Use your knowledge of Earth science to answer all questions in this examination. You may use scrap paper to work out the answers to the questions, but be sure to record your answers on your answer sheet and in your separate answer booklet. You are to answer all questions in all parts of this examination. You may use the 2011 Edition Reference Tables for Physical Setting/Earth Science. You will need these reference tables to answer some of the questions.

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

202

EARTH SCIENCE

PHYSICAL SETTING

REGENTS HIGH SCHOOL EXAMINATION

The University of the State of New York

Large-Type Edition

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

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PHYSICAL SETTING

EARTH SCIENCE

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NOTICE

A four-function or scientific calculator and a copy of the 2011 Edition Reference Tables for Physical Setting/Earth Science must be available for you to use while taking this examination.

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

Your answer sheet and booklet should be written in pen, except for graphs and drawings, which should be done in pencil.
1. The graph below shows changing ocean tide heights in feet (ft) on April 7 for a coastal location. The next high tide will occur on April 8 at

2. Scientists who proposed the Big Bang Theory were attempting to explain

(a) how Earth’s atmosphere evolved (c) the origin of our solar system
(b) why stars have different luminosities (d) the origin of the universe

3. Which star type has a surface temperature of 4000 K and a luminosity 1000 times greater than the Sun?

(a) dwarf (c) giant
(b) main sequence (d) supergiant

Directions (1–35): For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Some questions may require the use of the 2011 Edition Reference Tables for Physical Setting/Earth Science. Record your answers on your separate answer sheet.

P.S./E. Sci. – v202

4. (a) 3 a.m. (c) 10 p.m.
    (b) 3 p.m. (d) 10 a.m.

Answer all questions in this part.

Part A
4. The red shift in light from stars located in very distant galaxies suggests that these stars are moving away from the Milky Way.

5. A Foucault pendulum provides evidence that Earth

(i) orbits the Sun
(ii) spins on an axis
(iii) has a nearly spherical shape
(iv) is tilted on an axis

6. How many days during one year is the Sun directly overhead at noon in New York City?

(i) one
(ii) two
(iii) three
(iv) zero

7. Approximately which percentage of Earth's surface is exposed above water?

(i) 0\%
(ii) 10\%
(iii) 70\%
(iv) 90\%

8. On June 21, an observer in New York State will see the Sun set

(i) north of due west
(ii) south of due west
(iii) north of due east
(iv) south of due east

9. Compared to a well-sorted sample of smaller-sized particles, a well-sorted sample of larger-sized particles has greater

(i) capillarity
(ii) permeability
(iii) transpiration
(iv) porosity

Go right on to the next page.
The photographs below show two celestial objects just before, during, and just after a total solar eclipse as viewed by an observer located in Kingston, Tennessee, on August 21, 2017.

Photograph 1: Just Before Eclipse

Photograph 2: Total Solar Eclipse

Photograph 3: Just After Eclipse

G. Meyer
Which diagram represents the location of the Moon in its orbit at the time that each of these three photographs (1, 2, and 3) were taken? (Diagrams are not drawn to scale.)

Which diagram represents the location of the Moon in its orbit at the time that each of these three photographs were taken?
The diagram below represents Earth in four positions, labeled A, B, C, and D, in its orbit around the Sun on the first day of each season.

Between which two consecutive positions is the summer season occurring in the Northern Hemisphere?

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

12 Which atmospheric conditions occur when the dry-bulb temperature is 30°C and the difference between the dry-bulb temperature and wet-bulb temperature is 1°C?

(1) Warm and dry
(2) Warm and hummid
(3) Cool and humid
(4) Cool and dry

13 Which precaution is most appropriate during a blizzard?

(1) Take shelter in a basement.
(2) Avoid unnecessary travel.
(3) Evacuate to higher ground.
(4) Stay away from tall metal objects.
14 The graph below shows the relationship between the distance that wind blows over a body of water and the height of the waves that are generated.

A west wind blowing with the same velocity would generate the highest waves along the shoreline at

(1) Jamestown
(2) Oswego
(3) Plattsburgh
(4) Riverhead

Which location was probably experiencing the highest wind speed?

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

15 The weather map below shows a storm centered north of Iceland. Points A, B, C, and D indicate locations on Earth’s surface. Isobars are labeled in millibars.

Which location was probably experiencing the highest wind speed?

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

The weather map below shows a storm centered north of Iceland. Points A, B, C, and D indicate locations on Earth’s surface. Isobars are labeled in millibars.

The distance that wind blows over a body of water and the height of the waves that are generated.
16. The map below shows a cold, arctic air mass that moved southeast from Canada to cover most of the eastern half of the United States during January 2010.

Which shift caused this flow of cold air out of Canada?

(1) the northward shift of the global temperature zones
(2) the northward shift of the polar front jet stream
(3) a southward shift of the polar front jet stream
(4) a southward shift of the subtropical jet stream

17. Which surface ocean current cools the climate of the western coastline of South America?

(1) Brazil Current
(2) Peru Current
(3) Falkland Current
(4) California Current

18. When equal masses of ice and liquid water receive the same amount of energy, without a change in state, the ice changes temperature faster than the liquid water does because the

(1) density of ice is less than the density of liquid water
(2) density of ice is greater than the density of liquid water
(3) specific heat of ice is less than the specific heat of liquid water
(4) specific heat of ice is greater than the specific heat of liquid water

When equal masses of ice and liquid water receive the same amount of energy, without a change in state, the ice changes temperature faster than the liquid water does because the density of ice is less than the density of liquid water.
19. El Niño is a condition associated with a buildup of unusually warm water along the western coast of South America. Which changes in air temperature and precipitation usually occur in that region during El Niño?

1. Lower air temperature and less precipitation
2. Lower air temperature and more precipitation
3. Higher air temperature and less precipitation
4. Higher air temperature and more precipitation

20. Which conclusion can be drawn from the pattern of fossils found in Earth’s rock record?

1. Humans have existed for a longer period of time than dinosaurs.
2. Complex land organisms have been replaced by simpler marine forms.
3. Many species have existed in the past, and most have become extinct.
4. Few life forms existed before the late Cretaceous period.

21. The geologic cross section below represents a portion of Earth’s crust. The rock layers have not been overturned.

**Key**

- Igneous intrusion
- Inclusions

The inclusions were most likely broken off from their original rock layers:

1. At the same time as the intrusion of magma
2. At the same time as the crystallization of magma
3. Before the formation of sandstone
4. Before the formation of limestone.
While studying sediments deposited during and after the last ice age, scientists discovered that foraminiferid shells coil in different directions when they grow under different temperature conditions, as shown in the diagram below.

Inter-glacial (no ice age)

Foraminiferid Shell-Coiling Direction

Cool - Right
Warm - Left

Water Temperature

Layer X
Ocean Sediment Core

Foraminiferid Shells found in Layer X most likely
cooled to the
coiled to the

Which layer of Earth's interior is inferred to be composed of solid iron and nickel?

1. asthenosphere
2. outer core
3. inner core
4. stiffer mantle

Approximately how many million years ago (mya) was the amount of Earth's total landmass located south of the equator the greatest?

1. 119 mya
2. 232 mya
3. 359 mya
4. 458 mya

Which layer of Earth's interior is inferred to be composed of solid iron and nickel?

1. asthenosphere
2. stiffer mantle
3. inner core
4. outer core

23. Which layer of Earth's interior is inferred to be composed of solid iron and nickel?

24. Approximately how many million years ago (mya) was the amount of Earth's total landmass located south of the equator the greatest?

(1) 119 mya  (3) 359 mya
(2) 232 mya  (4) 458 mya

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(1) 119 mya  (3) 359 mya
(2) 232 mya  (4) 458 mya
25 The graph below shows the rate of decay of a radioactive isotope through two half-lives. Each box shows the ratio of atoms of the radioactive isotope to atoms of the disintegration product. The box at two half-lives has been left blank.

Which box best represents the ratio of these atoms at two half-lives?

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

26 The first S-wave reaches a seismic station 22 minutes after an earthquake occurred. How long did it take the first P-wave to reach the same seismic station?

(1) 8 minutes 50 seconds  (2) 10 minutes 00 seconds  (3) 12 minutes 00 seconds  (4) 12 minutes 50 seconds

The box at two half-lives has been left blank. Which box best represents the ratio of these radioactive isotopes through two half-lives?
An island arc is located near the boundary between which two tectonic plates?

(1) Antarctic Plate and Indian–Australian Plate
(2) Philippine Plate and Eurasian Plate
(3) African Plate and North American Plate
(4) Scotia Plate and South American Plate

The block diagram below represents the formation of an island arc near a plate boundary.
Which table correctly matches the average density and composition of continental and oceanic crusts?

<table>
<thead>
<tr>
<th>Type of Crust</th>
<th>Composition</th>
<th>Average Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continental</td>
<td>Mafic</td>
<td>2.7 g/cm³</td>
</tr>
<tr>
<td>Oceanic</td>
<td>Felsic</td>
<td>3.0 g/cm³</td>
</tr>
</tbody>
</table>

- Table 1
- Table 2
- Table 3
- Table 4
29 The photograph below shows a portion of the San Andreas Fault in the western United States.

30 What is the minimum stream velocity necessary to transport a quartz particle that is 0.1 centimeter in diameter in a stream?

(1) 0.05 cm/s  
(2) 0.5 cm/s  
(3) 5.0 cm/s  
(4) 50.0 cm/s

31 Scoria is a type of rock that forms most directly from the process of

(1) solidification  
(2) cementation  
(3) erosion  
(4) metamorphism

32 The element silicon (Si) is used in the production of cell phones. Which mineral could be a possible source of this silicon?

(1) calcite  
(2) galena  
(3) halite  
(4) quartz

33 The San Andreas Fault is an example of a

(1) transform plate boundary  
(2) divergent plate boundary  
(3) convergent plate boundary  
(4) complex plate boundary
33 The block diagram below shows a portion of a deeply eroded dome landscape.

Which two New York State locations have surface bedrock of similar ages?

(1) Mt. Marcy and Slide Mt.
(2) Buffalo and Rochester
(3) Old Forge and Niagara Falls
(4) Watertown and Albany

(1) (3) Which map shows the stream pattern that probably formed on the surface of this landscape?
The aerial photograph below shows small, circular bodies of water surrounded by sediment in an area that was once covered by glaciers.

These bodies of water are known as (1) finger lakes, (2) kettle lakes, (3) tributaries, (4) watersheds.

www.arctic.uoguelph.ca
Answer all questions in this part.

Part B-1
Base your answers to questions 36 and 37 on the diagram below and on your knowledge of Earth science.

The diagram represents the elliptical orbit for one planet in our solar system. The two foci of the orbit are shown as the Sun and F₂.

Not drawn to scale

Orbital path

Sun

F₂
36 Which condition would produce an orbit with a greater eccentricity?

(1) a decrease in the distance between the Sun and \( F_2 \)
(2) an increase in the distance between the Sun and \( F_2 \)
(3) a constant decrease in the orbital velocity of the planet
(4) a constant increase in the orbital velocity of the planet

37 The arrangement and movement of celestial objects in our solar system is best described by the

(1) spiral model
(2) cosmic model
(3) geocentric model
(4) heliocentric model

4) a constant increase in the orbital velocity of the planet
3) a constant decrease in the orbital velocity of the planet
2) an increase in the distance between the Sun and \( F_2 \)
1) a decrease in the distance between the Sun and \( F_2 \)
Base your answers to questions 38 and 39 on the diagram below and on your knowledge of Earth science.

The diagram represents a simplified model of the incoming (solar) and outgoing (terrestrial) electromagnetic radiation of Earth's energy budget. Use this diagram to answer the following questions:

1. Identify the two types of radiation depicted in the diagram.
2. Describe how the radiation is absorbed by the Earth's atmosphere.
3. Explain the role of greenhouse gases in the atmosphere.
4. Discuss the significance of the balance between incoming and outgoing radiation.
38 Which color and texture of Earth materials absorbs the greatest amount of short-wave radiation from the Sun?

(1) light color and smooth texture
(2) light color and rough texture
(3) dark color and smooth texture
(4) dark color and rough texture

39 Two major greenhouse gases that absorb outgoing long-wave radiation within the atmosphere are

(1) methane and oxygen
(2) methane and carbon dioxide
(3) nitrogen and oxygen
(4) nitrogen and carbon dioxide
Southeast Asia Monsoons

The Southeast Asia monsoons are seasonal shifts in the direction of regional planetary winds. These wind shifts occur due to changes in the position of the Earth's axis and the tilt of the planet. The monsoon season is characterized by a shift in wind direction, which brings significant changes to the region. The wind direction from May to August changes from southwest to northeast, driven by the movement of the Himalayan Mountains. This shift in wind direction also affects rainfall patterns, with the rainy season occurring from May to August. The monsoon season in Southeast Asia is crucial for agriculture and water resources.
Heavy rains occur in Cambodia and Thailand when the moist air brought by the monsoon rises, contracts, and warms. (4) sinks, contracts, and cools; (3) rises, expands, and cools; (2) rises, contracts, and warms; (1) rises, expands, and cools.
41. Which map shows the most likely location and direction of the monsoon winds and regional atmospheric pressure occurring in Southeast Asia in July?
Question 41 continued
Base your answers to questions 42 and 43 on the diagram below and on your knowledge of Earth science.

The diagram represents one position of Earth in its orbit around the Sun and 12 constellations that can be seen in the night sky by an observer in New York State at different times of the year. The approximate locations of the constellations in relation to Earth’s orbit are shown. Point A represents another position in Earth’s orbit.

Conclude your answers to questions 42 and 43 on the diagram below and on your knowledge of Earth science.
42 When Earth is located in the orbital position shown on the diagram, which constellation is visible to an observer in New York State at midnight?

(1) Gemini (3) Scorpius
(2) Pisces (4) Virgo

43 Approximately how many days (d) does it take for Earth to orbit from its present position to point A?

(1) 27 d (3) 183 d
(2) 91 d (4) 365 d

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Go right on to the next page.
Base your answers to questions 44 through 47 on the cross sections below and on your knowledge of Earth science. The cross sections represent three widely spaced rock outcrops labeled A, B, and C. Line XY represents a fault. Overturning has not occurred.

44. Identify the type of rock each layer represents.

45. Describe the sequence of events that led to the formation of the rock layers in each outcrop.

46. Explain how the cross sections can be used to determine the relative age of the rock layers.

47. Discuss the significance of the contact metamorphism observed in outcrop C.
44 What is the youngest sedimentary rock layer represented in these cross sections?

(1) black shale (3) tan siltstone
(2) brown sandstone (4) conglomerate

45 Which sequence shows the relative ages of the igneous intrusion, fault X–Y, unconformity, and red sandstone, from oldest to youngest, in outcrop C?

(1) unconformity → igneous intrusion → fault X–Y → red sandstone
(2) red sandstone → unconformity → igneous intrusion → fault X–Y
(3) igneous intrusion → unconformity → red sandstone → fault X–Y
(4) igneous intrusion → red sandstone → fault X–Y → unconformity

46 Which processes formed the unconformities shown in outcrops B and C?

(1) folding, faulting, and tilting
(2) uplift, erosion, and deposition
(3) weathering, abrasion, and igneous intrusion
(4) melting, contact metamorphism, and solidification

47 Which characteristic of the volcanic ash layer is most useful for correlating rock layers in outcrops A, B, and C?

(1) The ash was deposited over a large geographic area.
(2) The ash layer varies in thickness.
(3) Carbon-14 can be used to determine the age of the ash.
(4) Igneous rock particles are found in the ash.

48 Which sequence shows the relative ages of the igneous intrusion, fault X–Y, unconformity, and red sandstone, from oldest to youngest, in outcrop C?
Base your answers to questions 48 through 50 on the diagram below and on your knowledge of Earth science.

The diagram represents an erosional-depositional system in an arid environment, and indicates the processes occurring at various locations within the atmosphere and on the land surface. The box labeled X identifies one sand dune. Arrows represent the movement of particles.

48. Which agent of erosion moves the particles within this erosional-depositional system?
(1) waves (3) running water
(2) wind (4) moving ice

49. The total range of particle sizes indicated in this system is
(1) less than 0.004 cm, only
(2) 0.004 to 0.006 cm, only
(3) 0.006 to 0.2 cm, only
(4) 0.0004 to 0.2 cm

50. List the processes occurring within the atmosphere and on the land surface at various locations indicated in the diagram.

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Which diagram indicates both the direction of dune migration (movement) and the dominant process occurring on each slope of the dune in box X?
Base your answers to questions 51 through 53 on the passage below and on your knowledge of Earth science.

**Waimea Canyon**

Waimea Canyon is located on the west side of the island of Kauai, Hawaii. Waimea Canyon has been referred to as the “Grand Canyon of the Pacific.” But unlike the Grand Canyon, which was created through horizontal layers of sedimentary rocks, Waimea Canyon, which was carved through horizontal layers of volcanic rocks, Waimea Canyon has been referred to as the “Grand Canyon of the Pacific.” But unlike the Grand Canyon, which was created through horizontal layers of sedimentary rocks, Waimea Canyon is located on the west side of the island of Kauai, Hawaii.

51 Identify the epoch during which the first basalt lava flows occurred on Kauai. [1]

52 Identify the dominant agent of erosion that carved Waimea Canyon. [1]

53 In addition to pyroxene and olivine, identify the name of one other mineral commonly found in basalt that could oxidize to produce red soils. [1]

**Part B–2**

Record your answers in the spaces provided in your answer booklet. Some questions may require the use of the 2011 Edition Reference Tables for Physical Setting/Earth Science.
54 On the map in your answer booklet, plot with \(X\) the locations of the six islands and seamounts formed by the Easter Island Hot Spot. [1]

55 Identify the name of tectonic plate A. [1]

56 Describe the general relationship between the distance from the East Pacific Ridge and the age of the oceanic bedrock of the islands and seamounts. [1]

### Islands and Seamounts Formed by the Easter Island Hot Spot

<table>
<thead>
<tr>
<th>Name</th>
<th>Latitude (° S)</th>
<th>Longitude (° W)</th>
<th>Distance from East Pacific Ridge (km)</th>
<th>Age of Oceanic Bedrock (Milion Years)</th>
<th>Seamount/Eastern Plate/Ridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easter Island island</td>
<td>27</td>
<td>109</td>
<td>360</td>
<td>0.3</td>
<td>Island</td>
</tr>
<tr>
<td>Sala y Gomez island</td>
<td>26</td>
<td>105</td>
<td>750</td>
<td>1.7</td>
<td>Island</td>
</tr>
<tr>
<td>GS57202-70 seamount</td>
<td>25</td>
<td>255</td>
<td>1500</td>
<td>7.9</td>
<td>Seamount</td>
</tr>
<tr>
<td>18DS seamount</td>
<td>26</td>
<td>255</td>
<td>2000</td>
<td>11.5</td>
<td>Seamount</td>
</tr>
<tr>
<td>17DS seamount</td>
<td>26</td>
<td>255</td>
<td>2500</td>
<td>14.9</td>
<td>Seamount</td>
</tr>
<tr>
<td>12DS seamount</td>
<td>27</td>
<td>255</td>
<td>3100</td>
<td>22.0</td>
<td>Seamount</td>
</tr>
</tbody>
</table>

Base your responses to questions 54 through 56 on the map in your answer booklet, on the table below, and on your knowledge of Earth science.
Base your answers to questions 57 and 58 on the diagram below and on your knowledge of Earth science.

57 Water vapor forms a cloud of liquid droplets at location A. State the number of joules per gram of heat energy that is released into the atmosphere during this process. [1]

58 Identify the names of the two different processes, represented by letters B and C, that return moisture to the atmosphere. [1]
Base your answers to questions 59 through 62 on the weather map below and on your knowledge of Earth science. The map shows the location of a low-pressure system over New York State during late summer. Isobars indicate regions receiving precipitation. The air masses are labeled. Eight locations in New York State are indicated.
Identify the location labeled on the map that will next experience a short burst of heavy precipitation, a change in wind direction, and a rapid decrease in temperature. [1]

Convert the air pressure at Plattsburgh, New York, from millibars to inches of mercury. [1]

The table below lists the weather conditions at Old Forge, New York.

<table>
<thead>
<tr>
<th>Weather Condition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (°F)</td>
<td>85</td>
</tr>
<tr>
<td>Cloud cover (%)</td>
<td>100</td>
</tr>
<tr>
<td>Visibility (mi)</td>
<td>1-4</td>
</tr>
<tr>
<td>Present Weather</td>
<td>Rain Showers</td>
</tr>
</tbody>
</table>

Identify the weather instrument used to measure air pressure. [1]

On the station model in your answer booklet, record all four weather conditions for Old Forge using the proper format. [1]

Convert the air pressure at Plattsburgh, New York, from millibars to inches of mercury. [1]
Base your answers to questions 63 through 65 on the calendar below, on the diagram in your answer booklet, and on your knowledge of Earth science. The calendar shows the phases of the Moon for January 2019 as viewed by an observer in New York State. Some phrases have been labeled. The diagram on your answer sheet represents eight positions of the Moon in its orbit around Earth.

January 2019

Sunday Monday Tuesday Wednesday Thursday Friday Saturday
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21
22 23 24 25 26
27 28 29 30 31

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In your answer booklet, circle the position of the Moon in its orbit that produced the moon phase observed on January 17, 2019. [1]

On the diagram in your answer booklet, place an X on each of the two positions of the Moon in its orbit where neap tides (the smallest difference in the water levels between high tide and low tide) occur. [1]

A New Moon occurred on January 5, 2019. Determine the date of the New Moon that occurred in February 2019. [1]

On the diagram in your answer booklet, place an X on each of the two positions of the Moon in its orbit where neap tides (the smallest difference in the water levels between high tide and low tide) occur. [1]

63 In your answer booklet, circle the position of the Moon in its orbit that produced the moon phase observed on January 17, 2019. [1]
Base your answers to questions 66 through 69 on the topographic map in your answer booklet and on your knowledge of Earth science. Partially drawn contour lines are shown on the southern portion of the map. Points of elevation are recorded in meters. Points A, B, C, and D represent locations on Earth's surface. Lines AB and CD are reference lines. Line AB crosses Line CD.

66 On the southern portion of the map, complete the 480-meter, 500-meter, and 520-meter contour lines.

67 On the grid in your answer booklet, construct a topographic profile along Line AB by plotting the elevation of each contour line that crosses Line AB. The elevations of points A and B have been plotted on the grid. Connect all nine plots with a line from A to B to complete the profile.

68 Calculate the gradient, in meters per kilometer, from point C to point D.

69 Describe the evidence shown by the contour lines that indicates that Bry Creek flows downhill in a southwesterly direction.

Part C

Directions (66–85): Record your answers in the spaces provided in your answer booklet. Some questions may require the use of the 2011 Edition Reference Tables for Physical Setting/Earth Science.

Answer all questions in this part.
Base your answers to questions 70 through 72 on the passage below and on your knowledge of Earth science.

Carrara Marble

Carrara marble is named for the town of Carrara on the west coast of Italy. This dazzling white marble has been mined since the time of the ancient Romans and remains the major industry of the area today. Major museums around the world have statues carved from Carrara marble. The formation of Carrara marble began 200 million years ago when the sediments of tiny shells were buried and compacted. Approximately 27 million years ago, tectonic forces caused this area of the seafloor bedrock to be deformed and metamorphosed, forming the Carrara marble. Uplift and erosion later exposed huge formations of this famous marble. Uplift and erosion have shaped the Carrara marble into the Carrara marble. Among the world’s most prized building stones, Carrara marble is named for the town of Carrara on the west coast of Italy. This dazzling white marble has been mined since the time of the ancient Romans and remains the major industry of the area today. Major museums around the world have statues carved from Carrara marble.

70 Identify the most likely sedimentary rock that formed when the sediments of tiny shells were buried and compacted when the sediments of tiny shells were buried and compacted.

71 Identify the change in pressure and the change in temperature that most likely occurred to metamorphose the sedimentary seafloor bedrock into the Carrara marble.

72 In terms of mineral properties, explain why a statue is easier to carve from pure white marble rather than from pure white quartzite.
Base your answers to questions 73 through 75 on the diagram below and on your knowledge of Earth science.

The diagram represents the inferred sequence in which our solar system formed from a nebula of gas and dust. Letters A through F represent different stages in its development:

A. Nebula forms and starts to collapse.
B. Nebula flattens and begins to rotate. Material is pulled to the center.
C. Cloud becomes more dense at the center. Remaining dust and gas are blown away, leaving planets and other celestial objects orbiting the Sun.
D. Planets and other celestial objects form from gas and dust not pulled to the center.
E. Current solar system showing planetary orbits.
F. Sun forms and gives off energy.
Identify the force that pulled most matter to the center of the rotating disk in stage B. [1]

Identify the process that produces energy in the core of the Sun at stage E by combining lighter elements into heavier elements. [1]

Most asteroids formed in a belt located between 329 million and 478.7 million kilometers from the Sun.

Identify the two planets located on either side of the asteroid belt. [1]

Identify the force that pulled most matter to the center of the rotating disk in stage B. [1]
Base your answers to questions 76 and 77 on your knowledge of Earth science. The map shows the four time zones across the continental United States. Eight cities are labeled on the map. Use the information on the map to answer the following questions.

1. **New Orleans** is located in the **Central time zone**.
2. **Miami** is located in the **Eastern time zone**.
3. **Seattle** is located in the **Pacific time zone**.
4. **Massena** is located in the **Mountain time zone**.
5. **Denver** is located in the **Mountain time zone**.
6. **San Francisco** is located in the **Pacific time zone**.
7. **New York City** is located in the **Eastern time zone**.
8. **Miami** is located in the **Eastern time zone**.

Base your answers to questions 76 and 77 on your knowledge of Earth science. The map shows the four time zones across the continental United States. Eight cities are labeled on the map. Use the information on the map to answer the following questions.

1. **New Orleans** is located in the **Central time zone**.
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3. **Seattle** is located in the **Pacific time zone**.
4. **Massena** is located in the **Mountain time zone**.
5. **Denver** is located in the **Mountain time zone**.
6. **San Francisco** is located in the **Pacific time zone**.
7. **New York City** is located in the **Eastern time zone**.
8. **Miami** is located in the **Eastern time zone**.
76 State the time at San Francisco, California, when it is 12 noon at New Orleans, Louisiana. Indicate a.m. or p.m. in your answer. [1]

77 Identify the city on the map where the altitude of Polaris is closest to 45 degrees. [1]
Base your answers to questions 78 through 80 on the graphs below and on your knowledge of Earth science.

The climate graphs represent data for three different locations in North America. Line graphs show the average monthly air temperatures in degrees Fahrenheit (°F). Bar graphs show the average monthly precipitation in inches (in). A circled dot (●) indicates each location on the maps. The climate graphs represent data for three different locations in North America. Line graphs show the average monthly air temperatures in degrees Fahrenheit (°F). Bar graphs show the average monthly precipitation in inches (in). A circled dot (●) indicates each location on the maps.
78 State one reason why the annual temperature range of Calgary, Canada, is greater than the annual temperature range in Sitka, Alaska. [1]

79 Explain why the noontime altitude of the Sun (angle of insolation) is greater at Monterey, Mexico, than at Calgary, Canada, every day of the year. [1]

80 Identify the most likely types of precipitation that occur in Calgary, Canada, and Monterey, Mexico, during January and February. [1]
Base your answers to questions 81 and 82 on the map below and on your knowledge of Earth science. The map shows a river and a depositional feature at an ocean shoreline. Point A indicates a location on Earth's surface.
81 Identify the name of the depositional feature surrounding location A that is forming where the river enters the ocean. 

82 Describe how the rocks and sediments are rounded and smoothed as they are being eroded by the water in the ocean.

83 List the following organisms in order of geologic age from youngest to oldest: earliest mammals, earliest mammals, earliest mammals, earliest mammals, earliest mammals.

84 Identify the name of one New York State landscape region where the index fossil *Phacops* may be found in the surface bedrock.

85 On the timeline in your answer booklet, accurately shade in an area to represent the entire Neogene Period. Base your answers to questions 85 through 88 on the timeline in your answer booklet and on your knowledge of Earth science. The timeline represents the last 600 million years of geologic time. Shaded area A represents this time. The shaded region is labeled Early Cenozoic. The shaded area B represents Early Cenozoic.

86 Describe how the rocks and sediments are rounded and smoothed as they are being eroded by the water in the ocean.

87 Identify the name of the depositional feature surrounding location A that is forming where the river enters the ocean.