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Science

HiSET® Exam Free Practice Test FPT – 7

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Science

Directions

Time – 40 minutes

25 Questions

This is a test of your skills in analyzing science information. Read each question and decide which of the four alternatives best answers the question. Then mark your choice on your answer sheet. Sometimes several questions are based on the same material. You should carefully read this material and then answer the questions.

Work as quickly as you can without becoming careless. Do not spend too much time on any question that is difficult for you to answer. Instead, skip it and return to it later if you have time. Try to answer every question even if you have to guess.

Mark all your answers on the answer sheet. Give only one answer to each question.

If you decide to change one of your answers, be sure to erase the first mark completely.

Be sure that the number of the question you are answering matches the number of the row of answer choices you are marking on your answer sheet. The answer sheet may contain more rows than you need.

1

Consider the two facts:

- I. The specific heat of a substance is the heat required to raise the temperature of one gram of the substance 1°C .
- II. Water has the highest specific heat of any common substance.

Which of the following statements is consistent with these facts?

- A. Oceans change temperature more slowly than land.
- B. Oceans change temperature faster than land.
- C. The oceans are shrinking due to evaporation.
- D. The supply of water to the oceans is greater than the rate of evaporation.

2

Four students used the same meter stick to measure an edge of the same wooden cube four times. They obtained the following results:

Student	I	II	III	IV
	11.90 cm	11.95 cm	11.90 cm	11.95 cm
	12.25 cm	12.35 cm	12.15 cm	12.30 cm
	12.70 cm	12.60 cm	12.45 cm	12.55 cm
	12.75 cm	12.70 cm	13.10 cm	12.80 cm
Average	12.40 cm	12.40 cm	12.40 cm	12.40 cm

Which student's measurements represent the greatest precision?

- A. Student I
- B. Student II
- C. Student III
- D. Student IV

NO TEST MATERIAL ON THIS PAGE

Questions 3 through 10 refer to the following information.

Folk remedies are health treatments that people pass on to one another because they seem to work. For example, centuries ago a brew of willow leaves was recommended for the painful disorder called gout. Studies of the chemicals in willow trees later led scientists to develop the drug aspirin. Popular wisdom about cures for various ailments continues to prompt questions for scientific investigation.

A modern folk remedy is to put kitchen meat tenderizer on insect stings. Meat tenderizer contains an enzyme from papaya fruit that breaks down proteins. It has been speculated that this enzyme might break down the proteins in insect venom. This hypothesis was tested in the following experiment.

Twenty-two medical students volunteered to be stung by fire ants, once on each arm. Previous experiments had shown that water by itself is not effective in reducing pain from fire-ant stings. Thus, one sting was covered by a gauze pad that had been soaked in water, and the other was covered by a pad soaked in a solution made of powdered meat tenderizer dissolved in water. Neither the volunteers nor the people observing them knew which arm was treated with the meat tenderizer. The pads were left on for 20 minutes, during which time several precise measurements were taken of the blood flow in the skin around the stings.

At the end of the 20 minutes, the volunteers told the experimenters how each sting felt. The subjects reported no differences in the pain or itching of their two stings. Blood flow readings were found to be slightly higher for the sting areas treated with meat tenderizer, but the difference was very small. The researchers concluded that the experiment found no evidence that meat tenderizer was effective against fire-ant stings.

3

What is the main reason each volunteer was stung once on each arm but had only one sting treated with meat tenderizer?

- A. So that differences between right-handed students and left-handed students would not affect the results
- B. To allow the researchers to choose the more severe of the two stings for treatment
- C. So the researchers would have twice as much data about the meat tenderizer's effects
- D. To obtain a set of control data with which to compare the experimental data

4

Would the validity of the results have been affected if the volunteers had been told which of their two stings was being treated with meat tenderizer?

- A. No; it wouldn't have had any effect on the validity of the results as long as all the volunteers were told.
- B. No; the volunteers were medical students and therefore trained to be objective.
- C. Yes; it might have affected how much pain and itching they thought they felt on either arm.
- D. Yes; they probably would have felt greater discomfort on the arm that was treated with the meat tenderizer.

5

Suppose it is found that there is very little protein in the venom of fire ants. Is this fact of interest in the interpretation of the results of the experiment?

- A. No.
- B. Yes; it proves that the results must be correct.
- C. Yes; it proves that the results are incorrect.
- D. Yes; it bears on the implications of the results.

6

Suppose one of the researchers said, "I wonder if the meat tenderizer was not effective because it could not penetrate the skin." This statement can best be described as

- A. a hypothesis.
- B. an observation.
- C. a conclusion.
- D. a scientific theory.

7

After the blood flow measurements had been made and pain reports taken, which of the following would it have been best for the researchers to do?

- A. Look at the stings again later to check for long-term differences
- B. Try another remedy on the same set of stings and collect similar data
- C. Switch the gauze pads from one arm to the other
- D. Treat all the stings with meat tenderizer to help make them feel better

8

Which of the following best describes how the results of the experiment should be viewed?

- A. The results are not useful because the meat tenderizer was ineffective.
- B. The results are not useful because only twenty-two subjects participated in the experiment.
- C. The results are useful because they represent one set of data to be considered in related experiments.
- D. The results are useful because they proved that folk remedies do not work.

Suppose the experiment was designed to have each volunteer be stung once, report the pain, be treated with meat tenderizer solution for 20 minutes, and then report how the sting felt. Would this experimental design be as good as the original design?

- A. Yes.
- B. No; it would be impossible to separate the effects of normal recovery from the effects of the meat tenderizer.
- C. No; it would require twice as many volunteers to obtain the same amount of data.
- D. No; it would involve twice as much time for observers to take pain reports both before and after treatment.

Consider the hypothesis of interest in the experiment. Suppose the meat tenderizer had been effective in reducing pain. Then, which of the following questions would most likely be investigated next?

- A. Are proteins responsible for the effects of fire-ant venom?
 - B. Do all brands of meat tenderizer provide relief from fire-ant stings?
 - C. Do other folk remedies also provide relief from fire-ant stings?
 - D. Is it the enzyme or some other ingredient in the meat tenderizer that provides relief?
-

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Questions 11 through 15 refer to the following information.

A drought can be described using measures of rainfall amounts, agricultural productivity, vegetation condition, soil moisture, or streamflow. Yet, in the most basic terms, a drought is a significant deficit in moisture availability due to lower than normal precipitation. This definition, however, is relative to a given region and is dependent on the past and present conditions in that region.

A drought monitoring system used by the National Drought Mitigation Center provides a classification scheme, based on a series of calculations, for the severity of a drought within a region. The table below shows the percentages of Regions E and F in each drought classification on four different days.

Percentage of Region in Each Drought Classification (%)

	Day	Abnormally Dry	Moderate Drought	Severe Drought	Extreme Drought	Exceptional Drought	Percentage of Total Area Affected by Drought (%)
Region E	July 5	0.00	6.76	13.90	31.58	47.76	100.00
	July 12	0.00	6.76	14.24	30.90	48.10	100.00
	July 19	0.00	6.04	14.95	30.80	48.21	100.00
	July 26	0.00	6.04	14.62	30.25	49.09	100.00
Region F	July 5	11.91	5.74	8.01	16.36	2.17	44.19
	July 12	11.91	5.08	9.40	15.58	2.23	44.20
	July 19	12.79	5.43	10.33	14.66	2.22	45.43
	July 26	15.85	5.82	12.38	15.08	1.57	50.70

11

In the time period presented, in which drought classification were the percentages of affected areas in Regions E and F most similar?

- A. Abnormally dry
- B. Moderate drought
- C. Severe drought
- D. Extreme drought

12

Which statement about Regions E and F is true?

- A. The total area of Region E affected by drought is less than that of Region F.
- B. All of Region E and about half of Region F are affected by drought.
- C. The drought affecting Region E is less severe than that affecting Region F.
- D. Most of both Regions E and F are affected by exceptional drought.

13

Region H has zero percent of its area listed in all of the drought categories. Which statement about Region H is most likely true?

- A. Most of the crops are too dry to harvest.
- B. Daily temperatures are extreme compared to the past.
- C. The river levels are lower than normal.
- D. The amount of precipitation is typical for the region.

14

In Region G, 75.42% of the area is categorized as being affected by “Exceptional Drought.” How do the drought conditions in Regions E, F, and G compare?

- A. Exceptional drought conditions are affecting Region F more than Region E and Region G.
- B. Exceptional drought conditions are more widespread in Region E than in Regions F and G.
- C. The drought conditions in Regions E, F, and G are similar.
- D. Exceptional drought conditions are affecting a greater percentage of the area in Region G than in either Regions E or F.

15

Which of these natural disasters are intensified by drought?

- A. Tornadoes
 - B. Earthquakes
 - C. Wildfires
 - D. Hailstorm
-

Joshua was interested in studying the effect of exercise on the pulse rates of several of his friends. Which of the following four-step procedures would be best for completing this study?

A.

Step 1	Step 2	Step 3	Step 4
Measure pulse rates of friends	Have friends run in place for 2 minutes	Measure pulse rates of friends	Have friends sit for 5 minutes

B.

Step 1	Step 2	Step 3	Step 4
Measure pulse rates of friends	Have friends run in place for 2 minutes	Have friends sit for 5 minutes	Measure pulse rates of friends

C.

Step 1	Step 2	Step 3	Step 4
Have friends sit for 5 minutes	Measure pulse rates of friends	Have friends run in place for 2 minutes	Measure pulse rates of friends

D.

Step 1	Step 2	Step 3	Step 4
Measure pulse rates of friends	Have friends sit for 5 minutes	Have friends run in place for 2 minutes	Measure pulse rates of friends

Which birds of the northern United States can probably best withstand extreme temperature changes?

- A. Those that migrate to coastal regions in the fall
- B. Those that migrate south in the fall
- C. Those that migrate north in the spring
- D. Those that remain in that region throughout the year

In an experiment, the heights of three plants in the control group were measured as 10.6 cm, 10.8 cm, and 10.9 cm. The calculator used to compute the average of these measurements showed 10.766666. What value should be recorded for the average?

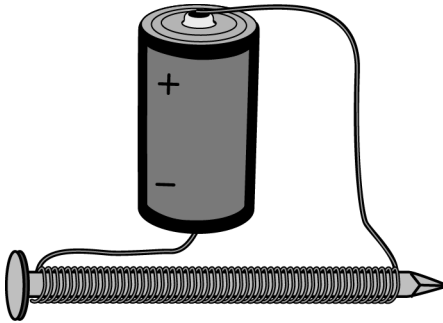
- A. 10.7 cm
- B. 10.8 cm
- C. 10.77 cm
- D. 10.767 cm

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Questions 19 through 23 refer to the following information.

In an electromagnet, the magnetic field is produced by the flow of an electric current. The magnetic field is maintained by a continuous supply of electrical energy. The typical parts of an electromagnet are a wire coil, a magnetic metal core, and a source of electricity. The magnetic field of an electromagnet can be manipulated by adjusting the supply of electric current. Electromagnets are used in many devices, including computer printers, imaging machines, and industrial lifting equipment.

A simple electromagnet can be made by coiling a copper wire around an iron nail and attaching each end of the copper wire to a battery. The more turns of copper wire around the iron nail, the stronger the magnetic field.



19

What would happen to the magnetic field of the electromagnet if the battery were removed?

- A. It would expand in size.
- B. It would change direction.
- C. It would weaken.
- D. It would cease to exist.

20

Which statement about electromagnets is supported by the information provided?

- A. Electromagnets are used in certain types of computer equipment.
- B. Batteries are the most common source of electric current used in electromagnets.
- C. Copper is the most common metal used for the core of electromagnets.
- D. Electromagnets are used more widely in industry than permanent magnets.

21

Which sentence best describes what will happen when a compass, a pendulum with a cork bob, and samples of lead and gold are placed near an electromagnet?

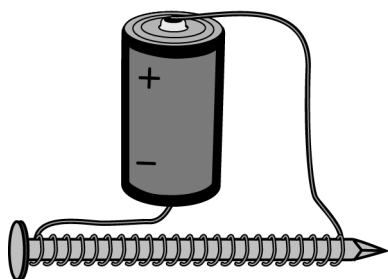
- A. The needle of the compass will move.
- B. The pendulum will swing.
- C. The sample of lead will be attracted to the electromagnet.
- D. The sample of gold will be attracted to the electromagnet.

22

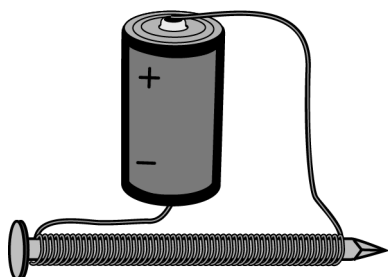
Which of these factors is least likely to affect the strength of a simple electromagnet?

- A. The number of turns of wire around the core
- B. The amount of electric current
- C. The magnetic properties of the core
- D. The presence of nearby nonmagnetic objects

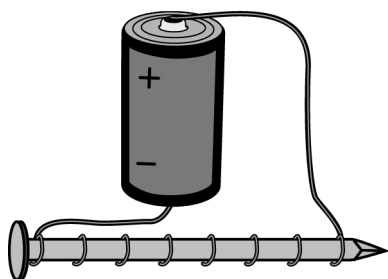
Electromagnet 1



Electromagnet 2



Electromagnet 3



Which statement is true about the strength of electromagnet 1 compared to that of electromagnets 2 and 3?

- A. The strength of electromagnet 1 is greater than that of electromagnets 2 and 3.
- B. The strength of electromagnet 1 is less than that of electromagnets 2 and 3.
- C. The strength of electromagnet 1 is greater than that of electromagnet 2 but less than that of electromagnet 3.
- D. The strength of electromagnet 1 is less than that of electromagnet 2 but greater than that of electromagnet 3.

Thirty radish seeds moistened with plain tap water all sprouted in three days. However, NONE of a group of thirty radish seeds moistened with salty tap water sprouted in that time. What is the best way to investigate whether the salt in the water killed the second group of seeds or just prevented them from sprouting?

- A. Repeat the experiment with all new seeds
- B. Repeat the experiment with new seeds, but use a greater amount of salt in the water
- C. Rinse all salt off the unsprouted seeds and moisten them with plain tap water
- D. Rinse all salt off the unsprouted seeds and moisten them again with salt water

Consider these two statements:

- I. An earthworm died when it stayed in the sun too long.
- II. Earthworms need moist skin for respiration.

Which of the following best describes the relationship between the two statements?

- A. I is an observation, and II is a possible explanation for I.
- B. II is an observation, and I is a possible explanation for II.
- C. Both statements are observations.
- D. Both statements are explanations.



HiSET Answer Key and Rationales

Sequence Number	Correct Response	Content Category	Question Difficulty
1	A	II. Physical Science	Medium
Rationale			
Option A is correct because based on the two facts provided, the heat required to raise the temperature of water is greater than the heat required to raise the temperature of land; therefore, temperatures change in the oceans more slowly than temperatures change on land.			

Sequence Number	Correct Response	Content Category	Question Difficulty
2	B	II. Physical Science	Medium
Rationale			
Option B is correct because the range of values for the data obtained by Student II is smaller than for any of the other students, indicating the greatest precision.			

Sequence Number	Correct Response	Content Category	Question Difficulty
3	D	I. Life Science	Medium
Rationale			
Option D is correct because treating one sting with meat tenderizer and leaving one sting untreated allowed the researchers to obtain control data (effects of the untreated sting) to compare to the experimental data (the effects of the treated sting).			

Sequence Number	Correct Response	Content Category	Question Difficulty
4	C	I. Life Science	Medium
Rationale			
Option C is correct because the results would have been invalid if the volunteers were told which of their two stings had been treated with meat tenderizer.			

Sequence Number	Correct Response	Content Category	Question Difficulty
5	D	I. Life Science	Hard
Rationale			
Option D is correct because the results, which showed only a small difference between the untreated sting areas and those treated with meat tenderizer, could be attributable to the fact that little protein is in fire ant venom, which would not disprove the hypothesis.			

Sequence Number	Correct Response	Content Category	Question Difficulty
6	A	I. Life Science	Medium
Rationale			
Option A is correct because the statement presented is a hypothesis, a proposed explanation for a phenomenon.			

Sequence Number	Correct Response	Content Category	Question Difficulty
7	A	I. Life Science	Medium
Rationale			
Option A is correct because changes in blood flow and pain may occur at later periods of time and would be relevant to the experiment.			

Sequence Number	Correct Response	Content Category	Question Difficulty
8	C	I. Life Science	Medium
Rationale			
Option C is correct because the results of the experiment are useful but in a limited way.			

Sequence Number	Correct Response	Content Category	Question Difficulty
9	B	I. Life Science	Medium
Rationale			
Option B is correct because the effects of normal recovery after 20 minutes would not be distinguishable from the effects of the meat tenderizer.			

Sequence Number	Correct Response	Content Category	Question Difficulty
10	D	I. Life Science	Medium
Rationale			
Option D is correct because if the meat tenderizer had been effective in reducing pain, the only way to test the hypothesis that the enzyme in meat tenderizer breaks down the protein in insect venom would be to eliminate the possibility that ingredients other than enzymes reduce pain.			

Sequence Number	Correct Response	Content Category	Question Difficulty
11	B	III. Earth Science	Easy
Rationale			
Option B is correct because, based on the data table, the percentages of Regions E and F for all four days in the moderate drought classification were more similar than for any other drought classification.			

Sequence Number	Correct Response	Content Category	Question Difficulty
12	B	III. Earth Science	Medium
Rationale			
Option B is correct because, based on the data table, 100% of the total area in Region E and between 44.19% and 50.70% of the total area in Region F were affected by drought.			

Sequence Number	Correct Response	Content Category	Question Difficulty
13	D	III. Earth Science	Medium
Rationale			
Option D is correct because, by definition, a drought is a significant lack of moisture in an area due to lower than normal precipitation; the fact that no areas in Region H are affected by drought indicates that the amount of precipitation is typical.			

Sequence Number	Correct Response	Content Category	Question Difficulty
14	D	III. Earth Science	Medium
Rationale			
Option D is correct because 75.42% is greater than the percentages of areas affected by exceptional drought in both Region E and Region F.			

Sequence Number	Correct Response	Content Category	Question Difficulty
15	C	III. Earth Science	Easy
Rationale			
Option C is correct because wildfires are more likely to start and to spread in dry conditions than in normal conditions.			

Sequence Number	Correct Response	Content Category	Question Difficulty
16	C	I. Life Science	Medium
Rationale			
Option C is correct because to determine the effect of exercise on pulse rate, a baseline pulse rate must first be determined by measuring the sitting pulse rate, followed by exercise and measuring the resulting pulse rate, so that the two rates can be compared.			

Sequence Number	Correct Response	Content Category	Question Difficulty
17	D	I. Life Science	Medium
Rationale			
Option D is correct because migrating birds go to regions that have milder temperatures than the temperatures of the regions they migrated from, whereas birds that remain in a region experience the full range of temperature extremes throughout the year.			

Sequence Number	Correct Response	Content Category	Question Difficulty
18	B	I. Life Science	Medium
Rationale			
Option B is correct because the numbers being averaged are presented to the tenths place, so the average should also be presented to the tenths place, which when rounded is 10.8.			

Sequence Number	Correct Response	Content Category	Question Difficulty
19	D	II. Physical Science	Medium
Rationale			
Option D is correct because a magnetic field cannot exist without a battery to supply electricity.			

Sequence Number	Correct Response	Content Category	Question Difficulty
20	A	II. Physical Science	Medium
Rationale			
Option A is correct because the information notes that electromagnets are used in computer printers.			

Sequence Number	Correct Response	Content Category	Question Difficulty
21	A	II. Physical Science	Medium
Rationale			
Option A is correct because the current flowing through the electromagnet will cause the compass needle to point in the direction of the current's magnetic field.			

Sequence Number	Correct Response	Content Category	Question Difficulty
22	D	II. Physical Science	Medium
Rationale			
Option D is correct because the number of turns of wire around the core, the amount of electric current, and the magnetic properties of the core affect the strength of an electromagnet, but the presence of nearby nonmagnetic objects does not affect the strength of an electromagnet.			

Sequence Number	Correct Response	Content Category	Question Difficulty
23	D	II. Physical Science	Easy
Rationale			
Option D is correct because the nail in electromagnet 1 is wrapped by fewer turns of wire than is the nail in electromagnet 2 but by more turns than is the nail in electromagnet 3.			

Sequence Number	Correct Response	Content Category	Question Difficulty
24	C	I. Life Science	Medium
Rationale			
Option C is correct because by rinsing off the salt from the unsprouted seeds and moistening them with plain tap water, investigators can determine whether the salt water killed the seeds (they do not sprout when rinsed and moistened) or whether the salt water prevented them from sprouting (they sprout when rinsed and moistened).			

Sequence Number	Correct Response	Content Category	Question Difficulty
25	A	I. Life Science	Medium
Rationale			
Option A is correct because the fact that earthworms need moist skin for respiration is a possible explanation for an earthworm that died when in the sun too long, since its skin could have dried out and prevented respiration.			

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