

Algebra 2 Readiness Summer Packet

*This packet is designed for those who have completed Geometry
and will be enrolled in Algebra 2 ~~XXXXXX~~ in the upcoming fall semester.*

Summer Packet

Algebra II

Welcome to Algebra II. The topics in Algebra II can be abstract but they have practical applications and serve as a foundation for further study in mathematics and other college level mathematics. Mathematics is a series of building blocks. A student of mathematics must have sufficient Algebra I skills to be proficient in Algebra II.

This Review Packet was prepared for students to be able to review material from Algebra I. The summer packet is to be completed by the first day of school. This packet covers all review skills.

Algebra Resources

- [Khan Academy](#) Take control of your **learning** by working on the skills you choose at your own pace. ... **Math**, science, computer programming, history, art, economics, and more.
- [Algebasics](#) has video tutorials explaining the basics of algebra, equations, ratio and proportion, absolute value, polynomials, factoring, linear equations, radicals, applications, and much more.
- [Algebra-Class.com](#) offers help with solving equations, graphing equations, writing equations, inequalities, functions, exponents and monomials, polynomials, and the quadratic equation. It also has a list of resources.
- [Algebra.help](#) contains lessons on topics that include equations, simplifying, factoring, distribution, and trinomials, as well as equation calculators and worksheets. This site also has an extensive list of math resources and study tips.
- [Algebra Help](#) covers topics such as fractions, percents, decimals, algebraic expressions, addition, multiplication, and word problems. Each section includes explanations and examples.
- [College-Cram.com](#) allows students to choose the algebra subject they are struggling with from a drop down menu, select the appropriate chapter, and pick your resources. The pages will feature formula solvers, bottomless worksheets, flashcards, quizzes, interactive overviews, and brief lessons and study sheets.
- [Interactive Mathematics](#) has a large section on algebra, including information on factoring and fractions, the quadratic equation, exponents and radicals, systems of equations, matrices and determinants, and inequalities.
- [Math Expression](#) has videos, worksheets, and lessons to help you develop your algebra skills. Math topics include algebra, exponents, symmetry, fractions, measurements, angles, and more. The site also includes a list of useful resources.
- [Purplemath](#) contains lessons with explanations on everything from absolute value and negative numbers to intercepts, variables, and factoring. In addition, this site includes a forum that allows students to ask questions and receive answers, as well as a list of homework tips and guidelines.

Part One: Order of Operations

Directions: Simplify each problem in the space provided, circling your final answer. Final answer should have all positive exponents and be in simplest form. No decimal approximations allowed.

Properties

1. Grouping symbols
2. Exponents
3. Multiplication or Division
In order from left to right
4. Addition or Subtraction
In order from left to right

<p>Example: $2^3 - (4 + 3 * 5)$ $= (2 * 2 * 2) - (4 + 3 * 5)$ $= (8) - (4 + 15)$ $= 8 - (19)$ $= -11$</p>	<p>1. $(15 - 8) \times 3 + 5 + 48 - 6$</p>	<p>2. $18 \div 9 \times (5 - 2) + 7$</p>
<p>3. $4^3 + 2 + 8 - 60 \div 3 \times 6 - 3$</p>	<p>4. $(a^2 - b) \div 6$, using $a = 6, b = 12$</p>	<p>5. when $x = -5$</p>
<p>6. $2x^2 - 2x + 24$ when $x = 2$</p>	<p>7. $\frac{3x^2 + 5}{12x - 4}$, when $x = -1$</p>	<p>8. $(a + \sqrt{16}) \left(\frac{1}{a^2} - \frac{a}{3} \right)$ when $a = 2$</p>

Equations of a Line

- *Slope-intercept form:* $y = mx + b$
- *Point-slope form:* $y - y_1 = m(x - x_1)$
- *Standard form:* $Ax + By = C$
- *Slope:* $m = \frac{y_2 - y_1}{x_2 - x_1}$

Part Two: Linear Equations

Directions: Solve each problem in the space provided, circling your final answer. Recall: to find x-intercept set $y=0$ and to find y-intercept set $x=0$. To find equation of a line find slope and then use slope and point to solve for y-intercept.

<p>Example: Write the equation of a line that has slope $m = -\frac{4}{9}$ and y-intercept $b = -3$.</p> <p>Use $y = mx + b$ then substitute values for m and b and simplify</p> $y = -\frac{4}{9}x + -3$ $y = -\frac{4}{9}x - 3$	<p>9. Find the slope of the line containing the points $(4, -3)$ and $(-6, 4)$.</p>	<p>10. Write the equation of a line that has slope $m = -\frac{4}{9}$ and passes through the point $(18, -2)$.</p>
<p>11. Write the equation of the line containing the points $(1, 3)$ and $(5, 11)$.</p>	<p>12. Write the equation of the line containing the point $(-4, 6)$ and parallel to $3x - 2y = 8$.</p>	<p>13. Write the equation of the line containing the point $(3, 56)$ and perpendicular to $3x - 2y = 8$.</p>

Part Three: Rules of Exponents

Directions: Simplify each problem in the space provided, circling your final answer. Final answer should have all positive exponents.

Properties

$$a^m \cdot a^n = a^{m+n}$$

$$(a^m)^n = a^{mn}$$

$$(ab)^m = a^m b^m$$

$$a^{-m} = \frac{1}{a^m}, a \neq 0$$

$$\frac{a^m}{a^n} = a^{m-n}, a \neq 0$$

$$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$$

<p>Example:</p> $(2a)^{-3}$ $= \frac{1}{(2a)^3}$ $= \frac{1}{(2a)} * \frac{1}{(2a)} * \frac{1}{(2a)}$ $= \frac{1}{2^3 a^3} = \frac{1}{8a^3}$	<p>14. $(7x)^{-2}$</p>	<p>15. $(2x^2y)^0(3xy)^3$</p>
<p>16. $\frac{a^3}{a} - \frac{4a^6}{a^4}$</p>	<p>17. $(4x^3)^3$</p>	<p>18. $\left(\frac{5u^2}{2v^2}\right)^2$</p>
<p>19. $(3^{-1} + 2^{-1})^2$</p>	<p>20. $\left(\left(\frac{3}{4}\right)^2 + 1\right)^2$</p>	<p>21. $\left(\frac{x^2y^8z^2}{xy^2z^6}\right)^2$</p>

Part Four: Simplifying Radicals

Directions: Simplify each problem in the space provided, circling your final answer. Final answer should have all positive exponents and be rationalized. No decimal approximations allowed.

Properties

$$\bullet \sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$$

$$\bullet \sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$$

$$\bullet a^{\frac{m}{n}} = \sqrt[n]{a^m} \text{ or } (\sqrt[n]{a})^m$$

$$\bullet \sqrt{x^2} = x$$

<p>Example:</p> $\begin{aligned} &\sqrt{24} \\ &= \sqrt{4 \cdot 6} \\ &= \sqrt{4} \cdot \sqrt{6} \\ &= 2\sqrt{6} \end{aligned}$	<p>22. $3\sqrt{700}$</p>	<p>23. $\sqrt{\frac{100}{49}}$</p>
<p>24. $3\sqrt{700} + 2\sqrt{7}$</p>	<p>25. $(2\sqrt{6}) \cdot (3\sqrt{15})$</p>	<p>26. $\sqrt{12} - \sqrt{48}$</p>
<p>27. $\sqrt{75x^3} \cdot \sqrt{3x^3}$</p>	<p>28. $\frac{50a}{2\sqrt{25a^2}}$</p>	<p>BE CAREFUL:</p> $\sqrt[n]{a+b} \neq \sqrt[n]{a} + \sqrt[n]{b}$ $\sqrt[n]{a-b} \neq \sqrt[n]{a} - \sqrt[n]{b}$ $\sqrt[n]{a^n + b^n} \neq a + b$

Part Five: Simplifying Polynomials

Directions: Simplify each problem in the space provided, circling your final answer. Final answer should have all positive exponents and be in simplest form. No decimal approximations allowed.

Properties

$$c(x + y) = cx + cy$$

$$(a + b)(c + d) = ac + ad + bc + bd$$

Example: $(4x^2 + 7x - 12) - (3x^2 + 5x + 2)$ $= 4x^2 + 7x - 12 - 3x^2 - 5x - 2$ $= 4x^2 - 3x^2 + 7x - 5x - 12 - 2$ $= x^2 - 2x - 14$	29. $(7x - 2y) - (3x + 5y)$	30. $-7x(2x - 9)$
31. $(-3x + y) + (2x - y)$	32. $(3x + 4)(2x - 9)$	33. $7(3x^2 + 10x) - 4x$
34. $3x^2 + 10x - 4(x - 7)$	35. $(3x^2 + 5)(2x - 3)$	36. $(-3x + y)(2x - y)$

Part Six: Factoring

Directions: Factor each problem completely in the space provided, circling your final answer. Recall: if not factorable, it is “prime”.

Strategies

1. *GCF*
2. Difference of Squares $(a + b)(a - b) = a^2 - b^2$
3. Trinomials: factors of ac that add up to b
4. Sum and Difference
$$a^2 + 2ab + b^2 = (a + b)^2$$
$$a^2 - 2ab + b^2 = (a - b)^2$$
5. Grouping

Example: $3b^2 + 15b + 18$ $= 3(b^2 + 5b + 6)$ $= 3(b + 3)(b + 2)$	37. $x^2 + 6x + 5$	38. $x^2 + x - 6$
39. $3x^3 + 18x^2 + 24x$	40. $4n^2 - 24n$	41. $144x^2 - 36$
42. $2x^2 + 7x - 4$	43. $2x^5 + 10x^4 + 12x^3$	44. $2x^3 + 3x^2 - 8x - 12$

Part Six: Solving

Directions: Solve each problem completely in the space provided, circling your final answer. Recall: For quadratics you may need the zero-product property... if $ab = 0$, then $a = 0$ or $b = 0$.

Strategies

1. Factor out a GCF (if one exists).
2. Quadratic – factor, completing the square or quadratic formula. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
3. Cubic – try to factor by grouping.
4. Absolute value equations : $|a+b| = c$
 $a+b = c$ or $a+b = -c$
5. Radical equations – raise each side to the root.

45. $3(x-7) + 5 = -2x - 8$	46. $\frac{x+1}{3} = 5$	47. $(x+4)(9x-3) = 0$
48. $x^2 + x - 12 = 0$	49. $x^2 + 2x - 35 = 0$	50. $x^2 + 3x = -1$
51. $ 1-4x = 5$	52. $-4x + 7 \leq 5$	53. $2\sqrt{x} - 3 = 5$

Part Seven: Systems of Equations

Directions: Solve each problem completely in the space provided, circling your final answer.

Methods

1. Graphing.
2. Substitution
3. Elimination.

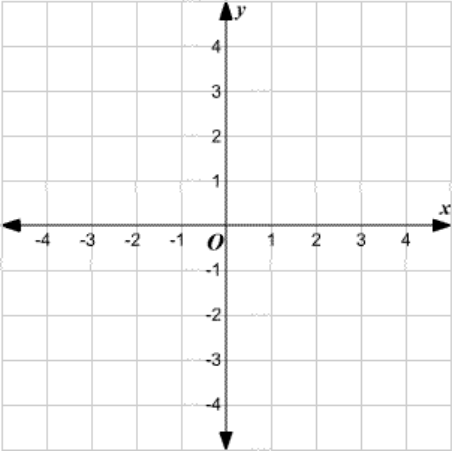
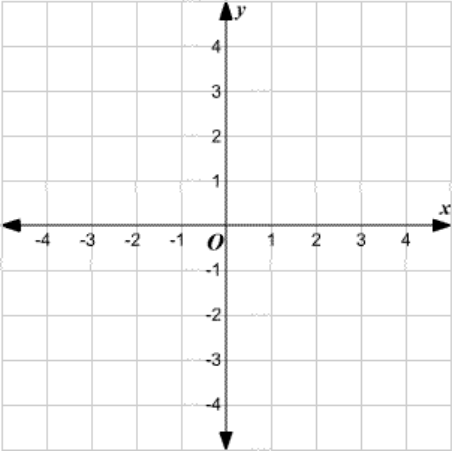
54. $\begin{cases} 3x + 2y = 2 \\ 9x - 8y = -4 \end{cases}$	55. $\begin{cases} y = -3x + 1 \\ 6x + 2y = 10 \end{cases}$	56. $\begin{cases} y = 2x - 2 \\ 7.5y = 15x - 15 \end{cases}$
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Part Eight: Systems of Inequalities

Directions: Solve each system of inequalities by graphing.

Methods

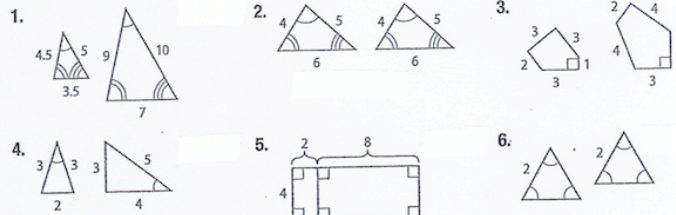
Graph both inequalities on the same coordinate plane and their intersection (overlapping region) is the solution. $<$ and $>$ are dotted lines, \leq and \geq are solid line.

57. $\begin{cases} y < 3x + 2 \\ y \leq -2x + 1 \end{cases}$ 	58. $\begin{cases} y > -3x - 2 \\ 2x - 3y < 6 \end{cases}$ 
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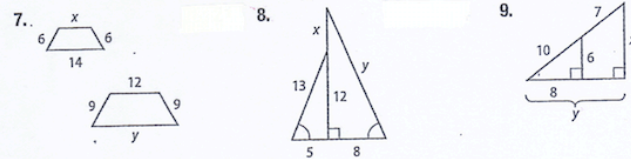
Part Nine: Basic Geometry and Trigonometry

Set One:

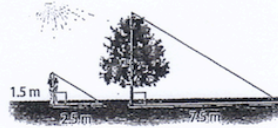
Determine whether each pair of figures is *similar*, *congruent*, or *neither*.



Each pair of polygons is similar. Find the values of x and y .



10. **SHADOWS** On a sunny day, Jason measures the length of his shadow and the length of a tree's shadow. Use the figures at the right to find the height of the tree.

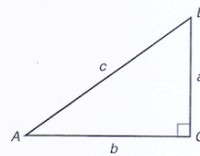


11. **PHOTOGRAPHY** A photo that is 4 inches wide by 6 inches long must be reduced to fit in a space 3 inches wide. How long will the reduced photo be?
12. **SURVEYING** Surveyors use instruments to measure objects that are too large or too far away to measure by hand. They can use the shadows that objects cast to find the height of the objects without measuring them. A surveyor finds that a telephone pole that is 25 feet tall is casting a shadow 20 feet long. A nearby building is casting a shadow 52 feet long. What is the height of the building?

Set Two:

Using the triangle shown, write an equation involving \sin , \cos , or \tan that can be used to find the missing measure. Then solve the equation. Round measures of sides to the nearest tenth.

- If $A = 20^\circ$ and $c = 32$, find a .
- If $A = 49^\circ$ and $a = 17$, find b .
- If $A = 27.3^\circ$ and $a = 7$, find c .
- If $a = 19.2$ and $A = 63.4^\circ$, find b .
- If $a = 28$ and $B = 41^\circ$, find c .



Solve each right triangle. Assume that C represents the right angle and c is the hypotenuse. Round measures of sides and angles to the nearest tenth.

- $a = 12, A = 35^\circ$
- $b = 25, B = 71^\circ$
- $a = 4, b = 7$
- $b = 52, c = 95$

Solutions

Part One: Order of Operations

- 1.) 68 2.) 13 3.) -49 4.) 4
5.) Oops ☺ 6.) 28 7.) $-\frac{1}{2}$ 8.) $-\frac{5}{2}$

Part Two: Linear Equations

- 9.) $\frac{-7}{10}$ 10.) $y = \frac{-4}{9}x + 6$ 11.) $y = 2x + 1$
12.) $y = \frac{3}{2}x + 12$ 13.) $y = \frac{-2}{3}x + 58$

Part Three: Rules of Exponents

- 14.) $\frac{1}{49x^2}$ 15.) $27x^3y^3$ 16.) $-3a^2$ 17.) $64x^9$
18.) $\frac{25u^4}{4v^4}$ 19.) $\frac{25}{36}$ 20.) $\frac{625}{256}$ 21.) $\frac{x^2y^{12}}{z^8}$

Part Four: Simplifying Radicals

- 22.) $30\sqrt{7}$ 23.) $\frac{10}{7}$ 24.) $32\sqrt{7}$ 25.) $18\sqrt{10}$
26.) $-2\sqrt{3}$ 27.) $15x^3$ 28.) 5

Part Five: Simplifying Polynomials

- 29.) $4x - 7y$ 30.) $-14x^2 + 63x$ 31.) $-x$ 32.) $6x^2 - 19x - 36$
33.) $21x^2 + 66x$ 34.) $3x^2 + 6x + 28$ 35.) $6x^3 - 9x^2 + 10x - 15$ 36.) $-6x^2 + 5xy - y^2$

Part Six: Factoring

- 37.) $(x + 5)(x + 1)$ 38.) $(x + 3)(x - 2)$ 39.) $3x(x + 4)(x + 2)$ 40.) $4n(n - 6)$
41.) $36(2x + 1)(2x - 1)$ 42.) $(2x - 1)(x + 4)$ 43.) $2x^3(x + 3)(x + 2)$ 44.) $(2x + 3)(x + 2)(x - 2)$

Part Six(2): Solving


- 45.) $\frac{8}{5}$ 46.) 14 47.) $\frac{1}{3}, -4$ 48.) -4, 3 49.) -7, 5
50.) $\frac{-3 \pm \sqrt{5}}{2}$ 51.) $-1, \frac{3}{2}$ 52.) $x \geq \frac{1}{2}$ 53.) 16


Part Seven: Systems of Equations

- 54.) $(\frac{4}{21}, \frac{5}{7})$ 55.) No solution 56.) Infinite solutions

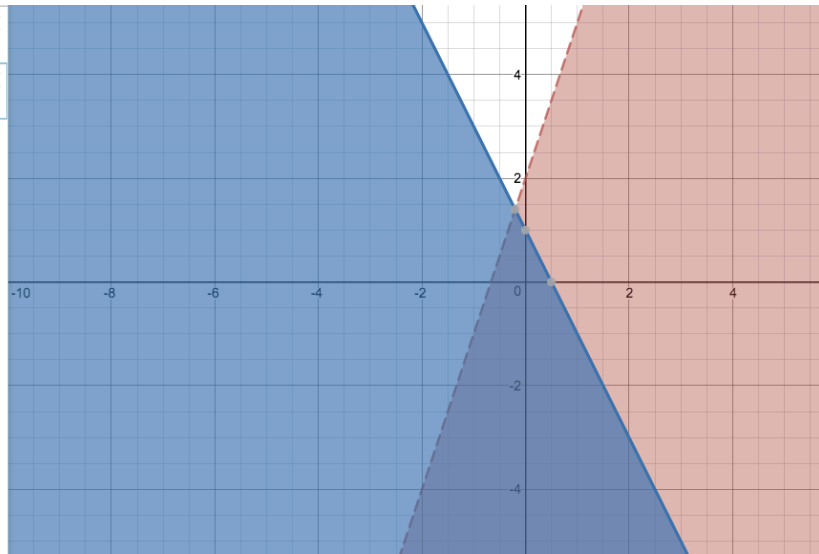
Part Eight: Systems of Inequalities

57.)


1  $y < 3x + 2$


2  $y \leq -2x + 1$

3

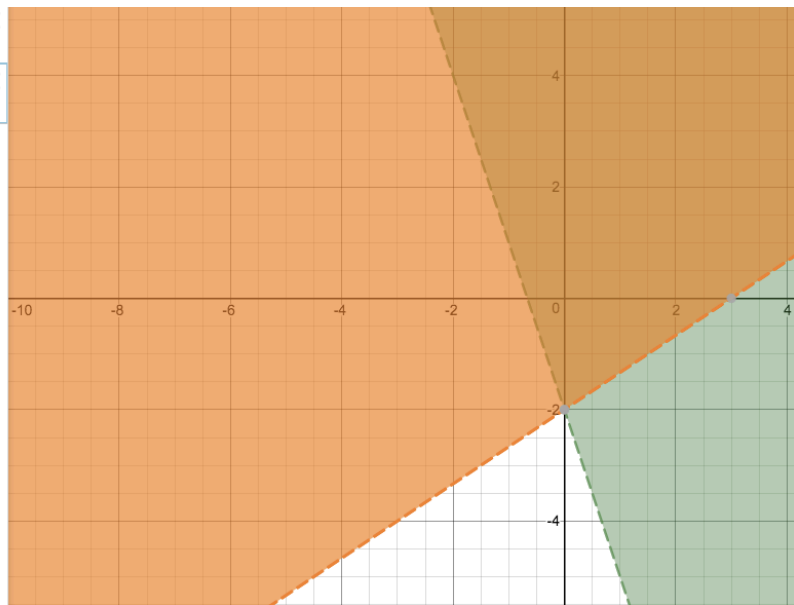


58.)

1  $y > -3x - 2$

2  $2x - 3y < 6$

3



Part Nine: Basic Geometry and Trigonometry

Set One:

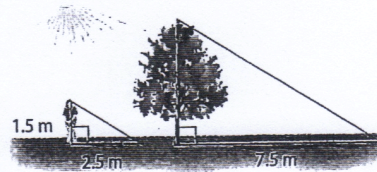
Determine whether each pair of figures is *similar*, *congruent*, or *neither*.

1. **similar**
2. **congruent**
3. **neither**
4. **neither**
5. **similar**
6. **congruent**

Each pair of polygons is similar. Find the values of x and y .

7. **8; 21**
8. **7.2; 20.8**
9. **10.2; 13.6**

10. **SHADOWS** On a sunny day, Jason measures the length of his shadow and the length of a tree's shadow. Use the figures at the right to find the height of the tree. **4.5 m**



11. **PHOTOGRAPHY** A photo that is 4 inches wide by 6 inches long must be reduced to fit in a space 3 inches wide. How long will the reduced photo be? **$4\frac{1}{2}$ in.**
12. **SURVEYING** Surveyors use instruments to measure objects that are too large or too far away to measure by hand. They can use the shadows that objects cast to find the height of the objects without measuring them. A surveyor finds that a telephone pole that is 25 feet tall is casting a shadow 20 feet long. A nearby building is casting a shadow 52 feet long. What is the height of the building? **65 ft**

Set Two:

1. If $A = 20^\circ$ and $c = 32$, find a .

$$\sin 20^\circ = \frac{a}{32}; 10.9$$

2. If $A = 49^\circ$ and $a = 17$, find b .

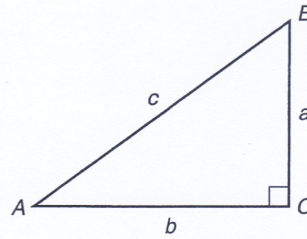
$$\tan 49^\circ = \frac{17}{b}; 14.8$$

3. If $A = 27.3^\circ$ and $a = 7$, find c .

$$\sin 27.3^\circ = \frac{7}{c}; 15.3$$

4. If $a = 19.2$ and $A = 63.4^\circ$, find b .

$$\tan 63.4^\circ = \frac{19.2}{b}; 9.6$$



5. If $a = 28$ and $B = 41^\circ$, find c .

$$\cos 41^\circ = \frac{28}{c}; 37.1$$

Solve each right triangle. Assume that C represents the right angle and c is the hypotenuse. Round measures of sides and angles to the nearest tenth.

6. $a = 12, A = 35^\circ$

$$B = 55^\circ, b = 17.1, c = 20.9$$

7. $b = 25, B = 71^\circ$

$$A = 19^\circ, a = 8.6, c = 26.4$$

8. $a = 4, b = 7$

$$A = 29.6^\circ, B = 60.3^\circ, c = 8.1$$

9. $b = 52, c = 95$

$$a = 79.5, A = 56.8^\circ, B = 33.2^\circ$$