### Prerequisite Skills for Algebra 2

- You should be able to do these problems without using a calculator.
- If you have questions, you can search the italicized phrase(s) in khanacademy.org.
- See Additional Problems on the following pages for more practice of each type.

<table>
<thead>
<tr>
<th>Solve for x.</th>
<th>Solve the inequality and graph on a number line.</th>
<th>Find the equation of the line going through the following points in point-slope form $(3,-2)$ and $(1,5)$.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$3(x+1) - 2 = 7$</td>
<td>$2x - 5 &lt; 1$</td>
<td><strong>Keywords:</strong> point-slope form of a line</td>
</tr>
<tr>
<td><strong>Keywords:</strong> solving linear equations</td>
<td><strong>Keywords:</strong> solving and graphing linear inequalities</td>
<td><strong>Additional Problems</strong></td>
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<tr>
<th>Find the domain and range.</th>
<th>Solve for $f(-2)$ and $f(a+h)$ for $f(x) = 4x - 3$.</th>
<th>Graph $3x + 2y = 12$ and find the x and y-intercepts.</th>
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<tbody>
<tr>
<td><img src="image_url" alt="Graph" /></td>
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</tr>
<tr>
<td><strong>Keywords:</strong> domain and range</td>
<td><strong>Keywords:</strong> function notation</td>
<td><strong>Keywords:</strong> graphing lines</td>
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<tr>
<th>Simplify.</th>
<th>If $f(x) = 6x^2 + 12x$ and $g(x) = 3x$, find and simplify…</th>
<th>Solve for $x$ and $y$.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$(2x^3)^2(3x)$</td>
<td>a.) $f(x) - g(x)$</td>
<td>$2x + 3y = 20$</td>
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<td></td>
<td>b.) $g(x)$</td>
<td>$-2x + y = 4$</td>
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<tr>
<td><strong>Keywords:</strong> exponent rules</td>
<td><strong>Keywords:</strong> simplifying polynomials</td>
<td><strong>Keywords:</strong> systems of equations</td>
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<tr>
<th>If $h(x) = x^2 + 5x + 6$</th>
<th>A video club costs $25 to join. Each video rented costs $3. Write a function that represents the total cost if $v$ represents videos rented.</th>
<th>Factor.</th>
</tr>
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<tbody>
<tr>
<td>a.) find $x$ when $h(x) = 0$.</td>
<td><img src="image_url" alt="Graph" /></td>
<td>$3x^2 - 13x + 12$</td>
</tr>
<tr>
<td>b.) graph $h(x)$.</td>
<td><img src="image_url" alt="Graph" /></td>
<td><strong>Keywords:</strong> factoring quadratic equations</td>
</tr>
<tr>
<td><strong>Keywords:</strong> graphing and solving quadratics</td>
<td><strong>Keywords:</strong> writing linear equations</td>
<td><strong>Additional Problems</strong></td>
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</table>
Solving Linear Equations

Solve each equation.

1) $-4x - 12 = -2(7x + 6)$

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

3) $-38 - 3b = 4 - 8(5b - 4)$

4) $-2 - 5(6n - 6) = 2 - 4n$

5) $29 + x = -7(x + 5)$

6) $3 - 5x = 6(x - 5)$

7) $8(a - 5) = -7a + 5$

8) $5(-5k - 6) = -3 + 2k$
Answers to

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<tr>
<td>1)</td>
<td>0</td>
<td>2)</td>
<td>1</td>
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<tr>
<td>3)</td>
<td>2</td>
<td>4)</td>
<td>1</td>
</tr>
<tr>
<td>5)</td>
<td>-8</td>
<td>6)</td>
<td>3</td>
</tr>
<tr>
<td>7)</td>
<td>3</td>
<td>8)</td>
<td>-1</td>
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</table>
Graphing Inequalities

Draw a graph for each inequality.

1) \( m > -1 \)

2) \( n > 5 \)

3) \( k \geq -2 \)

4) \( r < -4 \)

5) \( n > 6 \)

6) \( b > -3 \)
Answers to

1) 

2) 

3) 

4) 

5) 

6)
Finding Lines

Write the slope-intercept form of the equation of each line given the slope and y-intercept.

1) Slope = \(\frac{1}{5}\), y-intercept = 4

2) Slope = \(\frac{3}{2}\), y-intercept = 1

3) Slope = -2, y-intercept = 3

4) Slope = \(-\frac{1}{4}\), y-intercept = 3

Write the slope-intercept form of the equation of the line through the given points.

5) through: (0, -4) and (-1, 1)

6) through: (-3, -2) and (0, 2)

7) through: (-3, 4) and (-3, -4)

8) through: (-4, -2) and (0, 1)

Write the slope-intercept form of the equation of each line.

9) \(y + 5 = -9(x - 1)\)

10) \(y - 5 = -5(x + 1)\)

11) \(y - 4 = -\frac{4}{5}(x + 5)\)

12) \(y + 2 = \frac{1}{3}(x + 2)\)

Write the slope-intercept form of the equation of the line described.

13) through: (4, 0), perp. to \(y = -x - 2\)

14) through: (5, 2), perp. to \(y = -\frac{1}{7}x - 3\)

15) through: (3, 5), perp. to \(y = -\frac{2}{5}x + 3\)

16) through: (-2, 5), perp. to \(y = \frac{2}{3}x\)
Answers to

1) \( y = \frac{1}{5}x + 4 \)  
2) \( y = -\frac{3}{2}x + 1 \)  
3) \( y = -2x + 3 \)  
4) \( y = -\frac{1}{4}x + 3 \)  
5) \( y = -5x - 4 \)  
6) \( y = \frac{4}{3}x + 2 \)  
7) \( x = -3 \)  
8) \( y = \frac{3}{4}x + 1 \)  
9) \( y = -9x + 4 \)  
10) \( y = -5x \)  
11) \( y = -\frac{4}{5}x \)  
12) \( y = \frac{1}{3}x - \frac{4}{3} \)  
13) \( y = x - 4 \)  
14) \( y = 7x - 33 \)  
15) \( y = \frac{5}{2}x - \frac{5}{2} \)  
16) \( y = -\frac{3}{2}x + 2 \)
Domain and Range

State the domain and range for each graph and then tell if the graph is a function (write yes or no).
If the graph is a function, state whether it is discrete, continuous or neither.

1) Domain _____________  
   Range _____________  
   Function? _____________

2) Domain _____________  
   Range _____________  
   Function? _____________

3) Domain _____________  
   Range _____________  
   Function? _____________

4) Domain _____________  
   Range _____________  
   Function? _____________

5) Domain _____________  
   Range _____________  
   Function? _____________

6) Domain _____________  
   Range _____________  
   Function? _____________

7) Domain _____________  
   Range _____________  
   Function? _____________

8) Domain _____________  
   Range _____________  
   Function? _____________

9) Domain _____________  
   Range _____________  
   Function? _____________

10) Domain _____________  
    Range _____________  
    Function? _____________

11) Domain _____________  
    Range _____________  
    Function? _____________

12) Domain _____________  
    Range _____________  
    Function? _____________
Domain and Range

NAME: MR. Q

State the domain and range for each graph and then tell if the graph is a function (write yes or no).

1) Domain \{x=-3,5,-2,4\}
   Range \{-4,-2,0,3,5\}
   Function? No

2) Domain \{-3 \leq x \leq 3\}
   Range \{-4 \leq x \leq 3\}
   Function? No

3) Domain \{x>4\}
   Range \{y \geq 1\}
   Function? Yes

4) Domain \{-2 \leq x \leq 2\}
   Range \{0 \leq y \leq 4\}
   Function? Yes

5) Domain \mathbb{R}
   Range \mathbb{R}
   Function? Yes

6) Domain \mathbb{R}
   Range \{y \geq -5\}
   Function? Yes

7) Domain \{x \geq 0\}
   Range \mathbb{R}
   Function? No

8) Domain \mathbb{R}
   Range \{y = 1,3\}
   Function? No

9) Domain \{x < 2 \& x \neq -3\}
   Range \{y \geq -2\}
   Function? Yes
Domain and Range

Name: ____________________

State the domain and range for each graph and then tell if the graph is a function (write yes or no).

1) Domain \(\{x = -3, 2\}\)
   Range R
   Function? No

2) Domain \(\{-5 < x \leq 5\}\)
   Range \(\{2 \leq y \leq 2\}\)
   Function? No

3) Domain R
   Range R
   Function? Yes

4) Domain R
   Range \(\{y = 3\}\)
   Function? No

5) Domain \(\{x = -3, -2, 1, 2, 5\}\)
   Range \(\{y = -5, 0, 1, 4\}\)
   Function? Yes

6) Domain \(\{x \leq 4\}\)
   Range \(\{y \geq 0\}\)
   Function? Yes

7) Domain \(\{-2 \leq x \leq 2\}\)
   Range \(\{1 \leq y \leq 5\}\)
   Function? No

8) Domain R
   Range \(\{y \geq 0\}\)
   Function? Yes

9) Domain \(\{-4 \leq x < 3\}\)
   Range \(\{-5 < y < 5\}\)
   Function? No

10) Domain R
    Range \(\{y \geq -3\}\)
    Function? Yes

11) Domain \(\{x > -4 \& x \neq -2, 2\}\)
    Range \(\{y \leq 1\}\)
    Function? Yes

12) Domain \(\{-3 \leq x \leq 3\}\)
    Range \(\{-2 \leq x \leq 4\}\)
    Function? No
Function Notation

Evaluate each function.

1) \( g(n) = 4n - 5; \) Find \( g(-7) \)

2) \( k(x) = -3|x + 2|; \) Find \( k(10) \)

3) \( h(x) = 2x - 1; \) Find \( h(8) \)

4) \( h(x) = 2x; \) Find \( h(-8) \)

5) \( p(n) = n^3 - 5n; \) Find \( p(2) \)

6) \( h(n) = n^3 - 4; \) Find \( h(5) \)

7) \( h(n) = |-n|; \) Find \( h(-5) \)

8) \( g(x) = 2x + 3; \) Find \( g(10) \)

9) \( w(x) = x^2 - 4x; \) Find \( w(4x) \)

10) \( p(n) = -4n - 1; \) Find \( p(n - 4) \)

11) \( w(n) = 3n^3 + n; \) Find \( w(-2n) \)

12) \( w(n) = -3n + 4; \) Find \( w(3n) \)
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<tr>
<td>1)</td>
<td>$-33$</td>
<td>2)</td>
<td>$-36$</td>
<td>3)</td>
</tr>
<tr>
<td>5)</td>
<td>$-2$</td>
<td>6)</td>
<td>$121$</td>
<td>7)</td>
</tr>
<tr>
<td>9)</td>
<td>$16x^2 - 16x$</td>
<td>10)</td>
<td>$-4n + 15$</td>
<td>11)</td>
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Graphing Lines

Sketch the graph of each line.

1) \(6x + y = 3\)

2) \(y = -4\)

3) \(4x + y = 4\)

4) \(x + 5y = -20\)
5) \( y = \frac{4}{5}x \)

6) \( y = x - 2 \)

7) \( y = -x - 5 \)

8) \( y = -\frac{5}{2}x + 5 \)
9) \(-75 + 24x = -15y\)

10) \(1 = -y - 2x\)

11) \(8 - x = -4y\)

12) \(3 + y = -x\)
Answers to

1) 

2) 

3) 

4) 

5) 

6) 

7) 

8) 

9) 

10) 

11) 

12)
Exponent Rules

Simplify. Your answer should contain only positive exponents.

1) $3x \cdot 2x^{-3}y^4$

2) $3m^3 \cdot 3m^3 n^{-3}$

3) $3a^3 b^{-4} \cdot 2a^{-4} b^{-3}$

4) $x^{-4} y^2 \cdot x^{-4}$

5) $4x^4 \cdot 4x^2 y^{-3} \cdot 4x^3$

6) $mn^{-4} \cdot 3m^3$

7) $4m^3 n^{-1} \cdot m^{-3}$

8) $3u^3 \cdot 4v^{-4}$
Answers to

1) \( \frac{6y^4}{x^2} \)  
2) \( \frac{9m^6}{n^3} \)  
3) \( \frac{6}{b^7a} \)  
4) \( \frac{y^2}{x^8} \)  
5) \( \frac{64x^9}{y^3} \)  
6) \( \frac{3m^4}{n^4} \)  
7) \( \frac{4}{n} \)  
8) \( \frac{12u^3}{v^4} \)
Simplifying Polynomials

Divide.

1) \((2x^3 + 4x^2 + 2x) ÷ 4x\)

2) \((9n^3 + 27n^2 + 18n) ÷ 9n^2\)

3) \((24x^6 + 24x^5 + 40x^4) ÷ 8\)

4) \((36p^3 + 3p^2 + 9p) ÷ 9p\)

Simplify each expression.

5) \((8p^2 + 7p^4 - 2) - (1 + 3p^4 + 4p^2)\)

6) \((6 - 6n - 6n^3) + (8n - 4n^3 - 1)\)

7) \((7x^2 - 2x^4 - 7) + (3x^2 + 3 - 8x^4)\)

8) \((1 - 2x^3 + x^4) + (3x^3 + 2x^4 - 7)\)

9) \((6p^3 - 3 + 4p^2) + (8p^3 - 8p - 8p^2)\)

10) \((4a + 8a^3 + 5a^2) + (6a - 3a^2 + 2a^3)\)
Answers to

1) \( \frac{x^2}{2} + x + \frac{1}{2} \)  
2) \( n + 3 + \frac{2}{n} \)  
3) \( 3x^6 + 3x^5 + 5x^4 \)  
4) \( 4p^2 + \frac{p}{3} + 1 \)  
5) \( 4p^4 + 4p^2 - 3 \)  
6) \( -10n^3 + 2n + 5 \)  
7) \( -10x^4 + 10x^2 - 4 \)  
8) \( 3x^4 + x^3 - 6 \)  
9) \( 14p^3 - 4p^2 - 8p - 3 \)  
10) \( 10a^3 + 2a^2 + 10a \)
Systems of Equations

Solve each system by graphing.

1) \[5x - 3y = 9\]
   \[x + 3y = 9\]

2) \[x - y = -1\]
   \[2x + 3y = -12\]

3) \[5x - y = -1\]
   \[x - y = 3\]

4) \[2x + y = 2\]
   \[x - 2y = 6\]

5) \[3x + 2y = 8\]
   \[x + 4y = -4\]

6) \[x - y = -4\]
   \[5x + 2y = -6\]

7) \[x - 3y = -6\]
   \[2x - y = 3\]

8) \[x = 2\]
   \[3x + 2y = -2\]
Answers to

1) (3, 2)  
2) (−3, −2)  
3) (−1, −4)  
4) (2, −2)  
5) (4, −2)  
6) (−2, 2)  
7) (3, 3)  
8) (2, −4)
Solving and Graphing Quadratics

Solve each equation by factoring.

1) \( x^2 = 48 + 2x \)

2) \( x^2 + 3 = -4x \)

3) \( x^2 - 16 = 6x \)

4) \( x^2 + 11x = -24 \)

5) \( 7v^2 + 30v + 8 = 0 \)

6) \( 3x^2 + 4x - 7 = 0 \)

7) \( 5x^2 + 27x - 56 = 0 \)

8) \( 3n^2 + 28n + 49 = 0 \)

Sketch the graph of each function.

9) \( y = (x + 2)^2 - 2 \)

10) \( y = -2(x - 1)^2 - 4 \)
11) \[ y = -(x - 2)^2 + 3 \]

12) \[ y = -\frac{1}{2}(x + 4)^2 + 3 \]
Answers to

1) \([8, -6]\)  \hspace{1cm}  2) \([-3, -1]\)  \hspace{1cm}  3) \([-2, 8]\)  

5) \(\left\{-\frac{2}{7}, -4\right\}\)  \hspace{1cm}  6) \(\left\{-\frac{7}{3}, 1\right\}\)  \hspace{1cm}  7) \(\left\{\frac{8}{5}, -7\right\}\)

9) \([-2, 8]\)  

10) \([-3, -1]\)  

11) \([-8, -3]\)  

12) \(\left\{-\frac{7}{3}, -7\right\}\)
Writing and Solving Linear Equations

1) Rob left the White House at the same time as Jose. They drove in opposite directions. Jose drove at a speed of 55 km/h. After three hours they were 225 km apart. How fast did Rob drive?

2) Jack left school traveling toward the desert one hour before Wilbur. Wilbur traveled in the opposite direction going 20 km/h faster than Jack for four hours after which time they were 485 km apart. What was Jack's speed?

3) A metal alloy weighing 1 oz. and containing 60% silver is melted and mixed with 3 oz. of a different alloy which contains 80% silver. What percent of the resulting alloy is silver?

4) For his birthday party Matt mixed together 6 gal. of Brand A fruit punch and 7 gal. of apple juice. If Brand A contains 22% fruit juice, then what percent of the final mixture is fruit juice?

Solve each question. Round your answer to the nearest hundredth.

5) It takes Emily 12 hours to pick forty bushels of apples. Paul can pick the same amount in 15 hours. If they worked together how long would it take them?

6) Working alone, Ryan can pick forty bushels of apples in 14 hours. Jenny can pick the same amount in 8 hours. If they worked together how long would it take them?
### Answers to

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<tr>
<td>1) 20 km/h</td>
<td>2) 45 km/h</td>
<td>3) 75%</td>
<td>4) 64%</td>
<td></td>
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<tr>
<td>5) 6.67 hours</td>
<td>6) 5.09 hours</td>
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Factoring

Factor each completely.

1) \( p^2 - p \)
2) \( k^2 + 3k \)

3) \( 3v^2 - 30v + 48 \)
4) \( p^2 + 5p - 50 \)

5) \( 25m^2 - 20m + 4 \)
6) \( 25k^2 - 10k + 1 \)

7) \( r^2 + 6r + 9 \)
8) \( n^2 - 10n + 25 \)

9) \( a^2 - 3a \)
10) \( x^2 + 13x + 30 \)

11) \( -6n^2 - 54n - 84 \)
12) \( b^2 - 12b + 35 \)

13) \( 3m^2 - 15m - 108 \)
14) \( x^2 + 12x + 32 \)

15) \( -6v^2 + 36v - 30 \)
16) \( -6p^2 + 6p + 336 \)
Answers to

1) \( p(p - 1) \)  
2) \( k(k + 3) \)  
3) \( 3(v - 2)(v - 8) \)  
4) \( (p - 5)(p + 10) \)  
5) \( (5m - 2)^2 \)  
6) \( (5k - 1)^2 \)  
7) \( (r + 3)^2 \)  
8) \( (n - 5)^2 \)  
9) \( a(a - 3) \)  
10) \( (x + 10)(x + 3) \)  
11) \( -6(n + 2)(n + 7) \)  
12) \( (b - 5)(b - 7) \)  
13) \( 3(m - 9)(m + 4) \)  
14) \( (x + 4)(x + 8) \)  
15) \( -6(v - 1)(v - 5) \)  
16) \( -6(p - 8)(p + 7) \)