HiSET™ Science

Practice Test

Houghton Mifflin Harcourt

The University of Iowa

ITP

Iowa Testing Programs

Directions

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, then answer the questions.

Work as quickly as you can without becoming careless. Don't 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 and make every mark heavy and dark, as in this example.

Correct

Incorrect

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.

Science

Time — 40 minutes

25 Questions

Directions: Questions 1 through 5 are based on the information below.

Do bees have a sense of smell? Dr. Karl von Frisch investigated that question in the early 1900s with these two experiments.

Experiment 1

Dr. von Frisch set up a table with several identical cardboard boxes with removable covers. Each box had a small door hole for bees. Inside one box, he put a dish of sugar water that was scented with a fragrant oil. The other boxes he left empty. When the bees had explored the boxes for several hours, Dr. von Frisch saw that they could easily find the box with the fragrant sugar water, even when he switched the positions of the boxes.

After this training period, Dr. von Frisch prepared a set of clean boxes for the bees. He did not use any sugar water this time, but he did scent the inside of one box with the same fragrant oil used before. The bees would buzz around the doors of all these boxes, but they would only crawl inside the box with the training scent.

Experiment 2

Dr. von Frisch trained bees to enter a box that was scented with an oil made from the skin of Italian oranges. After the bees were trained, he prepared a clean set of 24 boxes. He scented one box with the Italian orange scent and scented all the others with different oils. Dr. von Frisch then recorded how many bees entered each box in five minutes.

Dr. von Frisch repeated the last part of the experiment, comparing an additional 23 fragrances to the one made from Italian oranges. Out of the 48 boxes used in the two runs, the only boxes that attracted many bees were the following.

Oil Used in Box	Number of Bees Entering Box in Five Minutes
Oil of Italian oranges (First run)	205
Oil of Italian oranges (Second run)	120
Oil of citron	148
Oil of bergamot oranges	93
Oil of Spanish oranges	60

These were the only boxes scented with oils from citrus fruits, and to a human nose they smelled very much the same.

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1 **What was the main reason Dr. von Frisch switched the positions of the boxes during the training sessions?**

A To allow the scent to spread over the entire table

B To eliminate the effects of wind direction

C To make the bees rely only on a sense of smell, if they had one

D To make sure the bees could not lead each other to the correct box

2 **Given the results of experiment 1, which of the following conclusions is most valid?**

A Bees probably have a sense of smell.

B Bees probably do not have a sense of smell.

C Bees probably identify different kinds of flowers by smell.

D Bees probably do not identify different kinds of flowers by smell.

3 **The dependent variable in an experiment is the factor that is observed to see how it changes in response to the experimental variable. What was the dependent variable in experiment 2?**

A The number of bees entering a given box in five minutes

B The presence or absence of sugar water in a box

C The length of time the bees were counted

D The particular smell in a box

4 **Suppose a bee's antennae can be coated with a material that prevents air from reaching them. If it was believed that a sense of smell in bees was located in their antennae, how could this idea best be tested?**

A Catch a bee, coat one antenna, and see if the bee can find any food in a field of flowers

B Catch a bee, coat both antennae, and see if the bee can find any food in a field of flowers

C Train a bee to find food in one scented box (as in experiment 1), then coat one antenna and see if the bee goes into a new box with the same scent

D Train a bee to find food in one scented box (as in experiment 1), then coat both antennae and see if the bee goes into a new box with the same scent

5 **How does the evidence gathered in the experiments relate to the following statement?**

Bees can smell just as well as most humans.

A The evidence proves that the statement is true.

B The evidence supports the statement but does not prove it.

C The evidence casts doubt on the statement but does not disprove it.

D The evidence disproves the statement.

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Directions: Questions 6 through 9 are based on the information below.

Impact craters are formed when meteorites strike the surface of a planet. A researcher investigated some factors that might influence the formation of impact craters by either dropping marbles into a tray of sand or launching them from a slingshot into the sand. The results are shown in the table below.

Test Number	Mass of Marble (g)	Method of Crater Formation	Marble Speed (cm/s)	Crater Diameter (cm)
1	3	Drop from 2 m	626	5.0
2	6	Drop from 2 m	626	7.0
3	6	Drop from 10 cm	140	1.8
4	6	Drop from 2 m	626	6.5
5	6	Launch from 36 cm	3,000	11.0

6 **Tests 1 and 2 were designed to test the effects of which of the following factors?**

A The mass of the marble
B The speed of the marble
C The crater diameter
D The method of crater formation

7 **Which of the following statements best explains why the speed of the marble in test 5 is so much greater than the speed of the marbles in tests 3 and 4?**

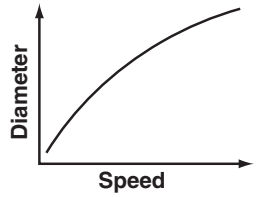
A It was dropped from the greatest height.
B It was launched rather than dropped.
C It produced the largest crater.
D It was made of a different material.

8 **The observed difference in the crater diameters in tests 3 and 4 is most likely due to which of the following factors?**

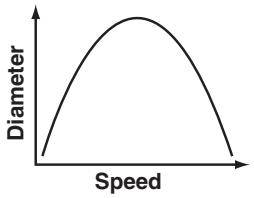
A The mass of the marbles
B The researcher's measuring technique
C Whether the marble was dropped or launched
D The height from which the marbles were dropped

9 **Consider the results for tests 3, 4, and 5. Which of the following graphs best illustrates the relationship between marble speed and crater diameter?**

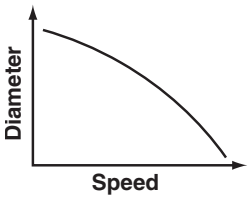
A



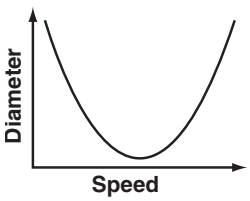
B



C



D



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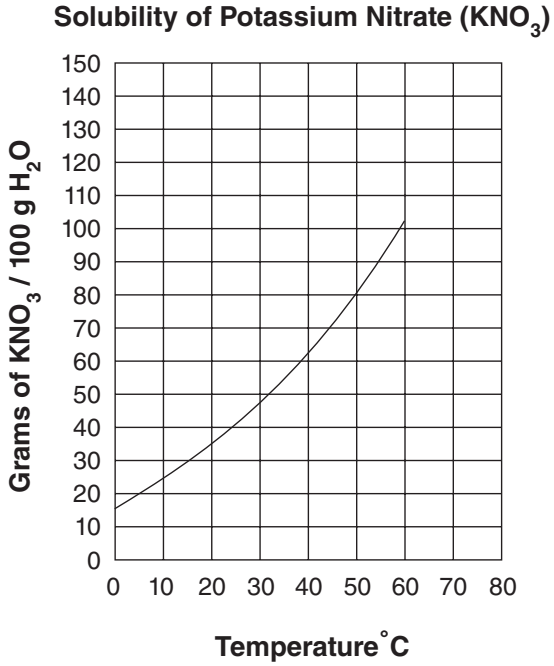
Directions: The graph below shows the number of grams (g) of potassium nitrate (KNO_3) dissolved in 100 grams of water (H_2O) at different Celsius temperatures (°C). Use this information to answer questions 10 through 13.



10 **Approximately how many grams of KNO_3 can be dissolved in 100 grams of H_2O at 35°C?**

A 65
B 60
C 55
D 50

11 **Which of the following is the lowest temperature at which 70 grams of KNO_3 can be dissolved in 100 grams of H_2O?**

A 55°C
B 45°C
C 35°C
D 25°C

12 **Which of the following is the best prediction of the mass of KNO_3 that could be dissolved in 100 grams of H_2O at 70°C?**

A 105 g
B 115 g
C 135 g
D 155 g

13 **Approximately 80 grams of KNO_3 is dissolved in 100 grams of H_2O at 50°C. If this solution is cooled to 10°C, approximately how much KNO_3 will come out of the solution?**

A 25 g
B 35 g
C 45 g
D 55 g

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Directions: Questions 14 through 20 are based on the information below.

The two experiments described below were done to investigate the effects of temperature on the growth rate of tomato seedlings.

Experiment I

A group of 60 tomato seedlings (Group I) was grown in a greenhouse under controlled temperatures. Ten plants were grown at each of six temperatures from 5°C to 30°C. These plants remained at their respective temperatures 24 hours each day for two weeks. All other conditions were the same for all seedlings. The growth rates are shown in Table 1.

Table 1. Growth rates for tomato seedlings in Group I

Day/Night Temperatures (°C)	Average Growth Rate (mm/day)
5	2
10	9
15	15
20	20
25	22
30	22

Experiment II

A second group of 30 tomato seedlings (Group II) was kept at 25°C during the day (12 hours). However, during the night, three groups of 10 plants were moved to each of three different temperatures. All other conditions remained the same as in experiment I. The growth rates are shown in Table 2.

Table 2. Growth rates for tomato seedlings in Group II

Day Temperature (°C)	Night Temperature (°C)	Average Growth Rate (mm/day)
25	10	10
25	20	25
25	30	22

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14 **Which of the following is the best statement of the hypothesis being tested in experiment I?**

A The optimum temperature for tomato seedling growth is 25°C.

B The temperature at which tomato seedlings grow must remain constant from day to night.

C The temperature at which tomato seedlings grow must vary from day to night.

D The temperature at which tomato seedlings are grown affects their growth rate.

15 **Consider the following statement.**

> When tomato seedlings were grown at constant temperatures of either 25°C or 30°C, their growth rates were the same.

This statement is best described as

A an observation.

B an assumption.

C a theory.

D a hypothesis.

16 **The range of temperatures used in experiment I was most likely chosen for which of the following reasons?**

A They represent temperatures at which tomatoes can be grown.

B They represent temperatures at which tomatoes are known to grow rapidly.

C They represent temperatures that have not been used in previous experiments.

D They represent the only temperatures that can be controlled in a greenhouse.

17 **Based on the information in the passage, which day and night temperatures resulted in the fastest growth of tomato seedlings?**

A 25°C during both day and night

B 30°C during both day and night

C 25°C during the day and 20°C during the night

D 30°C during the day and 25°C during the night

18 **In table 1, temperatures of both 25°C and 30°C resulted in growth rates of 22.0 mm/day. Which of the following is the best interpretation of this result?**

A The maximum possible growth rate for tomato seedlings is 22.0 mm/day.

B The maximum possible temperature at which tomato seedlings will grow is 30°C.

C Under the conditions of experiment I, the growth rate of tomato seedlings is greatest when they are grown at the same temperature all of the time.

D Under the conditions of experiment I, growth rates of tomato seedlings level off at 22.0 mm/day.

19 **Based on the data in table 1, which of the following questions about experiment I CANNOT be answered?**

A How does the growth rate vary from day to day during the two weeks of the experiment?

B At which of the six experimental temperatures is the growth rate lowest?

C How rapidly did the tomato seedlings grow at 20°C?

D What was the range of the average growth rate?

20 **Which of the following is the best statement of the hypothesis being tested in experiment II?**

A Day temperature is a determining factor in the growth rate of tomato seedlings.

B Night temperature is a determining factor in the growth rate of tomato seedlings.

C The optimum temperature for tomato seedling growth is 20°C.

D The maximum growth rate of tomato seedlings occurs at night.

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21 **A student wants to examine the relationship between the slope of an inclined plane and the effort needed to slide a given object along the plane. Which of these sets of inclined planes should be used?**

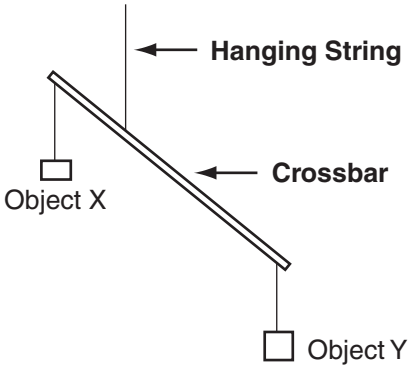
A Inclined planes of the same length and made of the same material, but having different slopes

B Inclined planes of the same slope and length, but made of different materials

C Inclined planes of the same length, but having different slopes and made of different materials

D Inclined planes made of the same material and having the same slope, but having different lengths

22 **A mobile is hung as shown below:**



To make the crossbar level, what should be done?

A Shorten the hanging string

B Lengthen the hanging string

C Move the hanging string closer to the point where object X is attached

D Move the hanging string closer to the point where object Y is attached

23 **Lynn measured her pulse before she ate lunch and determined her heart rate to be 72 beats per minute. Immediately after lunch, her heart rate was 75 beats per minute. How does Lynn's observation relate to the idea that heart rates will increase after eating?**

A It proves it.

B It disproves it.

C It supports it but does not prove it.

D It casts doubt on it but does not disprove it.

24 **Which of the following observations best illustrates that energy may be transferred when light impacts a surface?**

A Light shines on an object, and the temperature of the object increases.

B Light shines on an object and then reflects off the object.

C Light passes through a prism and separates into various colors.

D Light passes through a lens and travels in a new direction.

25 **The fossil of an ancient feathered creature is found. Which of the following would probably be most useful in judging whether the creature could fly?**

A The type of rock in which the fossil was found

B The geographic location of the fossil

C The shape and size of the fossil's parts

D The age of the fossil

Science Practice Test

Answer Key

Question Number	Correct Answer
1	C
2	A
3	A
4	D
5	B
6	A
7	B
8	D
9	A
10	C
11	B
12	C
13	D
14	D
15	A
16	A
17	C
18	D
19	A
20	B
21	A
22	D
23	C
24	A
25	C

Are You Ready to Take the HiSET Science Test?

You can estimate how well prepared you are for the real test in the following way. First, count how many questions you answered correctly on this practice test. Do not include any questions that you did not answer or that you answered incorrectly. Then find the number of questions you answered correctly in the table below to see an estimate of how well prepared you are.

Number of questions you answered correctly	How prepared you are
0 to 9	Not yet prepared
10 to 12	Somewhat prepared
13 to 15	Adequately prepared
16 to 25	Well prepared