

Five Sample Logical Reasoning Questions and Explanations

Directions: The questions in this section are based on the reasoning contained in brief statements or passages. For some questions, more than one of the choices could conceivably answer the question. However, you are to choose the best answer; that is, the response that most accurately and completely answers the question. You should not make assumptions that are by commonsense standards implausible, superfluous, or incompatible with the passage. After you have chosen the best answer, blacken the corresponding space on your answer sheet.

Question 1

Electrons orbit around the nucleus of an atom in the same way that the Earth orbits around the Sun. It is well known that gravity is the major force that determines the orbit of the Earth. We may, therefore, expect that gravity is the main force that determines the orbit of an electron.

The argument above attempts to prove its case by

- (A) applying well-known general laws to a specific case
- (B) appealing to well-known specific cases to prove a general law about them
- (C) testing its conclusion by a definite experiment
- (D) appealing to an apparently similar case
- (E) stating its conclusion without giving any kind of reason to think it might be true

Explanation for Question 1

This question requires the examinee to identify the method exhibited in an argument. The passage draws a parallel between two cases that share a similar trait: (1) the orbit of electrons around an atom's nucleus and (2) the orbit of the Earth around the Sun in our solar system. It uses knowledge about the second case (the fact that "gravity is the major force that determines the orbit of the Earth") to draw an inference about the first (that "gravity is the main force that determines the orbit of an electron"). The passage is "appealing to an apparently similar case" (the role of gravity in determining the Earth's orbit) to establish a conclusion about the role of gravity in determining an electron's orbit. Therefore, (D) is the credited response.

Response (A) is incorrect because it mistakes the argument made in the passage, based on an analogy, for an argument that applies "well-known general laws to a specific case." For the facts in this passage, such an argument from general laws to a specific case would go as follows:

1. General law: For all bodies in orbit, gravity is the main force that determines the body's orbit.
2. Specific case: An electron is a body in orbit.
3. Conclusion: Gravity is the main force that determines an electron's orbit.

Comparing this with the passage makes it clear that the argument in the passage builds its case on an apparently analogous situation, not on a general law. That the law of gravity, a well-known general law, applies to the specific case of the orbit of electrons is the conclusion the argument is drawing, not the method by which the argument attempts to prove its case.

Response (B) is incorrect because the argument is not trying to prove a general law about both electrons and planets. Its conclusion is only about electrons and their nuclei based on information about a comparable case.

Response (C) is incorrect because there is no evidence in the passage that the argument is using data from an experiment to make its point.

Response (E) is incorrect because the argument clearly does provide a reason for its conclusion, which can be stated as follows: since an electron orbits around its nucleus in the same way as the Earth orbits around the Sun, it is logical to conclude that there are other similarities between the two phenomena.

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This test question is classified as “moderately difficult.”

Question 2

During the construction of the Quebec Bridge in 1907, the bridge’s designer, Theodore Cooper, received word that the suspended span being built out from the Bridge’s cantilever was deflecting downward by a fraction of an inch [2.56 centimeters]. Before he could telegraph to freeze the project, the whole cantilever arm broke off and plunged, along with seven dozen workers, into the St. Lawrence River. It was the worst bridge construction disaster in history. As a direct result of the inquiry that followed, the engineering “rules of thumb” by which thousands of bridges had been built around the world went down with the Quebec Bridge. Twentieth-century bridge engineers would thereafter depend on far more rigorous applications of mathematical analysis.

Which one of the following statements can be properly inferred from the passage?

- (A) Bridges built before about 1907 were built without thorough mathematical analysis and, therefore, were unsafe for the public to use.
- (B) Cooper’s absence from the Quebec Bridge construction site resulted in the breaking off of the cantilever.
- (C) Nineteenth-century bridge engineers relied on their rules of thumb because analytical methods were inadequate to solve their design problems.
- (D) Only a more rigorous application of mathematical analysis to the design of the Quebec Bridge could have prevented its collapse.
- (E) Prior to 1907 the mathematical analysis incorporated in engineering rules of thumb was insufficient to completely assure the safety of bridges under construction.

Explanation for Question 2

The question requires the examinee to identify the response that can be properly inferred from the passage. The passage indicates that the Quebec Bridge disaster in 1907 and the inquiry that followed caused the engineering “rules of thumb” used in construction of thousands of bridges to be abandoned. Since the Quebec Bridge disaster in 1907 prompted this abandonment, it can be inferred that these were the rules of thumb under which the Quebec Bridge was being built when it collapsed and that these were the rules of thumb used in bridge building before 1907. Further, since the Quebec Bridge collapsed while under construction and the rules of thumb being used were abandoned as a result, it can be inferred that the rules of thumb used in building the Quebec Bridge and bridges prior to 1907 were insufficient to completely assure the safety of bridges under construction. Finally, since the alternative to the old engineering rules of thumb that was adopted was to “depend on far more rigorous applications of mathematical analysis,” it can be inferred that it was the mathematical analysis incorporated in the engineering rules of thumb used prior to 1907 that made them insufficient to completely assure the safety of bridges under construction. Thus, (E) is the credited response.

Response (A) is incorrect. (A) asserts that the lack of thorough mathematical analysis in construction of bridges before about 1907 was sufficient to establish that those bridges were unsafe for the public to use. But, the rules of thumb used in bridge construction before 1907 were abandoned because they were not sufficient to establish that the bridges being constructed using them were safe when under construction. It does not follow that the lack of more rigorous or thorough mathematical analysis in the rules of thumb was sufficient to establish that the bridges built before about 1907 using them were unsafe even while under construction, let alone for the public. In fact, some, or even all, may have been quite safe. In addition, the passage gives evidence only about the safety of bridges built before 1907 while they were under construction. It is silent on whether bridges built before about 1907 were safe when open for use by the public.

Response (B) is incorrect in claiming that Cooper’s absence from the construction site caused the breaking off of the cantilever.

The passage does not establish that, had Cooper been at the site, he could have successfully intervened to prevent the cantilever from breaking off. By freezing the project, he might have spared lives by stopping work, but there is

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nothing in the passage to indicate that he necessarily would have prevented the collapse.

Response (C) is incorrect; there is no evidence in the passage about why nineteenth-century engineers relied on their rules of thumb.

Response (D) is also incorrect. While the passage suggests that a more rigorous application of mathematical analysis would have prevented the collapse of the bridge, it offers no evidence that it is the only way the collapse could have been prevented. For example, it might have been prevented had corrective measures been taken in time.

The question is classified as “moderately difficult.”

Question 3

No one who has a sore throat need consult a doctor, because sore throats will recover without medical intervention. In recent years several cases of epiglottitis have occurred. Epiglottitis is a condition that begins with a sore throat and deteriorates rapidly in such a way that the throat becomes quite swollen, thus restricting breathing. Sometimes the only way to save a patient’s life in these circumstances is to insert a plastic tube into the throat below the blockage so that the patient can breathe. It is highly advisable in such cases that sufferers seek medical attention when the first symptoms occur, that is, before the condition deteriorates.

Which one of the following is the best statement of the flaw in the argument?

- (A) The author draws a general conclusion on the basis of evidence of a particular instance.
- (B) The author assumes that similar effects must have similar causes.
- (C) The author uses a medical term, “epiglottitis,” and does not clarify its meaning.
- (D) The author makes two claims that contradict each other.
- (E) The author bases her conclusion at the end of the passage on inadequate evidence.

Explanation for Question 3

This question requires the test taker to identify the reasoning error in the argument.

The argument states initially that “no one who has a sore throat need consult a doctor.” However, it is then pointed out that “several cases of epiglottitis have occurred” and argued that for this condition, which begins with a sore throat and then deteriorates, it is “highly advisable” for sufferers to seek medical attention before the condition deteriorates, that is, when the symptom is a sore throat. So the author claims both that no one with a sore throat need seek medical attention and that some people with a sore throat do need to seek medical attention, and these claims contradict each other. Therefore, (D) is the credited response.

Response (A) is incorrect because the author does not clearly draw “a general conclusion on the basis of evidence of a particular instance” of anything. Even though a specific disease (epiglottitis) is discussed, no conclusion about diseases in general is drawn. And having this disease is discussed in terms of “several cases” and “sometimes,” not in terms of a “particular instance.”

Response (B) is incorrect because the author is not concerned with the causes of sore throats and epiglottitis.

Response (C) is incorrect because the meaning of the medical term “epiglottitis” is specified in the third and fourth sentences of the passage in sufficient detail for purposes of the argument.

Response (E) is incorrect because the evidence given in the third and fourth sentences of the passage is adequate for the conclusion that “it is highly advisable” in cases of epiglottitis “that sufferers seek medical attention when the first symptoms first occur.”

This test question is classified as “very easy.”

Question 4

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Photovoltaic power plants produce electricity from sunlight. As a result of astonishing recent technological advances, the cost of producing electric power at photovoltaic power plants, allowing for both construction and operating costs, is one-tenth of what it was 20 years ago, whereas the corresponding cost for traditional plants, which burn fossil fuels, has increased. Thus, photovoltaic power plants offer a less expensive approach to meeting demand for electricity than do traditional power plants.

The conclusion of the argument is properly drawn if which one of the following is assumed?

- (A) The cost of producing electric power at traditional plants has increased over the past 20 years.
- (B) Twenty years ago, traditional power plants were producing 10 times more electric power than were photovoltaic plants.
- (C) None of the recent technological advances in producing electric power at photovoltaic plants can be applied to producing power at traditional plants.
- (D) Twenty years ago, the cost of producing electric power at photovoltaic plants was less than 10 times the cost of producing power at traditional plants.
- (E) The cost of producing electric power at photo-voltaic plants is expected to decrease further, while the cost of producing power at traditional plants is not expected to decrease.

Explanation for Question 4

This question requires the test taker to identify an assumption that would allow the argument's conclusion to be properly drawn. As the argument is stated, there is a logical gap between the information given in the premises and the claim made in the conclusion:

Premise 1: The cost of producing electric power at photovoltaic power plants is one-tenth of what it was 20 years ago.

Premise 2: The corresponding cost for traditional plants has increased.

Conclusion: Photovoltaic power plants offer a less expensive approach to meeting demand for electricity than do traditional power plants.

From the fact that one cost has gone down while another has risen, it does not necessarily follow that the first is now lower than the second. In particular, if the cost of producing electric power at photovoltaic power plants twenty years ago was more than ten times the corresponding cost for traditional plants, then the fact that it is now one-tenth what it was is not sufficient to show that it is now lower than the corresponding cost for traditional plants, even though we are told in Premise 2 that the cost for traditional plants has increased. To conclude from the premises given in the argument that photovoltaic power plants now offer a less expensive approach than do traditional power plants, we need to know how the costs of the two methods of production were related 20 years ago—specifically that the cost of producing power at photovoltaic plants was less than 10 times the cost of producing it at traditional plants. (D) gives this information and is, thus, the credited response.

Response (A) is incorrect because it tells us about only one of the two costs, not about how the two were related 20 years ago. It in effect restates premise 2, and premises 1 and 2 together are not sufficient for drawing the conclusion.

Response (B) is incorrect. The amount of electricity produced by the different kinds of plants is not at issue.

Response (C) is incorrect. While it is relevant to the discussion, (C) does not provide the information about the comparative costs of the two kinds of plants 20 years ago that allows the conclusion to be properly drawn.

Response (E) is incorrect because the conclusion in the argument is about the present only. Whether or not the change described in (E) is expected to take place has no bearing on the claim in the conclusion that the one kind of plant offers a less expensive approach at present.

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This question is classified as “difficult.”

Question 5

Some legislators refuse to commit public funds for new scientific research if they cannot be assured that the research will contribute to the public welfare. Such a position ignores the lessons of experience. Many important contributions to the public welfare that resulted from scientific research were never predicted as potential outcomes of that research. Suppose that a scientist in the early twentieth century had applied for public funds to study molds: who would have predicted that such research would lead to the discovery of antibiotics—one of the greatest contributions ever made to the public welfare?

Which one of the following most accurately expresses the main point of the argument?

- (A) The committal of public funds for new scientific research will ensure that the public welfare will be enhanced.
- (B) If it were possible to predict the general outcome of a new scientific research effort, then legislators would not refuse to commit public funds for that effort.
- (C) Scientific discoveries that have contributed to the public welfare would have occurred sooner if public funds had been committed to the research that generated those discoveries.
- (D) In order to ensure that scientific research is directed toward contributing to the public welfare, legislators must commit public funds to new scientific research.
- (E) Lack of guarantees that new scientific research will contribute to the public welfare is not sufficient reason for legislators to refuse to commit public funds to new scientific research.

Explanation for Question 5

This question requires the test taker to determine the most accurate expression of the main point of the argument in the passage. The main point of an argument is not only a salient point, but one which draws on the rest of the argument for support. The primary purpose of an argument such as that in the passage on which this question is based is to convince the reader to accept the main point.

The passage begins by stating the position that some legislators hold. These legislators “refuse to commit public funds for new scientific research if they cannot be assured that the research will contribute to the public welfare.” Then a reason is given for rejecting this position. Many important contributions to the public welfare come from scientific research for which no assurance could be given of a contribution to public welfare. These contributions “that resulted from scientific research were never predicted as potential outcomes of that research.” Finally, this reason is emphasized by giving an example.

Clearly the purpose of this argument is to refute the position of the legislators mentioned. The main point is the denial of that position. Since response (E) most accurately expresses the denial of the legislators’ position, it is the correct answer.

Response (A) is incorrect because it expresses a point that the argument does not make. Nothing is expressed or implied about whether committing public funds for new scientific research ensures that public welfare will be enhanced. All that is said is that legislators ought not to insist on assurances of enhanced public welfare before committing public funds for new scientific research.

Response (B) is incorrect because it is a prediction of what legislators would do in cases where it is possible to predict the outcome of scientific research. The argument states what the legislators would not do if they cannot be assured that the research will contribute to the public welfare. Moreover, nothing is stated or implied about what legislators would do, the issue is rather what legislators should do. (B) implies that if it is possible to predict a negative outcome of a new scientific research effort, then legislators would not refuse to commit public funds for that effort. Nothing in the argument suggests anything close to this.

Response (C) is incorrect because it speculates that scientific discoveries that have contributed to the public welfare would have occurred sooner if public funds had been committed to the underlying research. Response (C) takes the argument much further than it has committed itself—the issue of whether any discoveries may have occurred sooner

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is never addressed within the argument.

Response (D) is incorrect because it addresses an issue that is not discussed in the argument. The argument does not say that the existence of research contributing to the public’s welfare is conditional upon legislators committing public funds to that research.

This question is classified as “easy.”