

KEEP  
CALM  
AND USE  
YOUR  
ESRT

PLAINEDGE MIDDLE SCHOOL

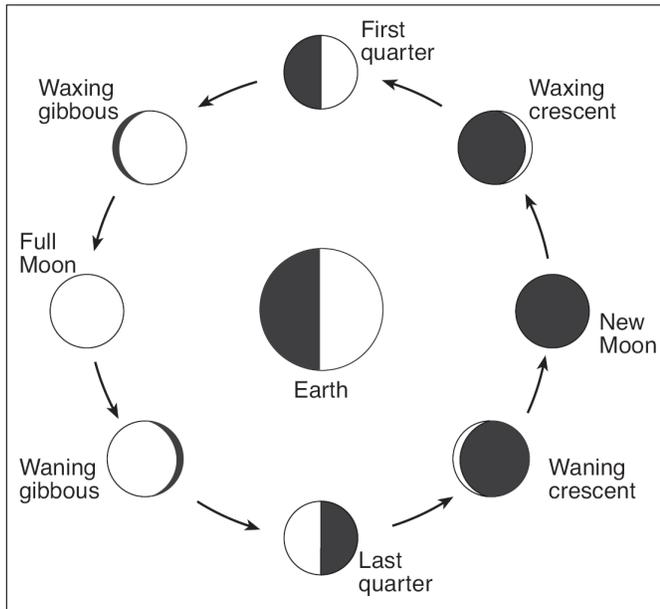
SESSION #4: ***Moon and Energy***

EARTH SCIENCE REGENTS REVIEW

Name: \_\_\_\_\_

# Moon and Energy

Base your answers to questions 1 and 2 on the diagram below, which shows positions of the Moon in its orbit and phases of the Moon as viewed from New York State.



(Not drawn to scale)

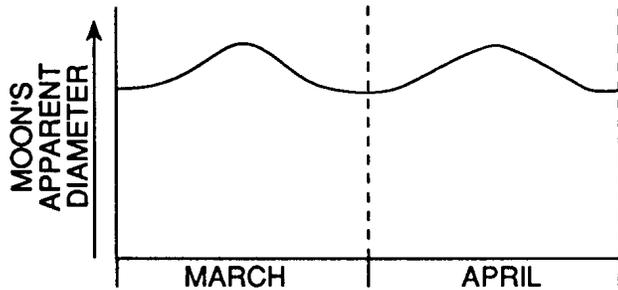
1. Which statement best explains why the same side of the Moon is viewed from Earth as the Moon goes through its phases?

- A) The Moon does not rotate as it revolves around Earth.
- B) The Moon's period of rotation equals Earth's period of rotation.
- C) The Moon's period of rotation equals Earth's period of revolution around the Sun.
- D) The Moon's period of rotation equals the Moon's period of revolution around Earth.

2. What is the eccentricity of the Moon's orbit?

- A) 0.017                      B) 0.055                      C) 0.386                      D) 0.723

3. An observer on the Earth measured and recorded the slight changes in the apparent diameter of the Moon for 2 months. A graph of the data is shown below.



Which statement best explains the observation:

- A) The Moon actually increases and decreases in size each month.
- B) The apparent diameter of the Moon is always greatest at the new-moon phase.
- C) The distance from the Earth to the Moon varies in a cyclic manner.
- D) The Earth revolves around the Moon each month.

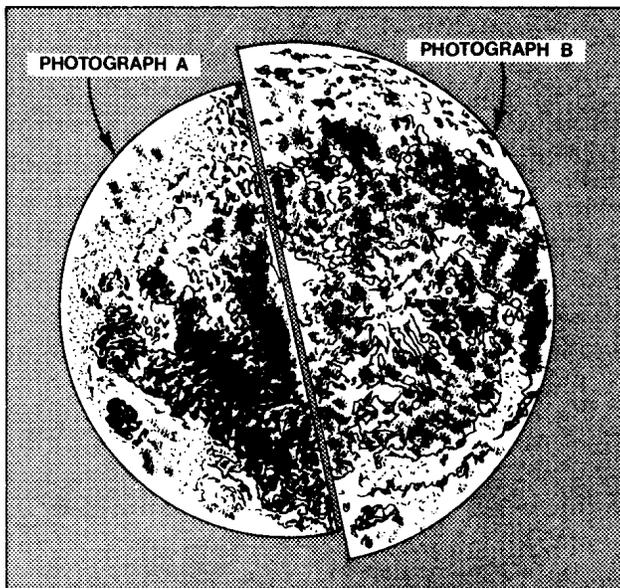
4. Base your answer to the following question on the diagram below which represents the Earth, Moon, and Sun on a particular day as viewed from a point in space. Positions *A* through *D* are located along the Earth's Equator and *E* is at the North Pole. Positions *F* and *G* are located on the surface of the Moon.



(NOT TO SCALE)

The actual diameter represented by the line *F-G* is

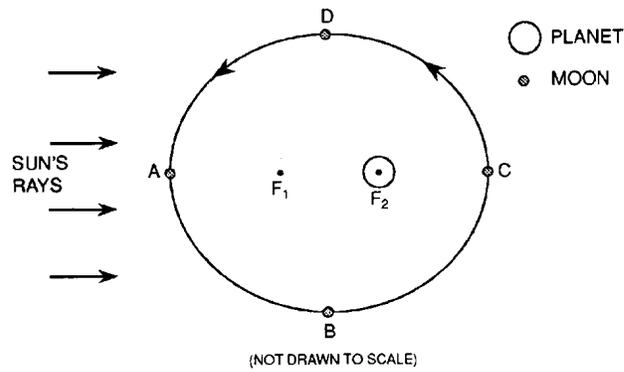
- A)  $1.74 \times 10^3$  km      B)  $3.48 \times 10^3$  km      C)  $6.37 \times 10^3$  km      D)  $12.74 \times 10^3$  km
5. The diagram below represents two photographs of the Moon, *A* and *B*, taken at full moon phase several months apart. The photographs were taken using the same magnification. Each photograph was cut in half and the halves placed next to each other.



What most likely caused the difference in the apparent size of the Moon in photographs *A* and *B*?

- A) The phases of the Moon changed.      B) The Moon expanded.  
 C) The distance from the Earth to the Moon changed.      D) The Moon rotated.
6. Rock samples brought back from the Moon show absolutely no evidence of chemical weathering. This is most likely due to
- A) the lack of an atmosphere on the Moon      B) extremely low surface temperatures on the Moon  
 C) lack of biological activity on the Moon      D) large quantities of water in the lunar "seas"

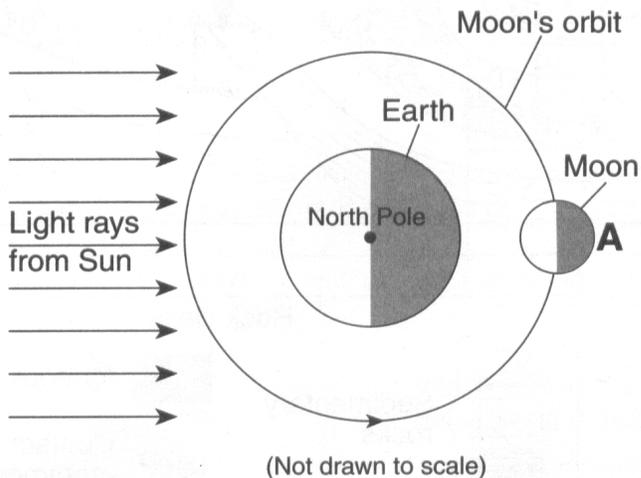
7. Base your answer to the following question on the *Earth Science Reference Tables* and the diagram below. The diagram represents a model of the orbit of a moon around a planet. Points  $A$ ,  $B$ ,  $C$ , and  $D$  indicate four positions of the moon in its orbit. Points  $F_1$  and  $F_2$  are focal points of the orbit.



As the moon moves in its orbit from point  $D$  to point  $B$ , the force of gravitational attraction between the moon and the planet

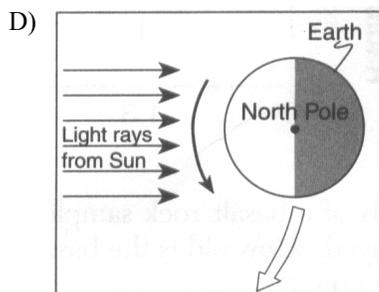
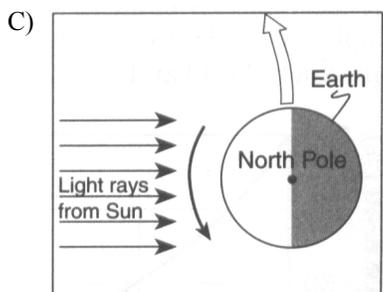
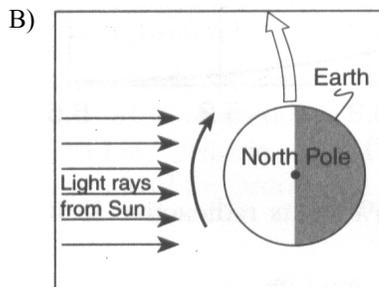
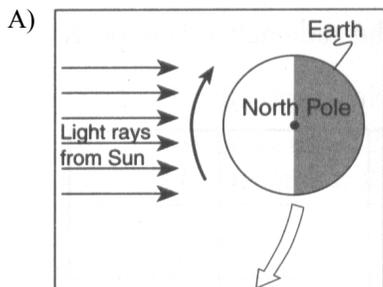
- A) increases, only
- B) decreases, only
- C) increases, then decreases
- D) decreases, then increases

8. Base your answer to the following question on the diagram below, which shows the Moon, Earth, and the Sun's rays as viewed from space. Letter A indicates a certain position of the Moon in its orbit.

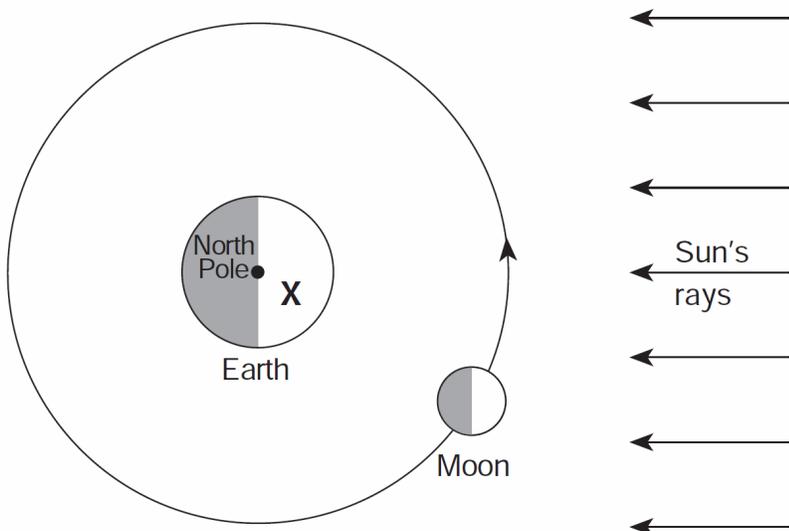


Which diagram correctly shows the direction of Earth's rotation and revolution?

Key	
	Rotation
	Revolution

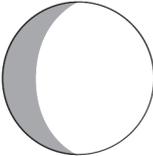
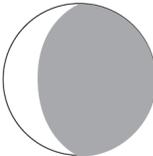
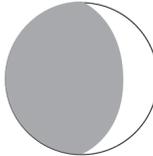
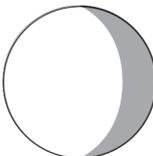


9. The diagram below shows the Moon at one position in its orbit around Earth. Letter X indicates the location of an observer in New York State.

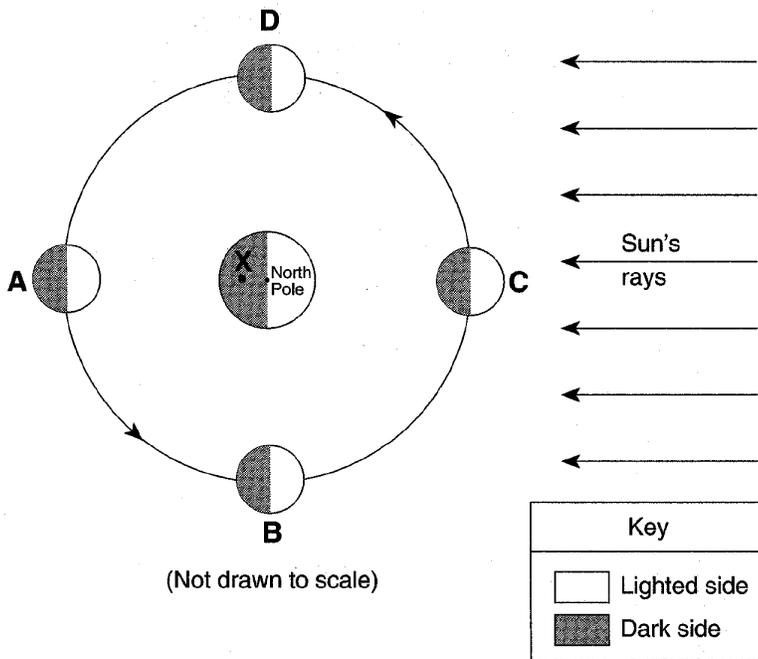


(Not drawn to scale)

Which phase of the Moon will the observer see when the Moon is at the position shown in its orbit?

- A)  B)  C)  D) 

10. Base your answer to the following question on the diagram below, which shows Earth and the Moon in relation to the Sun. Positions *A*, *B*, *C*, and *D* show the Moon at specific locations in its orbit. Point *X* is a location on Earth's surface.



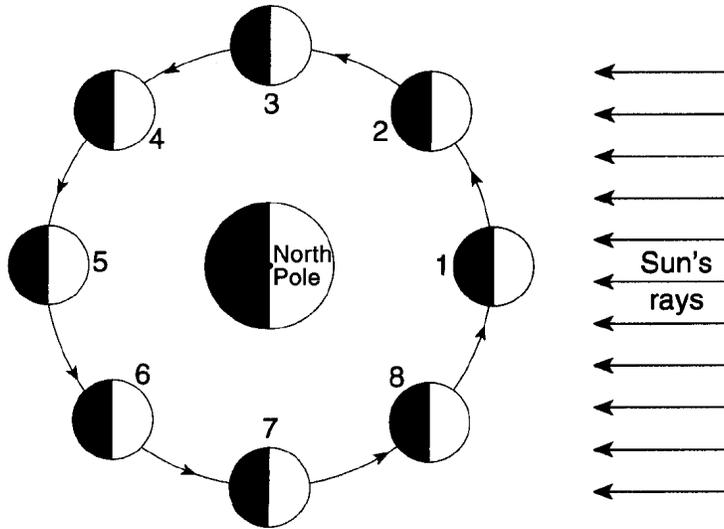
Which phase of the Moon would be observed on Earth when the Moon is at location *A*?

- A)
- B)
- C)
- D)

11. How many days are required for the Moon to go from one full-Moon phase to the next full-Moon phase when viewed from Earth?

- A) 24      B) 27.3      C) 29.5      D) 365

12. The diagram below shows the Moon as it revolves around Earth. The numbered locations represent different positions of the Moon in its orbit.



(Not drawn to scale)

Which Moon phase would be seen by an observer in New York State when the Moon is at position 2?

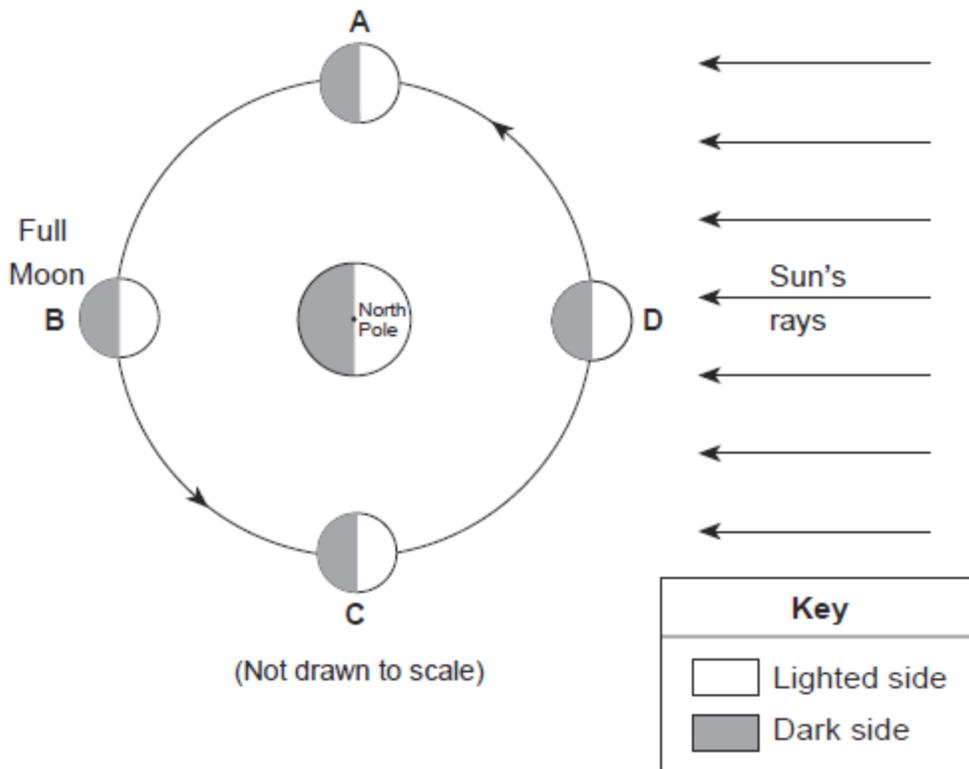
- A)  B)  C)  D) 

13. Which sequence of Moon phases could be observed from Earth during a 2-week period?

Key	
	Full Moon phase
	New Moon phase

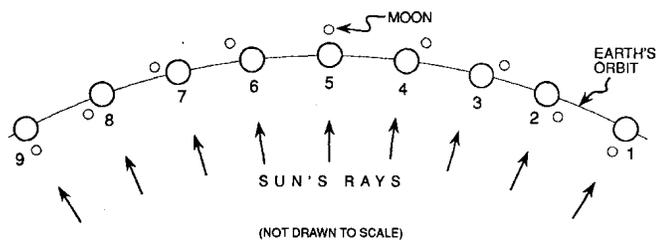
- A)  →  →  → 
- B)  →  →  → 
- C)  →  →  → 
- D)  →  →  → 

14. Base your answer to the following question on the diagram below and on your knowledge of Earth science. The diagram represents the Moon at four positions, labeled *A*, *B*, *C*, and *D*, in its orbit around Earth. The position of the full-Moon phase is labeled.



Approximately how many days (d) does it take for the Moon to move from the phase shown at position *A* to the full-Moon phase?

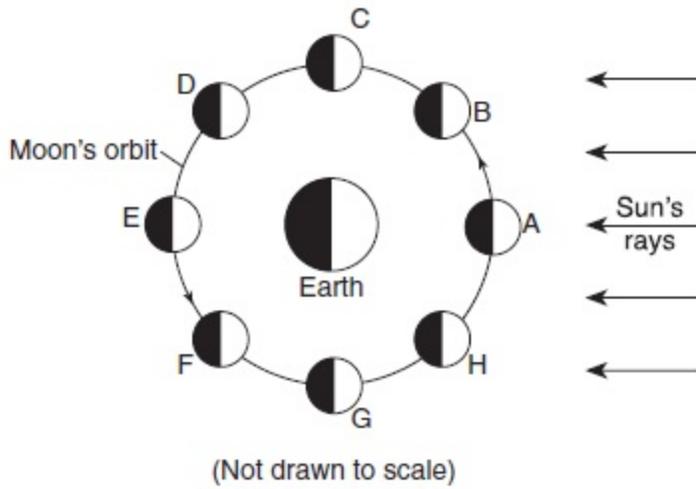
- A) 7.4 d                      B) 14.7 d                      C) 27.3 d                      D) 29.5 d
15. Base your answer to the following question on the diagram below which represents nine positions of the Earth in orbit around the Sun during one complete orbit of the Moon around the Earth.



Which phase of the Moon will be seen from the Earth at position 5?

- A)                      B)                      C)                      D)

16. Base your answer to the following question on the diagram below and on your knowledge of Earth science. The diagram represents the Moon in eight positions, *A* through *H*, in its orbit around Earth.

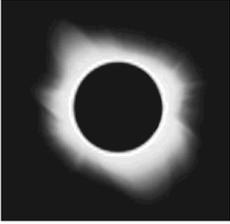


How many days are required for the Moon to complete a cycle of phases from the new Moon position represented in the diagram to the new Moon the following month?

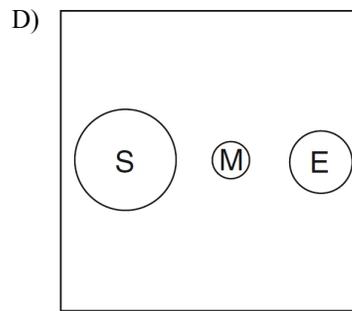
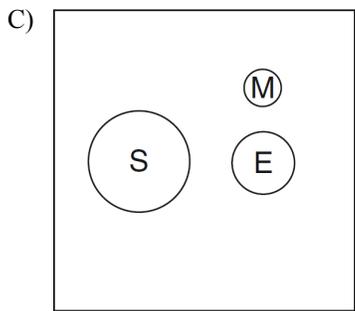
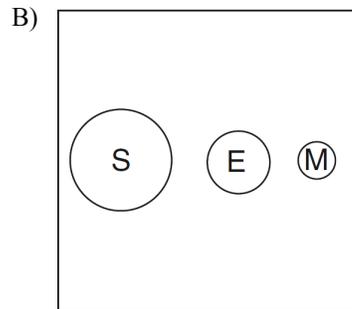
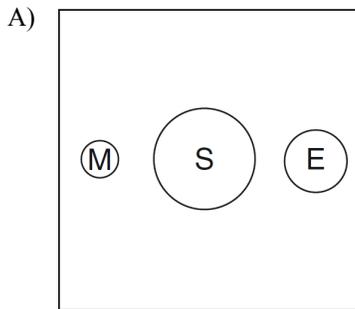
- A) 2.2 d                      B) 27.3 d                      C) 29.5 d                      D) 365.26 d

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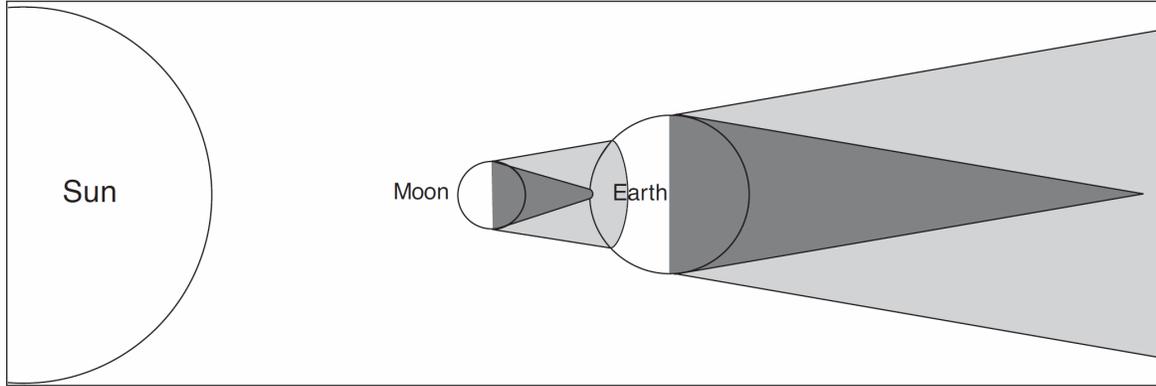
17. The diagram below represents a total solar eclipse as seen from Earth.



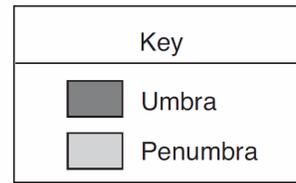
Which diagram correctly represents the relative positions of the Sun (*S*), Earth (*E*), and the Moon (*M*) in space during a total solar eclipse? [The diagrams are not drawn to scale.]



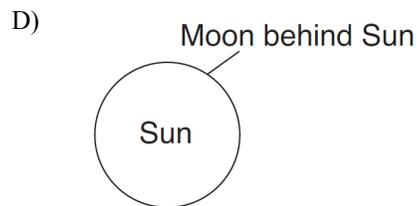
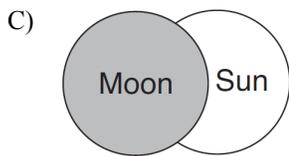
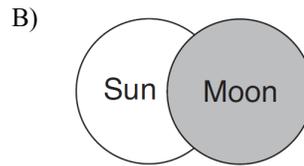
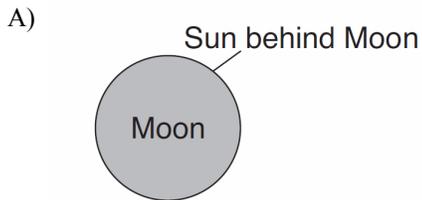
18. The diagram below shows the position of the Sun, the Moon, and Earth during a solar eclipse. The full shadow (umbra) and partial shadow (penumbra) of the Moon and Earth are shown.



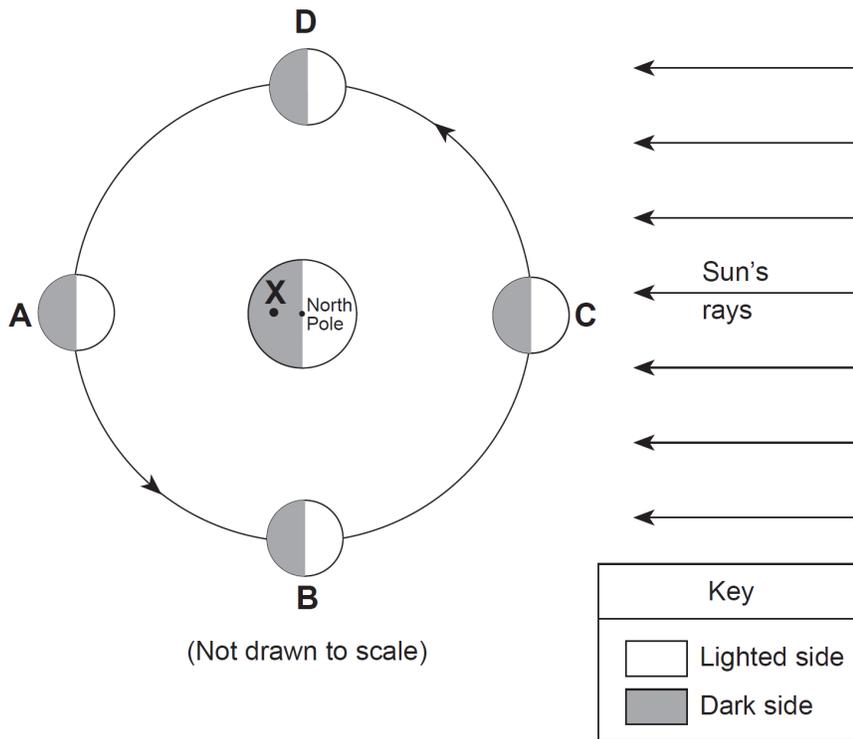
(Not drawn to scale)



Which diagram best represents the appearance of the Sun and the Moon to an observer located within the umbra of the Moon's shadow on Earth's surface?



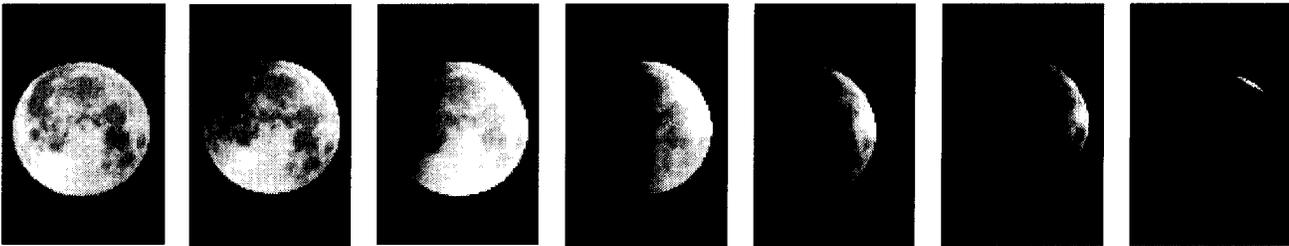
19. Base your answer to the following question on the diagram below, which shows Earth and the Moon in relation to the Sun. Positions *A*, *B*, *C*, and *D* show the Moon at specific locations in its orbit. Point *X* is a location on Earth's surface.



A solar eclipse might occur when the Moon is at location

- A) *A*                      B) *B*                      C) *C*                      D) *D*

20. The photographs below show the surface of the Moon as seen from Earth over an 80-minute period during a single night.



Which motion is responsible for this changing appearance of the Moon?

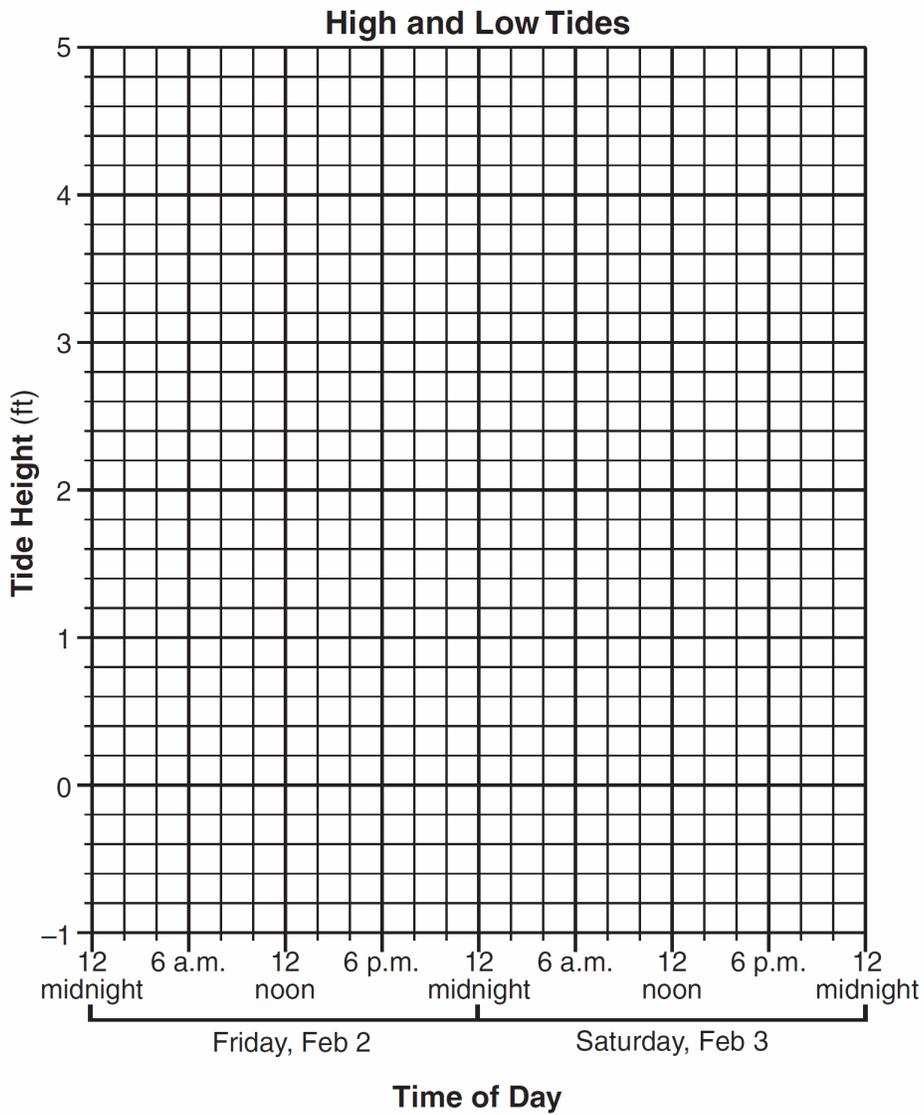
- A) The Moon moves into the shadow of Earth.                      B) The Moon moves into the shadow of the Sun.  
 C) The Sun moves into the shadow of Earth.                      D) The Sun moves into the shadow of the Moon.

21. Base your answer to the following question on the calendar and data table below. The calendar shows the month of February 2007, indicating the dates when some lunar phases occurred. February 24 lists only the name of the Moon phase that occurred on that day. The data table shows the highest and lowest tides (in feet) recorded for the Hudson River at Kingston, New York, over a 2-day period in February 2007.

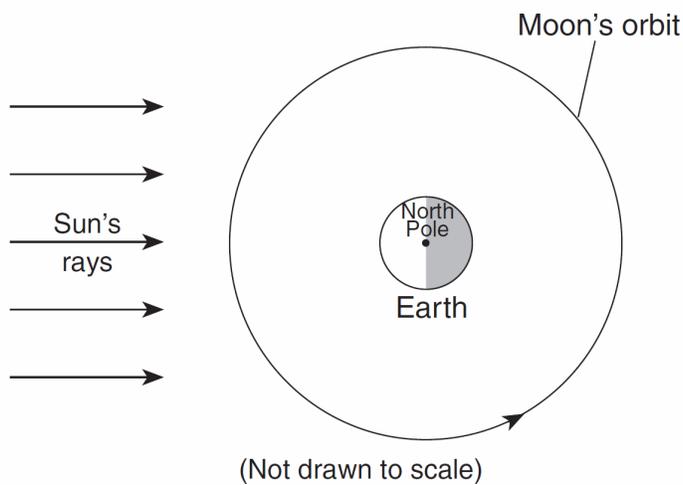
February 2007						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	Full 2	3
4	5	Old gibbous 6	7	8	9	Last quarter 10
11	12	13	14	15	16	New 17
18	19	New crescent 20	21	22	23	First quarter 24
25	26	27	28			

#### High and Low Tides for Kingston, New York

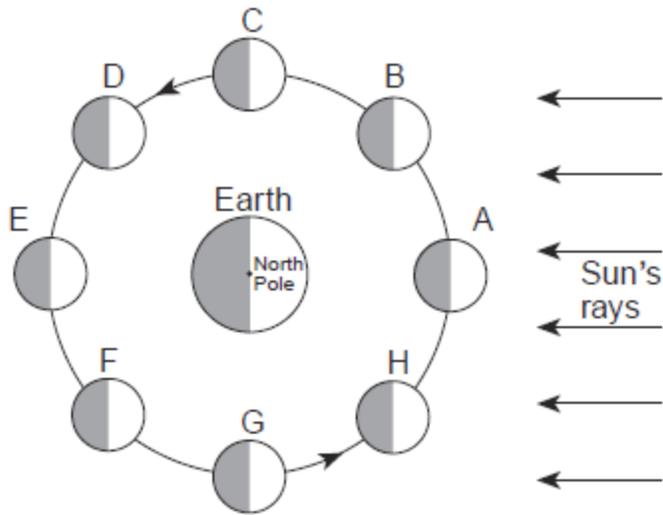
Date	Time of Day	Tide Height (ft)
Friday, February 2	1:30 a.m.	3.5
	7:30 a.m.	-0.2
	1:30 p.m.	4.1
	8:00 p.m.	-0.4
Saturday, February 3	2:00 a.m.	3.6
	8:30 a.m.	-0.2
	2:00 p.m.	4.0
	9:00 p.m.	-0.4



On the diagram below, draw a small circle (**O**) on the Moon's orbit to show the position of the Moon in its orbit on February 2.



22. The diagram below represents eight positions of the Moon in its orbit.

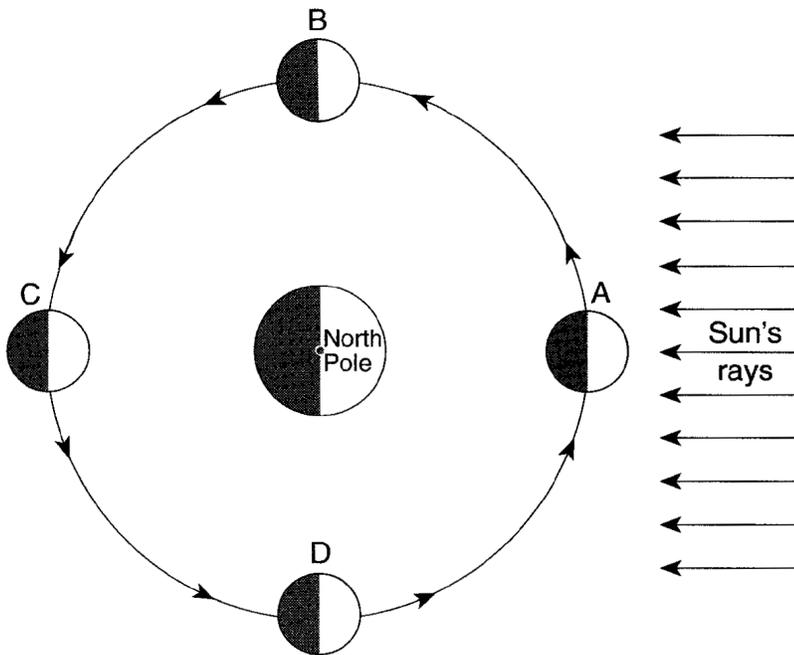


(Not drawn to scale)

Why are high tides on Earth greatest when the Moon is in position *A* and in position *E*?

- A) The Moon is closer to the Sun
- B) The Moon is closer to Earth
- C) The Moon, the Sun, and Earth are aligned
- D) The Moon is in the same phase at both locations

23. Base your answer to the following question on the diagram below and on your knowledge of Earth science. The diagram represents the Moon at different positions, labeled *A*, *B*, *C*, and *D*, in its orbit around Earth.



(Not drawn to scale)

At which two Moon positions would an observer on Earth most likely experience the highest high tides and the lowest low tides?

- A) *A* and *B*
- B) *B* and *C*
- C) *C* and *A*
- D) *D* and *B*

24. The table below shows the times of ocean high tides and low tides on a certain date at a New York State location.

### Ocean Tides

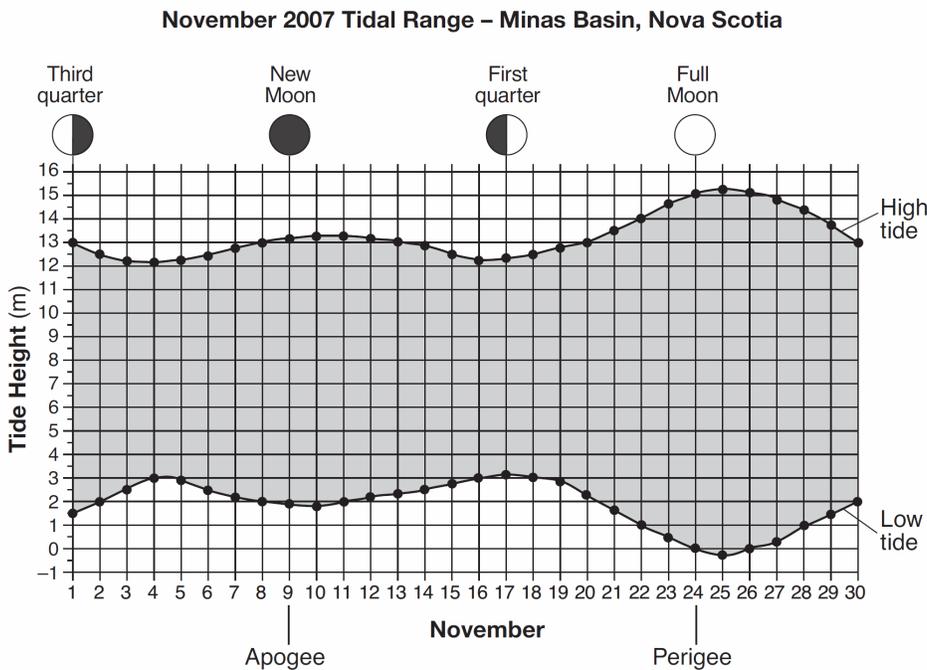
Type of Tide	Time
high	4:45 a.m.
low	10:58 a.m.
high	5:15 p.m.
low	11:22 p.m.

At approximately what time on the following day did the next high tide occur at this location?

- A) 4:40 a.m.      B) 5:40 a.m.      C) 4:40 p.m.      D) 5:40 p.m.

Base your answers to questions 25 through 27 on the graph below and on your knowledge of Earth science.

The graph shows the tidal range (the difference between the highest tide and the lowest tide) recorded in Minas Basin, Nova Scotia, during November 2007. The phase of the Moon on selected days is shown above the graph. The dates that the Moon was farthest from Earth (apogee) and closest to Earth (perigee) are indicated under the graph.



25. The next first-quarter Moon after November 17 occurred closest to

- A) December 9      B) December 14      C) December 17      D) December 24

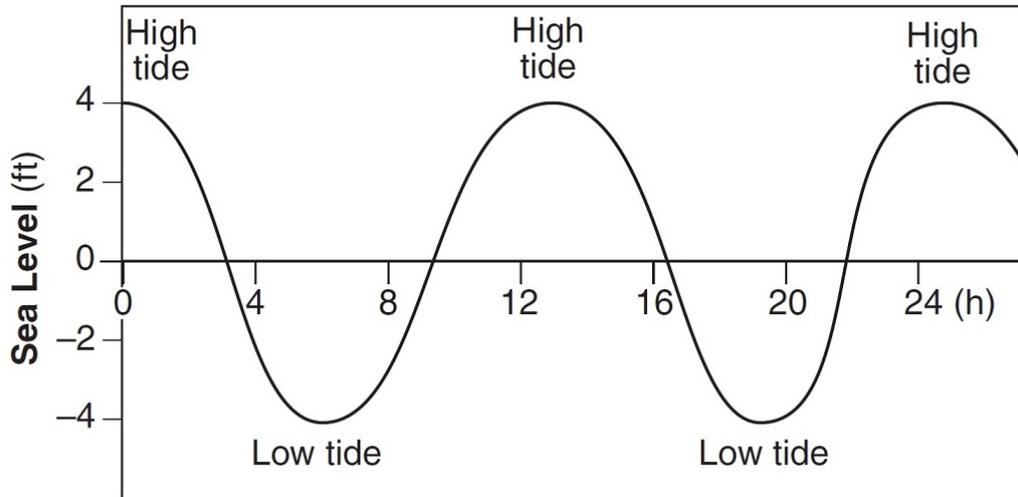
26. The highest high tides and the lowest low tides occurred when the Moon was near

- A) apogee and a new-Moon phase      B) apogee and a full-Moon phase  
 C) perigee and a new-Moon phase      D) perigee and a full-Moon phase

27. The tidal range on November 8 was approximately

- A) 11 m      B) 2 m      C) 13 m      D) 15 m

28. A graph of tidal sea-level changes at a coastal city is shown below.



The number of hours from one high tide to the next high tide is approximately

- A) 4 h                      B) 8 h                      C) 12 h                      D) 24 h

29. The photographs below show the same coastal location at two different times during the same day.



**People on Beach**  
12:40 p.m.



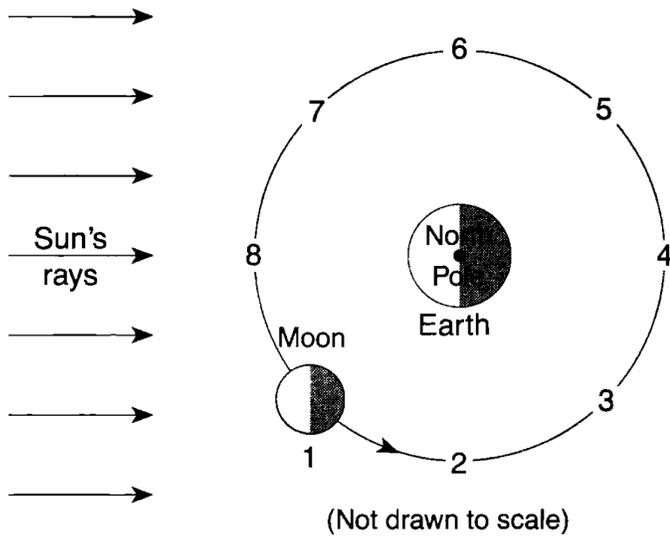
**People Boating**  
6:52 p.m.

Source: thehopewellrocks.ca (adapted)

Which statement best explains the cause for the higher water level at 6:52 p.m.?

- A) The Moon rotates on its axis at the same rate that it revolves around Earth.  
B) The Moon exerts a gravitational pull on a rotating Earth.  
C) Earth's rotation causes a deflection of surface ocean currents.  
D) Earth's tilted axis causes different amounts of insolation throughout the day.

Base your answers to questions 30 through 32 on the diagram below, which shows the Moon at position 1 in its orbit around Earth. Numbers 2 through 8 represent other positions in the Moon's orbit.



30. How many days does it take the Moon to go from one full-Moon phase to the next full-Moon phase when viewed from Earth?

\_\_\_\_\_ days

31. A solar eclipse could occur when the Moon is located at which numbered position?

\_\_\_\_\_

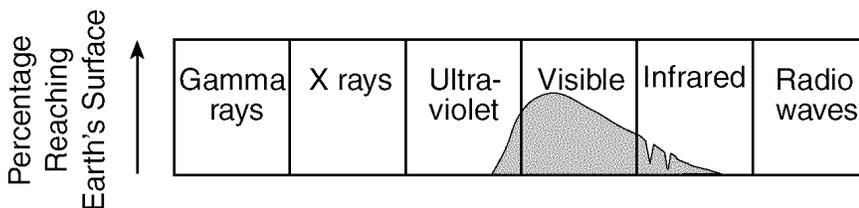
32. Identify *one* numbered orbital position where the gravitational attraction of the Moon and the Sun cause Earth to experience the highest high tides.

\_\_\_\_\_

33. A high tide occurred at 6:00 a.m. at a beach on Long Island. The next high tide at this same beach would occur at approximately

- A) 12:15 p.m. on the same day
- B) 6:30 p.m. on the same day
- C) 12:45 p.m. on the following day
- D) 7:00 a.m. on the following day

34. The diagram below shows the types of electromagnetic energy given off by the Sun. The shaded part of the diagram shows the approximate amount of each type actually reaching Earth's surface.



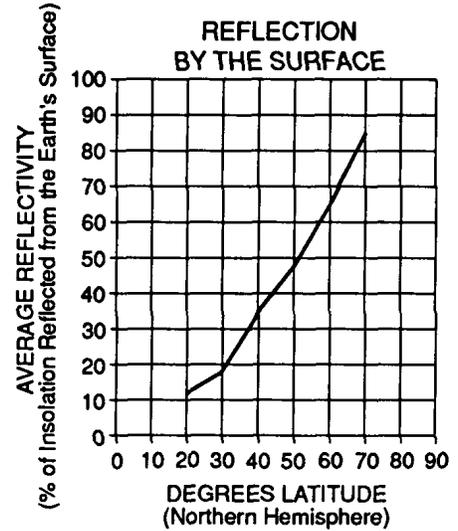
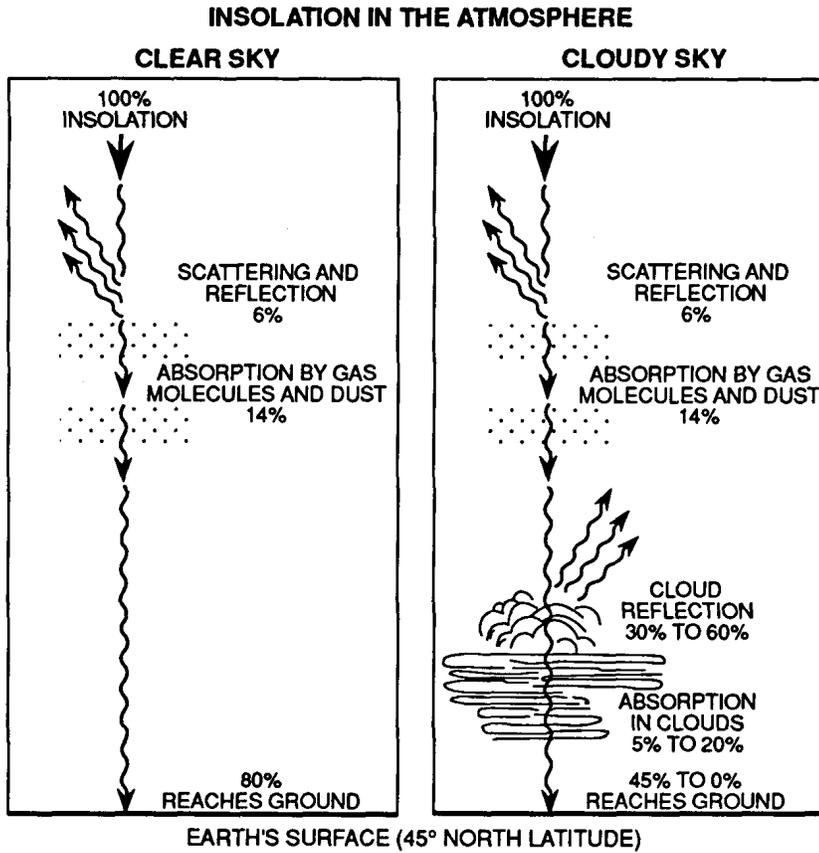
Which conclusion is best supported by the diagram?

- A) All types of electromagnetic energy reach Earth's surface.
- B) Gamma rays and x-rays make up the greatest amount of electromagnetic energy reaching Earth's surface.
- C) Visible light makes up the greatest amount of electromagnetic energy reaching Earth's surface.
- D) Ultraviolet and infrared radiation make up the greatest amount of electromagnetic energy reaching Earth's surface.

35. Energy is transferred from the Sun to Earth mainly by

- A) molecular collisions
- B) density currents
- C) electromagnetic waves
- D) red shifts

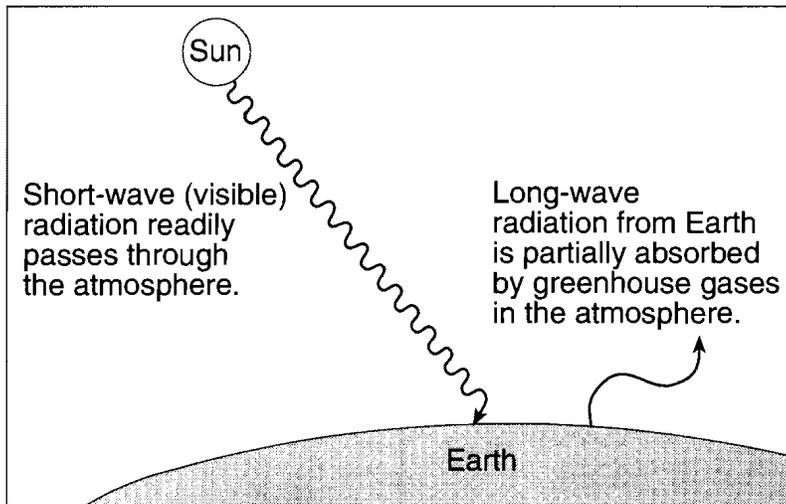
36. Base your answer to the following question on the diagrams and graphs below. The diagrams show the general effect of the Earth's atmosphere on insolation from the Sun at middle latitudes during both clear-sky and cloudy-sky conditions. The graph shows the percentage of insolation reflected by the Earth's surface at different latitudes in the Northern Hemisphere in winter.



The radiation that passes through the atmosphere and reaches the Earth's surface has the greatest intensity in the form of

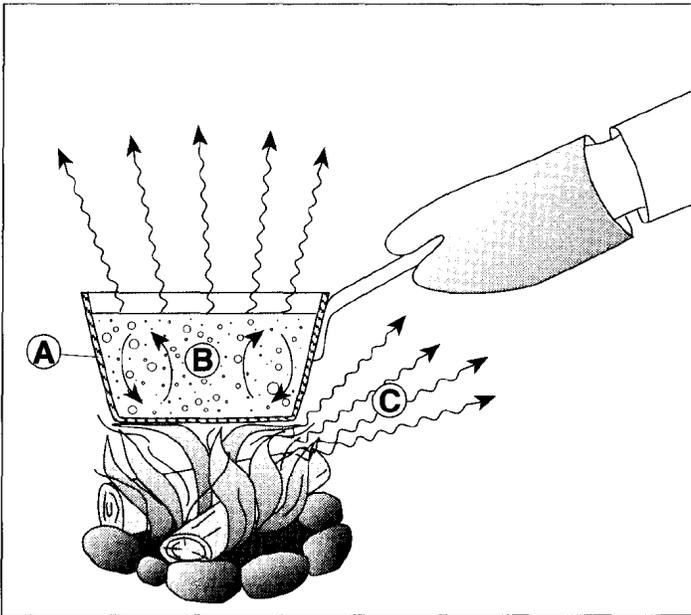
- A) visible-light radiation
- B) infrared radiation
- C) ultraviolet radiation
- D) radio-wave radiation

37. Base your answer to the following question on the diagram below, which represents the greenhouse effect in which heat energy is trapped in Earth's atmosphere



- Which type of radiation from Earth is the long-wave radiation absorbed by greenhouse gases?
- A) ultraviolet      B) visible light      C) infrared      D) radio waves
38. Which type of electromagnetic energy has the longest wavelength?
- A) infrared radiation      B) radio wave radiation  
C) ultraviolet radiation      D) x-ray radiation
39. Most of the solar radiation absorbed by Earth's surface is later radiated back into space as which type of electromagnetic radiation?
- A) x ray      B) ultraviolet      C) infrared      D) radio wave
40. Which type of land surface would probably reflect the most incoming solar radiation?
- A) light colored and smooth      B) light colored and rough  
C) dark colored and smooth      D) dark colored and rough
41. Scientists are concerned about the decrease in ozone in the upper atmosphere primarily because ozone protects life on Earth by absorbing certain wavelengths of
- A) x-ray radiation      B) ultraviolet radiation  
C) infrared radiation      D) microwave radiation
42. An object that is a good radiator of electromagnetic waves is also a good
- A) insulator from heat      B) reflector of heat  
C) absorber of electromagnetic energy      D) refractor of electromagnetic energy
43. How does the amount of heat energy reflected by a smooth, dark-colored concrete surface compare with the amount of heat energy reflected by a smooth, light-colored concrete surface?
- A) The dark-colored surface will reflect less heat energy.  
B) The dark-colored surface will reflect more heat energy.  
C) The dark-colored surface will reflect the same amount of heat energy.

44. The diagram below shows a student heating a pot of water over a fire. The arrows represent the transfer of heat. Letter A represents heat transfer through the metal pot, B represents heat transfer by currents in the water, and C represents heat that is felt in the air surrounding the pot.



Which table correctly identifies the types of heat transfer at A, B, and C?

A)

Letter	Type of Heat Transfer
A	conduction
B	radiation
C	convection

B)

Letter	Type of Heat Transfer
A	conduction
B	convection
C	radiation

C)

Letter	Type of Heat Transfer
A	radiation
B	conduction
C	convection

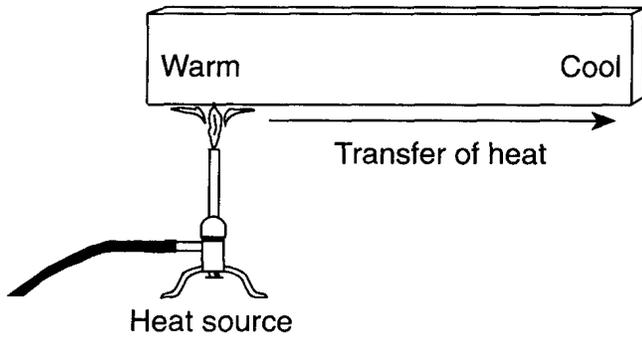
D)

Letter	Type of Heat Transfer
A	radiation
B	convection
C	conduction

45. What is the primary method of heat transfer through solid rock during contact metamorphism?

- A) advection      B) convection      C) absorption      D) conduction

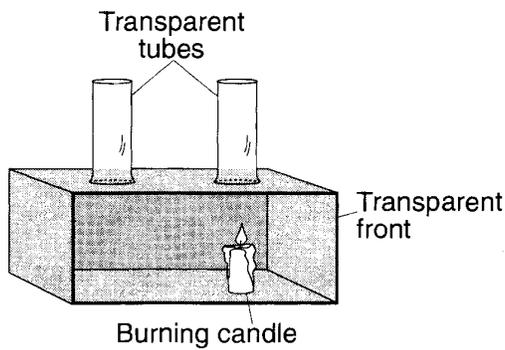
46. The diagram below shows a solid iron bar that is being heated in a flame.



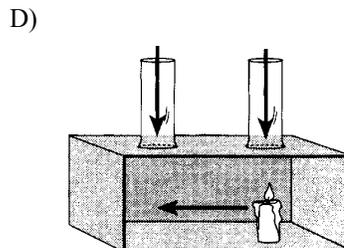
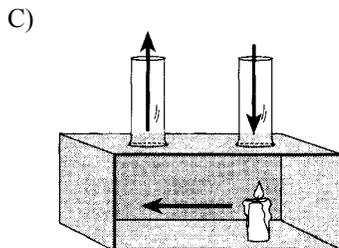
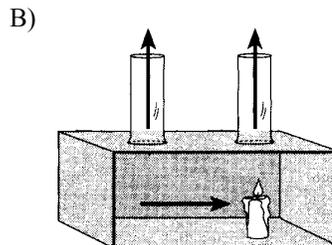
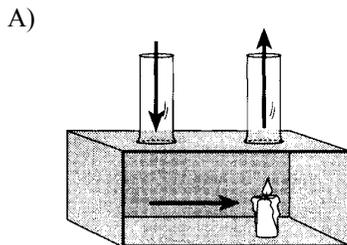
The primary method of heat transfer in the solid iron bar is

- A) convection      B) conduction      C) absorption      D) advection

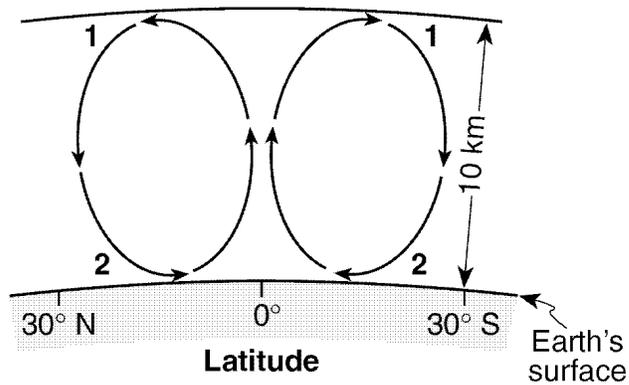
47. The diagram below shows a laboratory box used to demonstrate the process of convection in the atmosphere.



Which diagram has arrows that show the direction of airflow that occurs when the candle is burning?



48. Base your answer to the following question on the cross section below and on your knowledge of Earth science. The cross section shows the general movement of air within a portion of Earth's atmosphere located between 30° N and 30° S latitude. Numbers 1 and 2 represent different locations in the atmosphere.



(Not drawn to scale)

The air movement shown in the cross section is due to the process of

- A) condensation      B) conduction      C) evaporation      D) convection
49. Which process transfers energy primarily by electromagnetic waves?
- A) radiation      B) evaporation      C) conduction      D) convection
50. Which method of energy transfer is primarily responsible for energy being lost from Earth into space?
- A) conduction      B) convection      C) solidification      D) radiation