Notes on the Practice Exam
This practice exam has three major sections to it: test, answer key with hints, and scoring guide. You'll get the most out of this practice if you make the experience as authentic as possible so carefully follow the directions below. Good luck.

Directions
Find a quiet place to spend the next hour or two. Clear away all distractions and set a timer for 35 minutes. Once you start the timer resist the urge to pause for any reason or to peek ahead at the answers and hints. Once the timer goes off stop all work on test. Use the answer key to correct your test and the scoring guide to estimate your score on this practice exam. Lastly, go back through the exam using the hints to brush up on the ones you missed.

Practice Exam 1

Passage I

Corals are marine invertebrates that live in colonies of identical individuals called polyps. Corals secrete calcium carbonate ($CaCO_3$) to form a hard skeleton that spans an entire colony. Corals obtain most of their energy and nutrients from algae called zooxanthellae that live within the coral tissue. The algae benefit from the polyps' carbon dioxide and nitrogenous waste. The algae are colored, and the coral skeletons are white. Because of this, the coral will experience bleaching and appear white when the algae population is damaged or absent. Three scientists discuss their beliefs and reasoning behind why coral beaching occurs.

Scientist 1
Coral bleaching is caused by an increase in ocean water temperature, particularly at the surface. Corals live in a very narrow range of temperatures (23° - 29° C) and cannot survive in temperatures below 18 °C. Even a small increase in water temperature causes stress to corals. When under short-term stress, the coral will eject the algae, leaving the coral with only a skeleton that appears white.

Scientist 2
Coral bleaching is caused by ocean acidification. Ocean acidification is caused by increased quantities of atmospheric carbon dioxide dissolving in water to form carbonic acid ($CO_2 + H_2O \rightarrow H_2CO_3$). The carbonic acid reacts with the corals' calcium carbonate skeleton, causing the skeleton to dissolve. The algae live within the skeleton, so as the skeleton becomes smaller, the algae population declines. In addition, increasingly acidic water adds stress to the algae, which can also cause the algae population to decline. With fewer algae present, the coral appears white.

Scientist 3
Rising sea levels are the primary cause of coral bleaching. As the sea level rises, the coral becomes submerged under additional water. As the depth of water increases, less light is able to penetrate through the water to reach the coral and algae. Without light, the algae cannot undergo photosynthesis to create energy for themselves or for the coral, leading to the death of the algae and coral bleaching.

1. Sedimentation, the process of suspended particles settling, has also been suggested as a cause of coral bleaching. Which scientist would most likely agree with this cause?
- **A.** Scientist 1, because sediment only exists at relatively high temperatures.
- **B.** Scientist 2, because sediment is acidic.
- **C.** Scientist 3, because the sediment will block light from reaching the algae and coral.
- **D.** None of the scientists would agree, since sediment is not related to temperature, acidity, or light.

2. Recent observations show atmospheric concentrations of carbon dioxide are increasing, and the increase in carbon dioxide leads to higher average global temperatures. Which two scientists would expect these changes to directly lead to coral bleaching, based on their views of the cause of coral bleaching?

F. Scientist 1 and Scientist 2
G. Scientist 1 and Scientist 3
H. Scientist 2 and Scientist 3
J. Scientist 1 only

3. How could the relationship between coral and algae be described?

A. Mutualistic, because both species benefit from one another
B. Parasitic, because the coral benefits from the algae, but the algae is harmed by the coral.
C. Commensal, because the coral benefits from the algae, and the algae is unharmed.
D. Competitive, because the coral and the algae are both harmed.

4. How does the view of Scientist 2 differ from both Scientist 1 and Scientist 3?

F. The view of scientist 2 describes direct damage to the coral skeleton in addition to bleaching.
G. The view of scientist 2 involves a change in the ocean environment.
H. The view of scientist 2 explains coral bleaching without any detriment to algae.
J. The view of scientist 2 describes damage to the coral caused by excessive energy generated by the algae.

5. Ozone depletion has led to an increasing amount of visible and ultraviolet light reaching Earth's surface. This could potentially oppose coral bleaching according to which scientist?

A. Scientist 1
B. Scientist 2
C. Scientist 3
D. Both Scientist 1 and Scientist 2

6. All three scientists agree that coral bleaching is caused in part by

F. Over population of algae among the coral
G. Decline in the population of algae among the coral
H. Corals losing pigment within their skeleton with age.
J. Chemical pollution bleaching the skeleton and coral tissue

7. According to scientist 3, it can be assumed that

F. Coral live in relatively shallow, clear water.
G. Coral live in the deepest parts of the ocean.
H. Coral don't need algae if they are exposed to light.
J. Coral can live in or out of water.

Passage II

Calorimetry is a method for studying heat transfers between substances. Three experiments were conducted to study the heat capacity of different materials. Heat capacity is the amount of heat needed to raise the temperature of a substance by a given amount. A substance with a high heat capacity is able to absorb more energy before experiencing a temperature change. If two substances absorbed the same amount of energy, the substance with the higher heat capacity will have less change in temperature than the substance with a lower heat capacity.

Experiment 1

The heat transfer between different metals and water was measured using an insulated Styrofoam container. The Styrofoam container was filled with water. The initial temperature of the water was measured before the experiment began (at 0 seconds elapsed time). A 10 gram sample of each metal was heated to an initial temperature of 100°C. Each metal was then submerged in the water in the calorimeter. The calorimeter was sealed, and the temperature of the water was measured for two minutes. Table one shows temperature measurements of the water surrounding each metal over time.

Table 1

Total Elapsed Time (sec)	Temperature of Water Surrounding Each Metal (°C)			
	Aluminum	Copper	Iron	Lead
0	26.3	25.0	25.5	24.9
15	27.5	28.2	27.6	26.1
30	28.1	29.0	28.4	27.8
45	28.8	29.2	28.9	28.1
60	28.2	28.6	28.5	27.7
75	27.2	27.8	28.1	27.5
90	26.5	26.9	27.0	26.1

Experiment 2

Experiment 1 was repeated using different masses of lead, which were again heated to 100 °C and then submerged under water in the Styrofoam calorimeter. The calorimeter was sealed, and the temperature of the water was measured for two minutes. The results of experiment 2 are shown in Table 2.

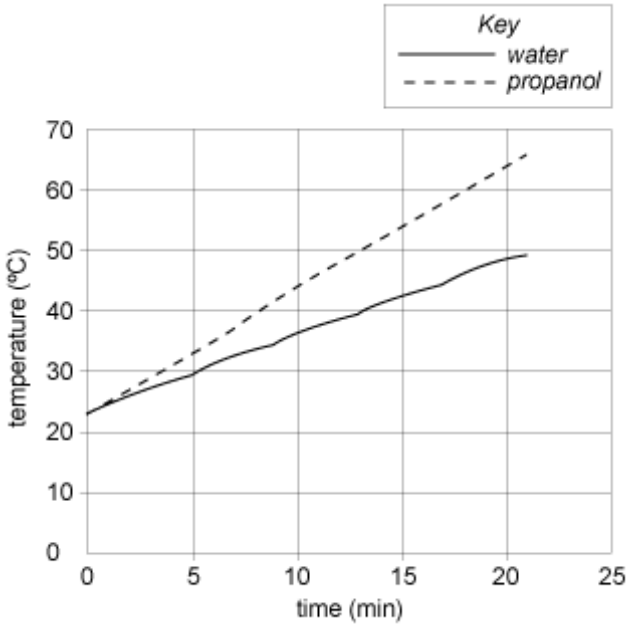
Table 2

Total Elapsed Time (sec)	Temperature of Water Surrounding Each Mass of Lead (°C)			
	5 grams	10 grams	15 grams	20 grams
0	24.6	24.8	25.2	24.8
15	25.2	26.2	26.8	25.9
30	26.9	27.8	28.3	27.2
45	26.8	28.1	29.1	27.9
60	26.6	27.7	29.3	26.5
75	25.5	27.4	27.5	26.1
90	24.0	26.0	26.5	24.7

Experiment 3

A 100 gram sample of water and a 100 gram sample of propanol were placed in two separate 250 mL Pyrex beakers, which were placed on one hot plate. The hot plate was turned on, and the temperature of the water and propanol were recorded over time. Figure 1 shows the change in the temperature of the water and propanol over time.

Figure 1



8. What was the temperature of the propanol after 20 minutes of heating during experiment 3?
- **A.** 50 °C
- **B.** 55 °C
- **C.** 60 °C
- **D.** 65 °C

9. In experiment 1, as the total elapsed time increases, the temperature of the metals:
- **F.** Increased
- **G.** Decreased
- **H.** Increased, then decreased
- **J.** Decreased, then increased.

10. Based on experiment 1, what would the temperature of the iron be after 80 seconds?
- **A.** 25.2
- **B.** 27.6
- **C.** 30.3
- **D.** 26.0

11. The experimental design of experiment 2 differs from experiment 1 in that in experiment 1:
- **F.** The Initial temperature of the metal was held constant
- **G.** The mass of the metal was constant in each test.
- **H.** The amount of time elapsed was varied.
- **J.** The initial temperature of the water was constant.

12. In experiment 1, why was Styrofoam used as the container for the experiment?
- **A.** Styrofoam doesn't react with any of the other materials used in the experiment.
- **B.** Styrofoam prevents contamination of the materials.
- **C.** Styrofoam insulates the system from energy transfers from the surroundings.
- **D.** Styrofoam increases safety because it prevents the container from becoming too hot to handle.

13. Do the results of experiment 3 support the hypothesis that water has a higher heat capacity than propanol?
- **F.** Yes, because the temperature of the water changed less than that of the propanol with the same amount of energy absorbed.
- **G.** Yes, because the temperature of the water changed more than that of the propanol with the same amount of energy absorbed.
- **H.** No, because the temperature change for water was less than the temperature change for propanol.
- **J.** No, the hypothesis is not supported because the propanol and water did not absorb equal amounts of energy.

Passage III

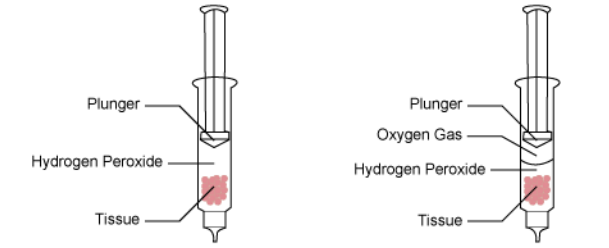
A group of students conducted three experiments to study the enzyme catalase, which is found in the cells of most organisms. Catalase increases the rate of the decomposition of hydrogen peroxide, H_2O_2, which can be toxic and harmful to the organism. The decomposition of hydrogen peroxide produces oxygen gas and liquid water, as shown in Equation 1:

Equation 1:

$$H_2O_2\,(aq) \rightarrow H_2O\,(l) + O_2(g)$$

Experiment 1

Eight tissue samples were tested to determine the relative amount of catalase in the cells of each type of tissue. Each tissue sample was placed into a syringe, and the plunger of the syringe was pushed in as much as possible without compressing the tissue sample. Equal volumes of 3% hydrogen peroxide were drawn into the syringe, and then the syringe was sealed. The syringes with tissue and peroxide were left overnight. The gas produced pushed the plunger of the syringe, allowing for a change in volume to be measured.



The volume of the contents of each syringe was measured to determine the amount of gas produced.

Table 1

Type of Tissue	Initial Volume of Syringe Contents	Final Volume of Syringe Contents	Change in Volume of Syringe Contents
Sliced raw potato	21	43	22
Yeast	20	54	34
Raw liver	22	74	52
Raw ground meat	20	50	30
Baked potato	22	31	9
Cooked liver	21	56	35
Green leaves	20	44	24
Sliced raw carrot	23	49	26

Experiment 2

Factors affecting the catalase activity were studied using yeast as the source for the catalase enzyme. Small disks of filter paper were soaked in a yeast solution. Ten milliliters of 1% hydrogen peroxide solution was added to five test tubes. One change was applied to each of five test tubes, as listed in Table 2. After enough oxygen was produced by the catalase enzyme within the paper disk, the disk floated to the surface of the solution. The time required for the disk to float to the top of the solution was measured and recorded.

Table 2

Applied Change	Effect on Solution	Time Required for Paper disk to Float (s)		
		Trial 1	Trial 2	Trial 3
Addition of 20 drops of acid	Increased acidity	33	32	33
Addition of 20 drops of base	Increased basicity	45	46	51
Placed into ice bath	Decreased Temperature	63	60	59
Placed into hot water bath	Increased temperature	29	28	25
Addition of 10 grams of salt	Increased salinity	40	42	45

Experiment 3

Experiment 2 was repeated, but only the temperature was varied. The test tubes of hydrogen peroxide were placed into water baths of varying temperatures. The yeast-soaked paper disks were placed into the test tubes of hydrogen peroxide after the test tubes sat in the water bath for ten minutes. The time required for the paper disk to float to the surface due to the production of oxygen is shown in Table 3.

Table 3

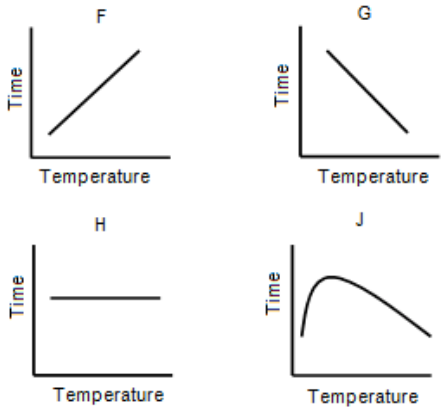
Temperature of Water Bath (°C)	Time Required for Paper Disk To Float (sec)
20	56
27	45
35	42
44	36
52	29
69	Did not float
73	Did not float

14. In experiment 2, what additional change could be tested for its effect on catalase activity?
- **A.** Addition of sugar
- **B.** Addition of salt
- **C.** Change in pH
- **D.** Change in temperature

15. Why were the test tubes in the water bath for ten minutes?
- **F.** The hydrogen peroxide only begins to decompose after ten minutes.
- **G.** To allow time to prepare other materials.
- **H.** To allow enough time for heat to be transferred from the water to the hydrogen peroxide until the temperatures are the same.
- **J.** There is no specific reason for this action.

16. Based on experiment 2, how much time is needed for enough oxygen to be produced by the yeast to make the filter paper buoyant in acidic conditions?
- **A.** 20 seconds
- **B.** 30 seconds
- **C.** 40 seconds
- **D.** 45 seconds

17. Which graph best represents the results of experiment 3?



18. Hydrogen peroxide is often used as a bleaching agent. It has been suggested that hydrogen peroxide produced within the body leads to gray hair. Considering this, what food might be suggested to prevent gray hair?
- **A.** Potatoes
- **B.** Carrots
- **C.** Liver
- **D.** Dark green vegetables

19. Which of the following conclusions are supported by the results of experiment 1?
- **F.** Plant tissues contain more catalase than animal tissues.
- **G.** All tissues contain about the same amount of catalase.
- **H.** Liver contained the least amount of catalase.
- **J.** D. Cooked tissues do not contain as much catalase as raw tissues.

Passage IV

A student conducted two experiments to study the frictional force between surfaces. For each experiment, a block was pulled on a flat surface at a constant speed. The block was pulled with a spring scale, which was used to measure the force applied to the block, as shown in Diagram 1. The applied force measured on the spring scale is equal to the friction force between the block and the surface.

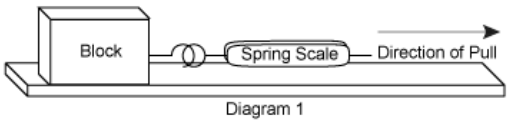


Diagram 1

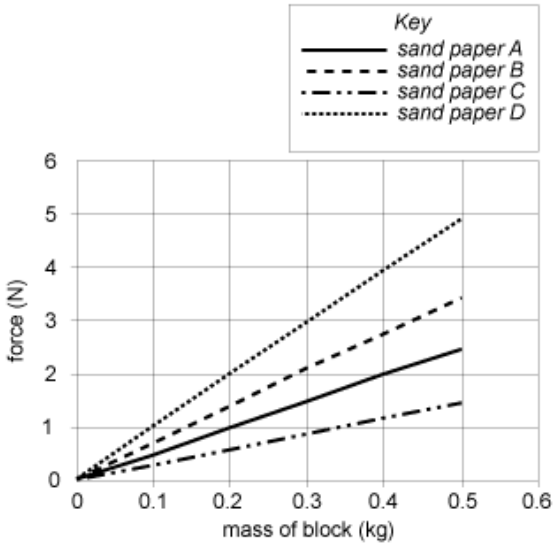
The force of friction between a moving object and a surface can be described with the following equation. The coefficient of friction, μ, is an experimentally determined constant specific to each object and surface.

$$\text{Force} = (\mu)(\text{mass of block})(9.8)$$

Experiment 1

In experiment 1, wood blocks of different masses were pulled along sand paper. Each block had the same dimensions and surface area. Four different types of sand paper were tested. The force applied to the block was measured on the spring scale as the block was pulled at a constant speed. The results are shown in Figure 1.

Figure 1



Experiment 2

In a second experiment, the student measured the force required to slide blocks of different materials across one type of sand paper. Each block had the same surface area in contact with the sand paper, and each block had a mass of 0.4 kg.

Table 1

Block Material	Force (N)
Wood	2.0
Rubber	4.2
Glass	0.73
Steel	0.95

20. In experiment 1, what force would be measured if a wood block with a mass of 0.6 kg was pulled across sand paper B?
- **A.** 1.8 N
- **B.** 2.9 N
- **C.** 4.1 N
- **D.** 5.9 N

21. Based on the results of experiment 1, which type of sand paper was used in experiment 2?
- **F.** A
- **G.** B
- **H.** C
- **J.** D

22. Based on both experiments, which sandpaper and block material combination would be expected to have the least friction of all the possible combinations?
- **A.** Rubber and sand paper A
- **B.** Wood and sand paper B
- **C.** Glass and sand paper C
- **D.** Steel and sand paper D

23. The student tested a fifth type of sand paper, Sand Paper E. The student measured a force of 4 N when using a 0.5 kg block. Based on the results in experiment 1, which of the following correctly lists the five types of sand paper in order of increasing friction force between the sand paper and the wood block?
- **F.** A B C D E
- **G.** B D E A C
- **H.** D E B A C
- **J.** C A B E D

24. According to experiment 1, if the mass of a block is doubled, the force of friction would _____.

A. Double
B. Triple
C. Halve
D. Stay the same

25. Based on experiment 1, what is the coefficient of friction for the wood block on sand paper D?

F. 0.1
G. 0.5
H. 1.0
J. 10

Passage V

Recently, scientists have discovered a number of extrasolar planetary systems. In an effort to understand the likelihood of life-supporting systems existing beyond our solar system, scientists have analyzed specific data in each system. Scientists have recently discovered System 273. Figure 1 displays the approximate orbits of each of the planets in System 273. Figure 2 and Table 1 list statistics for each of the 4 planets. Note: Rotation period refers to the time needed for the planet to complete one revolution on its axis.

Figure 1

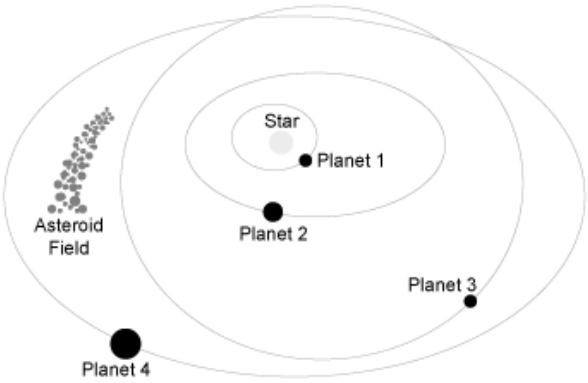


Figure 2

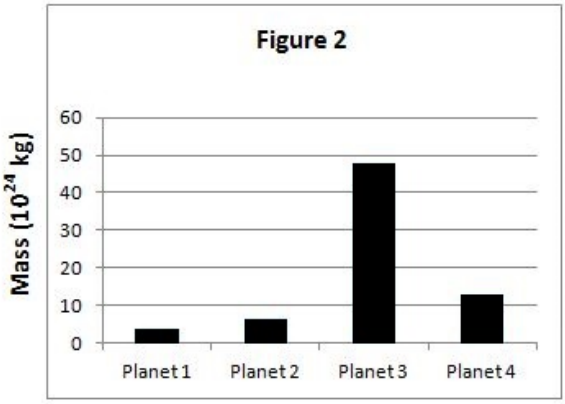


Table 1

	Diameter (km)	Surface Gravity (m/s^2)	Rotation Period (hours)	Mean Temp. (Celsius)
Planet 1	4552	3.7	1402.3	180
Planet 2	12,880	9.5	24.5	17
Planet 3	52,086	7	10.1	-20
Planet 4	13,042	15.5	20.2	-223

26. The mass of planet 3 is approximately _____ the mass of planet 4?

A. 4 times
B. 1/4
C. 1/2
D. 2 times

27. As part of their initial studies, scientists scanned the planet surfaces for signs of craters caused by asteroids or other small bodies hitting the planet surface. Typically planets within close proximity to asteroids would display signs of craters. According to figure 1, what two planets would most likely contain craters?

F. Planet 2 and Planet 4
G. Planet 3 and Planet 4
H. Planet 2 and Planet 3
J. Planet 1 and Planet 4

Scientists compared Planets 1-4 with the planets from our solar system:

	Diameter (km)	Surface Gravity (m/s^2)	Rotation Period (hours)	Mean Temp. (Celsius)
Venus	12104	8.9	1407.6	167
Earth	12756	9.8	23.9	15
Mars	6792	3.7	24.6	-65
Jupiter	142984	23.1	9.9	-110

28. If Mars were located in system 273, where would its orbit most likely be located in relation to the other planets in the system?

A. Between Planets 1 and 2
B. Between Planets 2 and 3
C. Between Planets 3 and 4
D. The answer cannot be determined

29. Planet 2 and Planet 4 have similar diameters, but the surface gravity of each is quite different. What is a possible explanation for this?

- **F.** The gravity of Planet 2 is lower because of the higher mean temperature
- **G.** The gravity of Planet 2 is lower because it has a slightly slower rotation period
- **H.** The gravity of Planet 4 is stronger because it is the planet farthest from the star it orbits
- **J.** The gravity of Planet 4 is stronger because of the higher mass

30. A 5th planet was discovered in the region with a diameter of 63,072 km, a rotation period of 38.2 hours, and a mean temperature of -382 degrees Celsius. Based on the info, where would the expected location of the 5th planet be?

- **A.** Between Planet 1 and Planet 2, because the rotation period is between that of Planet 1 and Planet 2.
- **B.** Beyond Planet 4, because the mean temperature is lower than that of Planet 4
- **C.** Near Planet 3, because the diameter is similar
- **D.** The answer cannot be determined

Passage VI

Scientists study electrical resistivity and conductivity to determine how easily electricity flows through a material. Resistivity measures the ability of a material to prevent electrical flow through that material. Conductivity is the opposite; it measures the ability of a material to conduct electrical flow through it. If a material has a high resistivity level, it will measure low in conductivity and vice versa. The formula for resistivity and conductivity are below:

Resistivity:
ρ = R x A / L
ρ = resistivity (Greek letter Rho)
R = Resistance (measured in Ohms Ω)
A = Area of the material
L = Length of the material

Conductivity:
σ = 1 / ρ
σ = conductivity (Greek letter sigma)
ρ = resistivity (Greek letter Rho)

In figure 1, scientists measured resistivity for eight different minerals. Resistivity can vary based on temperature and moisture, so the entire range is represented in the figure. Figure 2 shows resistivity for five new minerals that were discovered. Table 1 lists resistivity and conductivity for a number of substances recorded with a temperature of 20° C.

Figure 1

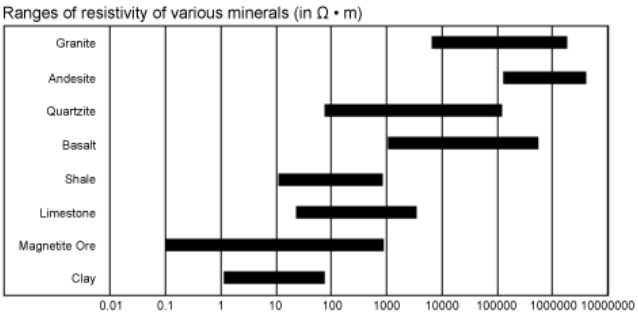


Figure 2

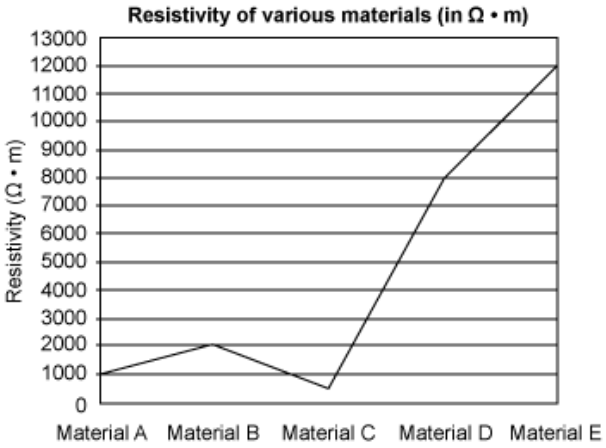


Table 1

	Resistivity ($\Omega \cdot m$)	Conductivity ($S \cdot m^{-1}$)
Granite	12,500	0.00008
Limestone	586	0.001706
Shale	182	0.005495
Clay	13	0.076923
Magnetite Ore	1.56	0.641026
Stainless Steel	0.000000586	1,706,484.64
Titanium	0.000000283	3,533,568.90
Iron	0.000000126	7,936,507.94
Silver	0.0000000183	54,644,808.74

31. If a mineral contained a resistivity of 10, what would the expected conductivity be?

A. 1/20
B. 1/10
C. 1
D. 10

32. Scientists hypothesize that when two materials are mixed, the combined resistivity of the two would be the average of the resistivity of each material individually. If that is the case, according to table 1, what two materials would have a resistivity of approximately 300 Ω • m when combined?
F. Granite and Limestone
G. Limestone and Shale
H. Limestone and Clay
J. Magnetite Ore and Stainless Steel

33. Developers are trying to determine the best material to use for installing wiring within an apartment complex. Based only on the data in table 1, which material would be the best choice?
A. Granite
B. Magnetite Ore
C. Iron
D. Silver

34. According to Figure 1, which material is most susceptible to changes in resistivity caused by temperature or moisture?
F. Andesite
G. Magnetite Ore
H. Granite
J. Clay

35. According to figure 2 and table 1, Material C is most like which other material in composition?
A. Limestone
B. Granite
C. Iron
D. Silver

Passage VII

Mount Sano, a volcanic mountain on the Pacific Rim, has been studied by scientists dating back to the early 1900's. During that time period, scientists have studied eruption patterns and emission rates. The eruption dates are outlined in Figure 1 below. Using an optical correlation spectrometer and infrared analyzer, scientists were able to monitor the average Sulfur Dioxide (SO_2) and Carbon Dioxide (CO_2) emissions from Mount Sano both at the time of eruptions and during dormant periods in order to determine the effect on the Earth's climate (Figure 2). Scientists also studied the composition of volcanic gases and compared with other volcanoes in the region (Table 1).

Figure 1

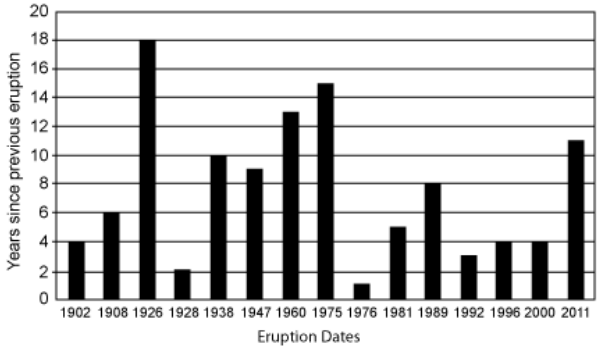


Figure 2

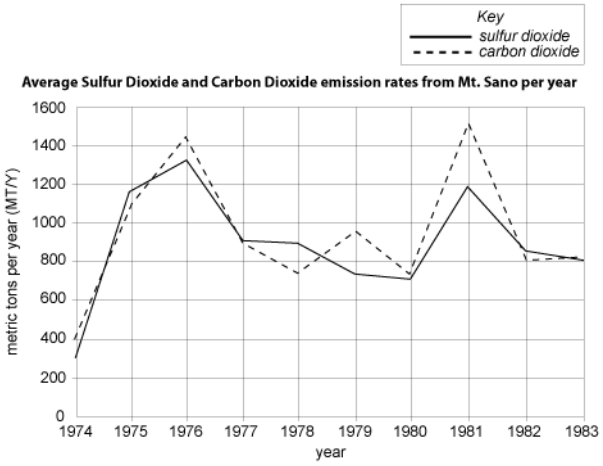


Table 1: Volcanic gas compositions, in volume percent concentrations for three different volcanoes

Volcano	Mount Sano	Mount Buxton	Mount Meyer
H_20	38.20%	76.30%	95.30%
CO_2	49.10%	10.80%	1.56%
SO_2	9.90%	8.10%	0.49%
H_2	0.80%	2.59%	0.71%
CO	1.21%	0.48%	0.01%
H_2S	0.69%	0.91%	0.24%
HCI	0.09%	0.82%	1.31%
HF	0.01%	0.00%	0.38%

36. How many volcanic eruptions took place at Mount Sano between 1980 and 2002?
- **A.** 5
- **B.** 6
- **C.** 20
- **D.** 24

37. Since 1902, how many dormancy periods of 10 years or longer were recorded for Mount Sano?
- **F.** 2
- **G.** 4
- **H.** 5
- **J.** 11

38. In Figure 2, what is the primary cause of the higher SO_2 and CO_2 levels in 1975, 1976, and 1981?
- **A.** The temperature of the volcano was highest at these times
- **B.** These were years where the volcano erupted
- **C.** These were dormant periods for the volcano
- **D.** Pollution caused by human activity caused the increase in SO_2 and CO_2 levels.

39. According to Table 1, which volcano produces the lowest levels of Sulfur Dioxide?
- **F.** Mount Sano
- **G.** Mount Buxton
- **H.** Mount Meyer
- **J.** Cannot be determined

40. In 1975, the CO_2 level of Mount Sano was measured at approximately 1,000 MT/Y. According to Figure 2 and Table 1, what was the approximate total amount in MT/Y of all gas emissions from Mount Sano in 1975, assuming that the same concentration percentages apply?

A. approximately 5,000 MT/Y
B. approximately 500 MT/Y
C. approximately 2,000 MT/Y
D. D. approximately 10,000 MT/Y

ANSWER KEY IS ON THE NEXT PAGE

ANSWER KEY		
Question #:	**Correct Answer**	**Hint**
1	C	Think about what would happen to the algae if sediment were to settle on top of it. Would this most likely affect the algae's access to light, the acidity of the water, or the temperature of the water. You can assume that the sediment is not acidic.
2	F	Revisit the logic that each scientist gave. Consider how an increase in temperature and in atmospheric carbon dioxide would impact the conditions that are highlighted by each scientist.
3	A	Scan the introductory explanation about the relationship between coral and algae. Don't worry about the scientific terms in the answer choices. Instead, focus on the explanation for each term.
4	F	Read through the answer choices before you revisit the passage. Eliminate any choices that you know are wrong, then compare the remaining options to the information about Scientist 2.
5	C	Increased light reaching the earth's surface would also mean increased light filtering through to the coral. Which scientist would think that this would cause a decrease in coral bleaching?
6	J	Revisit the introduction to see the underlying reason for coral bleaching.
7	F	Scientist 3 believes that rising ocean levels cause coral bleaching. Which situation for the coral would be most impacted by a small increase in the ocean level?
8	D	Look only at the points plotted for propanol, not water.
9	H	Choose one metal in the Table 1; then read the temperatures down a column. Check your idea by doing the same with a second metal.
10	B	Focus on the column of for iron, and find temperatures at time just before and just after 80 seconds. This gives you a range of temperatures that are possible around the time of 80 seconds.
11	G	Before looking at choices, write down what changed and what was constant in both Experiment 1 and Experiment 2. Then use this to choose the best choice. Process of elimination can be a great strategy here.
12	C	Another way to consider this question is to ask yourself: Why was Styrofoam chosen for this experiment instead of another material? Answer choices may have correct information (like Styrofoam doesn't react with metals) without answering the question correctly.
13	F	Since a key vocabulary term (heat capacity) is in the question, read the introduction of the passage again to review and focus on the information about the term. Eliminate choices with evidence or explanations that do not match the data in the passage. You can do this even if you're unsure about whether the answer is yes or no.
14	A	Since the question asks about an *additional* change, look for an answer choice that is not a change already printed in Table 2.

15	H	To answer this question, make sure you have carefully read all of the text within the passage. Then read each answer choice carefully. For each answer choice, ask yourself: Is the answer choice possible? Is the answer choice relevant? Does it answer the question? Is it correct? Reasons for having a specific method for an experiment are never for convenience. It might be nice, but it's not the *reason*.
16	B	Find the data for acidic conditions. The multiple trials should have very similar times, and only one answer choice will be similar to these.
17	G	The temperature is plotted on the x-axis for the graphs in the answer choices. Think about how the line would change as you read the graph along the x-axis, which means as the temperature increased. So as the temperature increased, did the time get larger or smaller? If time permits – make your own *rough sketch* of a graph of the data before looking at the choices. After making the sketch, you can simply choose the answer choice that matches your sketch.
18	C	If hydrogen peroxide leads to gray hair, preventing gray hair would require removing or decreasing hydrogen peroxide. What food would be most effective at decreasing or decomposing hydrogen peroxide?
19	J	Read each answer choice one-by-one. With each choice, look at the data in experiment 1 to consider if the choice is correct. Process of elimination is helpful, especially if there are choices that are easier to identify as incorrect.
20	C	Focus only on Sandpaper B, and don't let the wood material distract you – all of the blocks in experiment 1 are wood. Trace the line for sand paper B much further off the graph. Then, using this line, try finding the force (on the y-axis) for a 0.6 kg block.
21	F	The two things in common that can be found in both experiments are the wood block and a 0.40 kg mass. What sandpaper in experiment 1 required the same force with a 0.4 kg mass as the wood did in experiment 2?
22	C	The least friction will occur with materials that require the lowest amount of force. What materials have the least friction/lowest force in Experiment 1 and Experiment 2?
23	J	Place a mark on Figure 1 for the point at 0.5 kg and 4 N; label this point E. Now write the letters in order from lowest friction to highest.
24	A	Since this question isn't asking about one specific type of sandpaper, you can choose any of the lines to use in answering this question. Find the line that is the clearest, with easy-to-read points.
25	H	Choose one point (any point) on the plot of Sandpaper D to determine corresponding values for mass and force. Then round 9.8 to 10 for the calculation.
26	A	To answer this question, you'll need to look at figure two; the masses are listed there. Just determine the number value of each one and divide.
27	G	In the problem, it states that planets that come closest to the asteroid field would show signs of craters. Be careful though - make sure to look at the orbits, not just which planets appear closest as shown in the figure.

28	C	To answer this one correctly, you have to first determine what the trend is with the planets in system 273. If you compare the planets, you'll notice that the further you go from the star, the lower the mean temperature is. Next, you can compare the mean temperature of Mars with the mean temperatures of planets 1-4 and determine where it belongs to be in proper order.
29	J	To answer this question, your best bet is to first compare the stats of the two planets in the question using Figure 2 and Table 1. Next, go through the answer choices listed and determine which one could possibly affect the gravity of a planet.
30	B	Look at the stats of the new planet and ask yourself, "which statistic does location have an affect on?"
31	B	Take a look at the formula for conductivity and the parts of the formula.
32	H	To answer this question, the easiest approach is to look at each answer set and compare the resistivity of each. You need to find a set that averages to 300 Ω • m
33	D	The material with the highest conductivity would be best for wiring.
34	G	Another way to look at this question is: "Which material shows the largest range of resistivity?"
35	A	The quickest and easiest way to solve this question is to look at each of the 4 answer choices and compare them with material C.
36	A	You can find the answer to this one in Figure 1, but be careful. Note that the figure shows the number of years between each eruption, not the number of eruptions each year.
37	H	Again, you'll find the answer in Figure 1. Another way to word this question is: "How many times were there more than 10 years between eruptions?"
38	B	To answer this, it also helps to look at Figure 1. What occurred during the years listed?
39	H	To answer this, simply look at the figures in Table 1. Note: Sulfur Dioxide is SO_2
40	C	This problem can be a little tricky, but focus on what is being asked. We know that there is 1,000 MT/Y in CO_2. According to Table 1, CO_2 makes up 49.1 % (almost 50%) of the gas emissions from the volcano. If you know that CO_2 makes up about half and that the one half is about 1,000 MT/Y, you can use a little math to figure out the whole amount.

SCORING GUIDE IS ON THE NEXT PAGE

Scoring Guide	
Estimated Score	**Number Correct**
36	40
35	39
34	-
33	38
32	37
31	-
30	36
29	35
28	34
27	33
26	31-32
25	29-30
24	28
23	26-27
22	24-25
21	22-23
20	20-21
19	18-19
18	16-17
17	14-15
16	13
15	12
14	10-11
13	8-9
12	7
11	-
10	6
9	5
8	4
7	3

6	-
5	2
4	-
3	1
2	-
1	0