

**Lesson 1: Heart of Algebra Word Problems, Functions, and Systems**

1. Aaron is staying at a hotel that charges $99.95 per night plus tax for a room. A tax of 8% is applied to the room rate, and an additional onetime untaxed fee of $5.00 is charged by the hotel. Which of the following represents Aaron’s total charge, in dollars, for staying *x* nights?

A) (99.95 + 0.08x) + 5

B) 1.08(99.95x) + 5

C) 1.08(99.95x + 5)

D) 1.08(99.95 + 5) x

2. The gas mileage for Peter’s car is 21 miles per gallon when the car travels at an average speed of 50 miles per hour. The car’s gas tank has 17 gallons of gas at the beginning of a trip. If Peter’s car travels at an average speed of 50 miles per hour, which of the following functions f models the number of gallons of gas remaining in the tank *t* hours after the trip begins?

A) *f (t)* = 17 − $\frac{21}{50t}$

B) *f (t)* = 17 − $\frac{50t}{21}$

C) *f (t)* = $\frac{17-21t}{50}$

D) *f (t)* = $\frac{17-50t}{21}$

3. Ruth brings a 20% off coupon with her to the book store. The store is also having a 25% off sale on select books. Ruth buys *g* books for *c* dollars each. Only half of the books she buys are on sale, but she uses the coupon on all of them. A 7% sales tax is also applied to purchase at the end. Which of the following represents Ruth’s total cost?

A) $1.07(0.8(0.75\left(\frac{cg+2}{2}\right))$

B) $1.07\left(0.2\left(0.25\left(\frac{cg}{2}\right)+\frac{cg}{2}\right)\right)$

C) $1.07(0.8\left(0.75\left(\frac{cg}{2}\right)+\frac{cg}{2}\right))$

D) $0.07(0.8(0.75\left(\frac{cg+cg}{2}\right))$

4. Krista sells candy at a candy store for *h* cents each. She has a current deal that if someone buys at least *b* pieces, the first *f* are free (*f <b*). What is the price of 25 pieces of candy in dollars if 25>*b*?

A) $\left(25-g\right)h$

B) $\frac{\left(25-b\right)h}{100}$

C) $\left(25\right)h+f$

D) $\frac{\left(25-f\right)h}{100}$

5. Twelve years ago Greg was $\frac{1}{4}$ Bobby’s age. Now Greg is one greater than $\frac{1}{2}$ Bobby’s age. How old is Bobby?

A) 5

B) 17

C) 20

D) 32

6. A pancake maker can make 6 pancakes per liter of batter when making 96 pancakes an hour. The machine has 12 liters of batter first thing in the morning. If the machine continues making 96 pancakes an hour, which of the following function *s* models the number of liters of batter remaining in the machine *j* hours after the day begins?

A) $s\left(j\right)=12-\frac{96}{6j}$

B) $s\left(j\right)=12-\frac{6}{96j}$

C) $s\left(j\right)=\frac{12-96j}{6}$

D) $s\left(j\right)=\frac{96-12j}{6}$

(E) None of the above

7. Jim goes to the movies on a Wednesday morning. He is a senior citizen viewing a matinee performance. Movies usually cost *y* dollars a ticket. Students receive a 10% discount. Senior citizens receive a 15% discount. Matinee performances are then half off the new price. How much did Jim pay?

A) $0.5\left(0.9c\right)$

B) $0.9(.085(0.5c)$

C) $0.5\left(0.85c\right)$

D) $0.5\left(0.9\left(0.85c\right)\right)$

8. Hailey is going on a road trip and needs to rent a car. The company has a $3 untaxed car cleaning fee for all customers. Each mile is charged 4 cents. Customers must also pay the company $30 with an added 6% sales tax for the first tank of gas. How much will Hailey owe the company if she drives *t* miles?

A) $\left(0.04t\right)+34.8$

B) $\left(0.04t\right)+4.8$

C) $\left(0.04t\right)+33.18$

D) $\left(0.04t\right)+30.18$

9. $4x+5y=23$

$$x+4y=14$$

Based on the system of equations above, what is the value of $x^{2}$?

A) 1

B) 4
C) 9
D) 16

10. $4x-2y=16$

$$7x+4y=13$$

Based on the system of equations above, what is the value of the sum$ x+y$?

A) -2

B) 3
C) 1
D) 4

11. $4x+3y=-1$

$$\frac{1}{2}x+\frac{3}{2}y=1$$

Based on the system of equations above, what is the value of the sum$ x^{2}+y^{2}$?

A) -8

B) -5
C) 14
D) 19

E) None of the above

12. $6x+7y=-10$

$$-4x+8y=32$$

Based on the system of equations above, what is the value of the difference$ y-x$?

A) 6

B) 4
C) -4
D) 2

13. $4x+2y=6$

$$8x-3y=-37$$

Based on the system of equations above, what is the value of the sum$ x+y$?

A) -2

B) 7
C) 5
D) 10

14. $\frac{1}{2}x-\frac{1}{4}y=5$

$$ax-3y=20$$

In the system of linear equations above, *a* is a constant. If the system has no solution, what is the value of *a*?

A) $\frac{1}{2}$
B) 2
C) 6
D) 12

15. $2x+4y=6$

$$gx+12y=13$$

In the system of linear equations above, *g* is a constant. If the equations are parallel, what is the value of *g*?

A) 2
B) 3
C) 4
D) 6

16. $3x+15y=18$

$$mx+5y=2$$

In the system of linear equations above, *m* is a constant. If the system has no solution, what is the value of *m*?

A) 1
B) 3
C) 5
D) 6

17. $8x+4y=12$

What is the slope of a line perpendicular to the line above?

A) $\frac{1}{4}$
B) $\frac{1}{4}$
C) 2
D) 4

18. $3x-4y=24$

What is the slope of a line perpendicular to the line above?

A) $\frac{4}{3}$
B) $\frac{-4}{3}$
C) $\frac{-3}{4}$

D) $\frac{3}{4}$

19. $7x-4y=32$

What is the slope of a line parallel to the line above?

A) $\frac{4}{7}$
B) $\frac{-4}{7}$
C) $\frac{-7}{4}$

D) $\frac{7}{4}$

20. $\frac{1}{4}x+\frac{1}{3}y=4$

$$vx+9y=3$$

In the system of linear equations above, *v* is a constant. If the equations are parallel, what is the value of *v*?

A) $\frac{27}{4}$
B) $\frac{4}{27}$
C) 4
D) 3

21. 12$x-\frac{1}{4}y=6$

What is the slope of a line perpendicular to the line above?

A) $\frac{-1}{48}$
B) $\frac{-1}{24}$
C) 24
D) 48

22. If $y=\frac{a^{1/2}b^{2}c}{m}$, find an expression for c.

23. When y=kx, k is a constant and when y=50, x=12. Find y when x is 5.

24. If $a=\frac{k}{b}where k is a constand. $When a=10, b=20. Find b when a=15.

25. 8+12x is 18 more than 35. What is the value of 20x.

26. For what value of n is |n-2|+6 equal to zero?

27. A=1009 + 7.08t. Find an expression for time (t) in terms of a.

28. $\frac{c}{d}=4.What is the value of\frac{4d}{c}?$

29. $g\left(x\right)=mx^{2}+120.If g\left(5\right)=120, what is the value of g\left(-10\right)?$

30. $t^{2}-60=0 and t>0.What is the value of t?$

31.What is the value of x?

$$x+7y=-9$$

$$x-14y=-50$$

32. $b=6\sqrt{2} and 2b=\sqrt{6a}$ What is the value of a?

33. $x=\frac{\sqrt{b^{2}-4ac}}{2a}.Find an expression for b in terms of x, a, and c.$