**1** A list of three observed relationships is shown below.

- Erosional rate = depositional rate
- Amount of insolation = amount of terrestrial radiation
- Rate of condensation = rate of evaporation

In which situation would each relationship exist?

(1) when a cyclic change occurs
(2) when a change of state occurs
(3) when dynamic equilibrium is reached
(4) when global warming ceases and global cooling begins

2 Ocean tides are best described as

(1) **unpredictable and cyclic**
(2) **unpredictable and noncyclic**
(3) **predictable and cyclic**
(4) **predictable and noncyclic**

3 The graph below shows the average number of days each year that thunderstorms occur at different latitudes on Earth.
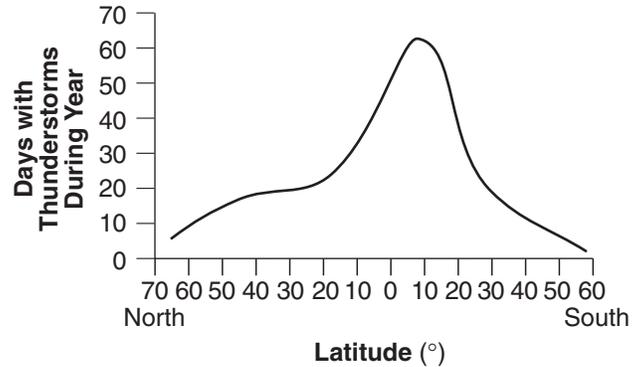
According to the graph, what is the approximate number of days each year that thunderstorms occur at locations along the 40° N parallel of latitude?

(1) 8 days   (3) 24 days
(2) 18 days   (4) 32 days

Base your answer to question **4** on the reading passage below and on your knowledge of **Earth Science**.

The Blue Moon

   A "Blue Moon" is the name given to the second full moon in a calendar month. Because there are roughly 29.5 days between full moons, it is unusual for two full moons to "fit" into a 30 or 31 day month (and impossible to fit into a 28 or 29 day month, so February can never have a Blue Moon). The saying "Once in a Blue Moon" means a rare occurrence, and predates the current astronomical use of the term, which is quite recent. In fact, Blue Moons are not all that rare, on average there will be one Blue Moon every 2.5 years. After 1999, the next Blue Moons will be in November 2001; July 2004; and June 2007. The last one before 1999 was in July 1996.

   The term Blue Moon is believed to have originated in 1883 after the eruption of Krakatoa. The volcano put so much dust in the atmosphere that the Moon actually looked blue in color. This was so unusual that the term "once in a Blue Moon" was coined.

"The Blue Moon"
David R. Williams
nssdc.gsfc.nasa.gov/planetary/lunar/blue_moon.html

   **4** Explain why a Blue Moon never occurs during the month of February.

Base your answer to question 5 on the table below and on your knowledge of Earth science.
The table shows air temperatures and air pressures recorded by a weather balloon rising over Buffalo, New York.

Altitude Above Sea Level (m)	Air Temperature (°C)	Air Pressure (mb)
300	16.0	973
600	16.5	937
900	15.5	904
1,200	13.0	871
1,500	12.0	842
1,800	10.0	809
2,100	7.5	778
2,400	5.0	750
2,700	2.5	721

5 On the grid provided below, construct a graph of altitude above sea
level and air temperature by following the directions below.

a Plot an **X** for the air temperature recorded at *each* altitude shown on the table.

b Connect the **X**s with a solid line.

Air Temperature (°C)

Altitude Above Sea Level (m)
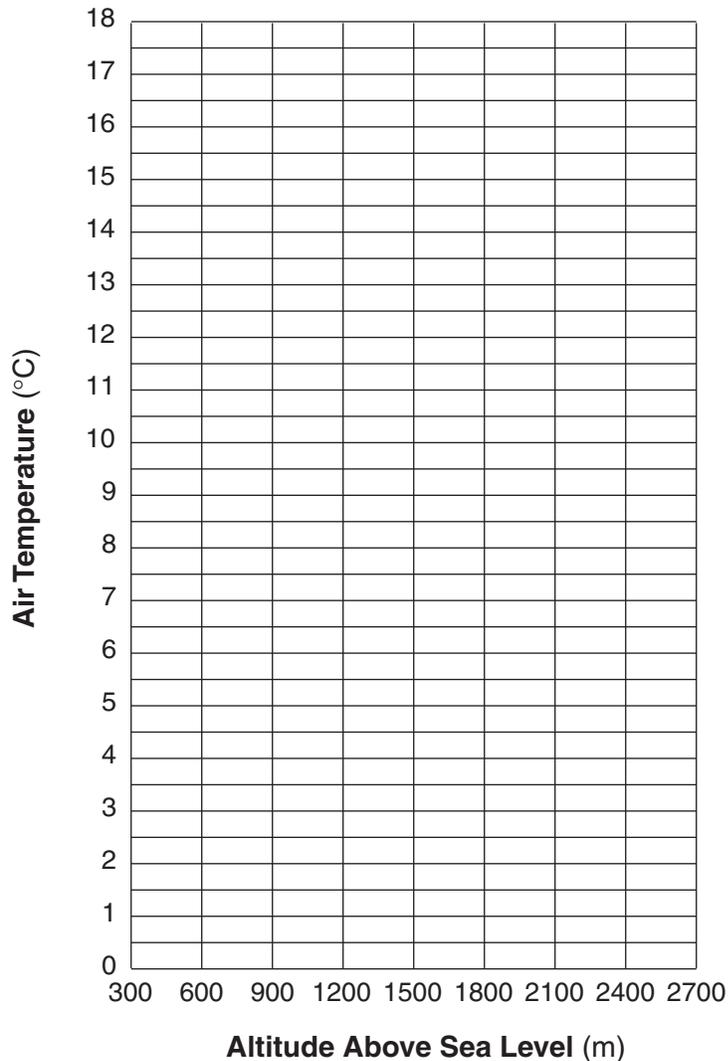
Base your answers to questions **6** and **7** on the graph below, which shows changes in the Sun's magnetic activity and changes in the number of sunspots over a period of approximately 100 years. Sunspots are dark, cooler areas within the Sun's photosphere that can be seen from Earth.

Solar Sunspots and Magnetic Activity
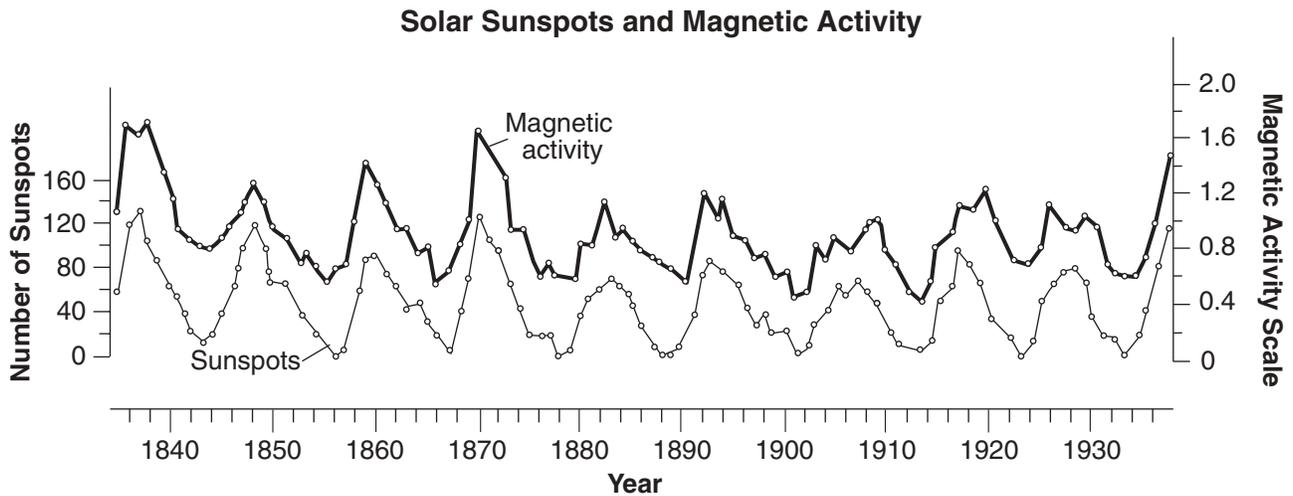
6 The graph indicates that years having the greatest number of sunspots occur

    (1)   randomly and unpredictably
    (2)   precisely at the beginning of each decade
    (3)   in a cyclic pattern, repeating approximately every 6 years
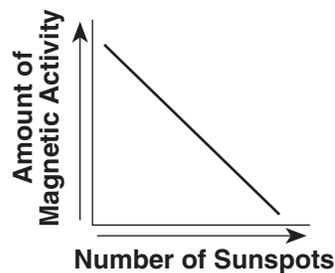   (4)   in a cyclic pattern, repeating approximately every 11 years

7 Which graph best represents the relationship between the number of sunspots and the amount of magnetic activity in the Sun?
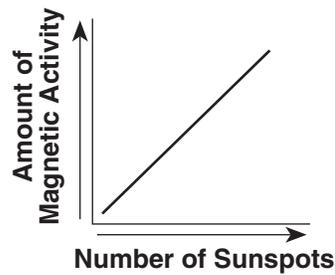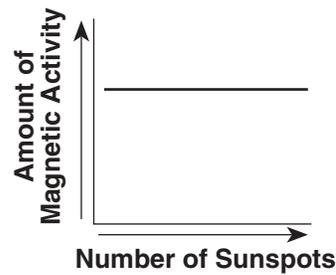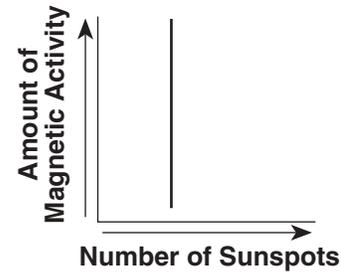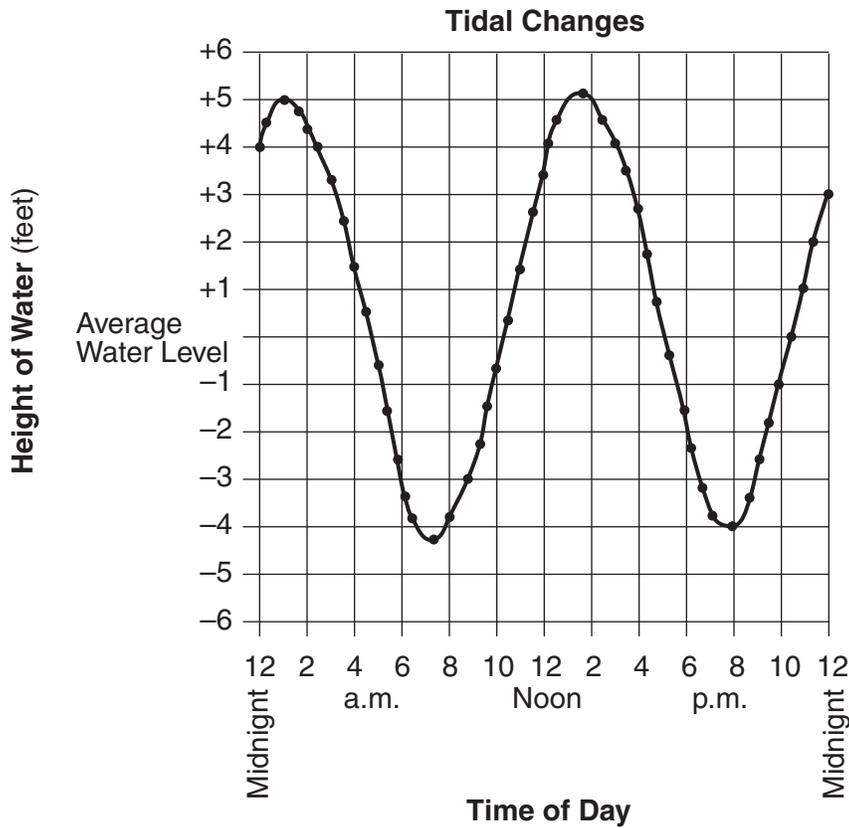
Base your answers to questions 8 and 9 on the graph below. The graph shows the recorded change in water level (ocean tides) at a coastal city in the northeastern United States during 1 day.

Tidal Changes

8 Which inference about tides is best made from this graph?

(1) The hourly rate of tidal change is always the same.
(2) The rate of tidal change is greatest at high tide.
(3) The tidal change is a random event.
(4) The tidal change is cyclic.

9 According to the pattern shown on the graph, the next high tide will occur on the following day at approximately

(1) 12:30 a.m.   (3) 3:15 a.m.
(2) 2:00 a.m.   (4) 4:00 a.m.

10 The table below shows the rate of erosion and the rate of deposition at four stream locations.

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

A state of dynamic equilibrium exists at location

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

Base your answer to question **11** on the map below, the graph **below**, and your knowledge of Earth science. The map shows the length of the growing season in New York State, expressed in days. The growing season is the average number of days between the last frost in spring and the first frost in fall. The graph line shows the relationship between the latitudes of Riverhead, New York; Albany, New York; and Massena, New York; and the length of the growing season at these three locations.

Length of Growing Season (in days)
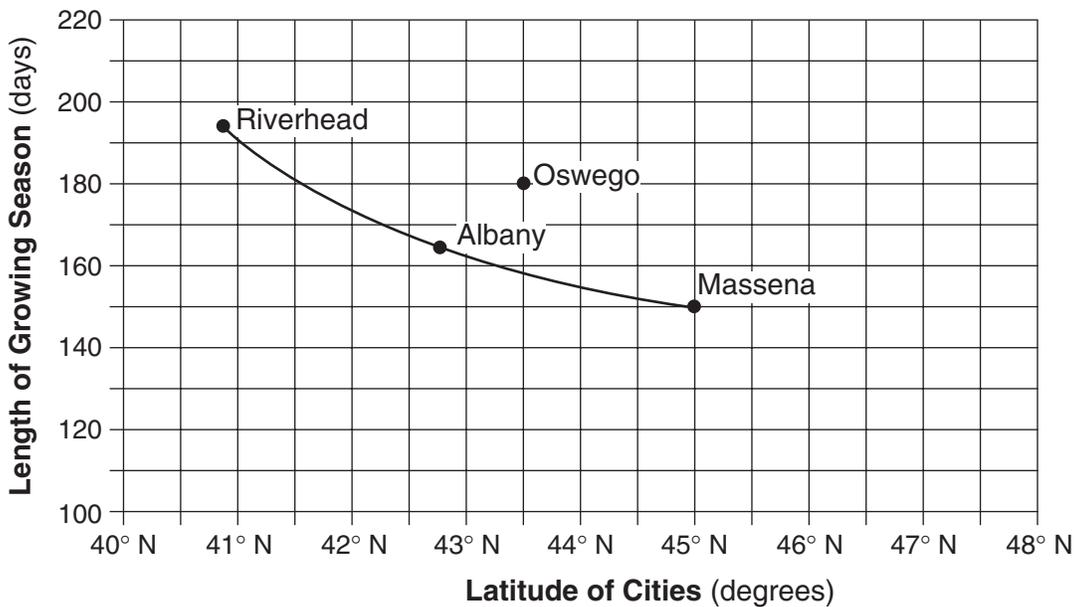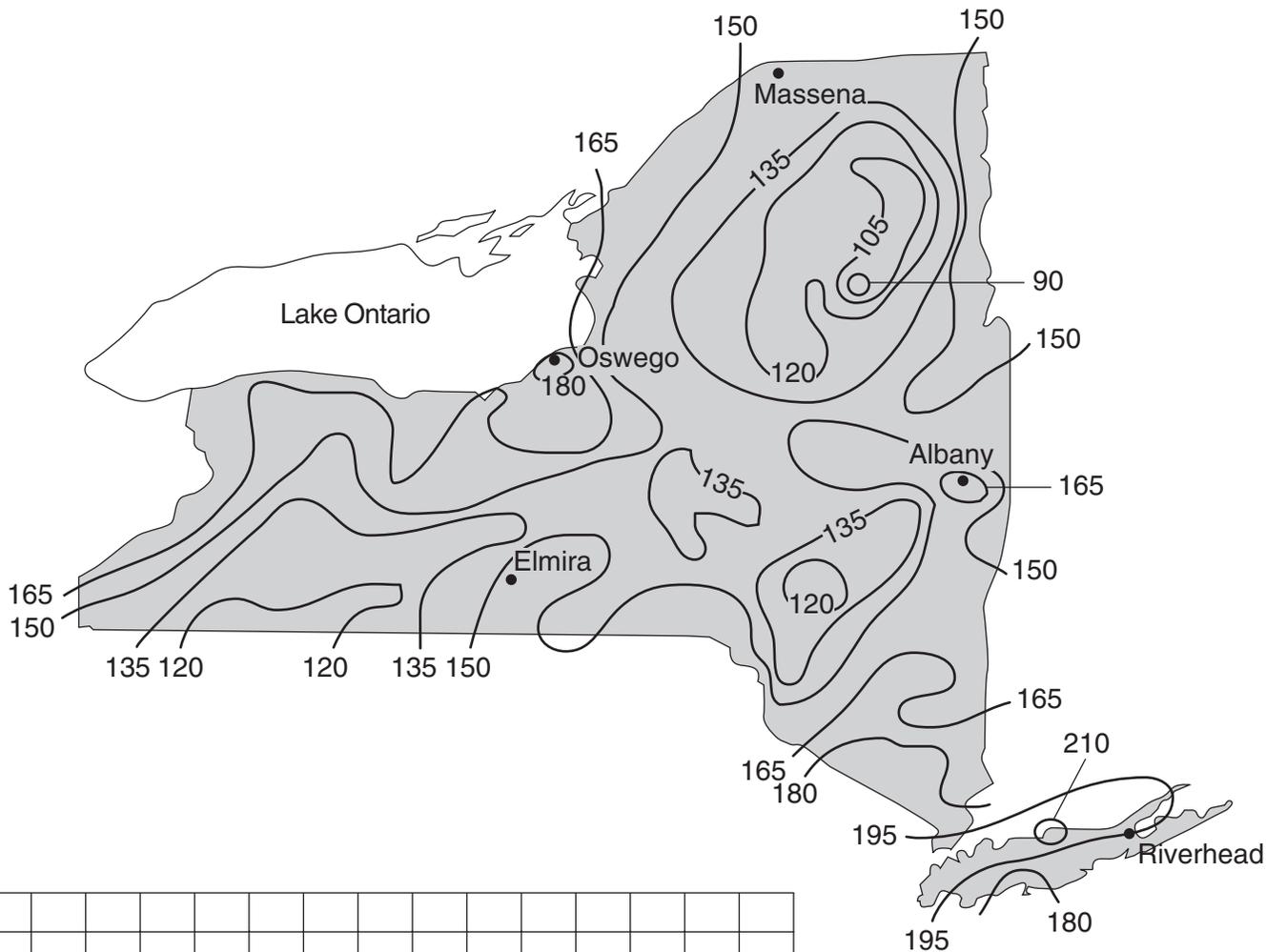
11 For Riverhead, Albany, and Massena, state the relationship between latitude and the length of the growing season shown by the graph.

Base your answer to question **12** on the graph below, which shows the crustal temperature and pressure conditions under which three different minerals with the same chemical composition (Al_2SiO_5) crystallize.

Conditions Under Which Three Different Minerals Composed of Al_2SiO_5 Form
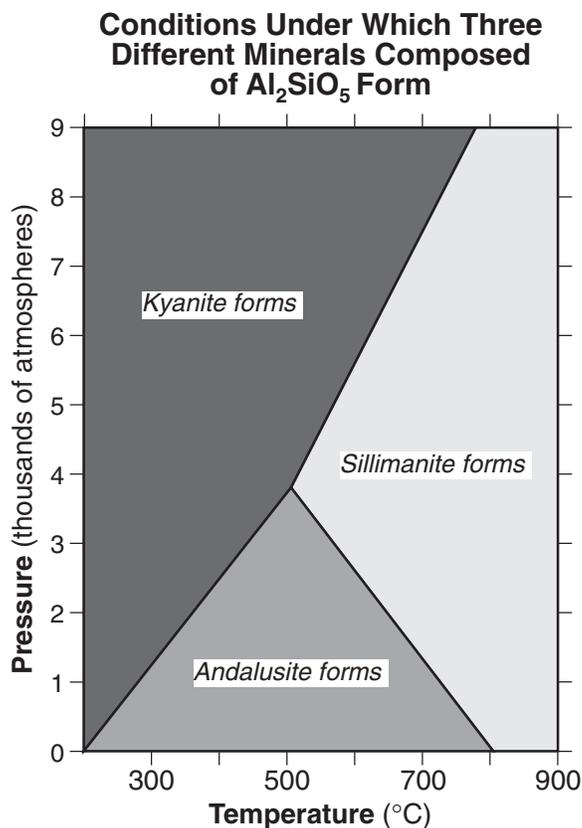
12 Under which crustal temperature and pressure conditions will andalusite form?

(1) 300°C and 6000 atmospheres   (3) 600°C and 4000 atmospheres
(2) 500°C and 2000 atmospheres   (4) 700°C and 8000 atmospheres

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13 The graph below shows the relationship between mass and volume for three samples, *A, B,* and *C,* of a given material.
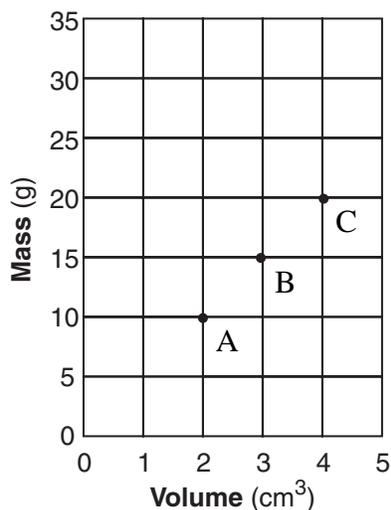
What is the density of this material?

(1) 1.0 g/cm³   (3) 10.0 g/cm³
(2) 5.0 g/cm³   (4) 20.0 g/cm³

14 A student incorrectly measured the volume of a mineral sample as **25** cubic centimeters when the actual volume was **30** cubic centimeters. What was the student's approximate percent deviation (percentage of error)?

(1) **5.0%**   (3) **16.7%**
(2) **7.2%**   (4) **20.0%**

15 As air on the surface of Earth **cools**, the density of the air

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

Base your answers to questions **16** and **17** on the graph below, which shows the changes in relative humidity and air temperature during a spring day in Washington, D.C.
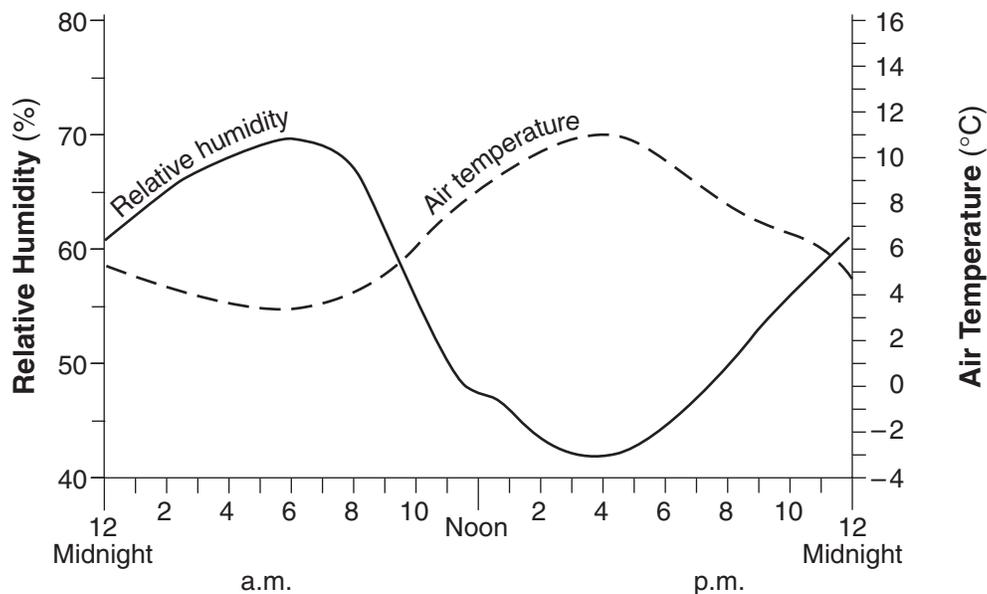
16 Which statement best describes the relationship between relative humidity and air temperature as shown by the graph?

(1) Relative humidity decreases as air temperature decreases.

(2) Relative humidity decreases as air temperature increases.

(3) Relative humidity increases as air temperature increases.

(4) Relative humidity remains the same as air temperature decreases.

17 What were the relative humidity and air temperature at noon on this day?

(1) 47% and 32°F   (3) 47% and 48°F
(2) 65% and 32°F   (4) 65% and 48°F