

ANSWERS TO TRADITIONAL ALGEBRA 1 SUMMER PACKET

Operations involving fractions

Simplify. Do not use a calculator.

$$1. \frac{3}{8} + \frac{1}{4} = \frac{3}{8} + \frac{1}{4} \cdot \frac{2}{2} = \frac{3}{8} + \frac{2}{8} = \frac{5}{8}$$

$$2. 6\frac{1}{2} + 3\frac{1}{9} = 6\frac{1}{2} \cdot \frac{9}{9} + 3\frac{1}{9} \cdot \frac{2}{2} = 6\frac{9}{18} + 3\frac{2}{18} = 9\frac{11}{18}$$

$$3. 5\frac{1}{3} \cdot \frac{4}{4} - 2\frac{1}{4} \cdot \frac{3}{3} = 5\frac{4}{12} - 2\frac{3}{12} = 3\frac{1}{12}$$

$$4. 6 + 3\frac{3}{8} = 9\frac{3}{8}$$

$$5. 2\frac{1}{6} + 2\frac{7}{8} = 2\frac{1}{6} \cdot \frac{4}{4} + 2\frac{7}{8} \cdot \frac{3}{3} = 2\frac{4}{24} + 2\frac{21}{24} = 4\frac{25}{24} = 5\frac{1}{24}$$

$$6. 7\frac{1}{8} - 2\frac{3}{4} = 7\frac{1}{8} - 2\frac{3}{4} \cdot \frac{2}{2} = 7\frac{1}{8} - 2\frac{6}{8} = 6\frac{9}{8} - 2\frac{6}{8} = 4\frac{3}{8}$$

$$7. 20 - 8\frac{3}{4} = 19\frac{4}{4} - 8\frac{3}{4} = 11\frac{1}{4}$$

$$8. \frac{5}{9} \div \frac{1}{3} = \frac{5}{9} \cdot \frac{3}{1} = \frac{15}{9} = \frac{5}{3} = 1\frac{2}{3}$$

$$9. \frac{11}{12} \cdot 3 = \frac{11}{12} \cdot \frac{3}{1} = \frac{33}{12} = 2\frac{9}{12} = 2\frac{3}{4}$$

$$10. \frac{5}{16} \cdot \frac{4}{5} = \frac{20}{80} = \frac{1}{4}$$

$$11. 5\frac{1}{2} \cdot 4\frac{3}{4} = \frac{11}{2} \cdot \frac{19}{4} = \frac{209}{8} = 26\frac{1}{8}$$

$$12. 3 \cdot 5\frac{2}{3} = \frac{3}{1} \cdot \frac{17}{3} = 17$$

$$13. 5 \div \frac{2}{5} = \frac{5}{1} \cdot \frac{5}{2} = \frac{25}{2} = 12\frac{1}{2}$$

$$14. 9\frac{1}{4} \div 2\frac{1}{4} = \frac{37}{4} \div \frac{9}{4} = \frac{37}{4} \cdot \frac{4}{9} = \frac{37}{9} = 4\frac{1}{9}$$

Operations involving decimals

Simplify. Do not use a calculator.

1. $5.038 + 2.96 = 7.998$

2. $16 + 1.6 + 0.517 = 18.117$

3. $27 - 10.4 = 16.6$

4. $9.006 - 4.44 = 4.566$

5. $4.8 \cdot 6.9 = 33.12$

6. $0.05 \cdot 0.7 = 0.035$

7. $17.03 \div 9 = 1.89\bar{2}$

8. $4.82 \div 45 = 0.107\bar{1}$

9. $3.25 \div 0.5 = 6.5$

10. $23.24 \div 2.8 = 8.3$

Order of Operations

Simplify. Do not use a calculator.

1. $[36 \div (3 \cdot 4)] + 2 = [36 \div 12] + 2 = 3 + 2 = 5$

2. $60 - 7(5 + 6 \div 2) + 2^4 = 60 - 7(5 + 6 \div 2) + 16 = 60 - 7(5 + 3) + 16 = 60 - 7(8) + 16$
 $= 60 - 56 + 16 = 20$

3. $4 + 6(5 - 2) = 4 + 6(3) = 4 + 18 = 22$

4. $2 + 8 \cdot 3^2 = 2 + 8 \cdot 9 = 2 + 72 = 74$

5. $24 - 6 \cdot 2 = 24 - 12 = 12$

6. $4 \cdot 9 + 7 \cdot 8 = 36 + 56 = 92$

7. $102 - 2^4(3^4 - 51) = 102 - 2^4(81 - 51) = 102 - 16(81 - 51) = 102 - 16(30) = 102 - 480 = -378$

8. $14 + 8 \div 2 - 1 = 14 + 4 - 1 = 17$

9. $\frac{63 - 8}{3 + 8} - 2 = \frac{55}{11} - 2 = 5 - 2 = 3$

10. $5 \cdot \frac{19 - 7}{5 + 1} = 5 \cdot \frac{12}{6} = 5 \cdot 2 = 10$

Writing expressions and equations from sentences

Write the expression described

1. Subtract 2 from x, then add y

$$x - 2 + y$$

3. One-eighth of z

$$\frac{1}{8}z$$

5. Divide y by the sum of 7 and z

$$\frac{y}{7+z}$$

7. Subtract the cube of z from 15

$$15 - z^3$$

9. 4 times the sum of 10 and x

$$4 \cdot (10 + x)$$

2. Multiply x by the sum of 7 and y

$$x \cdot (7 + y)$$

4. Add x and y, then square the result

$$(x + y)^2$$

6. Subtract the product of 5 and x from 7

$$7 - 5x$$

8. 13 less than the quotient of 5 divided by p

$$\frac{5}{p} - 13$$

10. 5 more than the product of 3 and c

$$5 + 3c$$

Evaluating a number raised to a power

Simplify. Do not use a calculator.

1. $3^3 = 3 \cdot 3 \cdot 3 = 27$

2. $2^7 = 128$

3. $(-2)^4 = (-2)(-2)(-2)(-2) = 16$

4. $-2^4 = -2 \cdot 2 \cdot 2 \cdot 2 = -16$

Write in expanded form.

5. $x^6 = x \cdot x \cdot x \cdot x \cdot x \cdot x$

6. $5^4 = 5 \cdot 5 \cdot 5 \cdot 5$

Write in exponential form.

5. $x \cdot x \cdot x \cdot x \cdot x \cdot x = x^6$

6. $3 \cdot 3 \cdot 5 \cdot 5 \cdot 5 \cdot 5 = 3^2 \cdot 5^4$

Operations with negative numbers

Simplify. Do not use a calculator.

1. $-6 + -3 = -9$

2. $9 - 15 = -6$

3. $12 - (-6) = 18$

4. $-9 + 5 = -4$

5. $18 \cdot -3 = -54$

6. $-8 \cdot -10 = 80$

7. $\frac{-35}{-5} = 7$

8. $\frac{27}{-3} = -9$

Solving 1-step equations

Solve. Do not use a calculator.

$$x - 8 = 15$$

1. $x - 8 + 8 = 15 + 8$

$$x = 23$$

$$x + 15 = 6$$

2. $x + 15 - 15 = 6 - 15$

$$x = -9$$

$$5x = 6$$

3. $\frac{5x}{5} = \frac{6}{5}$

$$x = 1\frac{1}{5}$$

$$\frac{x}{8} = -6$$

4. $\frac{x}{8} \cdot 8 = -6 \cdot 8$

$$x = -48$$

$$x - 8 = -12$$

5. $x - 8 + 8 = -12 + 8$

$$x = -4$$

$$6 + x = -5$$

6. $6 + x - 6 = -5 - 6$

$$x = -11$$

$$-1.3x = 2.6$$

7. $\frac{-1.3x}{-1.3} = \frac{2.6}{-1.3}$

$$x = -2$$

$$\frac{x}{-9} = -12$$

8. $\frac{x}{-9} \cdot -9 = -12 \cdot -9$

$$x = 108$$

$$\frac{2}{3}x = 18$$

$$9. \frac{2}{3}x \cdot \frac{3}{2} = 18 \cdot \frac{3}{2}$$
$$x = 27$$

$$-\frac{5}{6}x = 10$$

$$10. -\frac{5}{6}x \cdot -\frac{6}{5} = 10 \cdot -\frac{6}{5}$$
$$x = -12$$

Finding the absolute value of a number or numerical expression

Simplify.

$$1. |8| = 8$$

$$2. |-78| = 78$$

$$3. |8 - 17| = |-9| = 9$$

$$4. |15 + -7| = |8| = 8$$

$$5. |6 \cdot 4| = |24| = 24$$

$$6. |-24 \div 3| = |-8| = 8$$

Solving 2-step equations

Solve for x. (No calculator.)

$$2x + 3 = 19$$

$$2x + 3 - 3 = 19 - 3$$

$$1. 2x = 16$$

$$2x \div 2 = 16 \div 2$$

$$x = 8$$

$$5x - 3 = 12$$

$$5x - 3 + 3 = 12 + 3$$

$$2. 5x = 15$$

$$5x \div 5 = 15 \div 5$$

$$x = 3$$

$$4x - 2 = -1$$

$$4x - 2 + 2 = -1 + 2$$

$$3. 4x = 1$$

$$4x \div 4 = 1 \div 4$$

$$x = \frac{1}{4}$$

$$-2 + 3x = 8$$

$$-2 + 3x + 2 = 8 + 2$$

$$4. 3x = 10$$

$$3x \div 3 = 10 \div 3$$

$$x = 3\frac{1}{3}$$

$$\frac{1}{5}x + 3 = 7$$

$$5. \quad \frac{1}{5}x + 3 - 3 = 7 - 3$$

$$\frac{1}{5}x \cdot \frac{5}{1} = 4 \cdot \frac{5}{1}$$

$$x = 20$$

$$4.6 + 5x = -9$$

$$4.6 + 5x - 4.6 = -9 - 4.6$$

$$6. \quad 5x = -13.6$$

$$5x \div 5 = -13.6 \div 5$$

$$x = -2.72$$

$$13 = 9 - \frac{1}{3}x$$

$$13 - 9 = 9 - \frac{1}{3}x - 9$$

$$7. \quad 4 = -\frac{1}{3}x$$

$$4 \cdot -\frac{3}{1} = -\frac{1}{3}x \cdot -\frac{3}{1}$$

$$-12 = x$$

$$5 - 3c = 17$$

$$5 - 3c - 5 = 17 - 5$$

$$8. \quad -3c = 12$$

$$-3c \div -3 = 12 \div -3$$

$$c = -4$$

$$-\frac{4}{3} - x = -\frac{1}{3}$$

$$-\frac{4}{3} - x + \frac{4}{3} = -\frac{1}{3} + \frac{4}{3}$$

$$9. \quad -x = 1$$

$$-x \div -1 = 1 \div -1$$

$$x = -1$$

$$71 = 4 - x$$

$$71 - 4 = 4 - x - 4$$

$$10. \quad 67 = -x$$

$$67 \div -1 = -x \div -1$$

$$-67 = x$$

Writing expressions and equations from sentences

Write the expression described

1. Make 5 dollars per hour for x hours, plus \$7.50

$$5x + 7.50$$

2. Go 40 miles per hour for x hours, then go 70 miles further

$$40x + 70$$

3. Start with 50 grapes and eat 3 grapes per minute for 6 minutes

$$50 - 3(6)$$

4. Start 20 miles from home. Walk 4 miles per hour toward home for x hours.

$$20 - 4x$$

Solving word problems using equations.

Write an equation to describe the problem then solve.

1. Suzy is selling cookies for 25 cents plus 5 cents for the box. Let x be the number of cookies you buy.

a) Write an expression for the number of cents you pay for x cookies.

$$25x + 5 \text{ or } 0.25x + 0.05$$

b) How much will you pay for 5 cookies? 10 cookies?

$$25(5) + 5$$

$$125 + 5$$

$$130\text{cents} = \$1.30$$

$$25(10) + 5$$

$$250 + 5$$

$$255\text{cents} = \$2.55$$

c) If you paid \$4.30 (430 cents), how many cookies did you buy? (Write an equation first.)

$$25x + 5 = 430$$

$$25x + 5 - 5 = 430 - 5$$

$$25x = 425$$

$$x = 17\text{cookies}$$

2. A gas tank holds 20 gallons of gas and uses $\frac{1}{10}$ of a gallon every mile.

a) Let x be the number of miles driven. Write an expression for the number of gallons left after x miles.

$$20 - \frac{1}{10}x$$

b) How many gallons are left after 10 miles? 120 miles?

$$20 - \frac{1}{10}(10)$$

$$20 - 1 = 19\text{gallons}$$

$$20 - \frac{1}{10}(120)$$

$$20 - 12$$

$$8\text{gallons}$$

c) At the end of a trip you find that you have 11.5 gallons left. How far did you travel?

$$20 - \frac{1}{10}x = 11.5$$

$$20 - \frac{1}{10}x - 20 = 11.5 - 20$$

$$-\frac{1}{10}x = -8.5$$

$$-\frac{1}{10}x \cdot -\frac{10}{1} = -8.5 \cdot -\frac{10}{1}$$

$$x = 85 \text{ miles}$$

3. Hillary is traveling to her friend's house. Her friend's house is 40 miles away. If Hillary travels at a constant rate of 30 miles per hour:

a) how close will she be after 30 minutes?

$$30 \text{ minutes} = 0.5 \text{ hours}$$

$$40 - 30(0.5) = 40 - 15 = 25 \text{ miles}$$

b) how long has she been traveling if she is only 5 miles away?

$$40 - 30x = 5$$

$$40 - 30x - 40 = 5 - 40$$

$$-30x = -35$$

$$-30x \div -30 = -35 \div -30$$

$$x = 1.17 \text{ hours}$$

Distributive property

Simplify.

$$1. \quad 3(x + 7) = 3 \cdot x + 3 \cdot 7 = 3x + 21$$

$$2. \quad -2(11 - y) = -2 \cdot 11 - (-2)y = -22 + 2y$$

$$3. \quad \frac{1}{3}(12x - 15y) = \frac{1}{3}(12x) - \frac{1}{3}(15y) = 4x - 5y$$

$$4. \quad \frac{7x + 63 - 14d}{7} = x + 9 - 2d$$

Combining like terms

Simplify.

1. $7x + 6x + 8 = 13x + 8$

2. $9x - 5 + 7x + 4 = 16x - 1$

3. $7x^2 + 7x = \text{cannot_be_simplified}$

4. $3x^2 - 5x + 6 - 8x^2 = -5x^2 - 5x + 6$

5. $3(4x + 7) - 2 = 3(4x) + 3(7) - 2 = 12x + 21 - 2 = 12x + 19$

6. $13 - 2(3x + 4) = 13 + -2(3x + 4) = 13 + -6x + -8 = 5 + -6x$

7. $8(x + 4) - (x - 5) = 8x + 32 - x + 5 = 7x + 37$

8. $\frac{1}{4}(12x + 20) - \frac{1}{5}(30 - 15x) = 3x + 5 - 6 + 3x = 6x - 1$

9. $5x + 3(x - 2) = 5x + 3x - 6 = 8x - 6$

10. $6x - x(4x + 1) = 6x - 4x^2 - x = -4x^2 + 5x$

Percentages

Solve.

1. What is 45% of 70?

$$x = .45(70) = 31.5$$

2. 30 is what percent of 60?

$$30 = 60x$$

$$0.5 = x = 50\%$$

3. 16 is 15% of what number?

$$16 = .15x$$

$$106.\bar{6} = x$$

4. Andy received an 85% on his test. If the test had 25 questions, how many did Andy get right?

$$x = .85(25)$$

$$x = 21.25 \text{ questions}$$

5. Tyler made 80 ounces of a juice drink. If he used 20 ounces of apple juice, what percent of the drink is apple juice?

$$20 = 80x$$

$$0.25 = x = 25\%$$

Proportions

Solve for x .

$$1. \frac{x}{5} = \frac{24}{15} \Rightarrow 15x = 120 \Rightarrow x = 8$$

$$2. \frac{8}{x} = \frac{20}{17.5} \Rightarrow 20x = 140 \Rightarrow x = 7$$

3. In one basketball league, there are 96 players on 8 teams. In another basketball league, there are 12 teams. All of the teams in both leagues have the same number of players. How many players are in the 12-team league?

$$\frac{96}{8} = \frac{x}{12} \Rightarrow 1152 = 8x \Rightarrow x = 144$$

4. A car is able to get 25 miles per gallon of gasoline. The car has a 16 gallon gas tank. How many miles can the car travel if you start the trip with a full tank?

$$\frac{25 \text{ miles}}{1 \text{ gallon}} = \frac{x}{16 \text{ gallons}} \Rightarrow x = 400 \text{ miles}$$

5. A flower delivery person is able to make 5 deliveries in 30 minutes. He has 3 more hours left to work today. With his remaining time on the job, how many more deliveries can he make?

$$\frac{5 \text{ deliveries}}{30 \text{ minutes}} = \frac{x}{3 \cdot 60 \text{ minutes}} \Rightarrow 30x = 900 \Rightarrow x = 30 \text{ deliveries}$$

Students should be proficient at these concepts:

Factoring out a GCF from an expression

Factor out the common factors.

1. $3x + 3y = 3(x + y)$

2. $3a - 6 = 3(a - 2)$

3. $4ax + 12bx = 4x(a + 3b)$

4. $x^2 - 4x = x(x - 4)$

5. $3x + 3y - 6z = 3(x + y - 2z)$

6. $6x + 8y = 2(3x + 4y)$

Solving equations with like terms

Solve for x.

$$2x + 6x = 56$$

1. $8x = 56$

$$x = 7$$

$$3x + 4x + 8 = 22$$

2. $7x + 8 = 22$

$$7x = 14$$

$$x = 2$$

$$8x - 4 - 2x = -10$$

3. $6x - 4 = -10$

$$6x = -6$$

$$x = -1$$

$$7x + 3 + 3x = 63$$

4. $10x + 3 = 63$

$$10x = 60$$

$$x = 6$$

Solving equations with the distributive property

Solve for x.

$$5(x + 3) - 2x = -21$$

$$5x + 15 - 2x = -21$$

1. $3x + 15 = -21$

$$3x = -36$$

$$x = -12$$

$$5x + 3(x + 4) = 28$$

$$5x + 3x + 12 = 28$$

2. $8x + 12 = 28$

$$8x = 16$$

$$x = 2$$

$$7x - 4(2 - 3x) = -27$$

$$7x - 8 + 12x = -27$$

3. $19x - 8 = -27$

$$19x = -19$$

$$x = -1$$

$$4x - (3x + 11) = -11$$

4. $4x - 3x - 11 = -11$

$$x - 11 = -11$$

$$x = 0$$

$$2(x + 3) - 5(x - 1) = 32$$

$$2x + 6 - 5x + 5 = 32$$

5. $7x + 11 = 32$

$$7x = 21$$

$$x = 3$$

$$66 = 4(2x - 3) + 2(x + 4)$$

$$66 = 8x - 12 + 2x + 8$$

6. $66 = 10x - 4$

$$70 = 10x$$

$$7 = x$$

Solving equations with variables on both sides

Solve for x.

$$5x + 27 = 2x$$

1. $3x + 27 = 0$

$$3x = -27$$

$$x = -9$$

$$7z = -16 - 9z$$

2. $16z = -16$

$$z = -1$$

$$5x + 8 = 7x + 8$$

3. $-2x = 0$

$$x = 0$$

$$4(x + 3) = 6x$$

4. $4x + 12 = 6x$

$$12 = 2x$$

$$6 = x$$

$$7(2 - r) = 3(r + 8)$$

5. $14 - 7r = 3r + 24$

$$-10 = 10r$$

$$-1 = r$$

$$4x - 2(1 - x) = 2(3x - 2)$$

$$4x - 2 + 2x = 6x - 4$$

6. $6x - 2 = 6x - 4$

$$-2 = -4$$

no_solution

$$6(x + 4) - (x + 3) = x - 1$$

$$6x + 24 - x - 3 = x - 1$$

7. $5x + 21 = x - 1$

$$4x = -22$$

$$x = -5.5$$

Solving equations that involve decimals

Solve.

$$0.3c - 8.5 = 1 + 1.7c$$

1. $-1.4x = 9.5$
 $x \approx -6.79$

$$0.4x + 0.5 = 0.6x + 0.7 + 0.8x$$

2. $1.4x + 0.5 = 1.4x + 0.7$
 $0.5 = 0.7$
no_solution

3. $3(2.4x + 5) = x + 2.7$
 $7.2x + 15 = x + 2.7$
 $6.2x = -12.3$
 $x \approx -1.98$

4. $5.9 - 1.7t = 3(4.1 - t)$
 $5.9 - 1.7t = 12.3 - 3t$
 $1.3t = 6.4$
 $x \approx 4.92$

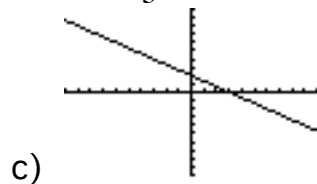
Linear Equations

- Transform the equation so y is given in terms of x .
- Pick 4 numbers, substitute them for x , and evaluate y .
- Plot the graph of the equation.

1. $2x + 3y = 6$

X	Y1
0	2
1	1.3333
2	.66667
3	0
4	-.6667
5	-1.3333
6	-2

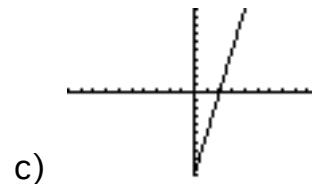
$2x + 3y = 6$
a) $3y = -2x + 6$
b) $X=0$
 $y = -\frac{2}{3}x + 2$



2. $5x - y = 10$

X	Y1
0	-10
1	-5
2	0
3	5
4	10
5	15
6	20

$5x - y = 10$
a) $-y = -5x + 10$
b) $X=0$
 $y = 5x - 10$

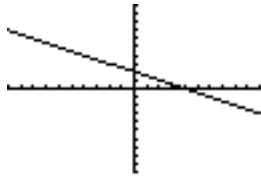


3. $x + 2y = 4$

X	Y1
0	2
1	1.5
2	1
3	0.5
4	0
5	-0.5
6	-1

a) $x + 2y = 4$
 $2y = -x + 4$

b) $y = -\frac{1}{2}x + 2$



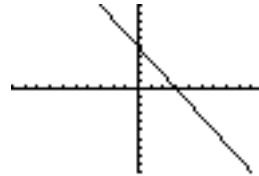
c)

4. $-5x - 3y = -15$

X	Y1
0	5
1	3.3333
2	1.6667
3	0
4	-1.6667
5	-3.3333

a) $-5x - 3y = -15$
 $-3y = 5x - 15$

b) $y = -\frac{5}{3}x + 5$



c)

Slope

Find the slope of the line containing the following points:

1. (4, 2) and (-1, 3)

$$\frac{2-3}{4-(-1)} = -\frac{1}{5}$$

2. (6, 7) and (-2, 7)

$$\frac{7-7}{6-(-2)} = \frac{0}{8} = 0$$

3. (-3, -8) and (-1, -3)

$$\frac{-8-(-3)}{-3-(-1)} = \frac{-5}{-2} = \frac{5}{2}$$

4. (3, -4) and (3, 12)

$$\frac{-4-12}{3-3} = \frac{-16}{0} = \text{no_slope}$$

Intercepts

Find the x- and y-intercepts and use them to plot the graph.

1. $8x + 3y = 24$

$$8(0) + 3y = 24 \quad 8x + 3(0) = 24$$

$$3y = 24 \quad 8x = 24$$

$$y = 8 \quad x = 3$$

$$(0, 8) \quad (3, 0)$$

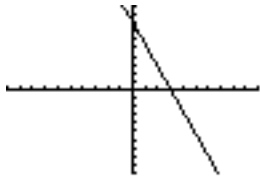
2. $y = \frac{2}{3}x - 2$

$$y = \frac{2}{3}(0) - 2 \quad 0 = \frac{2}{3}x - 2$$

$$y = -2 \quad 2 = \frac{2}{3}x$$

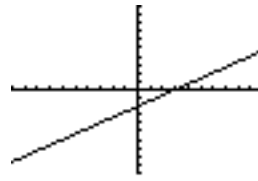
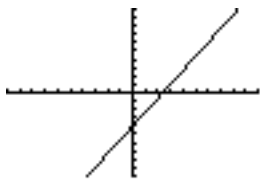
$$(0, -2) \quad 3 = x$$

$$(3, 0)$$



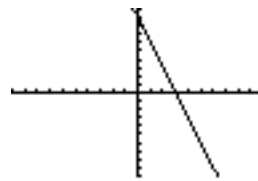
3. $-5x + 3y = -12$

$$\begin{aligned}
 -5x + 3(0) &= -12 \\
 -5(0) + 3y &= -12 & -5x &= -12 \\
 3y &= -12 & x &= \frac{12}{5} \\
 y &= -4 & & \\
 (0, -4) & & \left(\frac{12}{5}, 0\right) &
 \end{aligned}$$



4. $y = -3x + 9$

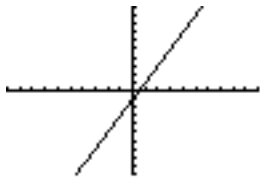
$$\begin{aligned}
 y &= -3(0) + 9 & 0 &= -3x + 9 \\
 y &= 9 & -9 &= -3x \\
 (0, 9) & & 3 &= x \\
 & & (3, 0) &
 \end{aligned}$$



Graphing equations using slope-intercept form
Plot the graph using the slope and y-intercept.

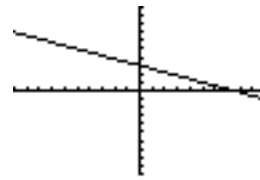
1. $y = 2x - 1$

$$m = \frac{2}{1} = \frac{\text{rise}}{\text{run}} \quad (0, -1)$$



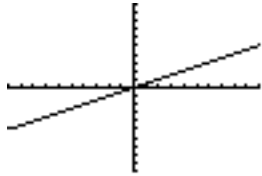
2. $y = -\frac{2}{5}x + 3$

$$m = \frac{-2}{5} \quad (0, 3)$$



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

$m = \frac{1}{2}$ (0,0)



4. $y = x - 4$

$m = \frac{1}{1}$ (0,-4)

