

Prerequisite Skills for Algebra I

Computation:

- Use [order of operations](#) to simplify expressions
- Simplify [fractional](#) expressions
- [Evaluate algebraic expressions](#) (substitution with positive and negative numbers)

Solving Equations and Inequalities:

- [Solve multi-step equations](#) using inverse operations
- [Solve linear equations & inequalities](#) which require the use of distributive property, combining like terms, simplifying and completing calculations involving fractions and decimals

Linear Functions:

- [Graph ordered pairs](#) on the coordinate plane
- [Graph linear functions](#) in slope-intercept form
- [Write the equation](#) of a line from a graph
- Given two points:
 - [Find the slope](#) of the line that passes through them
 - [Write the equation](#) of the line that passes through them
- Solve a linear word problem

PRACTICE PROBLEMS

Use order of operations to simplify the following expressions:

1. $54 \div 3 - 3 \times 2$
 $18 - 6$
 12

2. $8 \div 2(4) - 4^2$
 $8 \div 2(4) - 16$
 $4(4) - 16$
 $16 - 16$
 0

3. $2(4 - 7)^2 - 4 \div 2$
 $2(-3)^2 - 4 \div 2$
 $2(9) - 4 \div 2$
 $18 - 2$
 16

4. $-3^2 - 7 \div 2 + 5$
 $-9 - 7 \div 2 + 5$
 $-9 - 3.5 + 5$
 $-12.5 + 5$
 -7.5

5. $(-7) - (-8) \div 2^2 + 5$

$$(-7) - 8 \div 4 + 5$$

$$(-7) - 2 + 5$$

$$-9 + 5$$

$$-4$$

6. $(-3)^3 - 4 \div 2(2) - 10$

$$-27 - 4 \div 2(2) - 10$$

$$-27 - 2(2) - 10$$

$$-27 - 4 - 10$$

$$-31 - 10$$

$$-41$$

7. $7 - 4(3 - 8) - (-2 + 9)$

$$7 - 4(-5) - 7$$

$$7 + 20 - 7$$

$$27 - 7$$

$$20$$

8. $8 \div 4(2) - (6 - 9)^2$

$$8 \div 4(2) - (-3)^2$$

$$8 \div 4(2) - 9$$

$$2(2) - 9$$

$$4 - 9$$

$$-5$$

Simplify the following fractional expressions:

9. $\frac{3}{5} + \frac{2}{3} \times \frac{3}{5}$

$$\frac{3}{5} + \frac{6}{15}$$

$$\frac{3}{5} + \frac{2}{5}$$

$$\frac{5}{5}$$

$$1$$

10. $\frac{3}{5} + \frac{2}{3} \div \frac{3}{5}$

$$\frac{3}{5} + \frac{2}{3} \cdot \frac{5}{3}$$

$$\frac{3}{5} + \frac{10}{9}$$

$$\frac{27}{45} + \frac{50}{45}$$

$$\frac{77}{45} \text{ (or } 1\frac{32}{45}\text{)}$$

11. $\frac{1}{3} + \frac{1}{4} - \frac{1}{6}$

$$\frac{4}{12} + \frac{3}{12} - \frac{2}{12}$$

$$\frac{7}{12} - \frac{2}{12}$$

$$\frac{5}{12}$$

12. $\frac{1}{3} - \left(\frac{1}{4} + \frac{1}{6}\right)$

$$\frac{4}{12} - \left(\frac{3}{12} + \frac{2}{12}\right)$$

$$\frac{4}{12} - \frac{5}{12}$$

$$-\frac{1}{12}$$

13. $2\frac{1}{3} + 1\frac{1}{4} - 3\frac{1}{6}$

$$\frac{7}{3} + \frac{5}{4} - \frac{19}{6}$$

$$\frac{28}{12} + \frac{15}{12} - \frac{38}{12}$$

$$\frac{43}{12} - \frac{38}{12}$$

$$\frac{5}{12}$$

14. $(-\frac{1}{3})^2 \div \frac{1}{3}$

$$\frac{1}{9} \div \frac{1}{3}$$

$$\frac{1}{9} \cdot \frac{3}{1}$$

$$\frac{3}{9}$$

$$\frac{1}{3}$$

Evaluate the following algebraic expressions for $x = 2$ and $y = -3$:

15. $3x + 8y$
 $3(2) + 8(-3)$
 $6 - 24$
 -18

16. $x^2 - y$
 $2^2 - (-3)$
 $4 + 3$
 7

17. $-x^2 + y$
 $-2^2 + (-3)$
 $-4 - 3$
 -7

18. $5 + x - y^2$
 $5 + 2 - (-3)^2$
 $5 + 2 - 9$
 $7 - 9$
 -2

Solve the following equations:

19. $3x + 8x = -11$
 $11x = -11$
 $\frac{11x}{11} = \frac{-11}{11}$
 $x = -1$

20. $-4x - 9 = 13$
 $+9 + 9$
 $-4x = 22$
 $\frac{-4x}{-4} = \frac{22}{-4}$
 $x = -\frac{11}{2}$

$$\begin{aligned}
 21. \quad & -7t - 6t = 0 \\
 & -13t = 0 \\
 & \frac{-13t}{-13} = \frac{0}{-13} \\
 & t = 0
 \end{aligned}$$

$$\begin{aligned}
 22. \quad & -y + 3 + 8y = 17 \\
 & 7y + 3 = 17 \\
 & \quad -3 \quad -3 \\
 & 7y = 14 \\
 & \frac{7y}{7} = \frac{14}{7} \\
 & y = 2
 \end{aligned}$$

$$\begin{aligned}
 23. \quad & b - (5 - 3b) = 19 \\
 & b - 5 + 3b = 19 \\
 & 4b - 5 = 19 \\
 & \quad +5 \quad +5 \\
 & 4b = 24 \\
 & \frac{4b}{4} = \frac{24}{4} \\
 & b = 6
 \end{aligned}$$

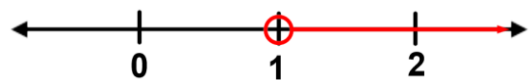
$$\begin{aligned}
 24. \quad & 2(t + 3) = 3(7 - t) \\
 & 2t + 6 = 21 - 3t \\
 & \quad +3t \quad \quad +3t \\
 & 5t + 6 = 21 \\
 & \quad -6 \quad -6 \\
 & 5t = 15 \\
 & \frac{5t}{5} = \frac{15}{5} \\
 & t = 3
 \end{aligned}$$

$$\begin{aligned}
 25. \quad & 4 - \frac{2}{3}t = 5 \\
 & -4 \quad -4 \\
 & -\frac{2}{3}t = 1 \\
 & -\frac{3}{2} \left(-\frac{2}{3}t \right) = -\frac{3}{2}(1) \\
 & t = -\frac{3}{2}
 \end{aligned}$$

$$\begin{aligned}
 26. \quad & h - \frac{2}{3}h = 6 \\
 & \frac{3}{3}h - \frac{2}{3}h = 6 \\
 & \frac{1}{3}h = 6 \\
 & 3 \left(\frac{1}{3}h \right) = 3(6) \\
 & h = 18
 \end{aligned}$$

Solve each of the following linear inequalities. Then graph each solution set on the number line:

$$\begin{aligned}
 27. \quad & 6x + 2 > 8 \\
 & -2 \quad -2 \\
 & 6x > 6 \\
 & \frac{6x}{6} > \frac{6}{6} \\
 & x > 1
 \end{aligned}$$



$$\begin{aligned}
 28. \quad & -4x + 3 \leq -9 \\
 & -3 \quad -3 \\
 & -4x \leq -12 \\
 & \frac{-4x}{-4} \leq \frac{-12}{-4} \\
 & x \geq 3
 \end{aligned}$$



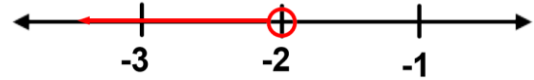
29. $5(x + 2) < 0$

$$\frac{5(x+2)}{5} < \frac{0}{5}$$

$$x + 2 < 0$$

$$-2 \quad -2$$

$$x < -2$$



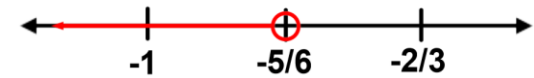
30. $2(x + 1) < \frac{1}{3}$

$$\frac{1}{2}[2(x + 1)] < \frac{1}{2}\left(\frac{1}{3}\right)$$

$$x + 1 < \frac{1}{6}$$

$$-1 \quad -\frac{6}{6}$$

$$x < -\frac{5}{6}$$



31. $\frac{2}{3}(3 - x) < 1$

$$\frac{3}{2}\left[\frac{2}{3}(3 - x)\right] < \frac{3}{2}(1)$$

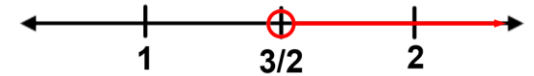
$$3 - x < \frac{3}{2}$$

$$-3 \quad -\frac{6}{2}$$

$$-x < -\frac{3}{2}$$

$$-1(-x) < (-1)\left(-\frac{3}{2}\right)$$

$$x > \frac{3}{2}$$



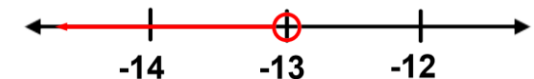
32. $0.2x + 2 < -0.6$

$$-2 \quad -2$$

$$0.2x < -2.6$$

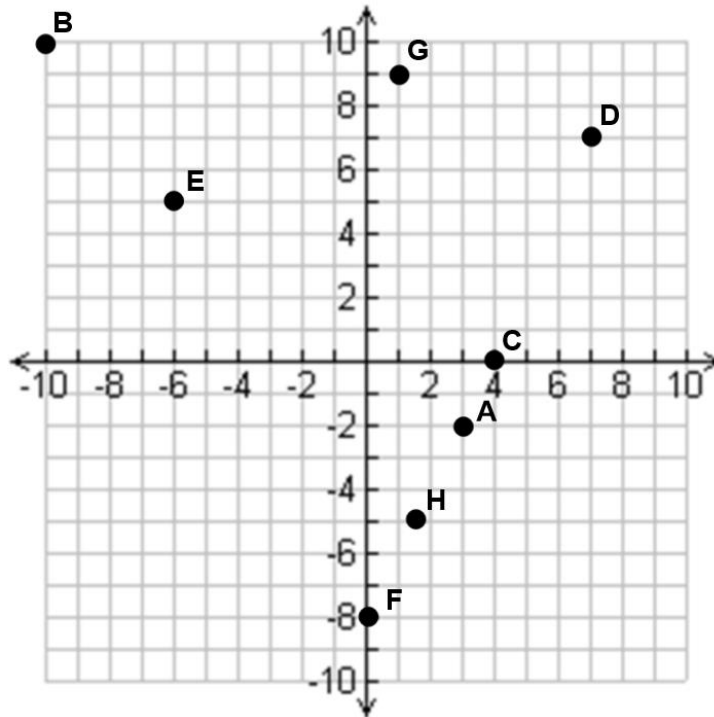
$$\frac{0.2x}{0.2} < \frac{-2.6}{0.2}$$

$$x < -13$$



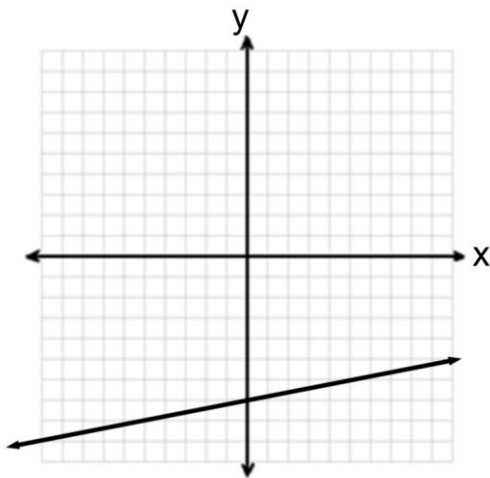
33. Graph the following ordered pairs on the coordinate plane and label each point:

A: $(3, -2)$ B: $(-10, 10)$ C: $(4, 0)$ D: $(7, 7)$ E: $(-6, 5)$ F: $(0, -8)$ G: $(1, 9)$ H: $(\frac{3}{2}, -5)$

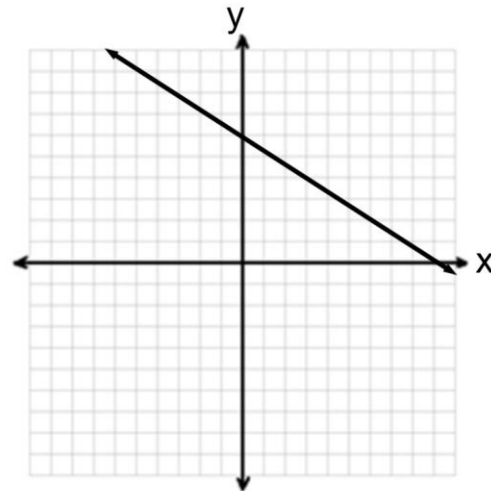


Graph each of the following linear functions:

34. $y = \frac{1}{5}x - 7$

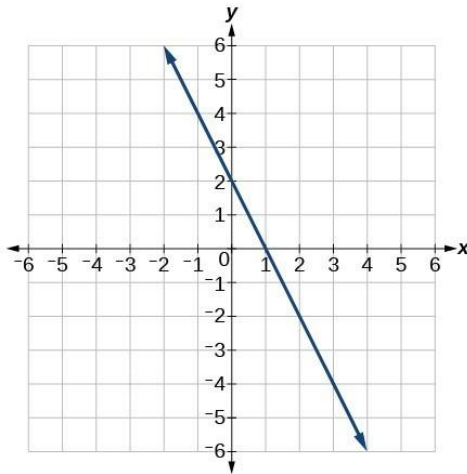


35. $y = -\frac{2}{3}x + 6$



For each of the following graphs, write the equation of the line in slope-intercept form:

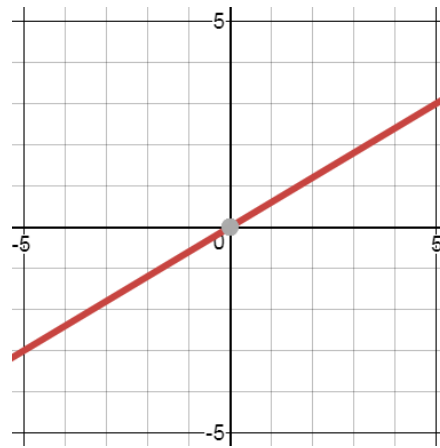
36.



Slope: $-\frac{2}{1}$ y-intercept: **(0,2)**

Equation: $y = -2x + 2$

37.



Slope: $\frac{3}{5}$ y-intercept: **(0,0)**

Equation: $y = \frac{3}{5}x$

Given points G (-4, 5) and H (-2, -1):

38. Find the slope of the line that passes through them.

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

$$m = \frac{6}{-2}$$

$$m = -3$$

39. Write the equation of the line that passes through them.

$$y = mx + b$$

$$5 = -3(-4) + b$$

$$5 = 12 + b$$

$$-12 - 12$$

$$-7 = b$$

Equation: $y = -3x - 7$

OR....

$$y - y_1 = m(x - x_1)$$

$$y - 5 = -3[x - (-4)]$$

$$y - 5 = -3(x + 4)$$

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

$$+5 \qquad +5$$

$$y = -3x - 7$$

Solve the following word problem using a method of your choice:

40. The Robinsons are tearing down their above-ground pool to fix the liner. The pool contains 18,000 gallons of water. The water drains at a rate of 1,500 gallons per hour. How long will it take to empty half of the water out of the pool?

$$\text{Half the water} = 18,000 \div 2 = 9,000 \text{ gallons}$$

$$9,000 \div 1,500 = 6 \text{ hours}$$

It will take 6 hours to drain half the pool.