

## *Algebra 2 Summer Work Question Videos*

Questions #1-3 Factoring

Question #1:

<https://www.khanacademy.org/math/algebra/multiplying-factoring-expression/factoring-by-grouping/v/factor-by-grouping-and-factoring-completely>

Question #2:

<https://www.khanacademy.org/math/algebra/multiplying-factoring-expression/factoring-quadratic-expressions/v/factoring-quadratic-expressions>

Question #3:

<http://www.virtualnerd.com/algebra-1/polynomials-and-factoring/factoring-special-products/difference-square-or-cubes/difference-of-squares-example>

Question #4: Adding Polynomials

<http://www.virtualnerd.com/algebra-1/polynomials-and-factoring/add-subtract/add/addition-example>

Question #5: Subtracting Polynomials

<http://www.virtualnerd.com/algebra-1/polynomials-and-factoring/add-subtract/subtract/subtraction-example>

Question #6: Multiplying Polynomials

<http://www.virtualnerd.com/algebra-2/polynomials/operations/multiply/monomial-by-polynomial-multiplication>

Question #7: Multiplying Polynomials

<https://www.khanacademy.org/math/algebra/multiplying-factoring-expression/multiplying-binomials/v/square-a-binomial>

Question #8: Simplifying Radicals

<https://www.khanacademy.org/math/pre-algebra/exponents-radicals/radical-radicals/v/simplifying-radicals>

Question #9: Simplifying Radicals with Variables

[https://www.youtube.com/watch?v=XX\\_MW4fVeTM](https://www.youtube.com/watch?v=XX_MW4fVeTM)

Question #10: Order of Operations with Exponents

Question #11: Monomial Rules (Powers Raised to Powers)

<https://www.youtube.com/watch?v=BtffwL4VzKc>

Question #12: Solving a quadratic equation by factoring

<https://www.khanacademy.org/math/algebra/multiplying-factoring-expression/factoring-special-products/v/factoring-special-products>

\*\*Question #13: Solving a quadratic equation by factoring

<https://www.youtube.com/watch?v=IKyUuvullbk>

Question #14 Solving a quadratic by the quadratic formula.

<https://www.youtube.com/watch?v=3ayhVAI3IeY>

Question #15 Finding the vertex of a parabola

<https://www.youtube.com/watch?v=rnkk0rC9Gyo>

Question #16 and #17 Ball motion problems with quadratics

<https://www.youtube.com/watch?v=gJudLQquYGo>

Question #18 and #19 Solving for a variable

[https://www.khanacademy.org/math/algebra/solving-linear-equations-and-inequalities/solving\\_for\\_variable/v/solving-for-a-variable](https://www.khanacademy.org/math/algebra/solving-linear-equations-and-inequalities/solving_for_variable/v/solving-for-a-variable)

Question #20 Solving a system of equations

Elimination: <https://www.youtube.com/watch?v=K9IG-aCHCSE>

Substitution: [https://www.youtube.com/watch?v=cwHR\\_B9zK7k](https://www.youtube.com/watch?v=cwHR_B9zK7k)

Question #21 and 22 Finding missing sides of right triangles

[https://www.khanacademy.org/math/trigonometry/basic-trigonometry/basic\\_trig\\_ratios/v/example-trig-to-solve-the-sides-and-angles-of-a-right-triangle](https://www.khanacademy.org/math/trigonometry/basic-trigonometry/basic_trig_ratios/v/example-trig-to-solve-the-sides-and-angles-of-a-right-triangle)

Question #23 Graphing a linear equation

<https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-linear-equations-functions/8th-slope/v/graphing-a-line-in-slope-intercept-form>

Question #24 Graphing a horizontal line

<https://www.youtube.com/watch?v=KwBE2pJDWvU>

Question #25 Finding the slope of a line between two points

<https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-linear-equations-functions/8th-slope/v/slope-of-a-line-2>

Question #26: Write the equation of a line that passes through two given points

<https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-linear-equations-functions/8th-slope-intercept-form/v/equation-of-a-line-3>

Question #27 Write the equation of a line from a graph

<https://www.youtube.com/watch?v=tcp40RIyMgc>

Question #28 Write the equation of a line that is perpendicular to a given line

<https://www.youtube.com/watch?v=H98iBqt1fFQ>

Question #29 Finding the length of a side of a right triangle using the Pythagorean Theorem

[https://www.khanacademy.org/math/geometry/right\\_triangles\\_topic/pyth\\_theor/v/the-pythagorean-theorem](https://www.khanacademy.org/math/geometry/right_triangles_topic/pyth_theor/v/the-pythagorean-theorem)

Question #30 Solving a linear inequality

[https://www.khanacademy.org/math/algebra/linear\\_inequalities/inequalities/v/multi-step-inequalities](https://www.khanacademy.org/math/algebra/linear_inequalities/inequalities/v/multi-step-inequalities)

After you complete each problem, rate yourself on the following scale:

1	2	3	4	5
Help me! I have no idea how to do this.	I'm not sure I am doing this correctly.	I can do this problem if I follow the example.	I can do some other problems like this without the example.	I can do any problems of this kind. Test me now!

1. Example	Problem	Answer	Rating
Factor $3x^2 + 7x + 4$ . $3 \times 4 = 12$ $3 + 4 = 7$ $3x^2 + 7x + 4 = 3x^2 + 3x + 4x + 4$ $= (3x^2 + 3x) + (4x + 4) = 3x(x+1) + 4(x+1)$ $= (x+1)(3x+4)$	1. Factor $5x^2 + 12x + 4$ .	$(5x+2)(x+2)$	1 2 3 4 5

2. Example	Problem	Answer	Rating
Factor $x^2 + 8x + 15$ . $3 \times 5 = 15$ $3 + 5 = 8$ $x^2 + 8x + 15 = (x+3)(x+5)$	2. Factor $x^2 + 5x + 4$ .	$(x+4)(x+1)$	1 2 3 4 5

3. Example	Problem	Answer	Rating
Factor $4x^2 - 49$ . $4x^2 = (2x)^2$ $49 = (7)^2$ $4x^2 - 49 = (2x+7)(2x-7)$	3. Factor $9x^2 - 100$ .	$(3x+10)(3x-10)$	1 2 3 4 5

4. Example	Problem	Answer	Rating
$(3x^2 - 10x + 5) + (4x - 7)$ $= 3x^2 - 10x + 5 + 4x - 7$ $= 3x^2 - 10x + 4x + 5 - 7$ $= 3x^2 - 6x - 2$	4. $(3x - 6) + (4x^2 + 11x - 5)$	$4x^2 + 14x - 11$	1 2 3 4 5

Make sure you express your answer in correct form with exponents in descending order.

5.	Example	Problem	Answer	Rating
	$(x^2 + 10x - 4) - (2x + 6)$ $= x^2 + 10x - 4 - 2x - 6$ $= x^2 + 10x - 2x - 4 - 6$ $= x^2 + 8x - 10$	5. $(5x^2 + 7x - 2) - (3x^2 - 2x - 2)$	$2x^2 + 9x$	1
				2
				3
				4
				5

6.	Example	Problem	Answer	Rating
	$5x^2(x^2 + 3x - 5)$ $= 5x^2 \cdot x^2 + 5x^2 \cdot 3x - 5x^2 \cdot 5$ $= 5x^4 + 15x^3 - 25x^2$	6. $6x(7x^2 - x - 5)$	$42x^3 - 6x^2 - 30x$	1
				2
				3
				4
				5

7.	Example	Problem	Answer	Rating
	$(3x - 8)^2$ $= (3x - 8)(3x - 8)$ $= 3x \cdot 3x - 3x \cdot 8 - 8 \cdot 3x + 8 \cdot 8$ $= 9x^2 - 24x - 24x + 64$ $= 9x^2 - 48x + 64$	7. $(5x - 2)^2$	$25x^2 - 20x + 4$	1
	<p>You have to do the distributive property twice (you might know it as FOIL.)</p>			2
				3
				4
				5

8.	Example	Problem	Answer	Rating
	$\sqrt{72}$ Simplify. $\sqrt{72} = \sqrt{2 \cdot 2 \cdot 2 \cdot 3 \cdot 3} = 2 \cdot 3 \sqrt{2}$ $= 6\sqrt{2}$	8. $\sqrt{300}$	$10\sqrt{3}$	1
				2
				3
				4
				5

9.	Example	Problem	Answer	Rating
	Simplify $\sqrt{20a^7b^4}$ . $\sqrt{20a^7b^4} = \sqrt{2 \cdot 2 \cdot 5 \cdot a \cdot a \cdot a \cdot a \cdot a \cdot b \cdot b \cdot b}$ $= 2 \cdot a \cdot a \cdot a \cdot b \cdot b \sqrt{5a} = 2a^3b^2\sqrt{5a}$	9. $\sqrt{90x^6y^5}$	$3x^3y^2\sqrt{10y}$	1
				2
				3
				4
				5

<u>10.</u>	<u>Example</u>	<u>Problem</u>	<u>Answer</u>	<u>Rating</u>
	$3 \square 2^4 =$	10. $5 \square 3^4$	405	1
	$2^4 = 16$			2
	$3 \square 16 = 48$			3
	$3 \square 2^4 = 48$			4
				5

<u>11.</u>	<u>Example</u>	<u>Problem</u>	<u>Answer</u>	<u>Rating</u>
	Simplify $(3x^2)^3$ .	11. $(4x^4)^3$	$64x^{12}$	1
	$(3x^2)^3 = (3x^2)(3x^2)(3x^2)$			2
	$= 3 \square 3 \square 3 \square x^2 \square x^2 \square x^2 = 3^3 (x^2)^3 = 27x^6$			3
				4
				5

<u>12.</u>	<u>Example</u>	<u>Problem</u>	<u>Answer</u>	<u>Rating</u>
	Solve $x^2 + 5x + 6 = 0$ .	12. $x^2 + 7x + 12 = 0$	$x = -3$	1
	This one can be solved by factoring.		$x = -4$	2
	$x^2 + 5x + 6 = (x+2)(x+3)$			3
	$x+2=0 \quad x=-2$			4
	$x+3=0 \quad x=-3$			5

<u>13.</u>	<u>Example</u>	<u>Problem</u>	<u>Answer</u>	<u>Rating</u>
	Solve $4x^2 + 5x - 6 = 0$ .	13. $3x^2 + 4x - 4 = 0$	$x = -2$	1
	$4x^2 + 5x - 6 = 0$		$x = 2/3$	2
	$4x^2 - 3x + 8x - 6 = (4x^2 - 3x) + (8x - 6)$			3
	$= x(4x - 3) + 2(4x - 3) = (4x - 3)(x + 2)$			4
	$4x - 3 = 0 \quad x = 3/4$			5
	$x + 2 = 0 \quad x = -2$			

<u>14.</u>	<u>Example</u>	<u>Problem</u>	<u>Answer</u>	<u>Rating</u>
	Solve $4x^2 + 9x - 5 = 0$ .	14. $5x^2 - 3x - 4 = 0$	$x = \frac{3 \pm \sqrt{89}}{10}$	1
	$a = 4 \quad b = 9 \quad c = -5$			2
	$b^2 - 4ac = 9^2 - 4 \square 4 \square -5 = 161$			3
	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-9 \pm \sqrt{161}}{8}$			4
				5

Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

<u>15.</u>	<u>Example</u>	<u>Problem</u>	<u>Answer</u>	<u>Rating</u>
	Determine the vertex of this parabola. $y = 3x^2 + 12x - 4$ $x = -\frac{b}{2a} = -\frac{12}{2(3)} = -2$ $y = 3(-2)^2 + 12(-2) - 4 = -16$ $(-2, -16)$	15. Determine the vertex of this parabola. $y = 5x^2 - 30x + 6$	$(3, -39)$	1 2 3 4 5

<u>16.</u>	<u>Example</u>	<u>Problem</u>	<u>Answer</u>	<u>Rating</u>
	The following equation gives the height in feet ( $h$ ) after $t$ seconds. $h = -16t^2 + 64t + 3$ What is the maximum height? $t = -\frac{b}{2a} = -\frac{64}{2(-16)} = 2$ $y = -16(2)^2 + 64(2) + 3 = 67$	16. The following equation gives the height in feet ( $h$ ) after $t$ seconds. $h = -16t^2 + 160t + 10$ What is the maximum height?	410 feet	1 2 3 4 5

Maximum height of 67 feet occurs at 2 seconds.

<u>17.</u>	<u>Example</u>	<u>Problem</u>	<u>Answer</u>	<u>Rating</u>
	The following equation gives the height in feet ( $h$ ) after $t$ seconds: $h = -16t^2 + 64t + 3$ When will the ball hit the ground? $0 = -16t^2 + 64t + 3 \quad 64^2 - 4(-16)(3) = 4288$ $t = \frac{-64 \pm \sqrt{4288}}{2(-16)} \approx \frac{-64 \pm 65.48}{-32}$ <del><math>t \approx -0.0463</math></del> $t \approx 4.046$ seconds	17. The following equation gives the height in feet ( $h$ ) after $t$ seconds. $h = -16t^2 + 160t + 10$ When will the ball hit the ground?	10.062 seconds	1 2 3 4 5

Quadratic Formula

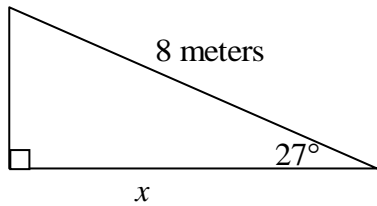
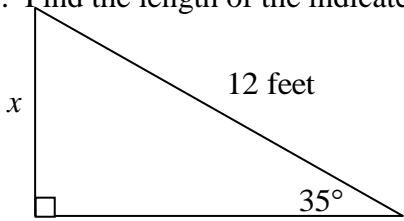
<u>18.</u>	<u>Example</u>	<u>Problem</u>	<u>Answer</u>	<u>Rating</u>
	Solve $y = \frac{2x-3}{5}$ for $x$ . <del><math>5y = \frac{2x-3}{5}</math></del> $5y = 2x - 3$ $+3 \quad +3$ $\frac{5y+3}{2} = \frac{2x}{2}$	18. Solve $y = \frac{3x-7}{6}$ for $x$ .	$x = \frac{6y+7}{3}$	1 2 3 4 5

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

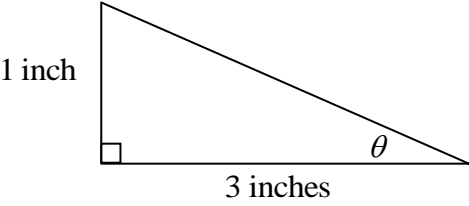
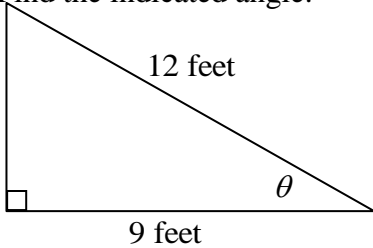
19.	Example	Problem	Answer	Rating
	Solve $x = 3y + 2$ for $y$ . $x = 3y + 2$ $-2 \quad -2$ $\frac{x-2}{3} = \frac{3y}{3}$ $y = \frac{x-2}{3}$	19. Solve $x = 6y + 10$ for $y$ .	$y = \frac{x-10}{6}$	1 2 3 4 5

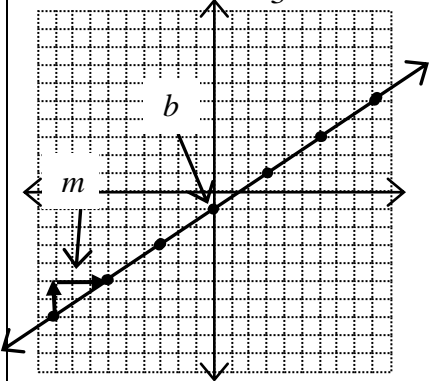
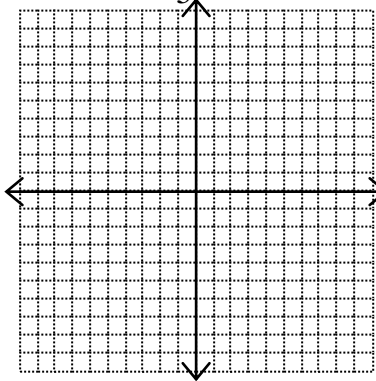
20.	Example	Problem	Answer	Rating
	Solve the following system. $\begin{cases} 3x + 2y = 14 \\ 4x - 3y = 13 \end{cases}$ $\begin{cases} 3(3x + 2y = 14) \\ 2(4x - 3y = 13) \end{cases}$ $9x + 6y = 42$ $8x - 6y = 26$ $17x = 68 \quad x = 4$ $3(4) + 2y = 14 \quad 12 + 2y = 14$ $2y = 2 \quad y = 1$	20. Solve the following system. $\begin{cases} 5x + 3y = -7 \\ 4x - 4y = -12 \end{cases}$	$(-2, 1)$	1 2 3 4 5

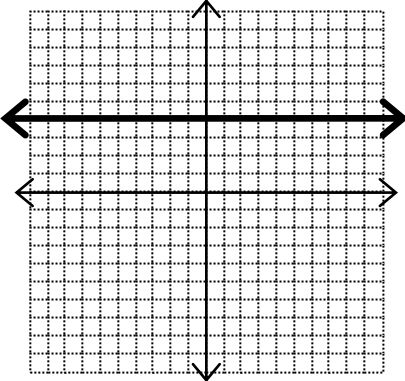
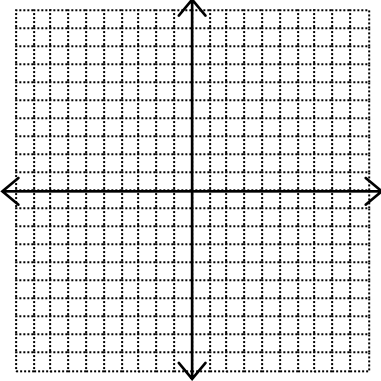
The solution is  $(4, 1)$ .

21.	Example	Problem	Answer	Rating
	Find the length of the indicated side.  $\cos \theta = \frac{A}{H} \quad \cos 27^\circ = \frac{x}{8}$ $8 \cos 27^\circ = \frac{x}{8} \quad x \approx 7.12$	21. Find the length of the indicated side. 	6.88 feet	1 2 3 4 5

The length of the side is about 7.12 meters.

22. Example	Problem	Answer	Rating
<p>Find the indicated angle.</p>  <p>1 inch</p> <p>3 inches</p> $\tan \theta = \frac{O}{A} \quad \tan \theta = \frac{1}{3}$ $\theta = \tan^{-1}\left(\frac{1}{3}\right) \quad \theta \approx 18.4^\circ$ <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p>The measure of the angle is about 18.4 degrees.</p> </div>	<p>22. Find the indicated angle.</p>  <p>12 feet</p> <p>9 feet</p>	<p>41.4°</p>	<p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p>

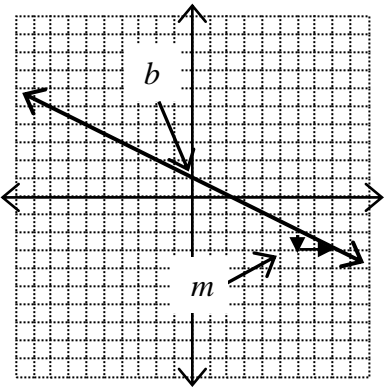
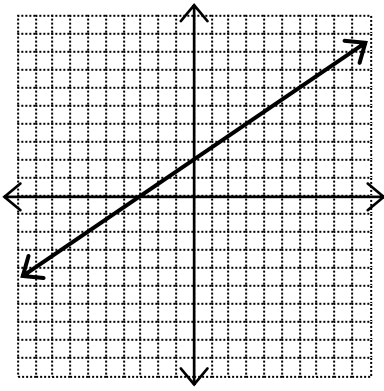
23. Example	Problem	Answer	Rating
<p>Graph the line <math>y = \frac{2}{3}x - 1</math>.</p>  <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p>The <math>b</math>-value is the <math>y</math>-intercept. Start at that point and using the slope, go up 2 and over 3.</p> </div>	<p>23. Graph the line <math>y = \frac{3}{5}x + 2</math></p> 	<p>Check the points (5, 5) and (-10, -4). If they are on your line, it is correct.</p>	<p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p>

24. Example	Problem	Answer	Rating
<p>Graph the line <math>y = 4</math>.</p> 	<p>24. Graph the line <math>y = -6</math></p> 	<p>Check the points (3, -6) and (-10, -6). If they are on your line, it is correct.</p>	<p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p>

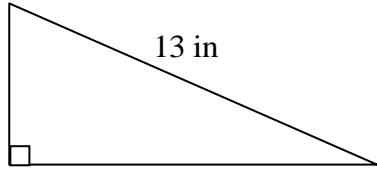
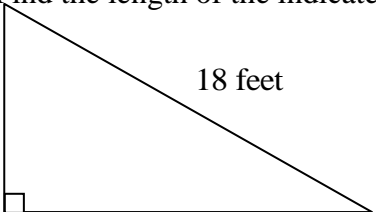


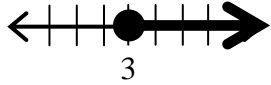
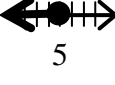
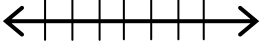
25. Example	Problem	Answer	Rating
<p>Find the slope of the line that passes through the points (6, 1) and (8, -4).</p> $m = \frac{y_2 - y_1}{x_2 - x_1}$ $m = \frac{-4 - 1}{8 - 6} = \frac{-5}{2}$	<p>25. Find the slope of the line that passes through the points (4, -6) and (0, 3)</p>	$m = \frac{-9}{4}$	<p>1 2 3 4 5</p>

26. Example	Problem	Answer	Rating
<p>Write the equation of the line that passes through the points (-2, 5) and (3, 1).</p> $m = \frac{5 - 1}{-2 - 3} = \frac{4}{-5} = -\frac{4}{5}$ $y = -\frac{4}{5}x + b$ $5 = -\frac{4}{5}(-2) + b \quad 5 = \frac{8}{5} + b$ $\quad \quad \quad -\frac{8}{5} \quad -\frac{8}{5}$ $b = \frac{25}{5} - \frac{8}{5} = \frac{17}{5}$ $y = -\frac{4}{5}x + \frac{17}{5}$	<p>26. Write the equation of the line that passes through the points (3, 2) and (5, 3)</p>	$y = \frac{1}{2}x + \frac{1}{2}$	<p>1 2 3 4 5</p>

27. Example	Problem	Answer	Rating
<p>Write the equation of the line.</p>  $y = -\frac{1}{2}x + 1$	<p>27. Write the equation of the line.</p> 	$y = \frac{2}{3}x + 2$	<p>1 2 3 4 5</p>

28. <u>Example</u>	<u>Problem</u>	<u>Answer</u>	<u>Rating</u>
<p>Write the equation of the line that is perpendicular to <math>y = \frac{2}{5}x - 3</math> and passes through the point <math>(4, 7)</math>.</p> $m_{\perp} = -\frac{5}{2}$ $y = -\frac{5}{2}x + b$ $7 = -\frac{5}{2}(4) + b \quad 7 = -10 + b$ $\phantom{7 = -\frac{5}{2}(4) + b} \quad +10 \quad +10$ $b = 17$ $y = -\frac{5}{2}x + 17$	<p>28. Write the equation of the line that is perpendicular to <math>y = \frac{4}{3}x - 7</math> passes through the point <math>(-8, 5)</math></p>	$y = -\frac{3}{4}x - 1$	<p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p>

29. <u>Example</u>	<u>Problem</u>	<u>Answer</u>	<u>Rating</u>
<p>Find the length of the indicated side.</p>  $a^2 + b^2 = c^2$ $9^2 + x^2 = 13^2$ $81 + x^2 = 169$ $-81 \quad -81$ $x^2 = 88$ $x = \sqrt{88} \approx 9.38 \text{ in}$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto;"> <p>The length of the side is about 9.38 inches.</p> </div>	<p>29. Find the length of the indicated side.</p> 	<p>14.25 feet</p>	<p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p>

30. <u>Example</u>	<u>Problem</u>	<u>Answer</u>	<u>Rating</u>
<p>Solve <math>-3x + 8 \leq 5x - 16</math> and graph your solution.</p> $-3x + 8 \leq 5x - 16$ $-5x \quad -5x$ $-8x + 8 \leq -16$ $\phantom{-8x + 8 \leq -16} \quad -8 \quad -8$ $\frac{-8x \leq -24}{-8} \leq \frac{-24}{-8}$ $x \geq 3$  <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto;"> <p>The dot is closed because it is greater than or <b>equal</b> to, not just greater than.</p> </div>	<p>30. Solve <math>-2x + 4 \geq 3x - 21</math></p>  	<p><math>x \leq 5</math></p>	<p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p>

# VOCABULARY AND FORMULAS YOU MUST KNOW

Slope Formula:	
Slope Intercept Form of a Line:	
Point-Slope Form of a line:	
Parallel Slopes:	
Perpendicular Slopes:	
Sine Ratio:	
Cosine Ratio:	
Tangent Ratio:	
$45^\circ$ - $45^\circ$ – $90^\circ$ Triangle Side Lengths:	
$30^\circ$ - $60^\circ$ – $90^\circ$ Triangle Side Lengths:	
Quadratic Formula:	
Axis of Symmetry Formula for a Quadratic:	