

Key Features of Graphs Answer Key

- A.** The maximum point occurs approximately at the point (60,40). We know that s represents speed in miles per hour, and that m represents mileage in miles per gallon. When Chris drives 60 miles per hour in his hybrid, he gets a mileage of 40 miles per gallon, his maximum mileage. Clearly, this is not his maximum speed, as data in the graph shows speeds up to 85 miles per hour. Choice B is incorrect because 60 is the speed his hybrid is going at to achieve the maximum mileage of 40 miles per gallon. Choice C is incorrect because 40 represents mileage and not speed. Choice D is incorrect because it is clear from the graph that Chris' hybrid can travel at speeds faster than 60 miles per hour.
- D.** The cells are increasing in number as time passes, so we can eliminate choices b and c. We can infer that the cells are growing at an exponential rate, as at hour zero, there will be 50 bacteria. At hour 1, there will be 100 bacteria. At hour 2, there will be 200 bacteria, and so on. Thus, only choice D represents an exponential graph. Choices A, B, and C are all incorrect because none of them represent a positive exponential graph.
- A.** The R -intercept shows that the value of S when $y = 0$ is 3. At $y = 0$, it represents an account lasting less than 5 years, and thus a short-lived account. indicating that the minimum return rate occurs at the R -intercept and has a value of 3 percent. The correct answer is that a short-lived account has a minimum return rate of 3%. Choice B is incorrect because long-lived accounts have a minimum return rate higher than 3%. Choice C is incorrect because it appears that the graph is growing, and thus nothing can be said about the maximum return rate. Choice D is incorrect because the average increase in return rate is not 1% per year.
- D.** The penguin starts out above the surface of the water on the ledge, submerges, and then rises above the water. The penguin resurfaces the second time that height = 0. This point occurs at (9, 0). We are interested in the t value, which is 9. Choice A is incorrect because 1 second is the amount of time the penguin was in the air after jumping and before hitting the water. Choice B is incorrect because at 5 seconds, the penguin reached its deepest point in the water. Choice C is incorrect because it does not consider the time between when the penguin was jumping, and thus is one second shorter than the actual answer.
- C.** The t -intercepts occur when the height of the ball is 0, or when the ball hits the ground. The ball hits the ground first at 0.6 seconds, then bounces up and hits the ground again at 1.2 seconds. Therefore, the ball hits the ground twice after being released. Choices A, B, and D are all incorrect because they all make false statements about the graph.
- B.** The x -intercepts represent when Michael is 0 ft in the air, indicating he was standing on the surface of the trampoline. The amount of time Michael was in the air for is just the difference between the second intercept and the first intercept. Choice A is incorrect because 0.8 seconds is the time when Michael hit the ground. Choice C is incorrect because it is the time when Michael reached his highest point. Choice D is incorrect because it is not how long Michael was in the air for.
- A.** Average value can be found with the expression $(y_2 - y_1)/(x_2 - x_1)$. In this case, our y -values correspond to weight, and our x -values correspond to age. Looking at the graph, we can see the slowest rates of weight gain occur at the beginning and end. Thus, we only need to compare option A to option D. The average weight gain for ages 2 to 6 is $\frac{46-28}{6-2} = \frac{18}{4} = 4.5$. The average weight gain for ages 16 to 20 is $\frac{154-134}{20-16} = \frac{20}{4} = 5$. Therefore, the time period with the least average weight gain is during the ages 2 to 6. Choices B, C and D are all incorrect because all of them have an average weight gain greater than choice A, the ages 2 to 6.
- A.** When the value of t increases by 1, the weight of an average American male increases by a pounds. Therefore, a represents the predicted amount, in pounds, by which an average American male grows during each year during the period the function models. Choices B, C and D are all incorrect because none of them accurately describe what a represents in the equation $w(t) = at + b$.

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9. **B.** The horizontal portion of the graph represents Amy staying still in place, and thus where she stopped to take pictures. The end of the horizontal portion corresponds to approximately 2.25 hours into the hike. 2.25 hours after 8:00 am is 10: 15 am. Note that 0.25 hours is equal to 15 minutes.

Choices A, C, and D are all incorrect because none of them correctly approximates the time when she finished taking her pictures. Choice A represents when she started taking her pictures, not when she finished taking her pictures.

10. **D.** We know straight away that option C cannot be correct, because the process of cooling was not linear. We also know option B is incorrect because the chicken went from hot to cold and not cold to hot. Thus, we are left with options A and D. Looking at option A, we see that from minutes 0 to 5, the temperature dropped approximately 40 degrees, and from minutes 25 to 30 the temperature only dropped approximately 1 degree. This means that the chicken cooled quickly at first, and slowly later, which is incorrect. Thus, only option D is left, and option D is the correct answer choice. Choices A, B, and C are all incorrect as none of them correctly represent the way the chicken temperature decreased. Choice A describes the chicken temperature as increasing. Choice B describes the temperature as decreasing rapidly at first, then slowly as time went by. Choice C represents a linear decrease.