

Prerequisite skills for Algebra II Level 2

- 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](#)
- [solving quadratics by factoring, square roots, quadratic formula, or completing the square](#)
- [simplifying, multiplying and dividing](#) rational expressions, including domain restrictions

Solving linear absolute value equations/inequalities

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

$$\left(\frac{4}{3}\right)\left(\frac{3}{4}\right)x = 9\left(\frac{4}{3}\right)$$

$$x = 12$$

2. $|x - 3| = 10$

$$x - 3 = 10, x - 3 = -10$$

$$x = 13, x = -7$$

3. $-2|2x + 3| = 16$

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

\emptyset

No absolute value = negative

4. Solve for m in $y = mx + b$

$$y - b = mx$$

$$\frac{y - b}{x} = m$$

5. Solve for w in $P = 2l + 2w$

$$p - 2l = 2w$$

$$\frac{p - 2l}{2} = w$$

6. $\frac{-|2x-1|}{6} = -5$

$$-|2x - 1| = -30$$

$$|2x - 1| = 30$$

$$2x - 1 = \pm 30$$

$$2x = 31, 2x = -29$$

$$x = \frac{31}{2}, x = -\frac{29}{2}$$

$$7. \frac{2}{3}s - 4 = \frac{1}{4}s - \frac{1}{2}$$

$$12\left(\frac{2}{3}s - 4 = \frac{1}{4}s - \frac{1}{2}\right)$$

$$8s - 48 = 3s - 6$$

$$5s = 42$$

$$s = \frac{42}{5}$$

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

$$30\left(\frac{4}{5}x + 3 = \frac{2}{15}x - \frac{3}{10}\right)$$

$$24x + 90 = 4x - 9$$

$$20x = -99$$

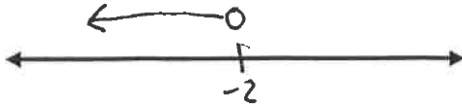
$$x = -\frac{99}{20}$$

9. Solve for x . Then graph your answer on the number line.

a. $-3x + 2 > 8$

$$-3x > 6$$

$$x < -2$$

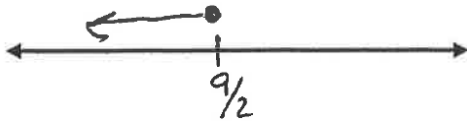


b. $-4x + 3 \leq -6x + 12$

$$-9 \leq -2x$$

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

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



c. $5x + 25 < 0 \cup 6x - 36 > 0$

$$5x < -25 \quad 6x > 36$$

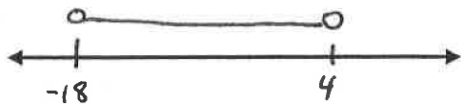
$$x < -5 \quad x > 6$$



d. $2x - 10 < -2 \cap x + 3 > -15$

$$2x < 8 \quad x > -18$$

$$x < 4$$



e. $|x + 5| \leq 15$

$$x + 5 \leq 15, x + 5 \geq -15$$

$$x \leq 10, x \geq -20$$



f. $\frac{|x+4|}{3} > 9$

$|x + 4| > 27$

$x + 4 > 27, x + 4 < -27$

$x > 23, x < -31$



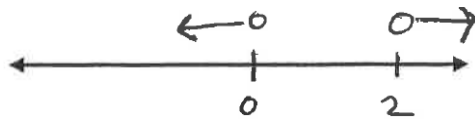
g. $14 - 2|x - 1| < 12$

$-2|x - 1| < -2$

$|x - 1| > 1$

$x - 1 > 1, x - 1 < -1$

$x > 2, x < 0$

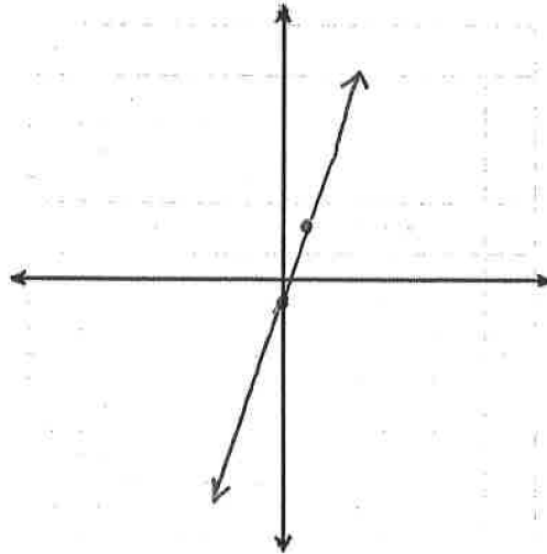


Graphing from tables of values

10. Create a table for each and graph the function

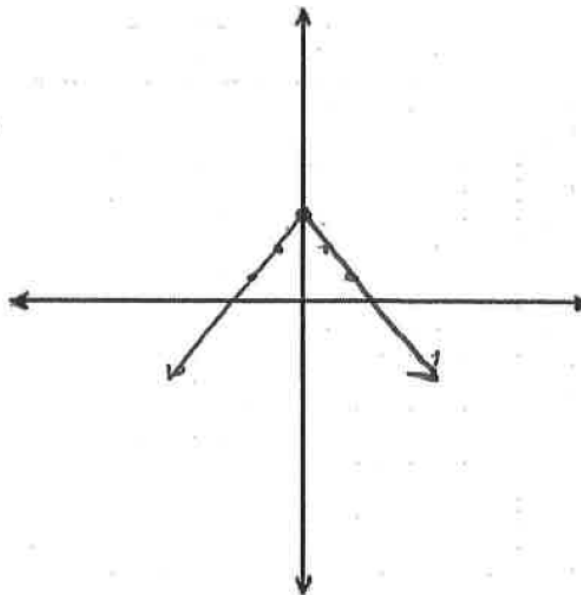
a) $y = 3x - 1$

x	y
-2	-7
-1	-4
0	-1
1	2
2	5



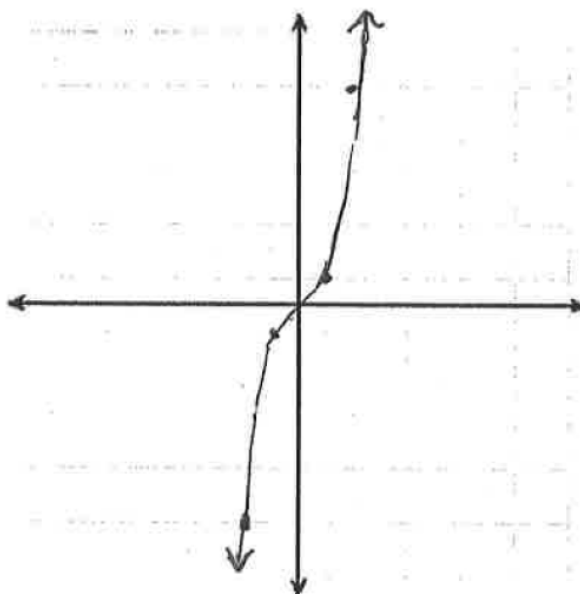
b) $y = -|x| + 3$

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



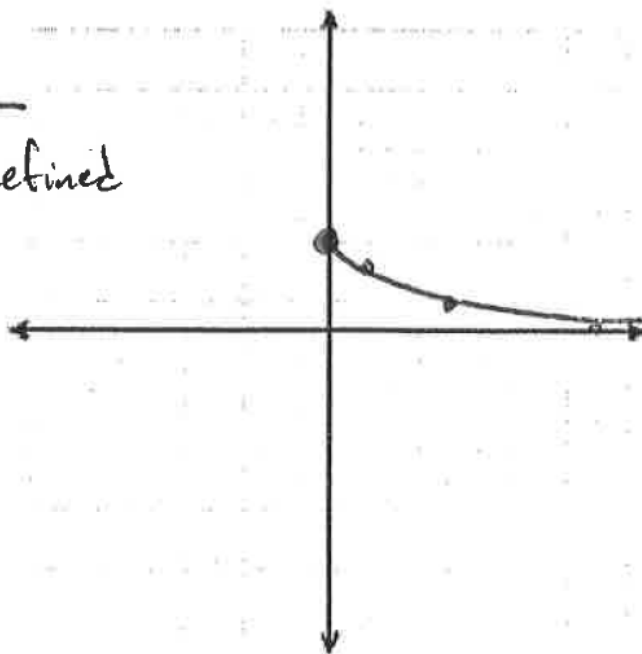
c) $y = x^3$

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



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

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



11. a. Write the equation of a line that crosses through G(-4, 5) and H(-2, -1).

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - 5}{-2 - (-4)} = \frac{-6}{2} = -3$$

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

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

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

$$y = -3x - 7$$

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

$$y = -3x + \text{anything}$$

$$\text{example: } y = -3x + 2$$

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

Perpendicular slope (opposite and reciprocal)

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

$$y = \frac{1}{3}x + \text{anything}$$

$$\text{example: } y = \frac{1}{3}x + 4$$

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

Right angle.

12. Write an equation of a line that crosses through F(5, 7) and M(-3, -1) in the following forms:

Slope-Intercept

$$m = \frac{-1 - 7}{-3 - 5} = \frac{-8}{-8} = 1$$

$$y = x + 2$$

Point-Slope

$$y - 7 = 1(x - 5)$$

$$y - 7 = x - 5$$

$$y = x + 2$$

Standard

$$y = x + 2$$

$$y - x = 2$$

$$-x + y = 2$$

13. Solve each system of equations:

$$\begin{cases} 3x + 9y = 9 \\ y = \frac{2}{3}x - 2 \end{cases}$$

$$3x + 9\left(\frac{2}{3}x - 2\right) = 9$$

$$3x + 6x - 18 = 9$$

$$9x = 27$$

$$x = 3$$

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

$$y = 2 - 2$$

$$y = 0$$

Answer is (3,0)

$$\begin{cases} y = -2x + 9 \\ 3x - 4y = 8 \end{cases}$$

$$3x - 4(-2x + 9) = 8$$

$$3x + 8x - 36 = 8$$

$$11x = 44$$

$$x = 4$$

$$y = -2(4) + 9 = -8 + 9 = 1$$

Answer is (4,1)

$$\begin{cases} -2x + 7y = 10 \\ x - 3y = -3 \end{cases}$$

$$2(x - 3y) = -6$$

$$2x - 6y = -6$$

$$2x - 6y = -6$$

$$\underline{-2x + 7y = 10}$$

$$y = 4$$

$$x = 3y - 3 = 3(4) - 3 = 9$$

Answer is (9,4)

14. 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.

$$12A + 6S = 15600$$

$$-6(A + S = 1500)$$

$$12A + 6S = 15600$$

$$\underline{-6A - 6S = -9000}$$

$$6A = 6600$$

$$A = 1100$$

$$S = 1500 - A = 1500 - 1100$$

$$S = 400$$

Factoring and solving polynomials

15. Factor the following completely or state that it is prime:

a) $9x^2 - 36$
 $9(x^2 - 4)$
 $9(x - 2)(x + 2)$

b) $8x^2 + 25x + 3$
 $(8x + 1)(x + 3)$

c) $6x^2 - 30x - 36$
 $6(x^2 - 5x - 6)$
 $6(x - 6)(x + 1)$

d) $x^2 - 10x + 25$
 $(x - 5)^2$

e) $6x^3 - 12x^2$
 $6x^2(x - 2)$

f) $3x^2 + x - 10$
 $(3x - 5)(x + 2)$

g) $2x^3 - 14x^2 + 24x$
 $2x(x^2 - 7x + 12)$
 $2x(x - 4)(x - 3)$

h) $3x^2 + 17x + 10$
 $(3x + 2)(x + 5)$

i) $4y^2 + 14y + 6$
 $2(2y^2 + 7y + 3)$
 $2(2y + 1)(y + 3)$

j) $6x^2 - 12x - 18$
 $6(x^2 - 2x - 3)$
 $6(x - 3)(x + 1)$

Simplifying square roots. *Simplify each.*

a.) $\sqrt{98} = \sqrt{49}\sqrt{2} = 7\sqrt{2}$

b.) $\sqrt{72} = \sqrt{36}\sqrt{2} = 6\sqrt{2}$

c.) $\sqrt{108} = \sqrt{27}\sqrt{4} = 2\sqrt{9}\sqrt{3} = 6\sqrt{3}$

d.) $2\sqrt{6} \cdot 5\sqrt{3} = 10\sqrt{18} = 10\sqrt{9}\sqrt{2} = 30\sqrt{2}$

e.) $\sqrt{15} \cdot \sqrt{10} = \sqrt{150} = \sqrt{25}\sqrt{6} = 5\sqrt{6}$

f.) $\frac{\sqrt{50}}{\sqrt{2}} - \sqrt{20} = \sqrt{25} - \sqrt{20} = 5 - 2\sqrt{5}$

g.) $\sqrt{20} - \sqrt{200} + \sqrt{45} = 2\sqrt{5} - 10\sqrt{2} + 3\sqrt{5} = 5\sqrt{5} - 10\sqrt{2}$

h.) $\sqrt{\frac{32}{50}} = \frac{\sqrt{32}}{\sqrt{50}} = \frac{\sqrt{16}\sqrt{2}}{\sqrt{25}\sqrt{2}} = \frac{4}{5}$

i.) $\frac{\sqrt{120}}{\sqrt{20}} = \sqrt{6}$

Solving quadratics. *Solve for x using any appropriate method*

a.) $x^2 - 3x = 4$
 $x^2 - 3x - 4 = 0$
 $(x - 4)(x + 1) = 0$
 $x = 4, x = -1$

b.) $x^2 = 10x - 25$
 $x^2 - 10x + 25 = 0$
 $(x - 5)(x - 5) = 0$
 $x = 5$

c.) $x^2 - 6x + 8 = 0$
 $(x - 4)(x - 2) = 0$
 $x = 4, x = 2$

$$\begin{aligned} \text{d.) } 3x^2 - 7x + 2 &= 0 \\ (3x - 1)(x - 2) &= 0 \\ x &= \frac{1}{3}, x = 2 \end{aligned}$$

$$\begin{aligned} \text{e.) } x^2 - 3x + 1 &= 6 \\ x^2 - 3x - 5 &= 0 \\ a=1, b=-3, c=-5 \\ x &= \frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(-5)}}{2(1)} = \frac{3 \pm \sqrt{9 + 20}}{2} = \frac{3 \pm \sqrt{29}}{2} \end{aligned}$$

$$\begin{aligned} \text{f.) } 4x^2 + 7x + 2 &= 0 \\ a=4, b=7, c=2 \\ x &= \frac{-7 \pm \sqrt{(7)^2 - 4(4)(2)}}{2(4)} = \frac{-7 \pm \sqrt{49 - 32}}{8} = \frac{-7 \pm \sqrt{17}}{8} \end{aligned}$$

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

$$\begin{aligned} \text{a.) } \frac{3x-12}{8x+12} \cdot \frac{12x+8}{5x-20} \\ &= \frac{3(x-4)}{4(2x+3)} \cdot \frac{4(3x+2)}{5(x-4)} \\ &= \frac{3(3x+2)}{5(2x+3)} \\ x &\neq -\frac{3}{2}, 4 \end{aligned}$$

$$\begin{aligned} \text{b.) } \frac{3x^2}{5y^3} \div \frac{9x^8}{15y^6} \\ &= \frac{3x^2}{5y^3} \cdot \frac{15y^6}{9x^8} = \frac{3x^2y^6}{3x^8y^3} = \frac{y^3}{x^6} \\ x, y &\neq 0 \end{aligned}$$

$$\begin{aligned} \text{c.) } \frac{x^2+4x}{x-5} \div \frac{x^2-x-20}{2} \\ &= \frac{x(x+4)}{(x-5)} \cdot \frac{2}{(x-5)(x+4)} = \frac{2x}{(x-5)(x-5)} \\ x &\neq 5, -4 \end{aligned}$$

$$\begin{aligned} \text{d.) } & \frac{x^2-6x+5}{x^2-x-20} \cdot \frac{x^2-16}{1-x^2} \\ & = \frac{(x-5)(x-1)}{(x-5)(x+4)} \cdot \frac{(x-4)(x+4)}{(-1)(x-1)(x+1)} = -\frac{x-4}{x+1} \\ & x \neq 5, -4, \pm 1 \end{aligned}$$

$$\begin{aligned} \text{e.) } & \frac{x^2+4x+4}{x^2-4} \\ & = \frac{(x+2)(x+2)}{(x-2)(x+2)} = \frac{x+2}{x-2} \\ & x \neq \pm 2 \end{aligned}$$

$$\begin{aligned} \text{f.) } & \frac{x^2+5x-6}{x^2-4x+4} \\ & = \frac{(x+6)(x-1)}{(x-2)(x-2)} \\ & x \neq 2 \end{aligned}$$