

Pre-Algebra Final Review Sheet

Simplify (reduce all fractions and leave answers as improper fractions or as mixed numbers):

1. $(8+5-1) \times 11 + 3 + 1 - 9$

$$(13-1) \times 11 + 3 + 1 - 9$$

$$12 \times 11 + 3 + 1 - 9$$

$$132 + 3 + 1 - 9$$

2. $4\frac{3}{4} \times 2\frac{4}{5}$ $\frac{127}{10}$

$$\frac{19}{4} \times \frac{14}{5} = \frac{266}{20} \div 2 = \frac{133}{10}$$

3. 57.11×4.2

$$\begin{array}{r} 57.11 \\ \times 4.2 \\ \hline 11422 \\ +22844 \\ \hline 239.862 \end{array}$$

4. $346 - 5.456$

$$\begin{array}{r} 346.000 \\ - 5.456 \\ \hline 340.544 \end{array}$$

5. $58.386 + 7.09$

$$\begin{array}{r} 58.386 \\ + 7.090 \\ \hline 65.476 \end{array}$$

6. $13 + (40 - 5^2 - 5)$

$$13 + (40 - 25 - 5)$$

$$13 + (15 - 5)$$

$$13 + 10$$

$$\boxed{23}$$

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7. $50.544 \div 2.16$

23.4

$$\begin{array}{r} 23.4 \\ 2.16 \overline{) 50.544} \\ \underline{-432} \\ 6784 \\ \underline{-648} \\ 864 \end{array}$$

$$\begin{array}{r} 21\overline{) 2} \\ \underline{432} \\ 21\overline{) 3} \\ \underline{648} \end{array}$$

$$\begin{array}{r} 21\overline{) 4} \\ \underline{864} \end{array}$$

8. $6 \div \frac{3}{4}$

$$\frac{6}{1} \div \frac{3}{4}$$

$$\frac{6}{1} \cdot \frac{4}{3} = \frac{24}{3} = 8$$

9. $10 + (2 \times 3^2 - 4)^4$

$$10 + (2 \times 9 - 4)^4$$

$$10 + (18 - 4)^4$$

$$10 + 14^4$$

$$10 + 38416$$

38426

10. $\frac{4}{6} + \frac{5}{8}$

CD=24

$$\frac{4 \cdot 4}{6 \cdot 4} = \frac{16}{24}$$

$$\frac{5 \cdot 3}{8 \cdot 3} = \frac{15}{24}$$

$$\frac{16}{24} + \frac{15}{24} = \frac{31}{24}$$

Solve for x (round to the nearest tenth if necessary):

11. $x - 5 = 86$

$$+5 \quad +5$$

$x = 91$

12. $4x + 2x - 2 = 40$

$$6x - 2 = 40$$

$$\frac{6x}{6} = \frac{42}{6}$$

$x = 7$

13. $\frac{x}{7} + 3 = 14$

$$7 \cdot \frac{x}{7} = 11 \cdot 7$$

$x = 77$

Find the prime factorization of each of the following (1 point each):

14. 78

$2 \cdot 3 \cdot 13$

$$\begin{array}{c} 78 \\ \swarrow \searrow \\ 2 \quad 39 \\ \quad \swarrow \searrow \\ \quad 3 \quad 13 \end{array}$$

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15. $45y^3x$

$$\begin{array}{c} 45 \\ 5 \swarrow \downarrow \\ 3 \quad 3 \end{array}$$

$$\boxed{3^2 \cdot 5 \cdot y \cdot y \cdot y \cdot x}$$

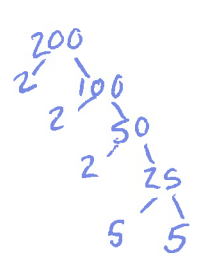
16. $5xy^3$

$$\boxed{5 \cdot x \cdot y \cdot y \cdot y}$$

17. $14r^7u$

$$\begin{array}{c} 14 \\ 2 \swarrow \downarrow \\ 7 \quad 2 \end{array}$$

$$\boxed{2 \cdot 7 \cdot r \cdot r \cdot r \cdot r \cdot r \cdot r \cdot u}$$



18. 200

$$\begin{array}{c} 2 \cdot 2 \cdot 2 \cdot 5 \cdot 5 \\ \boxed{2^3 \cdot 5^2} \end{array}$$

Reduce each of the following using only positive exponents (1 point each):

19. $20x \cdot 3x^3$

$$20 \cdot 3 \cdot x^1 \cdot x^3$$

$$\boxed{60x^4}$$

20. $6x^{-3} \cdot 4x^{-5}$

$$6 \cdot 4 \cdot x^{-3} \cdot x^{-5}$$

$$24x^{-8}$$

$$\rightarrow \begin{array}{c} 24 \cdot \frac{1}{x^8} \\ \frac{24}{1} \cdot \frac{1}{x^8} \\ \boxed{\frac{24}{x^8}} \end{array}$$

21. $\frac{9x^6}{3x^2}$

$$\boxed{3x^4}$$

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22.
$$\frac{5xy^4}{3x^2y}$$

$$\frac{5}{3} \cdot \frac{x^1}{x^2} \cdot \frac{y^4}{y}$$

$$\frac{5}{3} \cdot x^{-1} \cdot y^3$$

$$\frac{5}{3} \cdot \frac{1}{x} \cdot y^3$$

$$\frac{5y^3}{3x}$$

Solve for x (1 point each)

23.
$$\frac{x}{4} = \frac{6}{8}$$

$$24 = 8x$$

$$3 = x$$

24.
$$\frac{13}{24} = \frac{x}{3}$$

$$24x = 39$$

$$x = \frac{39}{24}$$

25.
$$\frac{125}{12} = \frac{x}{1000}$$

$$\frac{12x}{12} = \frac{125000}{12}$$

$$x =$$

$$1041\overline{6}$$

$$12 \overline{) 125000.0}$$

$$\underline{-12} $$

$$050 $$

$$\underline{-48} $$

$$20 $$

$$\underline{-12} $$

$$80 $$

$$\underline{-72} $$

$$80$$

Convert each of the following to unit rates (1 point each):

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26. 240 acorns to 4 squirrels

$$\frac{240 \text{ acorns}}{4 \text{ squirrels}} \div 4$$

$$\frac{60 \text{ acorns}}{1 \text{ squirrel}}$$

27. 80 basketballs to 4 basketball players

$$\frac{80 \text{ bb}}{4 \text{ bb players}} \div 4$$

$$\frac{20 \text{ bb}}{1 \text{ bb player}}$$

28. \$1350 for 15 hours of work

$$\frac{\$1350}{15 \text{ hours}} \div 15$$

$$\frac{\$90}{1 \text{ hour}}$$

29. 20 apples for 6 pies

$$\frac{20 \text{ apples}}{6 \text{ pies}} \div 6$$

$$\frac{3.\bar{3} \text{ apples}}{1 \text{ pie}}$$

$$6 \overline{) 20} \begin{matrix} 3.\bar{3} \\ -18 \\ \hline 2 \end{matrix}$$

30. \$250,000 for 7 cars

$$\frac{\$250,000}{7 \text{ cars}} \div 7$$

$$\frac{\$35714.29}{1 \text{ car}}$$

(rounded to the nearest cent)

Find the GCF of each pair (1 point each):

31. $5x^4, 65x^2y$

$$5x \cdot x \cdot x \cdot x$$

$$5 \cdot 13 \cdot x \cdot x \cdot y$$

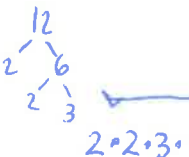
$$5x \cdot x \cdot x \cdot x$$

$$5 \cdot 13 \cdot x \cdot x \cdot y$$

$$5x^2$$



12, $78x^4$



$$\begin{matrix} 2 \cdot 3 \\ 2 \cdot 13 \cdot x \cdot x \cdot x \cdot x \end{matrix}$$

$$2$$

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32. (problem on previous page oops!)

33. $34xyz, 17y$

$$\begin{array}{r} 34 \\ 2 \swarrow \searrow \\ 17 \end{array}$$

$$2 \cdot \overbrace{17 \cdot x \cdot y \cdot z}^{17 \cdot 4}$$

$$\boxed{17y}$$

Find the LCM of each pair (1 point each)

34. $5x^4, 65x^2y$

$$5 \cdot 13 \cdot x \cdot x \cdot x \cdot x \cdot y$$

$$\boxed{65x^4y}$$

35. $12, 78x^4$

$$\begin{array}{r} 12 \\ 2 \swarrow \searrow \\ 2 \quad 3 \end{array}$$

$$2 \cdot 2 \cdot 3 \cdot 13 \cdot x \cdot x \cdot x \cdot x$$

$$\begin{array}{r} 78 \\ 2 \swarrow \searrow \\ 3 \quad 13 \end{array}$$

$$2 \cdot 2 \cdot 3 \cdot 13 \cdot x \cdot x \cdot x \cdot x$$

$$\boxed{156x^4}$$

36. $34xyz, 17y$

$$\begin{array}{r} 34 \\ 2 \swarrow \searrow \\ 17 \end{array}$$

$$2 \cdot \overbrace{17 \cdot x \cdot y \cdot z}^{17 \cdot 4}$$

$$\boxed{34xyz}$$

Answer each question (3 points each)

37. Jesse is 5.5 feet tall and his shadow is 7 feet long. The shadow of a nearby truck is 10 feet long. How tall is the truck?

let x = height of the truck in feet

$$\frac{5.5\text{ft}}{7\text{ft}} = \frac{x}{10\text{ft}}$$

$$\frac{7x}{7} = \frac{55}{7}$$

$$\boxed{x = \$7.86}$$

rounded to the nearest cent

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38. Manny spent \$50 on a packet of 200 marbles. What is the unit rate per marble?

$$\frac{\$50}{200 \text{ marbles}} \div \frac{200}{200} = \boxed{\frac{\$.25}{1 \text{ marble}}}$$

39. What is 3,000 feet / 1 hour converted into miles / 1 hour? (there are 5280 ft in 1 mile)

oops! →

~~Factor 1~~ ~~Factor 2~~ Factor 1 Factor 2

$$\frac{3,000 \text{ ft}}{1 \text{ h}} \cdot \frac{1 \text{ mi}}{5280 \text{ ft}} = \frac{3000 \text{ mi}}{5280 \text{ h}}$$

Simplify:

$$\frac{3,000 \text{ mi} \div 5,280}{5,280 \text{ h} \div 5,280} = \boxed{\frac{.57 \text{ mi}}{1 \text{ h}}}$$

rounded

40. $-3 + (-50)$

$$\boxed{-53}$$

41. $-111 - 101$

$$\boxed{-212}$$

42. $-360 \div 60$

$$\boxed{-6}$$

$$\begin{array}{r} 6 \\ 60 \overline{) 360} \\ \underline{-360} \\ 0 \end{array}$$

Calculate the following (round to the nearest tenth if necessary):

43. What is 9% of 200

$$9\% \rightarrow .09$$

$$\boxed{18}$$

$$\begin{array}{r} 200 \\ \times .09 \\ \hline 18000 \end{array}$$

44. What percent of 96 is 3?

$$\boxed{3.125\%}$$

$$\frac{3}{96} = \frac{x}{100}$$

$$\frac{96x}{96} = \frac{300}{96}$$

$$\begin{array}{r} 3.125 \\ 96 \overline{) 300.000} \\ \underline{-288} \\ 120 \\ \underline{-96} \\ 240 \\ \underline{-192} \\ 480 \end{array}$$

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45. What is 250 increased by 21%?

$$\begin{array}{r} 250.0 \\ + 52.5 \\ \hline 302.5 \end{array}$$

$$21\% \text{ of } 250 = 52.5$$

$$\begin{array}{r} 250 \\ \times .21 \\ \hline 500 \\ + 2500 \\ \hline 5250 \end{array}$$

46. What is 1309 decreased by 17%?

$$\begin{array}{r} 1309.86 \\ - 225.53 \\ \hline 1083.47 \end{array}$$

$$17\% \text{ of } 1309 = 225.53$$

$$\begin{array}{r} 1309 \\ \times .17 \\ \hline 9163 \\ + 13090 \\ \hline 22253 \end{array}$$

Identify the property that is illustrated by the following equations (1 point each):

47. $(7)(10)=(10)(7)$

Commutative property of multiplication

48. $90(a+b)=90a+90b$

Distributive property

49. $a+0=a$

Identity property of addition

50. $(7+5)+9=7+(5+9)$

Associative property of addition

51. $134(1)=134$

Identity property of multiplication

For the following expression: $x - 50 + 24 - 6x$

Identify all of the: (1 point each)

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a. Terms:

$$\boxed{x, -50, 24, -6x}$$

b. Sets of like-terms:

$$\boxed{x \text{ and } -6x ; -50 \text{ and } 24}$$

c. Coefficients:

$$\boxed{1 \text{ and } -6}$$

Solve each of the following for x: (2 points each)

52. $x - 20 = 4$
 $\begin{array}{r} +20 \quad +20 \\ \hline x = 24 \end{array}$

53. $5x + 12 = 24 + 2x$
 $\begin{array}{r} -2x \quad -2x \\ \hline 3x + 12 = 24 \\ -12 \quad -12 \\ \hline 3x = 12 \\ \frac{3x}{3} = \frac{12}{3} \\ \hline x = 4 \end{array}$

54. $\frac{x-3}{15} = 3 \cdot 15$
 $\begin{array}{r} x-3 = 45 \\ +3 \quad +3 \\ \hline x = 48 \end{array}$

55. $\frac{x}{-2} + 4 = 3$
 $\begin{array}{r} -4 \quad -4 \\ \hline \frac{x}{-4} = -1 \cdot -4 \\ \hline x = 4 \end{array}$

56. $3x - 9 < -4x + 61$
 $\begin{array}{r} +4x \quad +4x \\ \hline 7x - 9 < 61 \\ +9 \quad +9 \\ \hline 7x < 70 \\ \hline x < 10 \end{array}$

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* Remember

when solving
inequalities switch
the sign when multiplying
or dividing by a negative
number

12. $\frac{x}{4} + 2 \geq 15$

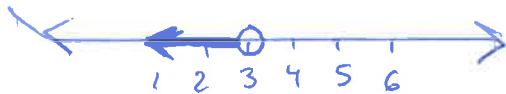
$\frac{4}{1} \cdot \frac{x}{4} \geq 13 \cdot 4$

$x \geq 52$

ex: $\frac{-2x}{-2} < \frac{10}{-2}$
 $x > -5$

Graph the following on number line (1 point each):

57. $x < 3$



58. $-10 \leq x$



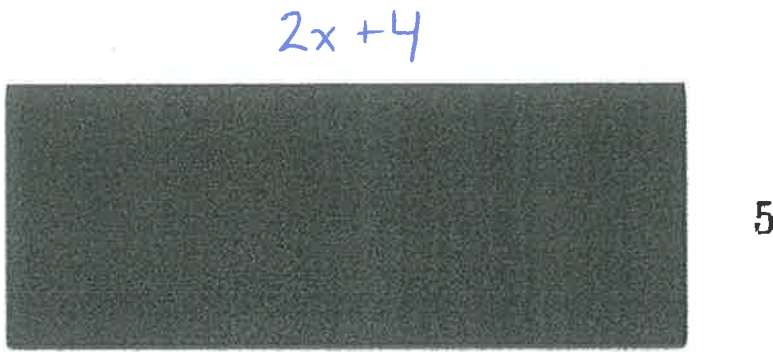
59. $x \geq 6$



Use the rectangle below for questions 60 to 61:

$2x + 4$

← This is supposed to be one side of the rectangle on the next page!



60. Calculate the area

$$A = l \times w \quad \begin{array}{l} l = 2x + 4 \\ w = 5 \end{array}$$

$$A = 5(2x + 4)$$

$$A = 10x + 20$$

61. Calculate the perimeter

$$P = 2l + 2w$$

$$P = 2(2x + 4) + 2(5)$$

$$P = 4x + 8 + 10$$

$$P = 4x + 18$$

Write an equation and solve (62-64):

62. Frank is considering purchasing a season pass to the community pool. Without the season pass, it costs \$12 to enter the pool and \$1 to park. The season pass costs \$70 and does not include parking. How many times will Frank have to visit the pool with the season pass (assuming he always needs to pay to park) in order for the season pass to be worth it?

~~$x = \text{total cost of visiting the park}$~~
 $x = \text{number of visits}$

w/out season pass

$$12x + 1x = \text{total cost}$$

6 trips

w/season pass

$$70 + 1x = \text{total cost}$$

$$\begin{array}{r} 12x + 1x = 70 + 1x \\ 13x = 70 + 1x \\ -1x \quad -1x \\ \hline 12x = 70 \end{array}$$

$$\frac{12x}{12} = \frac{70}{12}$$

$$x = 5.83$$

This is rounded up as you cannot take .83 trips to the park

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63. You have \$21 in your wallet and earn \$9 per hour. Your friend doesn't have any money but earns \$12/hour. If you both work the same number of hours, how many hours will you have to work before you and your friend have the same amount of money?

$x = \#$ of hours worked

\$ You have ~~money~~ = $21 + 9x$

\$ your friend has = $12x$

$$21 + 9x = 12x$$

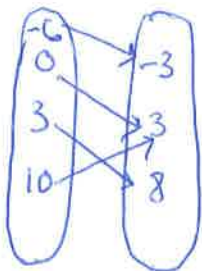
$$\frac{21}{3} = \frac{3x}{3}$$

$$7 = x$$

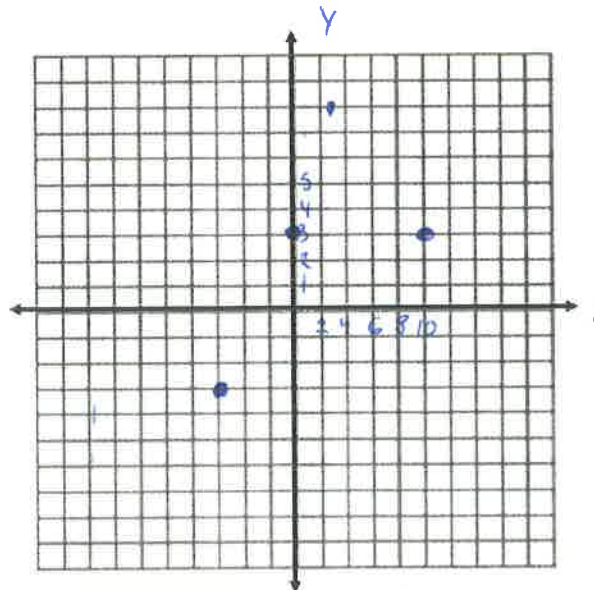
You will both have the same amount of money when you have both worked 7 hours

Represent each relation as a graph AND as a mapping diagram. Then tell whether the relation is a function.

64. $(0, 3), (-6, -3), (3, 8), (10, 3)$

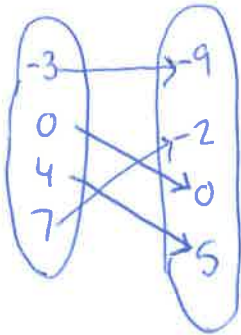


Yes, it's a function
(passes vertical line test)

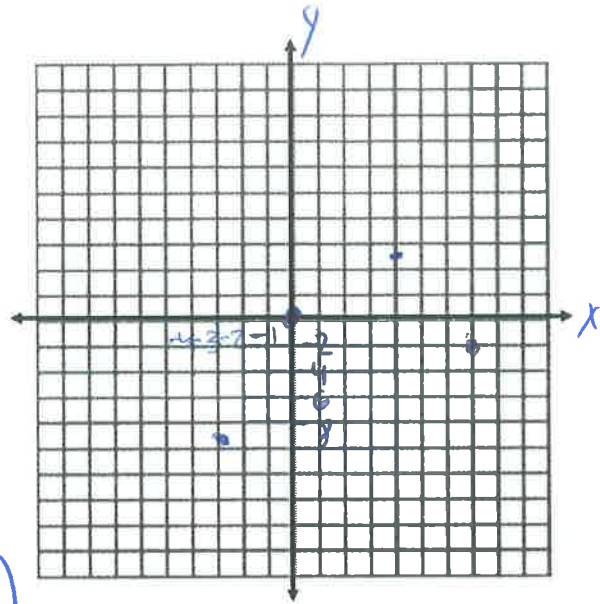


65. $(0,0), (4, 5), (-3, -9), (7, -2)$

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Yes, it's a
function
(passes vertical
line test)



Graph each equation. Tell whether the equation is a function:

66. $y = 6x + 1$

y -intercept = 1

x -intercept =

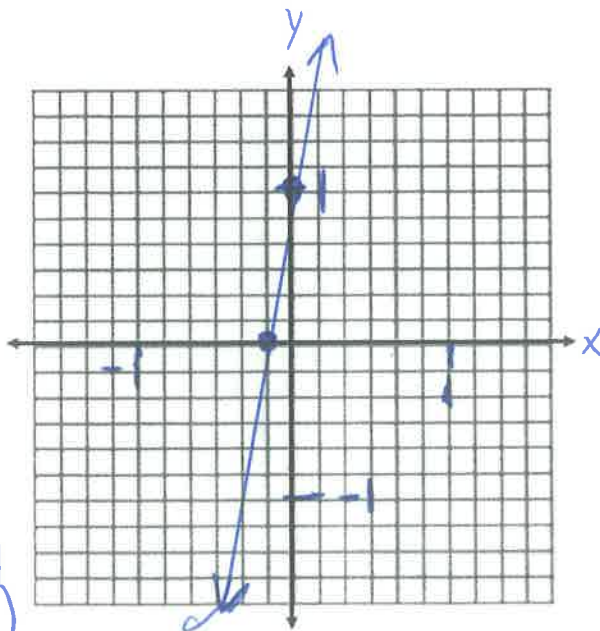
$0 = 6x + 1$

$-1 = 6x$

$-\frac{1}{6} = x$

Yes it's
a function

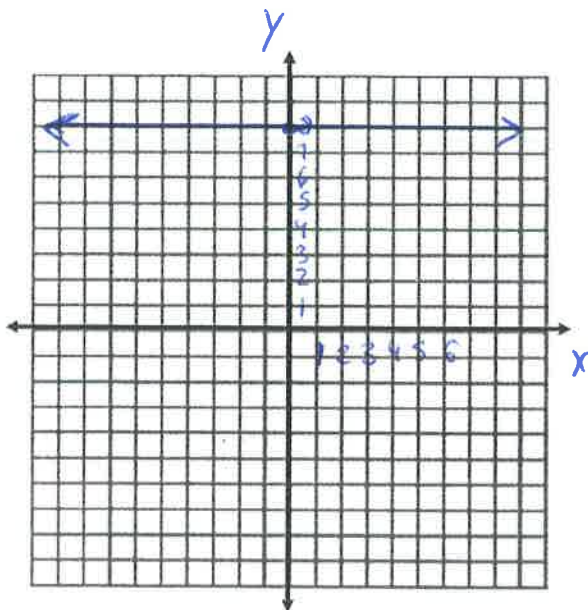
(passes vertical
line test)



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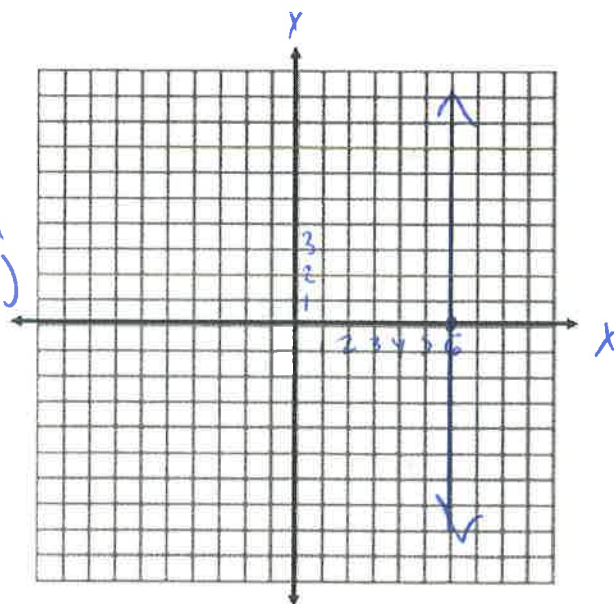
67. $y=8$

Yes, it is
a function



68. $x=6$

No,
not a function
(fails vertical
line test)



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Find the x and y intercepts of each equation. Graph each equation.

69. $y = -2x + 7$

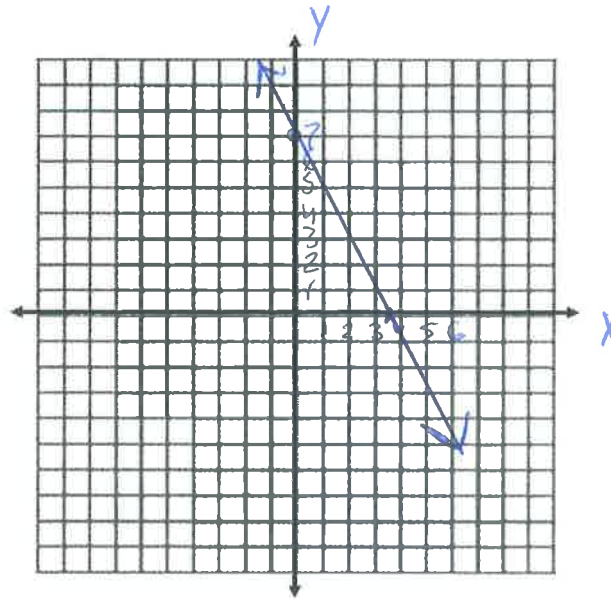
$y\text{-intercept} = 7$

$x\text{-intercept} = 3.5$

$0 = -2x + 7$

$\frac{-7}{-2} = \frac{-2x}{-2}$

$3.5 = x$



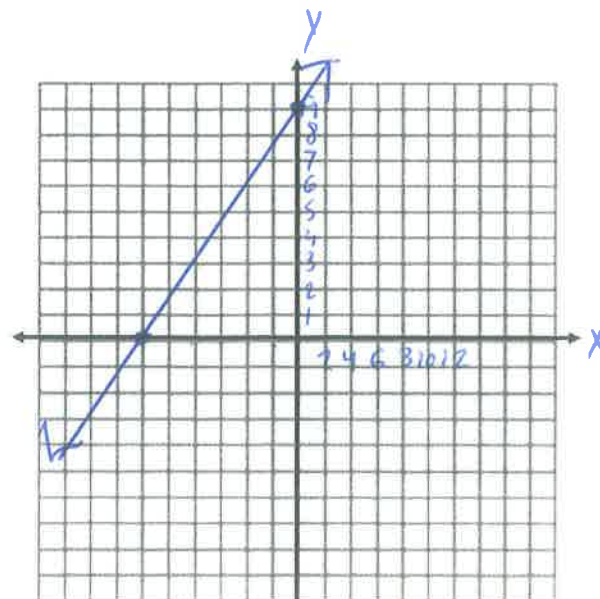
70. $-3x + 4y = 36$

$y\text{-intercept} = 9$
 $-3(0) + 4y = 36$

$4y = 36$
 $y = 9$

$x\text{-intercept} = -3x + 4(0) = 36$

$\frac{-36}{-3} = \frac{36}{-3}$
 $x = -12$



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Find the slope of each line:

71. Through points (10, -3) and (4, 5)

$$m = \frac{-3 - 5}{10 - 4}$$
$$m = \frac{-8}{6} = \boxed{\frac{-4}{3}}$$

72. $y = 70x - 12$

$$y = mx + b$$

↑
slope

$$\boxed{m = 70}$$

Answer the following question (2 points):

73. A movie theater charges \$8.50 admission for adults and \$5.50 admission for children. The movie theater expects to make \$7000 dollars in one night. Write an equation describing the number of adults and children that will need to go to the movie theater in order for the theater to make \$7000.

$x = \#$ of adult tickets sold
 $y = \#$ of child tickets sold

$$\boxed{8.50x + 5.5y = 7000}$$

Write a linear equation for each situation:

74. An equation with a slope of 14 and a y-intercept of 9

$$m = 14$$
$$b = 9$$
$$\boxed{y = 14x + 9}$$

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75. An equation which contains points (9, 10) and (0, -20)

$$m = \frac{10 - (-20)}{9 - 0}$$

$$m = \frac{30}{9} = \frac{10}{3}$$

y-intercept
b = -20

$$Y = \frac{10}{3}x + (-20)$$

76. A linear equation from this table of values:

x	0	9	18	27
y	3	2	1	0

y-intercept
b = 3

(0, 3), (9, 2)

$$m = \frac{2 - 3}{9 - 0} = -\frac{1}{9}$$

$$Y = -\frac{1}{9}x + 3$$

77. A linear equation that is parallel to $y = 7x - 3$ and contains the point (0, 8)

↑ slope of our line (parallel lines have slopes that are the same)
y-intercept of our line

$$Y = 7x + 8$$

78. A linear equation that is perpendicular to $y = 3x + 5$ and contains the point (0, -30)

← y-intercept of our line
(perpendicular lines have slopes that are opposite reciprocals)

$$Y = -\frac{1}{3}x + (-30)$$

$$3 = \frac{3}{1} \rightarrow -\frac{1}{3}$$

Find $f(9)$ for each function (79-81):

79. $f(x) = 7x + 9$

$$f(9) = 7(9) + 9$$

$$f(9) = 63 + 9$$

$$f(9) = 72$$

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80. $f(x) = 45 + 3 - x$

$F(9) = 45 + 3 - 9$

$F(9) = 48 - 9$

$F(9) = 39$

81. $f(x) = 5x$

$f(9) = 5(9)$

$f(9) = 45$

Solve each linear system system by graphing

82.

$y = x - 3$

$y = 2x + 1$

Graph:

$y = x - 3$

y-intercept = -3

x-intercept = 3

$0 = x - 3$
 $+3 \quad +3$
 $3 = x$

$x = -4$
 $y = -7$

Check:
 $y = x - 3$
 $-7 = -4 - 3$
 $-7 = -7$ ✓

$y = 2x + 1$
 $-7 = 2(-4) + 1$
 $-7 = -7$ ✓

Graph:

$y = 2x + 1$

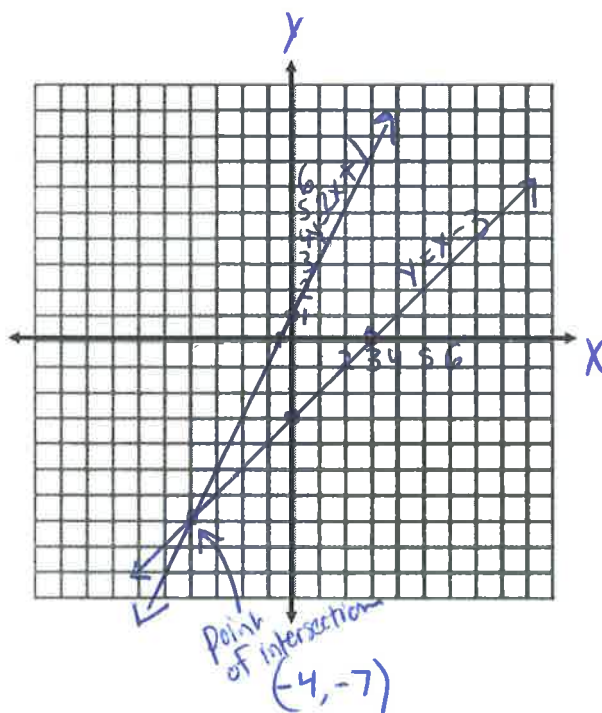
y-intercept = 1

x-intercept = $-\frac{1}{2}$

$0 = 2x + 1$

$-1 = 2x$

$-\frac{1}{2} = x$



83.

$y = -x + 4$

$y = x + 3$

Graph

$y = -x + 4$

y-intercept = 4

x-intercept:

$0 = -x + 4$

$-4 = -x$

$-1 \quad -1$

$4 = x$

$x = 0.5$
 $y = 3.5$

Graph

$y = x + 3$

y-intercept = 3

x-intercept = -3

$0 = x + 3$

$-3 = x$

Check

~~$y = -x + 4$~~

$y = -x + 4$

$3.5 = -0.5 + 4$

$3.5 = 3.5$ ✓

Check

$y = x + 3$

$3.5 = 0.5 + 3$

$3.5 = 3.5$ ✓

