Science Mini-Test 1 Answer Explanations

1. **The correct answer is C.** Table 2 shows the weekly average humidity. Since the highest humidity in the table is 88% (Week 5, Chamber 1), choice C is correct.

2. **The correct answer is H.** According to Table 1, the average air temperatures in Week 4 for the three chambers are 20.68, 19.15, and 18.92. It stands to reason that the average should be somewhere between the highest value, 20.68, and the lowest value, 18.92. Choices F and G are incorrect because they are both lower than the lowest value and therefore cannot be the average. Choice J is incorrect because 20.69 is greater than the highest value and therefore cannot be the average. Only choice H fits within the range of values given, so it is the only viable option for the average. The average can also be found by adding the values and dividing by 3: $(20.68 + 19.15 + 18.92) \div 3 \approx 19.58$.

3. **The correct answer is D.** Look at the relative values given in Tables 1 and 2 and compare. Choice D is correct because it accurately reflects the data trends in the tables—weekly average air temperature and weekly average humidity was highest in Chamber 1, medium (meaning in-between the values of the other two chambers) in Chamber 2, and lowest in Chamber 3.

4. **The correct answer is H.** Since the question is asking about the *weekly average air temperature in Chamber 2*, refer to Chamber 2 in Table 1. The values increased or stayed the same from Weeks 1 through 5 and decreased in Week 6, so choice H is correct.

5. **The correct answer is B.** The question states that Chamber 2 had the highest growth rate. Examine the temperature and humidity in this chamber compared to the other two. The weekly average air temperature and the weekly average humidity in Chamber 2 was between that of Chambers 1 and 3, so it can be considered *medium*. Since the question states that these conditions determine plant growth, choice B, which says medium temperature or humidity *is ideal for plant life growth rate*, is the correct answer.

Science Mini-Test 2 Answer Explanations

6. **The correct answer is G.** The results from Experiment 1 are shown in Table 1. As the temperature increases from 25°C to 29°C, the photovoltaic cell efficiency for each frequency decreases. Thus, choice G is the best answer. Choice F is incorrect because efficiency decreases—not increases—as temperature increases. Choices H and J are incorrect because the table's results show that photovoltaic cells are affected by changes in temperature.

7. **The correct answer is B.** In Table 1, at 29°C, Frequency 2 has the greatest efficiency (18.8%) and therefore would function best, making choice B correct.

8. **The correct answer is J.** In Table 1, at 26°C, all frequencies function at the same efficiency (19.7%), so choice J is correct.

9. **The correct answer is B.** Decreasing the temperature by 1°C will increase efficiency. In Table 1, we see that each time temperature decreases by 1°C, Frequency Range 1's efficiency increases by 1.1%, Frequency Range 2's efficiency increases by 0.7%, and Frequency Range 3's efficiency increases by 1.8%. Since Frequency Ranges 1 and 3 experience improvements greater than 1% when they are cooled 1°C, they would benefit from the cooling system. Frequency Range 2 would gain 0.7% efficiency from the cooler temperature but lose 1% efficiency from the device, so it would not benefit. Thus, choice B is correct.

10. **The correct answer is H.** Choice F is incorrect because the scientists were measuring the effects of changing temperature. Choice G is incorrect because the amount of sunlight is not a variable in the experiment. Choice J is incorrect because multiple frequency ranges were tested. Choice H is correct, since the same photovoltaic cells are presumably used for all three frequency ranges.

11. **The correct answer is A.** The efficiencies listed in Table 1 range from 17.6% to 20.4%, while the efficiencies listed in Table 2 range from 42.2% to 50.4%. The efficiencies are higher in Table 2, so efficiency increases from Experiment 1 to Experiment 2, which eliminates choices C and D. Since sensitivity is defined as *the amount of change in efficiency as temperature increases*, larger efficiency changes correspond to higher sensitivity, and smaller efficiency changes correspond to lower sensitivity. In Table 1, as temperature increases by 1°C, efficiency decreases by less than 1%. However, in Table 2, as temperature increases by 1°C, efficiency decreases by larger percentages, often greater than 1%. Therefore, sensitivity also increases from Experiment 1 to Experiment 2. Thus, choice A is correct.

Science Mini-Test 3 Answer Explanations

12. **The correct answer is F.** According to Figure 1, the percentage of hydrogen that corresponds with 8 billion years on the *x*-axis (for the line labeled *surrounding shell*) is approximately 30% on the *y*-axis.

13. **The correct answer is D.** Look at the solid line labeled *core* and determine where it touches the *x*-axis. This is approximately between 10 and 12 billion years, so choice D is correct.

14. **The correct answer is F.** The passage describes the process of fusion and states that *the hydrogen in the surrounding shell is quickly exhausted, as is the helium in the core*, which indicates that the helium in the core decreases over time. Thus, choice F is correct.

15. **The correct answer is C.** According to the question, fusion of hydrogen atoms in the core first causes an increase in helium. Then, after most of the hydrogen has been exhausted from the star's core, the star begins fusion of helium in its core. Therefore, the percentage of helium first increases and then decreases over time, which matches the graph shown in choice C. Choice B can be eliminated because it shows an overall increase of helium. Choices A and D are incorrect because they suggest a steady decline in helium. Only choice C mirrors the information in the passage and question by showing an increasing value for the helium before decreasing.

16. **The correct answer is J.** The passage states that a star, near the end of its life, *begins to fuse hydrogen and then helium in its outermost shell until all of it is exhausted*. We can deduce that the *white dwarf* phase described in the question corresponds to the end of the star's life. Only choice J mentions the exhaustion of both hydrogen and helium in the shells, so it is the best answer. Choices F, G, and H are incorrect because they include the exhaustion of hydrogen in the core, which occurs earlier in the star's life cycle.