

Prerequisite skills for Algebra II

Topic list items link to videos with lessons:

- solving linear equations/inequalities and absolute value equations/inequalities
- functions vs. relations
- graphing functions from tables of values
- finding x and y intercepts from standard form
- writing equations in point-slope, slope intercept, standard form
- solving systems of equations (2 variables)
- systems of linear inequalities
- quadratic factoring and including $a \neq 1$
- simplifying square roots

Topic 1: Simplifying/Evaluating Expressions

$$1. 14y + 22 - 15y^2 + 23y - 6 \\ - 15y^2 + 37y + 16$$

$$2. 3(18z - 4w) - 2(10z + 6w) \\ 34z - 24w$$

$$3. 5c^3 - 6c^2; c = -5 \\ -775$$

$$4. \frac{30-6}{2 \cdot 4^2 - 20} \\ 2$$

Topic 2: Solving Linear & Absolute Value Equations

$$1. \frac{3}{4}x + 7 = 16 \\ x = 12$$

$$2. 140 = 4x + 30 \\ x = \frac{55}{2}$$

$$3. 8(3x - 4) = 196 \\ x = \frac{19}{2}$$

$$4. 198 = 154 + 7x - 68 \\ x = 16$$

$$5. -131 = -5(3x - 8) + 6x \\ x = 19$$

$$6. -(12x - 6) = 12x + 6 \\ x = 0$$

$$7. \frac{2}{3}a - 4 = \frac{1}{4}a - \frac{1}{2} \\ a = \frac{42}{5}$$

$$8. 3 + \frac{4}{5}x = \frac{2}{15}x - \frac{3}{10} \\ x = -\frac{99}{20}$$

$$9. |x - 3| = 10 \\ x = -7 \text{ or } -13$$

$$10. -2|2x + 3| = 16 \\ \text{no solution}$$

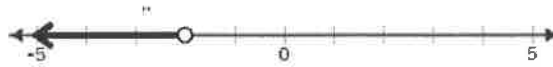
$$11. \text{Solve for } m \text{ in } y = mx + b \\ m = \frac{y-b}{x}$$

$$12. \text{Solve for } w \text{ in } P = 2l + 2w \\ w = \frac{P-2l}{2} \text{ or } w = \frac{1}{2}P - l$$

Topic 3: Solving Inequalities (graph your solution on a numberline)

$$1. -3x + 2 > 8$$

$$x < -2$$



$$2. -4x + 3 \leq -6x + 12$$

$$x \leq \frac{9}{2}$$



$$3. 5x + 25 < 0 \text{ or } 6x - 36 > 0$$

$$x < -5 \text{ or } x > 6$$



$$4. 2x - 10 < -2 \text{ and } x + 3 \geq -15$$

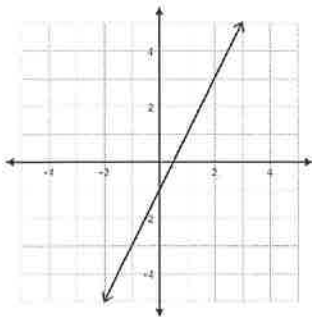
$$-18 \leq x < -4$$

**Topic 4: Linear Functions**

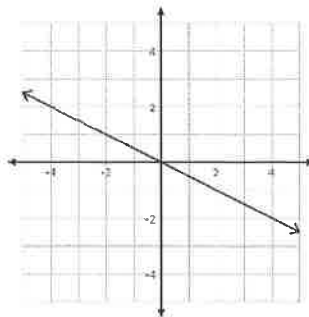
$$1. \text{ Slope formula: } m = \frac{y_2 - y_1}{x_2 - x_1}$$

2. On the graphs below, draw a line with the indicated slope.

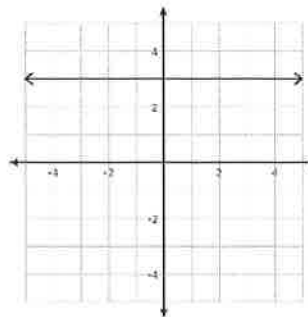
Positive Slope



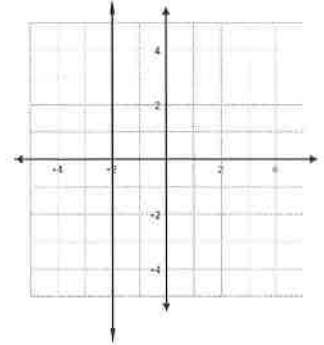
Negative Slope



Zero Slope



Undefined Slope



3. Find the slope of the line containing each pair of points.

a. $(-1, 4)$ and $(1, -2)$

$$m = -3$$

b. $(2, -1)$ and $(-2, 3)$

$$m = -1$$

c. $(2, -4)$ and $(6, -4)$

$$m = 0$$

d. $(8, 5)$ and $(8, 1)$

$$\text{undefined}$$

4. An equation of a line can be written in the forms listed below. Define the variables.

a. Slope - Intercept Form: $y = mx + b$

m = slope b = y-intercept

b. Point - Slope Form: $y - y_1 = m(x - x_1)$

m = slope x_1 = x-coordinate of a pt on the line y_1 = y-coordinate of the same pt on line

c. State the Standard Form of a line: $Ax + By = C$

5. A horizontal line has the equation of the form $y = b$.

6. A vertical line has the equation of the form $x = a$.

7. Write the equation of the line with the given information. You may use any form of a line.

a. Slope = -2 and Point (0, 5)

$$y = -2x + 5$$

b. Slope = $-\frac{3}{4}$ and Point (12, -2)

$$y + 2 = -\frac{3}{4}(x - 12)$$

$$y = -\frac{3}{4}x + 7$$

c. Points (1, 4) and (-3, 0)

$$y = x + 3$$

d. Undefined Slope and Point (-6, -3)

$$y = -6$$

8. Given the points G(-4, 5) and H(-2, -1).

a. Write the equation of the line GH.

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

b. Write an equation of a line parallel to the line in part (a).

$$y = -3x + 7$$

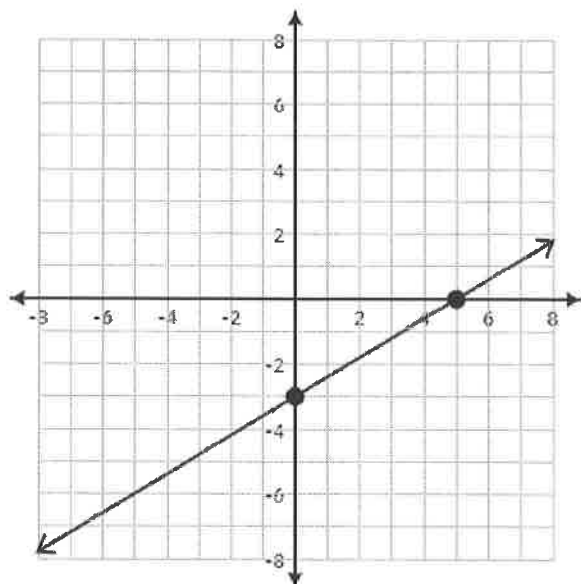
c. Write an equation of a line perpendicular to the line in part (a).

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

d. What type of angle do the lines in parts b and c create at their intersection? **right angle**

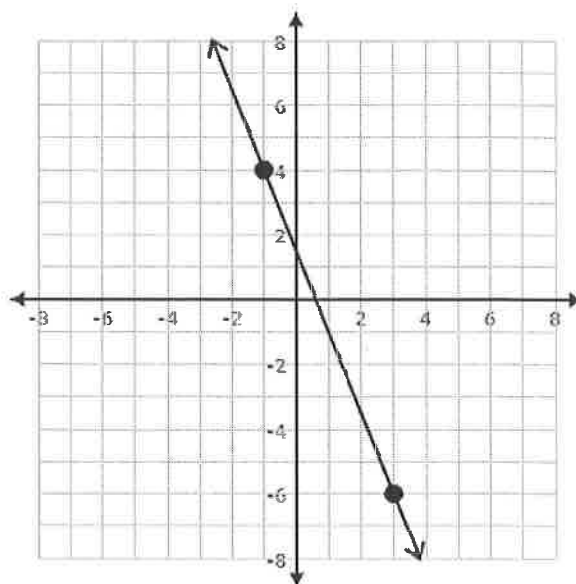
9. Write the equation for each of the lines graphed below.

a.



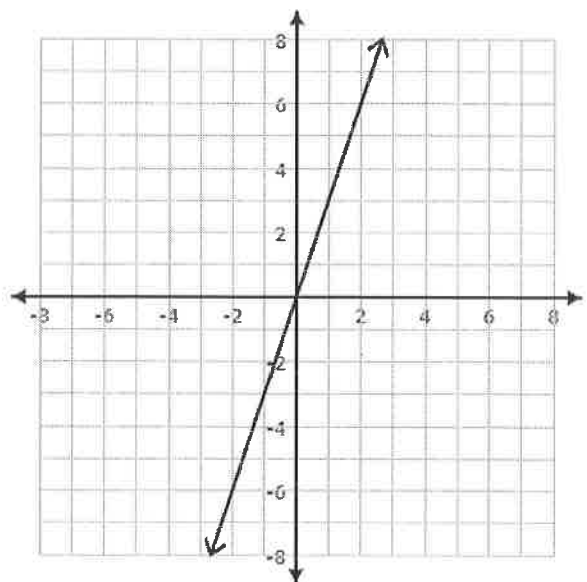
$$y = \frac{5}{3}x - 3$$

b.



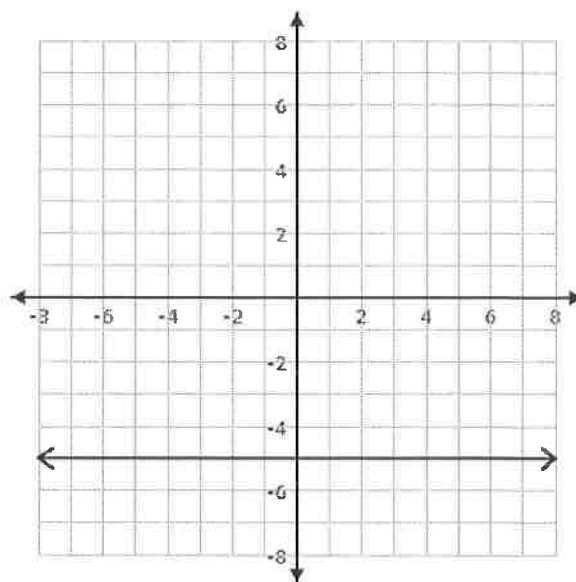
$$y = -\frac{5}{2}x + \frac{3}{2}$$

c.



$$y = 3x$$

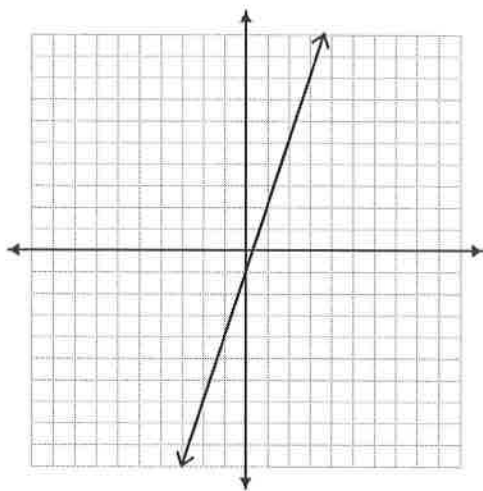
d.



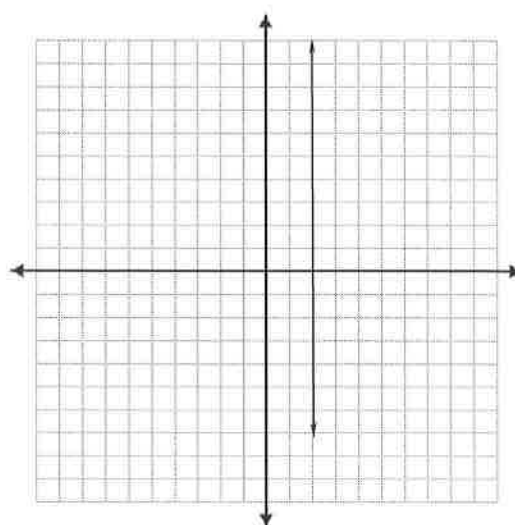
$$y = -5$$

10. Graphing Linear Functions

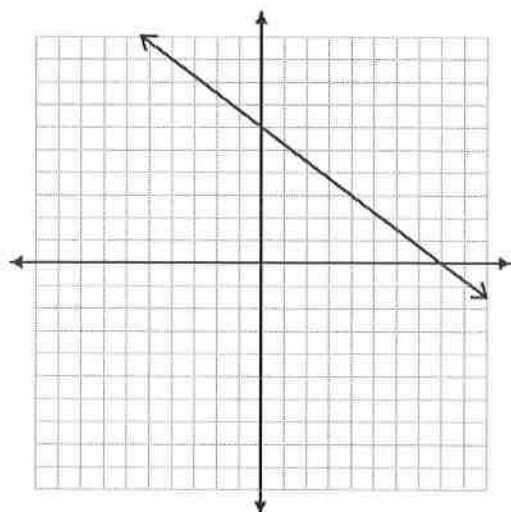
a. $y = 3x - 1$



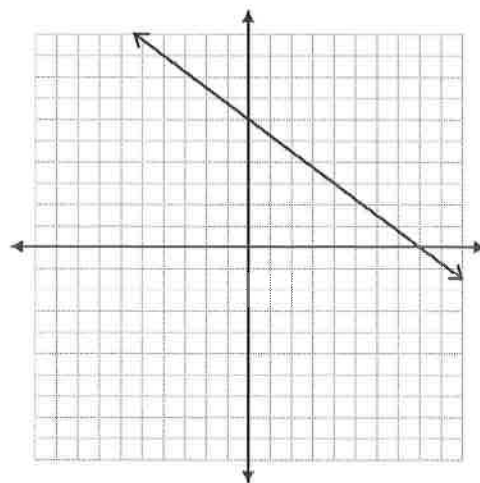
b. $x = 2$



c. $3x + 4y = 24$



d. $y - 2 = \frac{1}{2}(x + 6)$



Topic 5: Systems of Equations

1. Solve each system of equations using substitution or elimination method. Make sure to provide a value for x and y .

$$\begin{aligned} \text{a. } y &= \frac{2}{3}x - 2 \\ y &= \frac{-1}{3}x + 1 \end{aligned}$$

$$(3, 0)$$

$$\begin{aligned} \text{b. } y &= -2x + 9 \\ 3x - 4y &= 8 \end{aligned}$$

$$(4, 1)$$

$$\begin{aligned} \text{c. } -2x + 7y &= 10 \\ x - 3y &= -3 \end{aligned}$$

$$(9, 4)$$

2. At a recent concert, there were 1500 people. Adult tickets were \$12 each and student tickets were 50% off the adult price. If the concert profit was \$15,600, find the number of adult and student tickets sold.

1100 adult tickets and 400 student tickets

Topic 6: Factoring quadratic expressions

Factor the following completely or state that it is prime:

1. $9x^2 - 36$

$$(3x + 6)(3x - 6)$$

2. $8x^2 + 25x + 3$

$$(8x + 1)(x + 3)$$

3. $6x^2 - 30x - 36$

$$6(x - 6)(x + 1)$$

4. $x^2 - 10x + 25$

$$(x + 5)^2$$

5. $3x^2 + x - 10$

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

6. $3x^2 + 17x + 10$

$$(3x + 2)(x + 5)$$

7. $4y^2 + 14y + 6$

$$2(2y + 1)(y + 3)$$

8. $6x^2 - 12x - 18$

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

Topic 7: Simplifying square roots.*Simplify each:*

a.) $\sqrt{98}$

$7\sqrt{2}$

b.) $\sqrt{72}$

$6\sqrt{2}$

c.) $\sqrt{108}$

$6\sqrt{3}$

d.) $2\sqrt{6} \cdot 5\sqrt{3}$

$30\sqrt{2}$

e.) $\sqrt{15} \cdot \sqrt{10}$

$5\sqrt{6}$

f.) $\frac{\sqrt{50}}{\sqrt{2}} - \sqrt{20}$

$5 - 2\sqrt{5}$

g.) $\sqrt{20} - \sqrt{200} + \sqrt{45}$

$5\sqrt{5} - 10\sqrt{2}$

h.) $\sqrt{\frac{32}{50}}$

$\frac{4}{5}$

i.) $\frac{\sqrt{120}}{\sqrt{20}}$

$\sqrt{6}$

HONORS ALGEBRA 2 ONLY SECTIONS**Solving quadratics.** *Solve for x using any appropriate method*

a.) $x^2 - 3x = 4$

$x = 4 \text{ or } -1$

b.) $x^2 = 10x - 25$

$x = 5$

e.) $x^2 - 6x + 8 = 0$

$x = 4 \text{ or } 2$

f.) $3x^2 - 7x + 2 = 0$

$x = \frac{1}{3} \text{ or } 2$

g.) $x^2 - 3x + 1 = 6$

$x = \frac{3 \pm \sqrt{29}}{2}$

h.) $4x^2 + 7x + 2 = 0$

$x = -7 \pm \sqrt{17}$

Rational Expressions. *Multiply, divide, simplify. State any restrictions.*

$$\text{a) } \frac{3x-12}{8x+12} \cdot \frac{12x+8}{5x-20}$$

$$\text{b) } \frac{3x^2}{5y^3} \div \frac{9x^8}{15y^6}$$

$$\frac{3(3x+2)}{5(2x+3)} \quad x \neq \frac{-3}{2}, 4$$

$$\frac{y^3}{x^6} \quad x \neq 0, y \neq 0$$

$$\text{c) } \frac{x^2+4x}{x-5} \div \frac{x^2-x-20}{2}$$

$$\text{d) } \frac{x^2-6x+5}{x^2-x-20} \cdot \frac{x^2-16}{1-x^2}$$

$$\frac{2x}{(x-5)(x-5)} \quad x \neq 5, -4$$

$$-\frac{x-4}{x+1} \quad x \neq 5, -4, \pm 1$$

$$\text{e) } \frac{x^2+4x+4}{x^2-4}$$

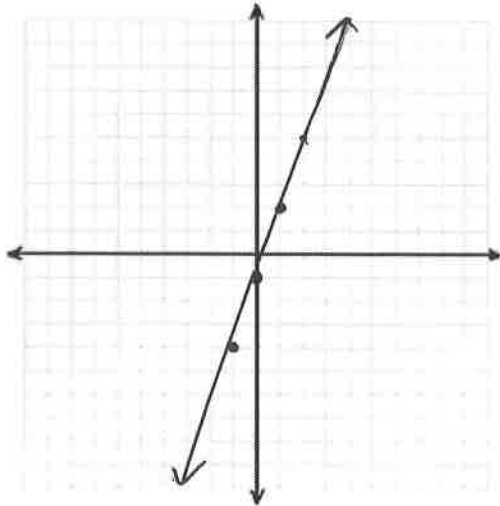
$$\text{f) } \frac{x^2+5x-6}{x^2-4x+4}$$

$$\frac{x+2}{x-2} \quad x \neq \pm 2$$

$$\frac{(x+6)(x-1)}{(x-2)(x-2)} \quad x \neq 2$$

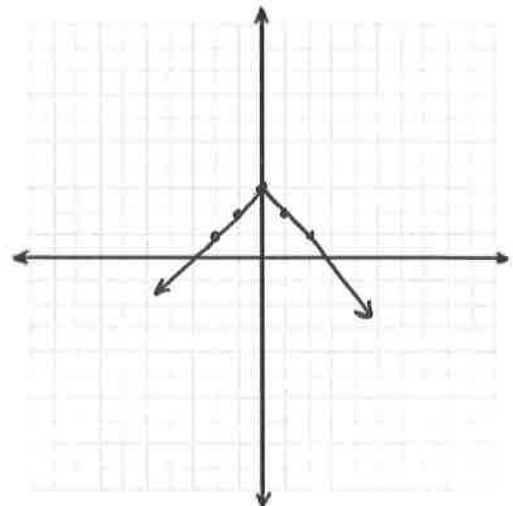
Graphing from tables of values*Create a table for each and graph the function*

a) $y = 3x - 1$



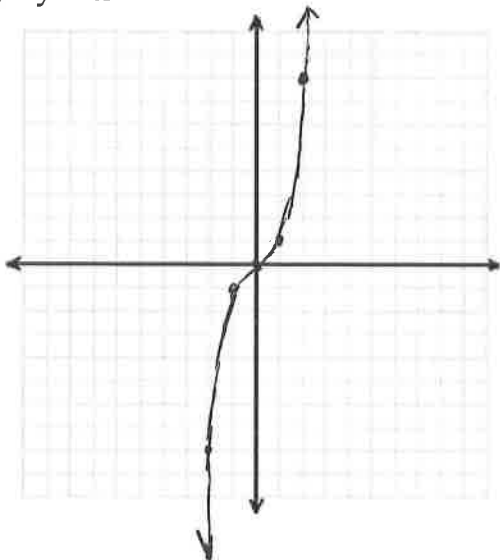
b) $y = -|x| + 3$

x	y
-2	1
-1	2
0	3
1	2
2	1



c) $y = x^3$

x	y
-2	-8
-1	-1
0	0
1	1
2	8



d) $y = 3 - \sqrt{x}$

x	y
-1	undef
0	3
1	2
4	1
9	0

