Science Jay

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lesson 1

SCIENCE TEST

35 Minutes—40 Questions

DIRECTIONS: There are seven passages in this test. Each passage is followed by several questions. After reading a passage, choose the best answer to each question and fill in the corresponding oval on your answer document. You may refer to the passages as often as necessary.

You are NOT permitted to use a calculator on this test.

Passage I

Marble, which can be used to make buildings, is composed mostly of *calcium carbonate*. Marble is *corroded* (broken down) by air pollutants such as *fly ash*, *nitric acid*, and *sulfuric acid*.

- Fly ash contains corrosive materials.
- Nitric acid, produced when *nitrogen dioxide* reacts with water, reacts with calcium carbonate to form *calcium nitrate*.
- Sulfuric acid, produced when *sulfur dioxide* reacts with air and water, reacts with calcium carbonate to form *calcium sulfate*.

A scientist studied marble corrosion.

Experiment 1

The scientist measured the *initial mass* of 4 samples from the same piece of marble. Each sample had a surface area of 24 square centimeters (cm^2). The scientist placed each sample in a separate container and added an acid solution (acid and water) with an acid concentration of either 30 parts per million (ppm) or 100 ppm. After 24 hours, the scientist removed each sample, scraped off the calcium nitrate or calcium sulfate, and measured the *final mass* of the sample. The scientist determined the mass of marble lost from each sample, in milligrams (mg), as shown in Table 1.

Table 1

Marble sample	Acid		Mass of marble lost (mg)
	type	concentration (ppm)	
1	sulfuric acid	30	10.9
2		100	56.2
3	nitric acid	30	4.0
4		100	4.3

Experiment 2

The scientist obtained marble samples from buildings of different ages. The outer surface of each sample had a gray crust of calcium sulfate, calcium nitrate, and fly ash. The concentrations of calcium sulfate and calcium nitrate in the crust were determined, as shown in Table 2.

Table 2

Marble sample	Age of building (years)	Calcium sulfate concentration (ppm)	Calcium nitrate concentration (ppm)
5	7	30	3
6	50	200	10
7	100	375	15
8	200	400	16

1. According to the information in the passage, a sample of marble from which of the following buildings would be expected to have the greatest concentration of calcium nitrate on its surface?
   - A. A 10-year-old building in a city with low levels of nitrogen dioxide in the atmosphere
   - B. A 10-year-old building in a city with high levels of nitrogen dioxide in the atmosphere
   - C. A 25-year-old building in a city with low levels of nitrogen dioxide in the atmosphere
   - D. A 25-year-old building in a city with high levels of nitrogen dioxide in the atmosphere

2. In Experiment 1, which of the following factors was the *same* for all 4 marble samples?

   F. Type of acid used
   G. Concentration of acid used
   H. Initial surface area of the sample
   J. Final mass of the sample

3. A comparison of the results for Samples 1 and 3 supports the hypothesis that marble corrodes more quickly when exposed to:

   A. sulfuric acid than when exposed to nitric acid.
   B. nitric acid than when exposed to sulfuric acid.
   C. sulfuric acid with a concentration of 30 ppm than sulfuric acid with a concentration of 100 ppm.
   D. nitric acid with a concentration of 30 ppm than nitric acid with a concentration of 100 ppm.

4. In Experiment 1, if the scientist had added nitric acid with a concentration of 50 ppm to a sample of marble with a surface area of 24 cm^2, approximately how much marble would have been lost after 24 hours?

   F. 3.0 mg
   G. 4.1 mg
   H. 4.5 mg
   J. 8.4 mg

5. If the scientist were to repeat Experiment 1, but break every sample of marble into 4 pieces to increase the surface area exposed to the acid, how would the mass of marble lost most likely be affected?

   A. The mass of marble lost would decrease for all 4 samples.
   B. The mass of marble lost would decrease for Samples 1 and 2 and increase for Samples 3 and 4.
   C. The mass of marble lost would stay the same for all 4 samples.
   D. The mass of marble lost would increase for all 4 samples.

6. According to the passage, if a scientist wants to study the effect of nitrogen dioxide on marble corrosion, the scientist should measure the amount of which of the following substances on the surface of the marble?

   F. Fly ash
   G. Sulfuric acid
   H. Calcium sulfate
   J. Calcium nitrate

Passage II

Hydrocarbons contain carbon (C) and hydrogen (H) atoms joined by chemical bonds (which are represented in chemical notation by short straight lines). The carbon atoms are bonded to each other to form linear, branched, or cyclic structures (examples are presented in Table 1). The boiling points of these hydrocarbons were measured and listed in Table 2, and their *densities* (ratio of mass to volume) are listed in Table 3.

Table 1

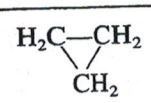
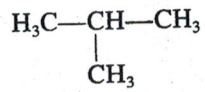
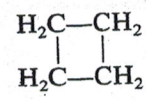
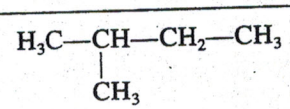
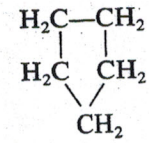
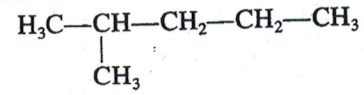
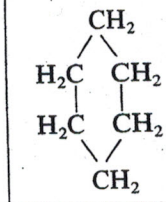
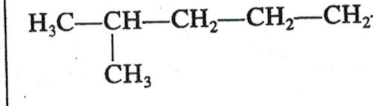
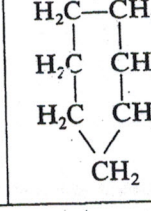
Number of carbon atoms	Name	Structure		
		linear	branched	cyclic
3	propane	$H_3C—CH_2—CH_3$	none	
4	butane	$H_3C—CH_2—CH_2—CH_3$		
5	pentane	$H_3C—CH_2—CH_2—CH_2—CH_3$		
6	hexane	$H_3C—CH_2—CH_2—CH_2—CH_2—CH_3$		
7	heptane	$H_3C—CH_2—CH_2—CH_2—CH_2—CH_2—CH_3$		

Table 2			
Number of carbon atoms	Boiling point (°C)		
	linear	branched	cyclic
3	–42	none	–33
4	0	–12	12
5	36	28	49
6	69	60	81
7	98	90	118

Table 3			
Number of carbon atoms	Density (g/cm^3)		
	linear	branched	cyclic
3	0.59	none	0.72
4	0.60	0.55	0.73
5	0.63	0.62	0.75
6	0.66	0.65	0.78
7	0.68	0.68	0.81

7. According to Table 2, by approximately how many degrees does the boiling point of a linear hydrocarbon differ from that of a branched hydrocarbon with the same number of carbon atoms?

   A. 5° C
   B. 10° C
   C. 20° C
   D. 30° C

8. According to Tables 1 and 3, which hydrocarbon has the lowest density?

   F. Linear propane
   G. Branched butane
   H. Branched pentane
   J. Cyclic heptane

9. For each type of structure, what is the relationship between the number of carbon atoms to the boiling point and density? As the number of carbon atoms increases, the boiling point:

   A. increases but the density decreases.
   B. decreases but the density increases.
   C. decreases and the density decreases.
   D. increases and the density increases.

10. According to Table 3, how do the structures of butanes (4 carbon atoms) correspond to their density?

    F. The cyclic butane has a higher density than the linear and the linear has a higher density than the branched.
    G. The cyclic butane has a higher density than the branched and the branched has a higher density than the linear.
    H. The branched butane has a higher density than the linear and the linear has a higher density than the cyclic.
    J. The branched butane has a higher density than the cyclic and the cyclic has a higher density than the linear.

11. Which hydrocarbons in Table 2 are gases at 10° C ?

    A. All the linear, branched, and cyclic hydrocarbons containing at least 5 carbon atoms
    B. The cyclic butane plus all the linear, branched, and cyclic hydrocarbons containing at least 5 carbon atoms
    C. The linear and cyclic propanes and the linear, branched, and cyclic butanes
    D. The linear and cyclic propanes and the linear and branched butanes

Passage III

When an object falls from a low altitude to Earth and gravity is the only force acting upon it, the object will have an acceleration of 9.8 meters/second^2 (m/sec^2).

Using a stopwatch that is accurate to the nearest 0.01 sec, students measured the times for 2 spheres to fall to Earth and used these times to calculate the spheres' acceleration.

Experiment 1

The students measured the times required for a 200 g wooden sphere and a 50 g plastic sphere to fall 2.5 m to Earth. The spheres had equal radii. (Note: A sphere's surface area is proportional to its radius squared; its volume is proportional to its radius cubed.) The results are shown in Table 1.

Table 1

Trial	Measured time of fall (sec)	
	wooden sphere	plastic sphere
1	0.75	0.81
2	0.85	0.84
3	0.80	0.78
4	0.79	0.78
5	0.77	0.80

For the wooden and plastic spheres, the average times were 0.79 sec and 0.80 sec, respectively, and the average accelerations were 8.0 m/sec^2 and 7.8 m/sec^2, respectively.

Experiment 2

The procedure in Experiment 1 was repeated for the same spheres falling 9.7 m to Earth. The results are given in Table 2.

Table 2

Trial	Measured time of fall (sec)	
	wooden sphere	plastic sphere
6	1.50	1.56
7	1.42	1.65
8	1.42	1.58
9	1.51	1.62
10	1.45	1.61

For the wooden and plastic spheres, the average measured times were 1.46 sec and 1.60 sec, respectively, and the average accelerations were 9.1 m/sec^2 and 7.6 m/sec^2, respectively.

Experiment 3

The students tested the hypothesis that the stopwatch was not being started or stopped at the right moments. Using the stopwatch and a blinking light that flashed every 1.00 sec, the students measured the time interval between adjacent flashes. The results are given in Table 3.

Table 3

Trial	Time interval (sec)
11	1.04
12	1.08
13	1.00
14	1.10
15	1.06

The average time recorded in Table 3 was 1.06 sec.

12. In Experiment 1, if an additional trial were conducted using the plastic sphere, the sphere's measured time of fall would most likely be nearest:

F. 0.70 sec.
G. 0.75 sec.
H. 0.80 sec.
J. 0.90 sec.

13. The students conducted Experiments 1 and 2 using both the wooden sphere and the plastic sphere, most likely to determine if a sphere's acceleration was affected by its composition and its:

A. mass.
B. radius.
C. surface area.
D. volume.

14. The best evidence that the spheres were influenced by forces in addition to gravity was that, during each experiment, the observed values of acceleration were:

F. equal to 9.8 m/sec^2.
G. significantly lower than 9.8 m/sec^2.
H. significantly higher than 9.8 m/sec^2.
J. the same for spheres having different masses.

15. Based on the passage, if the plastic sphere is dropped 5 times from an altitude of 1 m, the average measured time of fall will most likely be:

A. less than 0.80 sec.
B. approximately 0.85 sec.
C. approximately 1.06 sec.
D. more than 1.60 sec.

16. In Experiment 1, should the students have used a stopwatch that was accurate to the nearest second, and why?

F. Yes, because both spheres took approximately 1 sec to fall to Earth.
G. Yes, because in 1 sec the spheres would have fallen farther than they did in Experiment 1.
H. No, because the spheres took less than 1 sec to fall to Earth.
J. No, because in 1 sec the spheres would not have fallen as far as they did in Experiment 1.

17. To show that a sphere's acceleration is affected by air resistance, in addition to the experiments in the passage, which of the following experiments can be performed?

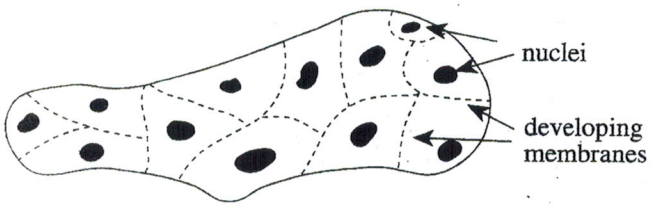
A. In a sealed vacuum chamber containing no air, the spheres are dropped from heights of 2.5 m and 9.7 m.
B. In a sealed vacuum chamber containing no air, the spheres are rolled across the floor at a speed of 9.8 m/sec.
C. In a sealed vacuum chamber containing air at atmospheric pressure, the spheres are dropped from heights of 2.5 m and 9.7 m.
D. In a sealed vacuum chamber containing air at atmospheric pressure, the spheres are rolled across the floor at a speed of 9.8 m/sec.

Passage IV

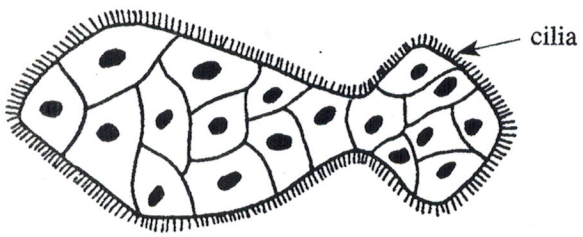
All multicellular animals can be grouped within the subkingdom *Metazoa*. Most metazoans are *bilaterally symmetrical* (they have right and left halves that are nearly identical). Biologists agree that metazoans evolved from *protozoans* (single-celled organisms) over 600 million years ago, but they do not agree on how this occurred. Three theories are presented.

Cellularization Theory

Some biologists believe that metazoans evolved from *multinucleated protozoans* (protozoans with many nuclei). Separate cells formed when membranes developed between adjacent nuclei. Later, *cilia* (hairlike structures), used for movement, grew from each cell. These ciliated protozoan ancestors then evolved into aquatic, bilaterally symmetrical metazoans similar to modern flatworms. Later, other metazoans evolved from these flatworm-like creatures (see Figure 1).



ancestral multinucleated protozoan

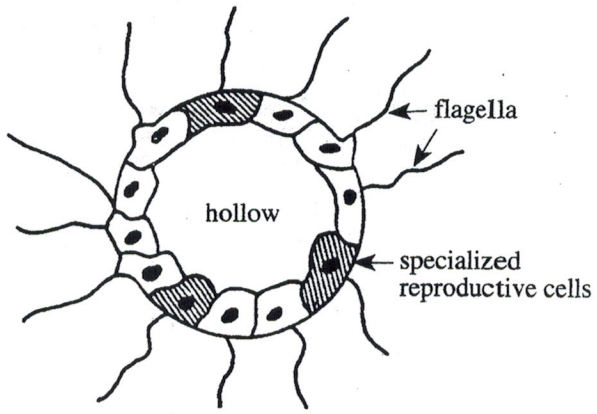


first flatworm-type metazoan

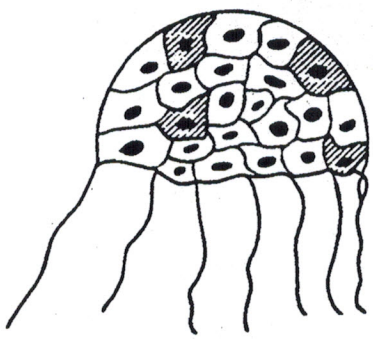
Figure 1

Colonial Theory

Other biologists suggest that many protozoans grouped together into a hollow ball, or colony. This colony evolved into the first metazoan. Each cell in the colony had a *flagellum* (movable tail) for movement. Initially, some of these cells were better suited for reproduction, and these became the reproductive cells of the metazoan. The first metazoans were aquatic, flagellated, *radially symmetrical* organisms (body parts arranged symmetrically around a central point, as in modern jellyfish). All later metazoans evolved from these jellyfish-like organisms (see Figure 2).



ancestral protozoan colony
(cross section through spherical colony)



first jellyfish-like metazoan

Figure 2

Separate Line Theory

Proponents of this theory argue that 2 separate protozoan lines led to metazoans. Radially symmetrical metazoans evolved from flagellated, colonial protozoans. Bilaterally symmetrical metazoans evolved from ciliated, multinucleated protozoans. The first metazoans of each group were jellyfish-like creatures and flatworm-like creatures, respectively. The 2 protozoan groups were only distantly related to each other, and the evolution of aquatic metazoans from the 2 protozoan groups occurred independently and at different times.

18. The Cellularization Theory does NOT include the hypothesis that the earliest metazoans were:

F. ciliated.
G. aquatic.
H. hollow.
J. bilaterally symmetrical.

19. The development of which of the following characteristics is addressed in the passage by the Colonial Theory, but NOT by the Cellularization Theory?

A. Body symmetry
B. Ciliated tissues
C. Multinucleated cells
D. Reproductive cells

20. Supporters of all 3 theories would agree with the conclusion that the first metazoans:

F. evolved from protozoans.
G. are older than the first protozoans.
H. had many nuclei in each cell.
J. were radially symmetrical.

21. Which of the following types of organisms, if present today, would provide the most support for the Colonial Theory?

A. Flagellated protozoans living in dense colonies
B. Flagellated protozoans living in hollow colonies
C. Ciliated protozoans living in dense colonies
D. Ciliated protozoans living in hollow colonies

22. Assuming that the Separate Line Theory is correct, which of the following conclusions can be made about modern hydras, which are radially symmetrical, and modern flukes, which are bilaterally symmetrical?

F. Hydras and flukes evolved from radially symmetrical metazoans.
G. Hydras and flukes evolved from bilaterally symmetrical metazoans.
H. Hydras and flukes are more closely related to each other than to protozoans.
J. Hydras and flukes are only distantly related through protozoans.

23. Which of the following questions is raised by the Colonial Theory, but is NOT answered in the passage?

A. Why did the first flatworm-like metazoans have cilia?
B. Why were some colonial cells better suited for reproduction?
C. How could 2 lines of metazoans evolve from protozoans?
D. How were multinucleated cells transformed into cells with single nuclei?

24. Proponents of all 3 theories would agree with which of the following conclusions about the evolution of metazoans?

F. Bilaterally and radially symmetrical metazoans evolved at different times.
G. The first metazoan was a jellyfish-like organism with flagella.
H. The evolution of metazoans led to the extinction of protozoans.
J. Bilaterally symmetrical metazoans are more advanced than radially symmetrical metazoans.

Passage V

Rain causes *sediment runoff* (erosion) of rangelands, which is affected by vegetation (grasses, leaves, and branches) and animal trampling. Scientists conducted 2 experiments using identical-sized plots of soil with slight slopes. Two soils that differed primarily in their sand content were used. Soil 1 contained 60% sand and Soil 2 contained 25% sand. Sprinklers simulated rainfall. It was noted that rain first collected in soil depressions, such as hoofprints, then overflowed and eroded the soil. Sediment runoff was measured at the bases of the plots in grams per square meter (g/m^2), following 1 hour of rain.

Experiment 1

Vegetation cover was simulated using window screens having various mesh sizes. The larger the number of mesh squares per inch, the greater the simulated vegetation cover. One plot was left uncovered, and screens of various mesh sizes covered the other plots. Table 1 shows the sediment runoff from each plot.

Table 1

Soil	Sediment runoff (g/m^2) with a simulated vegetation cover of:			
	0%	30%	50%	70%
1	947	751	572	492
2	378	331	291	200

Experiment 2

Animal trampling was simulated by leading a 500-kilogram (kg) cow back and forth over 2 plots of each soil type until 30% of one and 60% of the other were covered with hoofprints. One additional plot of each soil type was left untrampled. Rainfall was simulated as in Experiment 1. The depth of water stored in hoofprints, in centimeters (cm), is shown in Table 2, and the sediment runoff produced by erosion is shown in Table 3.

Table 2

Soil	Water stored (cm) in hoofprints on plot that was:		
	0% trampled	30% trampled	60% trampled
1	0	0.67	0.79
2	0	0.65	0.52

Table 3

Soil	Sediment runoff (g/m^2) from plot that was:		
	0% trampled	30% trampled	60% trampled
1	347	730	801
2	282	307	311

Tables adapted from G. Gifford and M. Savabi, "Effects of Simulated Canopy Cover and Animal Disturbances on Rill and Interrill Erosion." ©1989 by the American Water Resources Association.

25. Which of the following assumptions was made in the design of Experiment 1 ?

- **A.** All soils will show the same amount of erosion under the same conditions.
- **B.** Sprinklers do not adequately simulate actual rainfall.
- **C.** Grass is more important than trees in preventing sediment runoff.
- **D.** Simulated plant cover acts like natural plant cover in protecting the soil from erosion by water.

26. According to the results of Experiments 1 and 2, one can minimize soil erosion by:

- **F.** increasing plant cover, decreasing the amount of trampling, and using land covered with Soil 2.
- **G.** increasing plant cover, decreasing the amount of trampling, and using land covered with Soil 1.
- **H.** decreasing plant cover, increasing the amount of trampling, and using land covered with Soil 2.
- **J.** decreasing plant cover, decreasing the amount of trampling, and using land covered with either soil.

27. If Experiment 2 were repeated using a different soil containing 50% sand, which of the following would be the expected water storage in soil hoofprints and sediment runoff on a plot subjected to 60% trampling?

A. 0.89 cm water stored; 321 g/m^2 sediment runoff
B. 0.86 cm water stored; 932 g/m^2 sediment runoff
C. 0.71 cm water stored; 700 g/m^2 sediment runoff
D. 0.56 cm water stored; 295 g/m^2 sediment runoff

28. In Experiment 2, after 30% trampling, water stored in the two soil types was similar, but sediment runoff was not. Which of the following statements is the most likely explanation for the difference in sediment runoff?

F. Water stored in hoofprints has a significant relationship to sediment runoff.
G. Water in soil hoofprints evaporates before it can erode the soil.
H. A soil with a smaller percent sand is less susceptible to erosion than soil with a higher percent sand.
J. Sediment carried from higher areas of the plot is trapped in soil depressions.

29. If Experiment 1 were repeated using a soil containing 50% sand with 70% plant cover, which of the following would be closest to the expected sediment runoff from this soil?

A. 175 g/m^2
B. 200 g/m^2
C. 425 g/m^2
D. 500 g/m^2

30. To further investigate the effect of vegetation cover on soil erosion, the scientists should repeat Experiment:

F. 1, using plots planted with different grasses.
G. 1, using no window screen.
H. 2, using plots with steeper slopes.
J. 2, using a third soil type.

Passage VI

Earth's atmosphere consists of various gases and suspended liquid and solid matter. The atmosphere can be divided into layers based on air temperature and/or composition. Figure 1 shows the layers of the atmosphere, the altitude of the layer boundaries, in kilometers (km), and the air pressure, in millibars (mb), at those boundaries. Figure 2 shows the average air temperature, in degrees Celsius (°C), in *arctic* (cold) and *tropical* (warm) air masses at various altitudes. Table 1 shows air pressure and temperature readings from weather instruments carried into the stratosphere by balloons on 2 separate days.

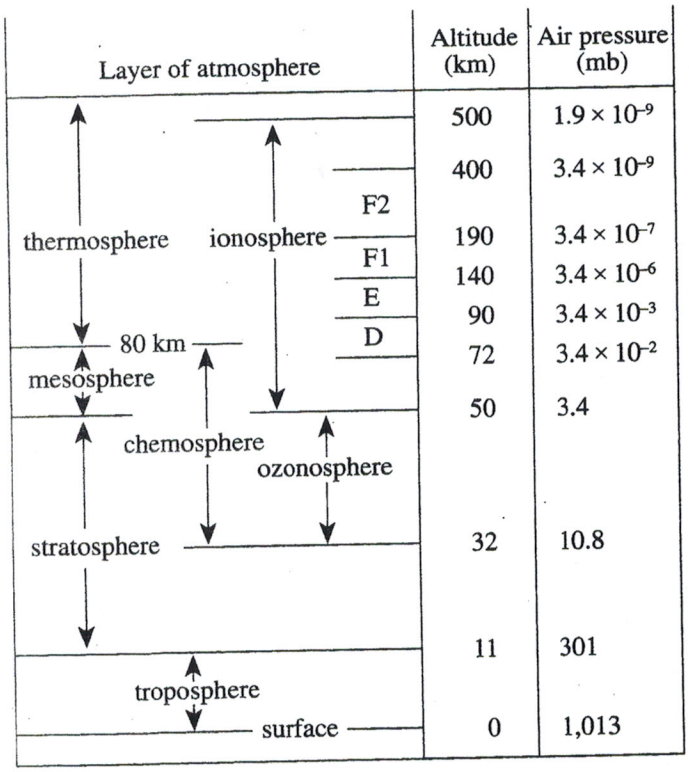


Figure 1

(Note: Figure is NOT drawn to scale.)

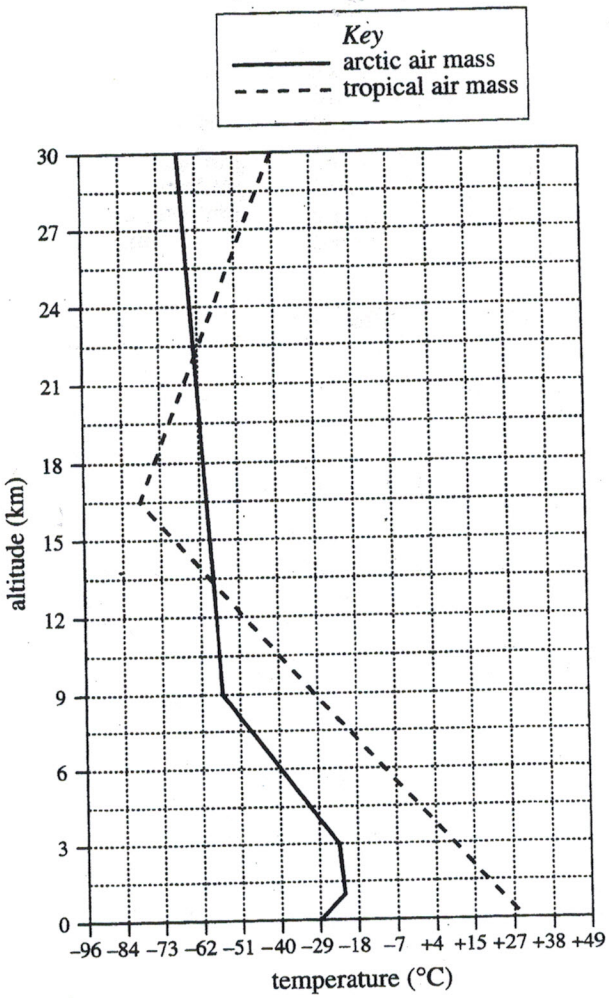


Figure 2

Table 1

Air pressure (mb)	Altitude (km)	Temperature (°C) readings on: Day 1	Day 2
1,000	0	2	25
900	0.9	0	15
700	2.9	–17	6
600	4.2	–25	–2
500	5.6	–30	–12
400	7.2	–40	–20
300	9.1	–50	–32
250	11.4	–50	–50
200	13.7	–48	–58

31. According to Figure 2, at approximately which of the following altitudes would a weather instrument measuring air temperature be unable to distinguish between tropical and arctic air masses?

A. 12.0 km
B. 13.5 km
C. 15.5 km
D. 16.5 km

32. According to Figure 1, several atmospheric layers overlap one another. Which of the following describes atmospheric layers that share part of a common altitude range?

F. Stratosphere and mesosphere
G. Stratosphere and thermosphere
H. Mesosphere and thermosphere
J. Mesosphere and chemosphere

33. According to Figure 1 and Table 1, if the weather instruments rose above 13.7 km, the air pressure would most likely:

A. increase to more than 1,000 mb.
B. stay at 200 mb.
C. decrease to less than 200 mb.
D. decrease to 1,000 mb.

34. According to Figure 1, a weather instrument reading an air pressure of 5 mb is most likely in which of the following layers?

F. Troposphere
G. Ozonosphere
H. Mesosphere
J. Ionosphere

35. According to Table 1, which of the following statements best describes the relationship between altitude and air temperature?

A. The air temperature decreased with increasing altitude on Day 1 only.
B. The air temperature increased with increasing altitude on Day 1 only.
C. The air temperature decreased with increasing altitude on Day 2 only.
D. The air temperature increased with increasing altitude on Day 2 only.

Passage VII

Bacteria, fungi, and viruses (*microorganisms*) cause diseases and infections. *Disinfectants* are chemical agents used on inanimate objects to kill or inhibit the growth of microorganisms. *Antiseptics* are chemical agents used on the skin to kill or inhibit the growth of microorganisms. Several groups of disinfectants and antiseptics are depicted in Table 1.

Table 1

Groups	Chemical agent	Effective against	Mechanism of action	Preferred use
Alcohols	ethanol	bacteria, fungi, some viruses	cell disruption, stops protein function, cleansing	skin antiseptic and thermometer disinfectant
Halogen	iodines	bacteria, fungi, viruses	stops protein function	skin antiseptic
Halogen	chlorines	bacteria, fungi, viruses	stops protein function	water disinfectant; disinfectant used on dairy, restaurant, and household equipment
Heavy metals	Mercurochrome, Merthiolate	bacteria	stops protein function	skin antiseptic
Quaternary ammonium compounds	Zephiran, Cepacol	bacteria, fungi, viruses	cell disruption, stops protein function	skin antiseptic; disinfectant for instruments, utensils, and rubber goods
Detergents	soaps, surfactants	bacteria, fungi, viruses	cleansing, decreases surface tension	mechanical removal of microorganisms by scrubbing

The chemical agents that make up disinfectants and antiseptics can be dissolved either in alcohol (forming a *tincture*) or water (forming an *aqueous solution*). The effectiveness of a variety of antiseptics against the normal microbial flora of the skin is shown in Figure 1.

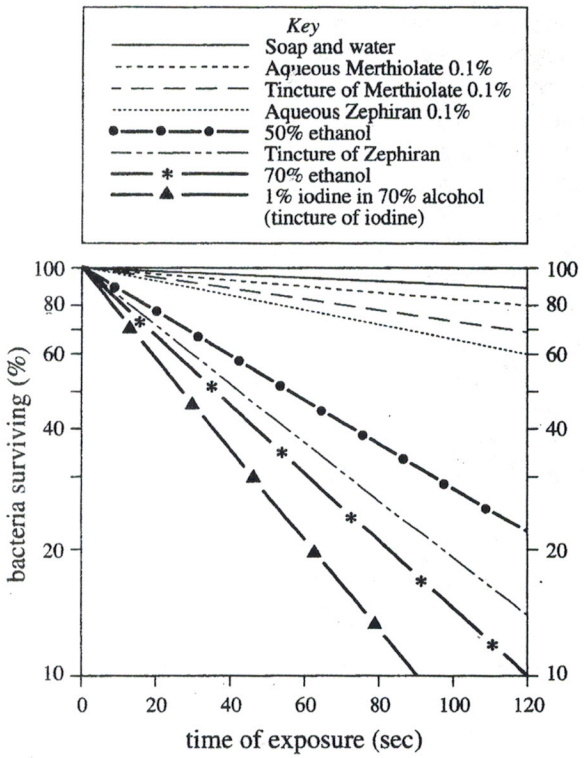


Figure 1

Table and Figure adapted from Tortora, Funke, and Case, *Microbiology: An Introduction*. ©1989 by The Benjamin/Cummings Publishing Company.

36. According to the passage, the most effective antiseptic against microorganisms is the one that leaves the:

- **F.** lowest percentage of surviving microorganisms in the longest time of exposure.
- **G.** lowest percentage of surviving microorganisms in the shortest time of exposure.
- **H.** highest percentage of surviving microorganisms in the longest time of exposure.
- **J.** highest percentage of surviving microorganisms in the shortest time of exposure.

37. According to the information presented in Table 1 and Figure 1, what conclusion about the use of alcohol as an antiseptic may be reached?

- **A.** Dissolving chemical agents in alcohol increases their effectiveness as antiseptics.
- **B.** Using 70% ethanol is ineffective as an antiseptic.
- **C.** Increasing the concentration of alcohol decreases its overall effectiveness as an antiseptic.
- **D.** The mechanism of action for alcohol as an antiseptic is unknown.

38. Is the statement "tinctures are more effective against microorganisms than aqueous solutions of the same antiseptic" supported by the information presented in Figure 1, and why?

- **F.** Yes, because tincture of Merthiolate is more effective against microorganisms than is aqueous Merthiolate.
- **G.** Yes, because 70% ethanol is more effective against microorganisms than is tincture of Zephiran.
- **H.** No, because soap and water is more effective against microorganisms than is 50% ethanol.
- **J.** No, because aqueous Zephiran is more effective against microorganisms than is tincture of Zephiran.

39. After you thoroughly wash your hands with plain soap and water for 2 minutes, your hands probably carry:

- **A.** the same number of bacteria as before; most are dead.
- **B.** the same number of bacteria as before; most are still alive.
- **C.** fewer bacteria than before; most are dead.
- **D.** fewer bacteria than before; most are still alive.

40. According to Figure 1, if a researcher prepared a disinfectant solution of 60% alcohol, the time of exposure required to kill 90% of the bacteria present would be:

- **F.** 60 to 80 sec.
- **G.** 80 to 100 sec.
- **H.** 100 to 120 sec.
- **J.** greater than 120 sec.

END OF TEST 4

STOP! DO NOT RETURN TO ANY OTHER TEST.