

SAMPLE QUESTION 1 SOLUTIONS

HYPOTHESIS WRITING (SAMPLE QUESTION 1)

Scientists plan to conduct a third experiment (Experiment C) to determine the effect of different brands of fertilizer on mud battery voltage. SuperGro fertilizer along with 7 other brands are tested together.

6. Which of the following is an appropriate hypothesis scientists can test?
- a) Changing brands of fertilizer will have an effect on the voltage produced.
 - b) Fertilizer brand has no effect on voltage since they are all made from the same source.
 - c) If there are differences in voltage produced, then it's due to differences in fertilizer brand.
 - d) If the fertilizer has greater amounts of nitrogen, then greater voltage will be produced.
 - e) Voltage produced by mud batteries will only change if brands of liquid fertilizer are used.

Correct answer: D (selected 23% of the time); Other: C (31%), A (26%)

It appears from the two most common answers that students struggle with the structure of a testable hypothesis. To be clear, a hypothesis is an explanation for a phenomenon. Choice A is a hypothesis. However, it is not a testable one - that is, there is no prediction of what might happen if there was a change in one of the variables. Typically, this is achieved by using an "if, then" statement. Choice C is an "if, then" statement. However, it provides the wrong structure. Testable hypotheses follow the structure "if <independent variable> increases/decreases, then <dependent variable> increases/decreases." In this case, the independent variable is fertilizer brand and the dependent variable is battery voltage. Hence, the answer is D.

SAMPLE QUESTION 2 SOLUTIONS

HYPOTHESIS WRITING (SAMPLE QUESTION 2)

24. Scientists are planning to do a follow-up experiment to this study. In the follow-up experiment, scientists want to investigate whether the results of their previous experiment on smoking also applies to e-cigarette smoking. Which of the following is a hypothesis scientists can test?
- a) Smoking e-cigarettes is the same as smoking cigarettes and, therefore, the effect is the same.
 - b) If e-cigarette store business increases, then it's due to more movies with cigarette smoking.
 - c) If the number of movies featuring smoking increases, then e-cigarette revenues increase.
 - d) Children of parents who smoke will also smoke - whether it's e-cigarettes or real ones.
 - e) The number of people who smoke e-cigarettes increases when movie ads feature smoking.

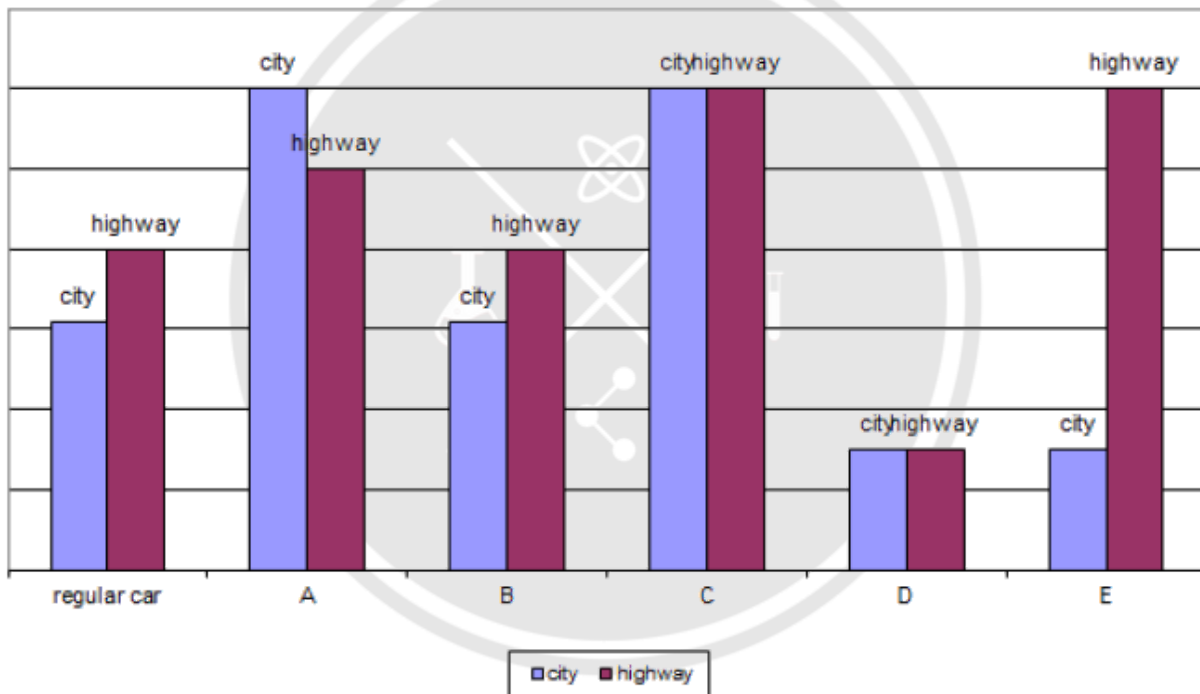
Correct Answer: C (selected 23% of the time); Other answers: A (21%), D (18%), B (15%), E (14%).

Students struggled with the same multiple choice answers in questions #24 and in question #6. A total of 39% of students chose Choice A and D, which are both hypotheses. However, both are not testable hypotheses. Choice B, an “if, then”, was selected by 15% of the time. However, the “if, then” statement in B is out of order. That is, a testable hypotheses has a structure, “if <independent variable> increases/decreases, then “dependent variable> increases/decreases.” Perhaps, in this question, students may also struggle with identifying what an independent variable and dependent variable might be. An independent variable, like number of movies featuring smoking, can be altered by researchers. A dependent variable, like e-cigarette revenues, may be dependent on how often smoking is shown in movies. Hence, the choice is C.

SAMPLE QUESTION 3 SOLUTIONS

INFRENCING/UNIT ANALYSIS (SAMPLE QUESTION 3)

13. Gas-Electric hybrid cars are cars that use electricity and gas. When a hybrid car accelerates from rest, electricity is used. A hybrid car will use gas when a minimum speed is reached. Such cars have the best fuel consumption in situations where the car is constantly stopping and starting. Which of the following graphs would correctly display the fuel consumption of a hybrid compared to a regular car?



Correct Answer: A (selected 24% of the time); Other answers: E (39%), D (16%), B (12%), C (5%)

A key piece of information in the passage is that hybrid cars “have the best fuel consumption in situations where the car is constantly stopping and starting.” Cars tend to start and stop more in the city as opposed to the highway. Thus, fuel consumption (in miles per gallon) is better in the city than on highways. That means that hybrid cars will have a higher fuel consumption (ie. travel more miles per gallon) in the city than on the highway. The choice is A. Approximately 39% of students chose E. This may be due to confusion with regards to how fuel consumption is measured (that is, in mpg). Roughly 16% and 5% % of students chose Choice D and C respectively. Both are incorrect due to the fact that here is no difference in fuel consumption in the city vs on the highway. This contradicts what the passage initially says.

SAMPLE QUESTION 4 SOLUTIONS

INFRENCING/UNIT ANALYSIS (SAMPLE QUESTION 4)

8. What could be another unit for fuel consumption in the United Kingdom?
- a) gal/mi
 - b) feet/L
 - c) grams/gal
 - d) km/mi
 - e) mi/feet

Correct Answer: B (selected 28% of the time); Other answers: A (50%)

According to the passage, fuel consumption is expressed as distance travelled to volume of fuel consumed (ex. miles per gallon, mpg or mi/gal) in the United Kingdom. In other words, the correct unit would have a unit of distance divided by a unit of volume. Choice B is the correct choice (ie. feet is a unit of distance, litre is a unit of volume). Roughly 50% of respondents chose A, which suggests students may not have understood the concept of fuel consumption well enough to make an inference. Instead, students may have just chosen an answer that incorporated the same units mentioned in the passage.

SAMPLE QUESTION 5 SOLUTIONS

SCIENTIFIC REASONING (SAMPLE QUESTION 5)

18. If new fossil evidence showed that prehistoric marine life were the first to go extinct in the Great Dying, which hypothesis does this fossil evidence support and why?
- a) Hypothesis 1 because magma flows from volcanic eruptions would nourish marine habitats.
 - b) Hypothesis 2 because tsunamis resulting from asteroid impacts would displace ocean species.
 - c) Hypothesis 3 because continental shift would have caused coastlines to dry up.
 - d) Hypothesis 1 because more greenhouse gases would result in greater ocean acidification.
 - e) Hypothesis 3 because shifts in continents greatly how nutrients are cycled in ocean habitats.

Correct Answer: E (selected 28% of the time); Other answers: C (39%), B (13%)

According to the passage, only Hypothesis 3 suggests that marine life was the first to go extinct in the Great Dying due to changes in shallow aquatic environments as a result of Pangaea. Hypothesis 1 and 2 support the idea that terrestrial plants and animals were the first to go extinct. Thus, choices A, B, and D cannot be our answer. Approximately 39% of students incorrectly chose C, which mentions hypothesis 3 but its reasoning (ie. the drying up of coastlines) directly contradicts the hypothesis (which suggests there would have been seasonal monsoons by the coast). Choice E, which reasons that nutrient circulation led to marine extinction, provides an explanation that fits with the hypothesis for marine life extinction.

SAMPLE QUESTION 6 SOLUTIONS

SCIENTIFIC REASONING (SAMPLE QUESTION 6)

16. If scientists discovered evidence that showed the extinction took place over a period of 10000 years, which of the following hypotheses would this evidence support and why?
- a) Hypothesis 1 because the loss of plant life was rapid due to a lack of sunlight which resulted in mass extinctions.
 - b) Hypothesis 2 because the high amounts of greenhouse gases would have led to accelerated climate change
 - c) Hypothesis 1 because quick weather patterns changes would have resulted from continental movement.
 - d) Hypothesis 3 because ocean life - which is the most important at that time - would have been the most affected.
 - e) Hypothesis 2 because eruptions from volcanoes would have ruined habitats and displaced animals.

Correct Answer: A (selected 31% of the time); Other answers: D (24%), B (14%), C (14%), E (11%)

The question claims extinction took place over 10,000 years, which is a quick extinction according to the passage. Choice D is incorrect because hypothesis 3 suggests requires a long extinction period. Choice B is incorrect because Hypothesis 2 does not suggest greenhouse gases as being the culprit of extinction. Choice E is incorrect because the premise of Hypothesis 2 is that extinctions were caused by an asteroid collision, not volcanic activity. Although choice C correctly mentions hypothesis 1, it provides the incorrect reasoning (Hypothesis 1 does not mention weather patterns as a cause for extinction). Choice A, which correctly mentions hypothesis 1 and provides a valid complimentary reason, is correct.