

## Algebra Review

*Questions 1 - 6 should be solved without a calculator.*

1. A pizza restaurant mailed out 1,000 coupons for \$2.50 off a large specialty pizza. By the time the coupon expired, 175 of the coupons had been redeemed for delivery and another 35 were redeemed at the restaurant. What was the total amount of discounts provided by the restaurant's coupon mailing?
2. Rob went skiing at a local ski resort. When he arrived at the lodge at 1:00 p.m. the temperature was  $13^{\circ}\text{F}$ . When he left 5 hours later the temperature was  $-2^{\circ}\text{F}$ . How much did the temperature decrease?
3. Glenn and his dad were planning a hike in Death Valley National Park. They planned to start their hike at 25 feet below sea level, have lunch at 9 feet below their start, and finish their hike at 15 feet above where they lunched. What will be the altitude at the end of their hike?
4. There are 25 students in Naomi's history class. Her teacher put one piece of paper for each student into a hat labeled either Group A, Group B, or Group C in order to divide the students into groups.  $\frac{2}{5}$  of the pieces of paper were for Group A and  $\frac{8}{25}$  were for Group B. What fraction of the pieces of paper were for Group C?
5. Nancy owes \$2.25 in library fines. She has a DVD and a book overdue. There is a daily fine of \$0.75 for the DVD and \$0.15 for the book. If she fails to return the DVD and book today, what will be her total in library fines tomorrow?
6. An owner of an exotic fish store mixed  $161\frac{1}{5}$  gallons of salt water. He used it to fill as many  $10\frac{2}{5}$  gallon aquariums as he could. How many aquariums did he fill?

*Solve for the situation using the percent proportion.*

7. Bob and Taylor ate at a restaurant for lunch. They gave the waiter a tip that was 20% of the cost of their meal. Their meal cost \$35. What amount did they tip the waiter?
8. Wanda is the goalie on her school's soccer team. Last night they played a game in which she stopped 13 shot attempts and allowed 2 goals. What percentage of the shots did she stop?

*Solve for the situation.*

9. Sam's dining room is 16 feet wide and 12 feet long. He wants to put a wallpaper border along the wall where it meets the ceiling. How many feet of border does he need?
10. Two congruent squares with side lengths of 4 inches share a side to form a rectangle. What is the perimeter of the rectangle?
11. A carpet cleaner charges \$0.25 per square foot. Fredo had the carpet in his living room cleaned. His living room was rectangular with a length of 15 feet and a width of 12 feet. How much did it cost to get his carpet cleaned?

12.

| <b>Chili</b> | <b>Topping</b> | <b>Cheese</b> |
|--------------|----------------|---------------|
| Vegetarian   | Onions         | Cheddar       |
| Texas        | Peppers        | Swiss         |
| Cincinnati   | Hot Sauce      | Monterey Jack |
| Turkey       |                | American      |
| Sausage      |                |               |

At Bart's Chili Shack you order by choosing a type of chili, a topping, and a cheese. How many different combinations are there?

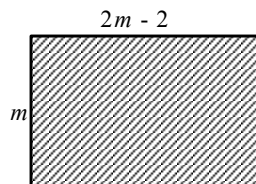
13. The average weight of the 21 students in Wanda's class was 152 lbs. When Kal left the room the average weight increased to 153 pounds. How much does Kal weigh?

14.

| <b>Stem</b> | <b>Leaf</b>        |
|-------------|--------------------|
| <b>2</b>    | <b>0 0 2 4 6</b>   |
| <b>3</b>    | <b>2 3 7 8 8 9</b> |
| <b>5</b>    | <b>1 1 1 3 5</b>   |
| <b>6</b>    | <b>6 8 9 9</b>     |
| <b>8</b>    | <b>1</b>           |

The stem-and-leaf plot shows the weight in pounds of all the dogs in a dog show. Do more dogs weigh less or more than 50 pounds?

15. Write an algebraic expression to represent the area of the rectangle. Then evaluate it to find the area when  $m = 3$  centimeters.



16. At a store, Jack bought a scientific calculator for \$22 and four notebooks for \$3.75 each. Write and evaluate an expression to find how much money he spent, not including sales tax.

17. Write an algebraic expression for *one-fourth the sum of  $2x$  and  $8y$  decreased by half  $x$* . Then simplify, indicating the properties used.

*Write an algebraic expression for each verbal expression. Then simplify, indicating the properties used.*

18. three times the sum of  $4m$  and  $n$  increased by 12 times  $m$

19. Four times the product of  $x$  and  $y$  increased by the sum of  $y^2$ ,  $xy$ , and 5

20. Paul bought 14 gifts from a store. Each gift cost \$32.65. He got them gift wrapped for \$2 each. Write and evaluate an expression to determine the total amount he spent.

21. A gourmet jelly bean company packs 2565 jelly beans in 45 different packets every hour. Write and solve an equation to find how many jelly beans each packet holds, assuming each packet contains equal number of jelly beans.

A car rental costs \$36.95 a day plus \$0.35 a mile.

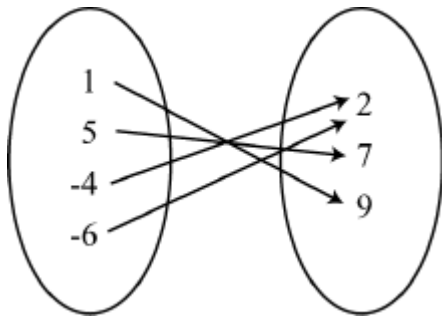
22. Tom's family rents a car for a three-day trip to reach a destination that is 220 miles away. Write and solve an inequality to determine whether they can reach the destination for under \$190. Describe what the variables in your answer represent and explain your answer.
23. Write and solve an inequality to find how far they can go in a four-day trip if they had \$160. Determine whether your answer is reasonable.

Express the relation shown in each table, mapping, or graph as a set of ordered pairs. Then write the inverse of the relation.

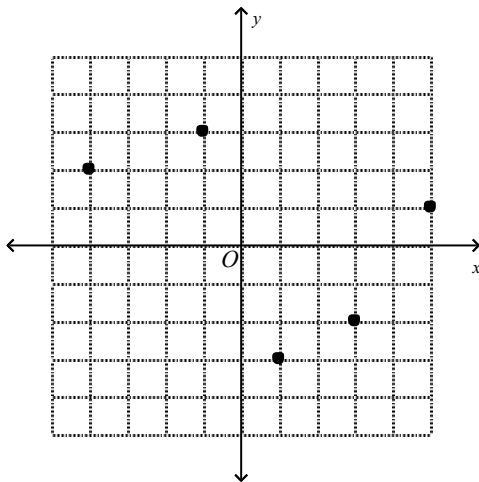
24.

| $x$ | $y$ |
|-----|-----|
| 0   | 4   |
| 2   | -3  |
| 4   | 6   |
| 6   | -7  |
| 8   | 1   |

25.



26.

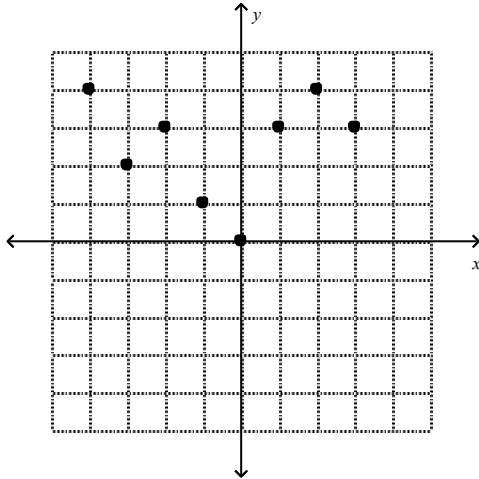


Determine whether the relation is a function.

27.

| $x$ | $y$ |
|-----|-----|
| -8  | -3  |
| -2  | 0   |
| 5   | 7   |
| 9   | 2   |
| 7   | -6  |
| 5   | 2   |

28.

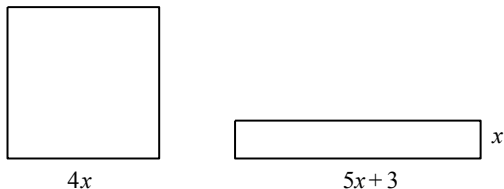


29.  $\{(5, 9), (4, 8), (-7, 4), (0, 4), (2, 4), (3, 9), (-3, 8)\}$

Identify the hypothesis and conclusion of each statement. Then write each statement in if-then form.

30. A square is a rectangle with all sides equal.
31. A number divisible by 6 is divisible by both 2 and 3.
32.  $7d + 4 > 39$  when  $d > 5$
33. David had \$350. After shopping, he was left with \$235. If  $c$  represents the amount he spent, write an equation to represent this situation. Then use the equation to find the amount of money David spent.
34. At a certain gas station, gas costs \$2.85 a gallon. Jason paid \$25.50 to fill his tank. Write and solve an equation to find how many gallons of gas he bought?
35. Bryan eats three slices of a ten-slice pizza. He pays \$3.30 as his share of the full price. Write and solve an equation to find the full price.
36. Eleven increased by three times a number equals 68. Write an equation for this situation and then find the number.
37. Fourteen decreased by twice a number equals  $-42$ . Write an equation for this situation and then find the number.
38. The sum of three consecutive integers is 18. Write an equation for this situation and then find the three integers.
39. Henry and his brother each start a savings account. Henry begins with \$200 and plans to deposit an additional \$25 per month. His brother begins with \$150 and plans to deposit an additional \$35 per month. After how many months will the two brothers have the same amount in their accounts?

40. The rectangle and square shown below have the same perimeter. Find the dimensions of each figure.



41. Does the pair of ratios form a proportion? Use cross products to help you decide.  
 $\frac{5}{3} = \frac{42}{18}$
42. Mr. Jones surveyed a group of college students. He noticed in a sample of 36 students, thirty students went hiking on their summer vacations. If there were 758 students in the college, about how many students went hiking?
43. In a purse containing only nickels and dimes, four out of every five coins is a nickel. If there are 25 coins altogether, how many nickels are there?
44. The team's ratio of games won to games played was 3 to 8. If the team played 56 games, how many games did the team win?
45. A department store purchases a dress for \$85. To sell the dress to the customers, the price is increased by 13%. What is the new price of the dress?
46. Samantha earned a grade of 83 on her first math exam and a 62 on her second math exam. What was the percent of decrease in Samantha's grade? Round to the nearest whole percent.
47. In 2001, Bradley's Pet Shop had a 210% increase in turtle sales over the previous year. If they sold 30 turtles in 2000, find the total number of turtles sold in 2001.

*Write an equation and solve for the variable specified.*

48. Twelve more than a number,  $s$ , equals another number,  $p$ , minus 4. Solve for  $s$ .
49. Five times a number,  $m$ , plus 6 equals 10 times another number,  $n$ , plus 16. Solve for  $m$ .
50. One sixth of a number,  $p$ , is 5 more than two thirds another number,  $q$ . Solve for  $p$ .
51. An alloy of metals is 40% iron. Another alloy is 35% iron. How much of each should be mixed to make 500 grams of an alloy that is 38% iron?
52. An athlete runs 9 miles in 1.5 hours and then 14 miles in 2.5 hours. What is the average speed of the athlete?
53. In a school, a student's math grade is calculated by weighting the student's exam average at 60% and the student's assignment average at 40%. What is the final score, in percent, for a student with a 93% exam average and an 84% assignment average?
54. Two travelers were 250 miles apart at 2:00 p.m. and were headed towards each other. If they met at 4:30 p.m. and one was traveling 10 miles per hour faster than the other, what was the speed of each traveler?

55. How many liters of a 26% vinegar solution should be added to a 60% vinegar solution to create 136 liters of a 49% vinegar solution?

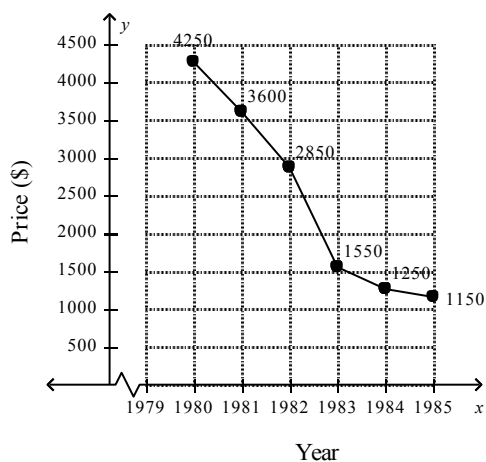
Copy and complete the table representing the problem.

|             | Liters    | Total Amount of Vinegar |
|-------------|-----------|-------------------------|
| 49% Vinegar | 136       |                         |
| 26% Vinegar | $n$       |                         |
| 60% Vinegar | $136 - n$ |                         |

Also write an equation to represent the problem.

56. Find the  $x$ - and  $y$ -intercepts of the graph of  $2x - 3y = 6$ .
57. Find the  $x$ - and  $y$ -intercepts of the graph of  $\frac{5}{4}x + \frac{3}{2}y = 9$ .
58. Angie is selling lemonade at a concert. She paid \$30 for supplies and is selling each cup of lemonade for \$2. The function  $y = 2x - 30$  represents her profit  $y$  for each lemonade sold  $x$ . Find the zero and explain what it means in the context of this situation.
59. At a ski resort there were 10 feet of snow on the ground. A blizzard blew in and dumped 3 inches of snow per hour. The function  $y = \frac{1}{4}x + 10$  represents the total feet of snow  $y$  after snowing for  $x$  hours. If the blizzard started at 12:00 noon, at what time would there be  $11\frac{3}{4}$  feet of snow on the ground?
60. A country paid \$541 million in interest on its national debt in 1940 and \$1291 million in 1970. What was the annual rate of change from 1940 to 1970? Explain the meaning of the rate of change.

Use the graph of computer prices for 1980–1987 to answer the following questions.



Source: <http://oldcomputers.net/appleiiicp.html>

61. Find the rate of change for prices from 1980 to 1982. Explain the meaning of the rate of change.
62. In which years did computer prices fall the most? Explain two ways you could find this.

Suppose  $y$  varies directly as  $x$ . Write a direct variation equation that relates  $x$  and  $y$ . Then solve.

63. If  $y = 8$  when  $x = 6$ , find  $y$  when  $x = 9$ .
64. What is the slope of a line that contains the point  $(2, -3)$  and has the same  $x$ -intercept as  $x + 5y = 8$ ?
65. Linda has 250 CDs. She buys another twelve packs of CDs each containing 15 CDs. How many CDs does she have in all?
66. Kate pays \$203 in advance on her account at the athletic club. Each time she uses the club, \$9 is deducted from the account. Find the value remaining in the account after 12 visits.
67. A paper airplane is thrown off a 71-foot-high bridge. As the paper airplane flies, its height decreases at a steady rate.

|                    |    |    |    |    |    |
|--------------------|----|----|----|----|----|
| <b>Time (s)</b>    | 0  | 5  | 10 | 15 | 20 |
| <b>Height (ft)</b> | 71 | 56 | 41 | 26 | 11 |

What would be the height of the airplane after 3 seconds? 12 seconds?

68. Cindy started her bank account with \$400, and she deposited \$50 per week. Write a linear equation in slope-intercept form to find the total amount in her account after  $w$  weeks. Then graph the equation.
69. Write an equation and describe the slope for the line that passes through  $(9, 22)$  and  $(15, 36)$ .
70. Write an equation for the line that passes through  $(\frac{1}{4}, \frac{2}{5})$  and  $(\frac{3}{4}, \frac{7}{5})$ . What is the slope?
71. Write the point-slope form, slope-intercept form, and standard form of an equation for a line that passes through  $(5, 7)$  with slope  $-9$ .
72. Write the point-slope form, slope-intercept form, and standard form of an equation for a line that passes through  $(\frac{1}{3}, \frac{2}{5})$  with slope  $\frac{3}{8}$ .
73. Determine whether  $y = 4x + 5$  and  $y = \frac{1}{4}x - 2$  are perpendicular. Explain.
74. Write an equation of the line that is parallel to the graph of  $y = -4x + 2$  and passes through  $(2, -4)$ .
75. Find an equation for the line that has an  $x$ -intercept of 3 and is perpendicular to the graph of  $-2x + 5y = 6$ .
76. Write the slope-intercept form of an equation for the line that passes through  $(-3, -2)$  and is perpendicular to the graph of the equation  $y = \frac{2}{5}x + 3$ .
77. Olivia must earn 475 points out of 550 to receive a  $B$  in math. So far, she has earned 240 test points, 85, quiz point, and 40 homework points. How many points,  $p$ , must she score on her final exam to earn at least a  $B$  in math?
78. Victoria goes to the mall with \$60. She purchases a skirt for \$12 and perfume for \$35.99. She also spends \$3.25 on food. She still wants to buy a belt. How much money can she spend on the belt?

79. Edward will take his friends bowling at a bowling alley that charges \$5.50 per person for unlimited bowling plus a \$3.50 basic lane fee. He doesn't want to spend more than \$44. Write and solve an inequality to find the number of friends,  $x$ , he can invite.
80. Jordan works at a hair salon. He earns \$9 per hour, plus 5% of any hair products he sells. If he works 20 hours a week, how much money in hair products must he sell to earn at least \$250?



## Algebra Review Answer Section

### SHORT ANSWER

- $-\$525$   
 $175 + 35 = 210$   
 $210 \times (-2.5) = -525$
- $15^\circ\text{F decrease}$   
 $13 - 13 = 0$   
 $0 - 2 = -2$   
 $(-13) + (-2) = -15$
- 19 feet below sea level  
 $-25 + (-9) = -34$   
 $-34 + (15) = -19$
- $\frac{7}{25}$   
 $\frac{2}{5} + \frac{8}{25} = \frac{18}{25}$   
 $\frac{25}{25} - \frac{18}{25} = \frac{7}{25}$
- $-\$3.15$   
 $-0.75 + -0.15 = -0.9$   
 $-2.25 + (-0.9) = -3.15$
- $15\frac{1}{2}$   
 $\frac{806}{5} \div \frac{52}{5} = \frac{806}{5} \times \frac{5}{52}$   
 $\frac{806}{52} = \frac{31}{2}$
- $\$7$   
 $\frac{\alpha}{35} = \frac{20}{100}$   
 $100\alpha = 700$   
 $\alpha = 7$
- 86.7%

$$13 + 2 = 15$$

$$\frac{13}{15} = \frac{p}{100}$$

$$15p = 1,300$$

$$p = 86.\overline{66}$$

9. 56 feet

$$p = 2(16 + 12)$$

$$p = 2(28)$$

$$p = 56$$

10. 24 inches

$$p = 2(8 + 4)$$

$$p = 2(12)$$

$$p = 24$$

11. \$45

$$A = 15 \times 12$$

$$A = 180$$

$$180 \times .25 = 45$$

12. 60

$$5 \times 3 \times 4 = 60$$

13. 132 lbs.

$$21 \times 152 = 3,192$$

$$20 \times 153 = 3,060$$

$$3,192 - 3,060 = 132$$

14. More dogs weigh less than 50 pounds

11 dogs weigh less

10 dogs weigh more

15.  $m(2m - 2)$ ;  $12 \text{ cm}^2$

The area of a rectangle is equal to the product of its length and width.

$$A = l \times w$$

16.  $22 + 4 \times 3.75$ ; \$37

To calculate the total money spent, first multiply the number of notebooks with the cost of each notebook, and then add the product to the cost of the calculator.

17.  $\frac{1}{4}(2x + 8y) - \frac{1}{2}x$ ;

$$\begin{aligned}
&= \frac{1}{4}(2x) + \frac{1}{4}(8y) - \frac{1}{2}x && \text{Distributive Property} \\
&= \frac{1}{2}x + 2y - \frac{1}{2}x && \text{Substitution} \\
&= \frac{1}{2}x - \frac{1}{2}x + 2y && \text{Commutative Property} \\
&= 2y && \text{Additive Inverse}
\end{aligned}$$

Example: Two-fifth the sum of  $4x$  and  $10y$  increased by one-fifth of  $x$  translates into  $\frac{2}{5}(4x + 10y) + \frac{1}{5}x$ ;

$$\begin{aligned}
&= \frac{2}{5}(4x) + \frac{2}{5}(10y) + \frac{1}{5}x && \text{Distributive Property} \\
&= \frac{8}{5}x + 4y + \frac{1}{5}x && \text{Substitution} \\
&= \frac{8}{5}x + \frac{1}{5}x + 4y && \text{Commutative Property} \\
&= \frac{9}{5}x + 4y && \text{Addition}
\end{aligned}$$

$$\begin{aligned}
18. \quad &3(4m + n) + 12m; \\
&= 3(4m) + 3(n) + 12m && \text{Distributive Property} \\
&= 12m + 3n + 12m && \text{Substitution} \\
&= 3n + 12m + 12m && \text{Commutative Property} \\
&= 3n + 24m && \text{Substitution}
\end{aligned}$$

Example: Five times the sum of  $m$  and  $4n$  decreased by 8 times  $m$  translates into  $5(m + 4n) - 8m$ ;

$$\begin{aligned}
&= 5(m) + 5(4n) - 8m && \text{Distributive Property} \\
&= 5m + 20n - 8m && \text{Substitution} \\
&= 20n + 5m - 8m && \text{Commutative Property} \\
&= 20n - 3m && \text{Substitution}
\end{aligned}$$

$$\begin{aligned}
19. \quad &4xy + y^2 + xy + 5; \\
&= 4xy + xy + y^2 + 5 && \text{Commutative Property} \\
&= 5xy + y^2 + 5 && \text{Addition}
\end{aligned}$$

Example: Six times the product of  $x$  and  $y$  decreased by the sum of  $x^2$ ,  $xy$ , and 2 translates into  $6xy - (x^2 + xy + 2)$ ;

$$\begin{aligned}
&= 6xy - xy - x^2 - 2 && \text{Commutative Property} \\
&= 5xy - x^2 - 2 && \text{Subtraction}
\end{aligned}$$

$$20. \quad 14(32.65 + 2) \text{ or } 14(32.65) + 14(2); \$485.10$$

To calculate the total amount, first add the cost of the gift and the gift wrapping. Then, multiply the total cost by the number of gifts.

21.  $2565 = 45x$ ; 57 jelly beans

The total number of jelly beans = the number of packets  $\times$  the number of jelly beans in each packet.

22.  $36.95x + 0.35y < 190$ ;

where  $x$  represents how many days the car is rented and  $y$  represents the number of miles traveled.

Yes, they can reach their destination as the total amount required for the car rental is equal to  $36.95(3) + 0.35(220) = \$187.85$  which is less than \$190, the total amount they have.

The total cost for the rental for three days + total cost for the number of miles traveled  $< 190$ .

23.  $36.95x + 0.35y \leq 160$

where  $x$  represents how many days they rent the car and  $y$  represents the number of miles they can travel.

$36.95(4) + 0.35(34.5) = \$159.87$  which is less than or equal to \$160 so they can travel around 34.5 miles with the given amount.

The total cost for the rental for four days + total cost for the number of miles traveled  $\leq 160$ .

24.  $\{(0, 4), (2, -3), (4, 6), (6, -7), (8, 1)\}$ ;  $\{(4, 0), (-3, 2), (6, 4), (-7, 6), (1, 8)\}$

To find the inverse of a relation, exchange  $x$  and  $y$  in each ordered pair.

25.  $\{(1, 9), (5, 7), (-4, 2), (-6, 2)\}$ ;  $\{(9, 1), (7, 5), (2, -4), (2, -6)\}$

To find the inverse of a relation, exchange  $x$  and  $y$  in each ordered pair.

26.  $\{(-4, 2), (-1, 3), (1, -3), (3, -2), (5, 1)\}$ ;  $\{(2, -4), (3, -1), (-3, 1), (-2, 3), (1, 5)\}$

To find the inverse of a relation, exchange  $x$  and  $y$  in each ordered pair.

27. No

28. Yes

29. Yes

30. H: a rectangle with all sides equal.

C: square.

If a rectangle has all sides equal, then it is a square.

A **hypothesis** is a belief used as a basis for action. It follows the word *if*.

A **conclusion** is a result or outcome of an act or process. It follows the word *then*.

31. H: number is divisible by both 2 and 3.

C: number is divisible by 6

If a number is divisible by both 2 and 3, then the number is divisible by 6.

A **hypothesis** is a belief used as a basis for action. It follows the word *if*.

A **conclusion** is a result or outcome of an act or process. It follows the word *then*.

32. H:  $7d + 4 > 39$

C:  $d > 5$

If  $7d + 4 > 39$ , then  $d > 5$

A **hypothesis** is a belief used as a basis for action. It follows the word *if*.

A **conclusion** is a result or outcome of an act or process. It follows the word *then*.

33.  $\$350 - c = \$235$ ; \$115

Read each statement carefully and write the equation according to the given information. Solve the written equation by isolating the variable on one side of the equation.

34.  $\$2.85n = \$25.50$ ; about 8.95 gallons

Read each statement carefully and write the equation according to the given information. Solve the written equation by isolating the variable on one side of the equation.

35.  $\frac{3}{10}s = \$3.30$ ; \$11

Read each statement carefully and write the equation according to the given information. Solve the written equation by isolating the variable on one side of the equation.

36.  $11 + 3n = 68$ ; 19

First translate the verbal sentences into equations by using key words and phrases you have learned to replace words with symbols. Then to solve an equation with more than one operation, undo operations by working backward.

37.  $14 - 2n = -42$ ; 28

First translate the verbal sentences into equations by using key words and phrases you have learned to replace words with symbols. Then to solve an equation with more than one operation, undo operations by working backward.

38.  $n + (n + 1) + (n + 2) = 18$ ; 5, 6, 7

First translate the verbal sentences into equations by using key words and phrases you have learned to replace words with symbols. Then to solve an equation with more than one operation, undo operations by working backward.

39. 5 months

Read each statement carefully and write the equation according to the given information.

Use the Addition and/or Subtraction Properties of Equality to get the variables on one side of the equals sign and the numbers without variables on the other side of the equals sign.

Simplify the expressions on each side of the equals sign.

Use the Multiplication or Division Property of Equality to solve.

40. 6 by 6 and 10.5 by 1.5

Read each statement carefully and write the equation according to the given information.

Use the Addition and/or Subtraction Properties of Equality to get the variables on one side of the equals sign and the numbers without variables on the other side of the equals sign.

Simplify the expressions on each side of the equals sign.

Use the Multiplication or Division Property of Equality to solve.

41. no

42. about 632 students

Read each statement carefully and write the equation according to the given information. To solve a proportion containing a variable, use cross products and other techniques to solve the equation.

43. 20

Read each statement carefully and write the equation according to the given information. To solve a proportion containing a variable, use cross products and other techniques to solve the equation.

44. 21 games

Read each statement carefully and write the equation according to the given information. To solve a proportion containing a variable, use cross products and other techniques to solve the equation.

45. \$96.05

Find the increase in price by multiplying the rate as a decimal with the original price. Add the amount to the original price.

46. 25%

First find the amount of change. Then find the percent of change by using the original number as the base.

47. 93 turtles

Find the increase in sales by multiplying the rate as a decimal with the previous year's sales. Add the amount to the previous year's sales.

48.  $12 + s = p - 4$ ;  $s = p - 16$

First translate the verbal sentences into equations by using key words and phrases you have learned to replace words with symbols. Then to solve an equation for a specific variable, use the properties of equality to isolate the specified variable on one side of the equation.

49.  $5m + 6 = 10n + 16$ ;  $m = 2n + 2$

First translate the verbal sentences into equations by using key words and phrases you have learned to replace words with symbols. Then to solve an equation for a specific variable, use the properties of equality to isolate the specified variable on one side of the equation.

50.  $\frac{1}{6}p = \frac{2}{3}q + 5$ ;  $p = 4q + 30$

First translate the verbal sentences into equations by using key words and phrases you have learned to replace words with symbols. Then to solve an equation for a specific variable, use the properties of equality to isolate the specified variable on one side of the equation.

51. 300 g of 40% alloy, 200 g of 35% alloy

Mixture problems, in which one or more parts are combined into a whole, are solved using *weighted averages* i.e. the sum of the product of the number of units and the value per unit divided by the sum of the number of units.

52. 5.75 mph

Uniform motion problems are problems where an object moves at a certain speed, or rate. Use the formula  $d = rt$  to solve these problems, where  $d$  is the distance,  $r$  is the rate, and  $t$  is the time. Average speed is given by total distance traveled over total time.

53. 89.4%

Final score can be obtained using *weighted averages* i.e. the sum of the product of the number of units and the value per unit divided by the sum of the number of units.

54. 45 mph, 55 mph

Uniform motion problems are problems where an object moves at a certain speed, or rate. Use the formula  $d = rt$  to solve these problems, where  $d$  is the distance,  $r$  is the rate, and  $t$  is the time.

55. 44 liters of 26% vinegar solution.

|             | Liters    | Total Amount of Vinegar |
|-------------|-----------|-------------------------|
| 49% Vinegar | 136       | $0.49(136)$             |
| 26% Vinegar | $n$       | $0.26n$                 |
| 60% Vinegar | $136 - n$ | $0.60(136 - n)$         |

$$0.26n + 0.60(136 - n) = 0.49(136)$$

Complete the table with expressions for liters and total amount of vinegar. Use the total amount of vinegar column in the table to write the equation for the problem.

56. 3, -2

To find the  $x$ -intercept, set  $y = 0$  and solve for  $x$ .

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57.  $\frac{36}{5}$ , 6

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58. 15; If she sells 15 cups of lemonade her profit will be zero.

59. 7:00 p.m.

60. \$25 million/year; There was an average increase of \$25 million per year in interest on the public debt.

Slope can be used to describe a rate of change. The rate of change tells, on average, how a quantity changes over time.

61. -700; There was an average decrease of \$700 per year in the price of computers.

Slope can be used to describe a rate of change. The rate of change tells, on average, how a quantity changes over time.

62. Sample answer: 1982–1983; Look on the graph for the steepest line segment, which indicates the greatest rate of change, or calculate the biggest difference using the values given on the graph.

Slope can be used to describe a rate of change. The rate of change tells, on average, how a quantity changes over time.

63.  $y = \frac{4}{3}x$ ; 12

A direct variation is described by an equation of the form  $y = kx$ , where  $k \geq 0$ . We say that  $y$  varies directly with  $x$ . In the equation  $y = kx$ ,  $k$  is the constant of variation.

64.  $\frac{1}{2}$

To find the  $x$ -intercept, set  $y = 0$  and solve for  $x$ .

The equation of the line is given by  $y = mx + c$ , where  $m$  is the slope of the line.

65. 430

To find the total number of CDs, add the number of CDs Linda bought to the number of CDs she already has.

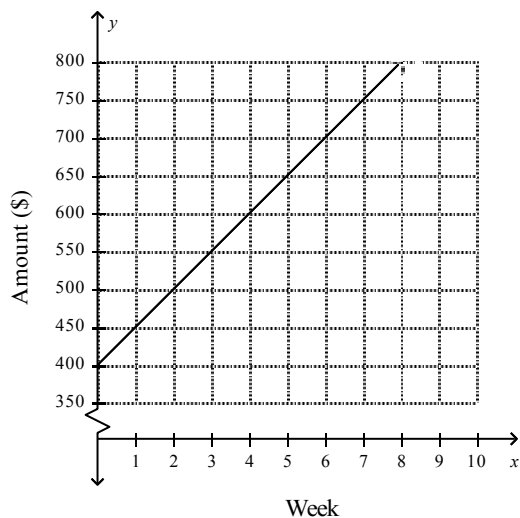
66. \$95

To find the remaining amount, subtract the amount deducted after 12 visits from the initial amount deposited in the account.

67. 62 ft; 35 ft

The equation in function notation for the relation is given by  $f(t) = 71 - 3t$ . Find the value of  $f(t)$  for  $t = 3$  and 12.

68.  $y = 50w + 400$ ;



If a quantity changes at a constant rate over time, it can be modeled by a linear equation. The  $y$ -intercept represents a starting point, and the slope represents the rate of change.

69.  $y = \frac{7}{3}x + 1$ ;  $\frac{7}{3}$

Find the slope of the line with the slope formula. Find the  $y$ -intercept by replacing  $x$  and  $y$  with the given point and  $m$  with the slope in the slope-intercept form. Solve for  $b$ . Write the equation in slope-intercept form using the given  $m$  and the calculated  $b$ .

70.  $y = 2x - \frac{1}{10}$ ; 2

Find the slope of the line with the slope formula. Find the  $y$ -intercept by replacing  $x$  and  $y$  with the given point and  $m$  with the slope in the slope-intercept form. Solve for  $b$ . Write the equation in slope-intercept form using the given  $m$  and the calculated  $b$ .

71.  $y - 7 = -9(x - 5)$ ;  $y = -9x + 52$ ;  $9x + y = 52$

The linear equation  $y - y_1 = m(x - x_1)$  is written in point-slope form, where  $(x_1, y_1)$  is a given point on a nonvertical line and  $m$  is the slope of the line.

Given an equation in point-slope form, solve the equation for  $y$  to find the equation in slope-intercept form.

The linear equation in standard form is given as  $Ax + By = C$ , where  $A$ ,  $B$ , and  $C$  are constants. Use Addition and Subtraction Properties of Equality to rewrite the equation in standard form.



72.  $y - \frac{2}{5} = \frac{3}{8} \left( x - \frac{1}{3} \right)$ ;  $y = \frac{3}{8}x + \frac{11}{40}$ ;  $15x - 40y = -11$

The linear equation  $y - y_1 = m(x - x_1)$  is written in point-slope form, where  $(x_1, y_1)$  is a given point on a nonvertical line and  $m$  is the slope of the line.

Given an equation in point-slope form, solve the equation for  $y$  to find the equation in slope-intercept form.

The linear equation in standard form is given as  $Ax + By = C$ , where  $A$ ,  $B$ , and  $C$  are constants. Use Addition and Subtraction Properties of Equality to rewrite the equation in standard form. Remember that  $A$ ,  $B$ , and  $C$  must be integers with a GCF of 1.

73. No; the slopes are 4 and  $\frac{1}{4}$ .

Two nonvertical lines are perpendicular if the slopes are opposite reciprocals of each other.

74.  $y = -4x + 4$

Two nonvertical lines are parallel if they have the same slope. Use the given point with the slope of the parallel line in the point-slope form. Then change to the slope-intercept form.

75.  $y = -\frac{5}{2}(x - 3)$  or  $y = -\frac{5}{2}x + \frac{15}{2}$

Two nonvertical lines are perpendicular if the slopes are opposite reciprocals of each other. Use the given point with the slope of the perpendicular line in point-slope form. Then change to slope-intercept form.

76.  $y = -\frac{5}{2}x - \frac{19}{2}$

Two nonvertical lines are perpendicular if the slopes are opposite reciprocals of each other. Use the given point with the slope of the perpendicular line in point-slope form. Then change to slope-intercept form.

77.  $p \geq 110$

$$240 + 85 + 40 + p \geq 475$$

Solve the inequality by subtracting the sum of the constant terms on the left side of the inequality from both sides of the inequality.

78. Victoria can spend no more than \$8.76 on the belt.

$$\$12 + \$35.99 + \$3.25 + x \leq \$60$$

Solve the inequality by subtracting the sum of the constant terms on the left side of the inequality from both sides of the inequality.

79.  $\$3.50 + \$5.50x \leq \$44$ ;  $x \leq 7$

Add the lane fee to the number of persons,  $x$ , times \$5.50 per person. This sum must be less than or equal to \$44.

To solve the inequality, first combine the constants by subtracting the constant term on the left from both sides.

Next, divide both sides by the coefficient of the variable.

80. at least \$1400

Multiply the number of hours (20) by the amount earned per hour (9). Add the product to 5% of the money earned in the hair products sold,  $x$ . This sum must be greater than or equal to \$250.