>
</table>
62 [1] Allow 1 credit for circling letter I.

63 [1] Allow 1 credit if the center of the X is located anywhere in the contact metamorphic zone in the limestone layer.

Example of a correct response for questions 62 and 63:

64 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
   — There is no contact metamorphism shown in rock unit D.
   — Rock unit F was eroded, then rock unit D was formed.
   — There is a buried erosional surface between F and D.
   — Rock unit D is on top of rock unit F.

65 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
   — Rock unit H was displaced by movement along a fault.
   — Rock unit H was broken when an earthquake occurred.
Part C

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

66  [1] Allow 1 credit if the center of the student’s X is located over the water in the diagonally lined area.

67  [2] Allow a maximum of 2 credits, allocated as follows:

- Allow 1 credit for any value from 0.016 to 0.018.

- Allow 1 credit for the correct units. Acceptable responses include, but are not limited to:
  - millibars per kilometer
  - mb/km
68 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
   — The isobars are close together between Miles City and Pierre.
   — There is a large pressure gradient between Miles City and Pierre.
   — The feathers on the station models indicate strong winds in that area.

69 [1] Allow 1 credit.

<table>
<thead>
<tr>
<th></th>
<th>Albuquerque</th>
<th>New York City</th>
<th>Chicago</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest RH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest RH</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

70 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
   — inward
   — counterclockwise
   — counterclockwise and toward the center

71 [1] Allow 1 credit for 11 p.m. Do not allow credit for 11 or 11 a.m.

72 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
   — Earth rotates at a rate of 15°/hr.
   — Earth’s period of rotation is 24 hours.
   — Earth spins 360° in 24 hours.
Allow 1 credit if the centers of eight or nine Xs are within the circles shown on the graph and are correctly connected with a line that passes through the circles.

**Note:** An overlay should be used to rate this graph.

**Example of a 1-credit response:**

As latitude increases, the number of days with thunderstorms decreases.

Lower latitudes have more thunderstorms.

An inverse relationship between latitude and number of days with thunderstorms.
75 [1] Allow 1 credit for evaporation.

76 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Condensation is the phase change from water vapor (gas) to water (liquid).

77 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The soil is saturated.
— Rate of rainfall exceeds the rate of infiltration.
— The ground is frozen.
— The land has a steep slope.

78 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Plants release water into the air by transpiration.
— Runoff is slowed by plants, so more infiltration can occur.

79 [1] Allow 1 credit for 80 calories/gram.

80 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— moraines
— grooved bedrock
— scratched bedrock
— polished bedrock
— U-shaped valleys

81 [1] Allow 1 credit for 24 hours.
Allow 1 credit if both latitude and longitude are correct.

Latitude: 80° S
Longitude: 120° W

Allow 1 credit. Acceptable responses include, but are not limited to:
- unsorted
- mixed
- not in layers

Allow 1 credit. Acceptable responses include, but are not limited to:
- snow removal by wind
- decreased rate of ice flow
- increased melting
- global warming
- iceberg formation
- decreased snowfall
The Chart for Determining the Final Examination Score for the January 2008 Regents Examination in Physical Setting/Earth Science will be posted on the Department’s web site http://www.emsc.nysed.gov/osa/ on Wednesday, January 23, 2008. Conversion charts provided for previous administrations of the Regents Examination in Physical Setting/Earth Science must NOT be used to determine students’ final scores for this administration.

Submitting Teacher Evaluations of the Test to the Department

Suggestions and feedback from teachers provide an important contribution to the test development process. The Department provides an online evaluation form for State assessments. It contains spaces for teachers to respond to several specific questions and to make suggestions. Instructions for completing the evaluation form are as follows:

2. Select the test title.
3. Complete the required demographic fields.
4. Complete each evaluation question and provide comments in the space provided.
5. Click the SUBMIT button at the bottom of the page to submit the completed form.
# Map to Core Curriculum

## January 2008 Physical Setting/Earth Science

### Question Numbers

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<th>Part B</th>
<th>Part C</th>
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</thead>
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<td><strong>Standard 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math Key Idea 1</td>
<td>18</td>
<td></td>
<td>67, 73</td>
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<tr>
<td>Math Key Idea 2</td>
<td>2, 7, 11, 16, 25, 26</td>
<td>50, 53, 61</td>
<td>72, 74</td>
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<tr>
<td>Math Key Idea 3</td>
<td>29</td>
<td>60</td>
<td>68</td>
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<tr>
<td>Science Inquiry Key Idea 1</td>
<td>15, 31</td>
<td>43, 56, 57, 58</td>
<td>81, 84</td>
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<tr>
<td>Science Inquiry Key Idea 2</td>
<td></td>
<td></td>
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<tr>
<td>Science Inquiry Key Idea 3</td>
<td>2, 4, 9, 11, 26, 28,</td>
<td>30, 32</td>
<td></td>
</tr>
<tr>
<td>Engineering Design Key Idea 1</td>
<td></td>
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</tbody>
</table>

### Standard 2

- Key Idea 1
- Key Idea 2
- Key Idea 3

### Standard 6

| Key Idea 1 | 12, 35 | 56, 57, 58, 65 | 75, 76, 77, 78, 79, 83 |
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| Key Idea 3 | 54 | 67, 68, 69, 70 |        |
| Key Idea 4 |        |        |        |
| Key Idea 5 | 13, 29 | 48, 50, 52, 57, 59 | 66, 70, 77, 84 |
| Key Idea 6 |        |        |        |

### Standard 7

- Key Idea 1
- Key Idea 2

### Standard 4

| Key Idea 1 | 1, 2, 3, 4, 5, 6, 11, 28, 29, 30, 31, 32 | 43, 47, 48, 49, 50, 57, 58, 59, 60, 61, 62, 63, 64, 65 | 71, 72, 75, 76, 77, 78, 79, 82 |
| Key Idea 2 | 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 20, 21, 23, 24, 25, 26, 27, 33, 34, 35 | 36, 37, 38, 39, 40, 41, 45, 46, 50, 52, 54, 55, 56 | 66, 67, 68, 69, 70, 73, 74, 80, 81, 83, 84 |
| Key Idea 3 | 18, 19, 22 | 42, 43, 44, 51, 53, 63 |        |

### Reference Tables

| ESRT 2001 Edition | 2, 4, 7, 9, 11, 15, 16, 17, 18, 19, 21, 22, 24, 25, 26, 28, 30, 31, 32 | 36, 37, 41, 42, 43, 44, 46, 51, 52, 53, 55, 56, 60, 61, 63 | 66, 67, 68, 69, 79 |
To determine the student’s final score, locate the student’s Total Performance Test Score across the top of the chart and the Total Written Test Score down the side of the chart. The point where the two scores intersect is the student’s final examination score. For example, a student receiving a Total Performance Test Score of 10 and a Total Written Test Score of 72 would receive a final examination score of 86.
### Total Performance Test Score

**January 2008 Examination in Physical Setting/Earth Science – continued**

<table>
<thead>
<tr>
<th>23</th>
<th>22</th>
<th>21</th>
<th>20</th>
<th>19</th>
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**Total Written Test Score**

**Total Performance Test Score**