

Linear Equations and Functions Word problems Answers and Explanation

Answer Key

1. B 2. A 3. C 4. B 5. A 6. A 7. B 8. D 9. B 10. C 11. C 12. B 13. C
14. A 15. D 16. A 17. C 18. A 19. D 20. D

Answer Explanation

- B.** In this problem we are given the information that there is a flat fee of \$1.50 to start the shower and continuous charge of \$0.25 for every minute after. Therefore, the rate, or the slope, is constantly increasing at a rate of \$0.25 which means the slope of our linear function can be modeled by the function $c = 0.25m + b$. Because there is an initiation fee of \$1.50, our y-intercept represents the initial cost to start the shower. Therefore, our equation is as follows $c = 0.25m + 1.50$, which means answers choice (B) is correct.
- A.** In this problem we know that Jimmy's ice cream was x dollars, and Melvin's ice cream was \$1 more, $x + 1$ dollars. Thus, the total cost of the ice creams was $2x + 1$ dollars. Because this cost was split evenly the net cost is equal to $\frac{2x+1}{2} = x + 0.5$ plus a 15% tip. After adding the 15% tip, each of them paid $1.15(x + 0.5) + 1.15(x + 0.5) = 2.3(x + 0.5) = 2.3x + 1.15$
- C.** In this problem, we are given the information that the babysitter's daily wage increases by \$12 every hour and she can earn an additional \$5 if the children complete their homework on time. With the assumption she helps the children finish the homework on time, she gains a single payment of \$5 that does not change; however, the \$12 increases by the hour. Therefore, our linear equation is as follows $y = 12x + 5$, which means answer choice (C) is correct.
- B.** From the given information, we can conclude that Carrie works on the article for longer than 2 hours; therefore, she is guaranteed the pay of \$100 and the value that continuously increases by the hour is the \$25 charge. Therefore, our equation looks like the following:
 $D = 100 + 25(x - 2) \rightarrow D = 100 + 25x - 50 = 25x + 50$, which means that answer choice (B) is correct.
- A.** In this problem, we are given the information that a retailer purchases two goods from a manufacturer, x number of headphones and y number of smartphone cases. We know that:
 $x + y = 170$
 $20x + 15y = 3000$
Therefore, we can utilize our system of equations to determine the number of headphones and smartphone cases purchased.
 $x = 170 - y \rightarrow 20(170 - y) + 15y = 3000 \rightarrow 3400 + (-20y + 15y) = 3400$
 $3400 - 5y = 3000 \rightarrow -5y = -400 \rightarrow y = 80 \mid x + y = 170 \rightarrow x + (80) = 170 \rightarrow x = 90$
Now that we know the number of headphones and the number of smartphone cases that were purchased, we can find the difference. $90 - 80 = 10$, which makes answer choice (A) correct.
- B.** In this problem, we are given the information that a landscaper will be designing a garden with a length that is 7 feet longer than the width but has an area of 78 square feet. We know that:
 $y = x + 7$
 $xy = 78$
Therefore, we can utilize our system of equations to determine the length of the fence.
 $xy = 78 \rightarrow x(x + 7) = 78 \rightarrow x^2 + 7x = 78 \rightarrow x^2 + 7x - 78 = 0 \rightarrow (x + 13)(x - 6) = 0$
Because the length of a fence cannot be negative, we know that the length of the fence is 6 feet. However, given the information that the length of the fence will be extended by 7 feet we can find the actual length of

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the fence. $y = x + 7 \rightarrow y = (6) + 7 = 13$.

7. **B.** In this problem, we are given the information that 210 male Pacific Blue Fin Tunas (PBFT) and 200 female PBFTs have been tagged; however, the researches want $\frac{3}{5}$ of the tagged PBFTs to be male. Thus, we can set up a linear proportion to determine how many more males must be tagged.
- $$\frac{210+x}{520} = \frac{3}{5} \rightarrow 1050 + 5x = 1560 \rightarrow 5x = 510 \rightarrow x = 102$$
8. **D.** In this problem, we are given the information that Ricky receives \$12 for every hour spend working to accumulate signatures, as well as a \$50 bonus for surpassing his 10-signature quota. Therefore, knowing that \$12 is an incremented value that constantly increases by the hour and the \$50 bonus is a onetime incentive our linear equation looks like the following $y = 12x + 50$ which makes answer choice (D) correct.
9. **B.** From the given information, we can conclude that there is a constantly increasing rate of \$5 per mile as well as a flat fee of \$150 to acquire to rental car. Therefore, our linear equation is as follows $y = 5x + 150$. However, the question asks us for the number of miles Janelle drove in order to accumulate a total cost of \$250. Therefore, we set our y -value equal to \$250 giving the following $250 = 5x + 150 \rightarrow 100 = 5x \rightarrow x = 20$, which makes answer choice (B) correct.
10. **C.** In this problem, we are given the information that an exterminator receives \$20 for every hour spent working on a house call as well as \$35 fee to respond to the house call. Therefore, knowing that the \$20 is an incremented value that constantly increases by the hour and the \$35 is a onetime payment our linear equation looks like the following: $y = 20x + 35$, which makes answer choice (C) correct.
11. **C.** In this problem, we are presented with the different revenue streams an R&B music artist acquires after their album is released. We are given the information that for each download the artist receives \$0.08 and for each time the song is streamed she receives \$0.0015. Therefore, our function should be $f(x) = 0.08d + 0.0015s$, which makes answer choice (C) correct.
12. **B.** Here we will be finding a function that models the elevation of a delivery truck traveling down a road. Given that the initial elevation of the road is 850 meters we need to find the rate of change in elevation of the delivery truck. Knowing the elevation decreases by 3 meters every 90 meters and the truck is traveling at 6 meters per second, we can find the increase in elevation every second $\frac{3}{90} \times 6 = 0.2$. Therefore, our function should be $850 - 0.2t$, which makes answer choice (B).
13. **C.** In this problem, we are presented with a television streaming service that gives its user base access to pre-released shows for a fee of \$5.00/hour of watch time. Furthermore, there is a \$15 monthly fee to remain subscribed to the service. Therefore, a function that models the cost for a single month assuming she spent x hours watching pre-released show would be the following $C(c) = 15 + 5x$, which makes answer choice (C) correct.
14. **A.** Here we are asked to find a linear function that models the change in pounds per square inch of the pressure on a marine biologist. Given that at 11 feet there is 20 pounds of pressure per square inch and at 15 feet there is 22.2 pounds of pressure per square inch, we can use the equation of a slope to find the rate of change in pounds of pressure per square inch.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{22.2 - 20}{15 - 11} = \frac{2.2}{4} = 0.55. \text{ From this we can use point-slope form to complete the linear}$$

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$$\text{function } y - y_1 = m(x - x_1) \rightarrow y - 20 = 0.55(x - 11) \rightarrow y = 0.55x + 14.5.$$

Therefore answer choice (A) is correct.

15. **D.** In this problem, we are asked to find a linear function that models that declination in use of brown energy. Given that in 2000 there was 3.9 billion units of brown energy utilized and in 2008 there was 2.7 billion units, we can use the equation of a slope to find the decrease in the use of brown energy.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3.9 - 2.7}{2000 - 2008} = -\frac{12}{80}.$$

Furthermore, given the information that the model represents the declination after 2000, we can use 3.9 billion units as our y-intercept which means our function is

$$f(t) = -\frac{12}{80}t + 3.9. \text{ Which makes answer choice (D) correct.}$$

16. **A.** This problem deals with being able to interpret a linear function solely based on the given information in the world problem. We are presented with the information that Rock X contains 80% filter material, which means that only 20% of Rock X is genuine content. However, Rock Y contains only 20% filler material which means that Rock Y has 80% genuine content. Therefore, the linear function should look like such $0.2x + 0.8y = 320$, which makes answer choice (A) correct.

17. **C.** Here we have a problem that asks us to determine a linear function for four college students looking to split the cost equally on an apartment. Given that there is an initial deposit of \$1,500 and a monthly rent of x , we can divide these values by 4 to obtain the pay for one college student $4R = x + 1500 \rightarrow R = \frac{x}{4} + 375$. Which makes answer choice (C) correct.

18. **A.** In this problem, we are dealing with the increase in elevation of a helicopter. Given that it starts at an initial height of 35 feet above the ground and rises at a constant rate of 12 feet per second we can create our linear function is $h = 12s + 35$ because our initial height or y-intercept is 35 feet and are changing rate is 12 feet per second, which makes answer choice (A) correct.

19. **D.** In this problem, we are dealing with a linear function that models a stop motion video. Knowing that the video is 60 frames per second, we know that the number of frames every second is equal to 60; therefore, our linear function should be $f = 60s$. Thus, answer choice (D) is correct.

20. **D.** In this problem, we are determining a linear function that models the distance remaining from Jamie's house. Given that she is located 3.2 miles from her school and her average trip takes 28 minutes. We can find the rate at which she walks:

$$\frac{3.2 \text{ miles}}{28 \text{ minutes}} = \frac{32}{280} = \frac{4}{35}$$

Furthermore, knowing that when she completes her trip d should equal zero; therefore, our function should contain 3.2 miles subtracted by the time spent walking times her walking rate $d = 3.2 - \frac{4}{35}t$ which makes answer choice (D) correct.