

ACT Science Workshop: Answers with Explanations from Preparing for the ACT 2011-12

Data Interpretation - Passage IV

Primary subject – Biology Secondary subject – Chemistry/Physics

Visuals – formula (chemical equation), table, multiple dependent variables x-y scatter plot, single variable x-y scatter plot,

17. A – Chlorophyll b is represented by the solid line found on Figure 1. The highest relative absorption (Y) is at a wavelength (X) of approximately 475 nm. This wavelength of light is blue according to Table 1.

18. F – The chemical equation is the general equation of photosynthesis. Chloroplasts are the eukaryotic organelles which absorb sunlight and catalyze the reactions of photosynthesis in plants, algae, and some bacteria. This is an example of a question in which content knowledge must be used since the answer is not given in the passage or on a visual.

19. B – The peak associated with the wavelength of 670 nm in Figure 2 is the second highest rate of photosynthesis. The only higher peak is at 440 nm. Since 440 is not a choice, 430 is the best answer.

20. G – The reactant CO_2 provides the carbon necessary to produce $\text{C}_6\text{H}_{12}\text{O}_6$ in photosynthesis. $\text{C}_6\text{H}_{12}\text{O}_6$ is the chemical formula of glucose, a simple sugar. This is an example of a question in which content knowledge must be used since the answer is not given in the passage or on a visual.

21. C – The wavelength that results in the highest rate of photosynthesis is at 440 nm in Figure 2. That same wavelength in Figure 1 corresponds to the highest relative absorption by chlorophyll a.

Research Summary – Passage III

Primary subject – physics

Visuals – apparatus, 2 tables

11. B – The reading provides only one detail regarding the plastic bottle and none about the aluminum bottle. The bottle in Experiment 3 is a clear plastic bottle. Further, the bubbles were visible in experiment 3 which would have made the bubbles in the liquid easier to see. The incorrect answers were not possible to know based on the information given.

12. J – Trials 1, 3, & 5 had the same average roll times of 1.75 seconds. J is the only choice that includes 2 of these.

13. D – (A) is counterintuitive. No mass data are given to support (B) and that would violate the Law of Conservation of Mass. Roll time increased in Experiment 2 which eliminates (C).

14. H – It is unlikely that bubbles were present in large numbers since the soda was flat and this is further supported by 1.75 second roll-time. This roll time was the same for the tap water control in Experiment 1. Therefore the first part of the answer is No, which eliminates (F) and (G). In Trial 5, data were only collected for 2 hours after Trial 4, yet the roll time was still 1.75 (same as control). It is unlikely that a longer period of 3 hours would create more bubbles. In addition, there were no data for 3 hours. This reasoning eliminates (J).

Research summary continued

15. A – Based on the data, one would predict that roll time would not increase with time because the soda would become even more flat 2 more hours after Trial 5. In a 6th trial, the roll time would most likely have been 1.75 seconds since that appears to be the minimum reached in Trial 1 (control), Trial 3 and Trial 5. That is less than 1.86 sec.

16. H – Bubbles disappeared sometime between 15 minutes and 2 hours in Experiment 3. The passage states that “Fifteen minutes later, some bubbles were still visible [eliminates (F) and (G)], but after 2 hours, no bubbles could be seen[eliminates (J)].”

Conflicting Viewpoint – Passage VII

Primary subject – Biology

Visual – Labeled cell diagram

34. H – Amount of amino acids vary with protein amounts (rather than DNA amounts); and since amino acids are part of proteins and protein amounts vary from cell type to cell type (F) and (G) are eliminated. DNA is found only in the nucleus as are chromosomes. This eliminates (G) and (J).

35. D – DNA is found only in the nucleus. The diagram shows this, too.

36. J – (F) is incorrect since both are found in all cells. (G) is incorrect since DNA is not found in the cytoplasm. (H) is incorrect since only proteins are composed of 20 different amino acids. The reading specifically states that “Proteins are composed of subunits called amino acids. DNA consists of chains of subunits called nucleotides.”

37. A – The Protein Hypothesis argues that the “20 different amino acids can be arranged in a virtually infinite number of ways to make different proteins...In contrast, only 4 different nucleotides make up the DNA found in cells.” (B) and (C) are contradictory to the reading. (D) is strong evidence in support of the DNA hypothesis.

38. F – Since the DNA Hypothesis uses the argument that DNA and chromosomes are only found in the nucleus, evidence that DNA is present outside the nucleus in mitochondria contradicts this hypothesis. This eliminates (H) and (J). (G) is also eliminated since the presence of DNA in the nucleus supports the DNA hypothesis.

39. B – Word for word from the DNA Hypothesis...“Additionally, the amount of protein in a cell varies from cell type to cell type, even within the same animal.” (A) would support the DNA hypothesis. (C) makes no difference since DNA is made of many subunits, too. (D) is not true.

40. J – DNA is composed only of subunits called nucleotides. Amino acids are the subunits of proteins. (F), (G), and (H) all include amino acids.

Answers to questions in remaining passages

Passage I – Data	Passage II - Data	Passage V - Research	Passage VI - Research
1. D	6. F	22. G	28. H
2. G	7. C	23. C	29. C
3. D	8. J	24. H	30. G
4. F	9. C	25. B	31. D
5. A	10. J	26. F	32. G
		27. B	33. D