

# **SUMMER MATH PREP WORK FOR STUDENTS ENTERING GEOMETRY**



**NAME:** \_\_\_\_\_

## **SUMMER PREP WORK HELP**

**8/2, 8/9, AND 8/16**

**2:45PM - 3:45PM**

**BOLGER MEDIA CENTER**

**Mr. Rosenberg will be there on 8/2**

**Mrs. Keelen will be there on 8/9 & 8/16**



KEANSBURG

HIGH SCHOOL

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Ms. Jennifer Vecchiarelli

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Mr. Dennis O'Keefe

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Mr. Thomas Stark

## ALGEBRA 1, GEOMETRY, & ALGEBRA 2 SUMMER PREP WORK

This prep work should be completed, to the best of your ability, by the first day of school. If provided, Big Ideas and Google Classroom will have helpful resources (textbook, tutorials, etc.) to assist you with the completion of the prep work. Please note that all of the material in the prep work was covered in previous math classes; there are no excuses.

This prep work will be checked on the first day of class and will be collected on the second day of class. **The prep work will count as your first CLASSWORK grade for the year.**

The next page contains skills and mathematical ideas that you are expected to have a good understanding of in order to be successful in your next course. It is important that you are able to complete these skills both with and without a calculator. This prep work has been designed to specifically target the skills listed in order to help you become better prepared for your next course.

### Google Classroom Code: \_\_\_\_\_

- (1) Sign into your school email & go to Google Classroom ([classroom.google.com](https://classroom.google.com)).
- (2) Click the "+" in the top bar and type the code.

### Big Ideas Code: \_\_\_\_\_

Already Have a Username & Password?

- (1) Go to [bigideasmath.com](https://bigideasmath.com)
- (2) Sign in using your information
- (3) Click your name in the top right
- (4) Click "Add Class" and enter code above

Need a Username & Password?

- (1) Go to [bigideasmath.com](https://bigideasmath.com)
- (2) Click "New to Big Ideas Math?"
- (3) Enter the code above & create a login

**BEFORE ENTERING GEOMETRY, ...**  
**YOU ARE EXPECTED TO KNOW THE SKILLS BELOW:**

- Solving multi-step equations & systems of equations (including distribution & fractions), solving proportions, and factoring
- Simplifying radicals and rationalizing the denominator
- Knowledge of the coordinate plane and graphing linear functions
- Working in Different Dimensions (no, 1, 2, & 3)
- Basic conceptual knowledge of lines, segments, rays, planes, parallel & perpendicular lines, polygons, transformations, circles, etc.
- Basic knowledge of signs, symbols, and terminology: angle notation, side notation, degrees, congruent angles - arcs, congruent sides – tally marks, vertices, etc.
- Use the following ideas to solve problems: area, perimeter, volume, surface area, slope, Pythagorean Theorem, etc.

**YOU ARE EXPECTED TO KNOW THE MATHEMATICAL IDEAS BELOW:**

**Congruence**

- Experiment with transformations & Understand congruence in terms of rigid motions

**Similarity, Right Triangles, and Trigonometry**

- Understand similarity in terms of similarity transformations
- Solve problems involving right triangles

**Circles**

- Understand and apply information about circles (arc lengths, areas of sectors, etc.)

**Expressing Geometric Properties with Equations**

- Use coordinates to prove simple geometric theorems algebraically

**Geometric Measurement and Dimension**

- Explain area, perimeter, & volume formulas and use them to solve problems
- Visualize relationships between two-dimensional and three-dimensional objects

**Modeling with Geometry**

- Apply geometric concepts in modeling situations

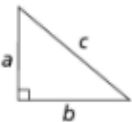
**Mathematical Practices**

- Make sense of problems and persevere in solving them
- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics
- Use appropriate tools strategically
- Attend to precision
- Look for and make use of structure
- Look for and express regularity in repeated reasoning

# ALGEBRA 1, GEOMETRY, & ALGEBRA 2 SUMMER PREP WORK REFERENCE SHEET

Key	
$b$ = base	$d$ = diameter
$h$ = height	$r$ = radius
$l$ = length	$\ell$ = slant height
$w$ = width	$B$ = area of base
	$P$ = perimeter of base
Use 3.14 or $\frac{22}{7}$ for $\pi$ .	

Formulas for Area	
Triangle	$A = \frac{1}{2}bh$
Rectangle	$A = lw$
Trapezoid	$A = \frac{1}{2}h(b_1 + b_2)$
Parallelogram	$A = bh$
Circle	$A = \pi r^2$

Linear Equation Forms
<u>Point-Slope Form:</u> $y - y_1 = m(x - x_1)$
<u>Standard or General Form:</u> $Ax + By = C$
<u>Slope-Intercept Form:</u> $y = mx + b$
Pythagorean Theorem
 $c^2 = a^2 + b^2$

Coordinate Geometry
Given: Points $A(x_1, y_1)$ , $B(x_2, y_2)$
<u>Distance between two points:</u> $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
<u>Midpoint between two points:</u> Midpoint of $\overline{AB} = \left(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2}\right)$
<u>Slope of line through two points:</u> $m = \frac{y_2 - y_1}{x_2 - x_1}$
Quadratic Formula
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Formulas for Volume and Area of Solids		
Solid	Volume	Total Surface Area
Right Circular Cone	$V = \frac{1}{3}\pi r^2 h$	$T = \frac{1}{2}(2\pi r)\ell + \pi r^2 = \pi r\ell + \pi r^2$
Pyramid	$V = \frac{1}{3}Bh$	$T = B + \frac{1}{2}P\ell$
Sphere	$V = \frac{4}{3}\pi r^3$	$T = 4\pi r^2$
Right Circular Cylinder	$V = \pi r^2 h$	$T = 2\pi r h + 2\pi r^2$
Right Prism	$V = Bh$	$T = 2B + Ph$

## CONVERSIONS

1 inch = 2.54 centimeters	1 kilometer = 0.62 mile
1 meter = 39.37 inches	1 pound = 16 ounces
1 mile = 5280 feet	1 pound = 0.454 kilograms
1 mile = 1760 yards	1 kilogram = 2.2 pounds
1 mile = 1.609 kilometers	1 ton = 2000 pounds
1 cup = 8 fluid ounces	
1 pint = 2 cups	
1 quart = 2 pints	
1 gallon = 4 quarts	
1 gallon = 3.785 liters	
1 liter = 0.264 gallon	
1 liter = 1000 cubic centimeters	

## Additional Formulas

Arithmetic Sequence	$a_n = a_1 + (n - 1)d$
Geometric Sequence	$a_n = a_1 r^{n-1}$
Geometric Series	$S_n = \frac{a_1 - a_1 r^n}{1 - r}$ where $r \neq 1$
Radians	1 radian = $\frac{180}{\pi}$ degrees
Degrees	1 degree = $\frac{\pi}{180}$ radians
Exponential Growth/Decay	$A = A_0 e^{k(t-t_0)} + B_0$
Circumference of a Circle	$C = \pi d$ or $C = 2\pi r$

**DIRECTIONS:** Circle your final answers. All work must be shown!  
Feel free to use an additional piece of paper, but make sure it's stapled to this packet before you turn it in. Name: \_\_\_\_\_

### Part 1: Writing, Evaluating, and Simplifying Expressions

#### \*Choose 2\*

1. Evaluate the expression:  $43w$ , when  $w = 5$ .
2. Evaluate the expression:  $r^2$ , when  $r = 17$ .
3. Evaluate the expression:  $\frac{2}{5}x$ , when  $x = \frac{1}{6}$ .
4. Evaluate the expression  $2^n$ , when  $n = 4$ .

#### \*Choose 4\*

5. Simplify:  $12 - 2(13 - 9 + 3)$
6. Simplify:  $130 \div (4^2 - 6)$
7. Simplify:  $\frac{(4+6^2)}{4}$
8. Simplify:  $\frac{7}{3} + \frac{3}{10}$
9. Simplify:  $5.3(-0.8)$

**\*Complete ALL\***

10. Simplify:  $-42.6 \div (-7.1)$

11. Simplify:  $\frac{4}{5} \times \frac{1}{4}$

**\*Complete ALL\***

12. Simplify:  $\sqrt{120}$

13. Simplify:  $-2\sqrt{72}$

14. Rationalize the denominator:  $\frac{5}{\sqrt{10}}$

15. Rationalize the denominator:  $\frac{3\sqrt{2}}{2\sqrt{15}}$

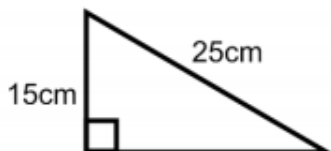
**\*Choose 1\***

16. Translate the verbal phrase into an expression. Then, simplify the expression. “the quotient of four and a number, minus seventeen”.
17. Translate the verbal phrase into an expression. Then, simplify the expression. “the quantity of twelve more than a number, times eight”.
18. Translate the verbal phrase into an expression. Then, simplify the expression. “six less than the product of five and a number is twenty-nine”.

**Part 2: Using Formulas to find Measurements**

**\*Choose 1\***

19. Find the missing side using the Pythagorean Theorem.



20. The two shorter sides of a right triangle have measures of 3 inches and 4 inches. What is the measure of the hypotenuse? (Hint: Use the Pythagorean Theorem)

**\*Choose 2\***

21. What is the volume of a rectangular prism with a length of 5 cm, a width of 8cm, and a height of 10 cm?
22. What is the volume of a cylinder with a height of 10 in and a radius of 6 in?
23. What is the volume of a cylinder with a height of 10 in and a diameter of 8 in?

**\*Choose 1\***

24. The volume of a cylinder is 3 times larger than a cone with the same height and radius. What would be the volume of a cone if a cylinder with the same height and radius has a volume of  $240 \text{ cm}^3$ ?
25. The area of a square is  $100 \text{ cm}^2$ . Suppose the sides of the figure are doubled. What will be the new area of the similar figure?

**\*Complete ALL\***

26. What is the sum of the measures of the interior angles of a nonagon?  
Use:  $180(n - 2)$  where  $n$  is the number of sides.
27. What is the measure of one angle in a regular octagon?  
Use:  $\frac{180(n-2)}{n}$  where  $n$  is the number of sides.



**\*Complete ALL\***

28. Calculate the slope of a line containing the following points: (3, 8) and (0, 4).

29. Calculate the slope of a line containing the following points: (4, 2) and (-7, -8).

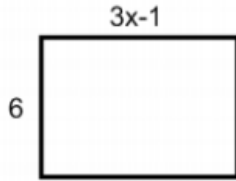
30. Write the equation in slope-intercept form of the line with a slope of 3 and a y-intercept of -1.

31. Write the equation in slope-intercept form of the line passing through (-5, 2) and a slope of  $\frac{3}{7}$ .

32. Write the equation in slope-intercept form of the line passing through (2, 2) and (3, 4). Hint: Find slope first.

**\*Choose 3\***

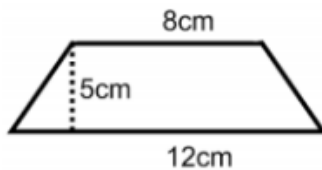
33. If the area of the rectangle below is 48 square units. Solve for the value of  $x$ .



34. What is the area of a circle with a diameter of 20 inches?

35. What is the circumference of a circle with a radius of 3 cm?

36. What is the area of the trapezoid below?



**Part 3: Solving Equations, Systems of Equations, Proportions, & Factoring**

**\*Choose 2\***

37. Solve for the variable:  $7x - 90 = 120 + x$

38. Solve for the variable:  $22 - 15x = -8 - 2x - 18x$

39. Solve for the variable:  $47 + 5 + 5y + 40 = 180$

**\*Complete ALL\***

40. Solve for the variable:  $-2(14x + 5) = -8$

41. Solve for the variable:  $\frac{(x-4)}{6} = 8$

42. Multiply & Simplify:  $(x + 4)(x - 2)$

43. Multiply & Simplify:  $(3x - 5)(6x + 2)$

**\*Choose 1\***

44. Solve for the variable:  $\frac{2}{x+1} = \frac{8}{12}$

45. Solve for the variable:  $\frac{x+3}{16} = \frac{x-1}{8}$

**\*Choose 1\***

46. Factor:  $x^2 + x - 6$

47. Factor:  $x^2 - 9x + 20$

**\*Choose 1\***

48. Factor:  $3x^2 + 7x + 10$

49. Factor:  $2x^2 - 11x + 15$

**\*Choose 1\***

50. Factor and solve for all value of x:  $x^2 + 7x + 6$

51. Factor and solve for all value of x:  $x^2 - 2x - 80$

**\*Choose 1\***

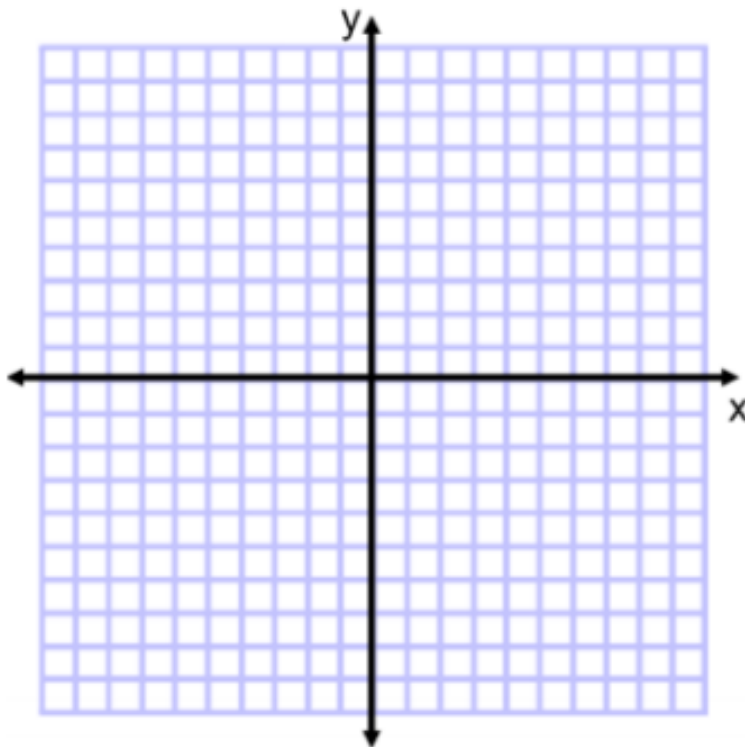
52. Factor and solve for all value of x:  $2x^2 - 5x - 12$

53. Factor and solve for all value of x:  $4x^2 + 12x - 40$

**Part 4: Using the Coordinate Plane**

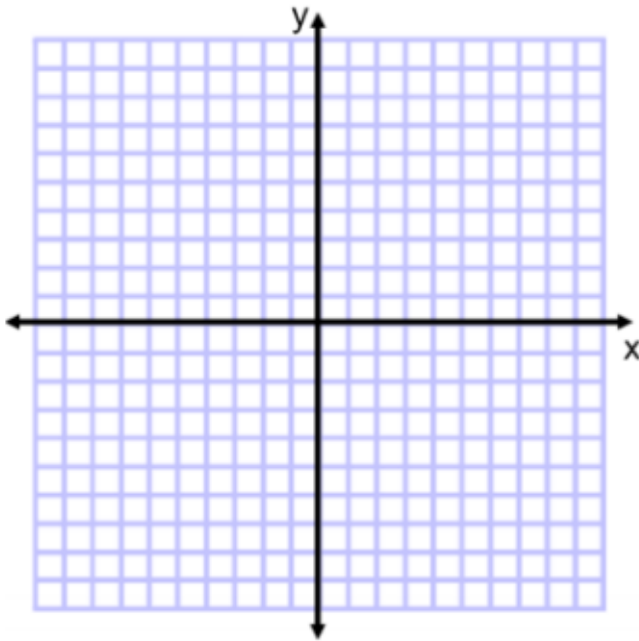
**\*Complete ALL in this Part\***

54. Using the coordinate plane below, plot the following points: R(4, 3), S(6, 8), T(-4, 7), X(-2, -3), and Y(6, -2). Make sure you label your vertices.



55. Give the coordinates of the image of point A(3, 5) after it is translated 5 units up, and 4 units to the left.

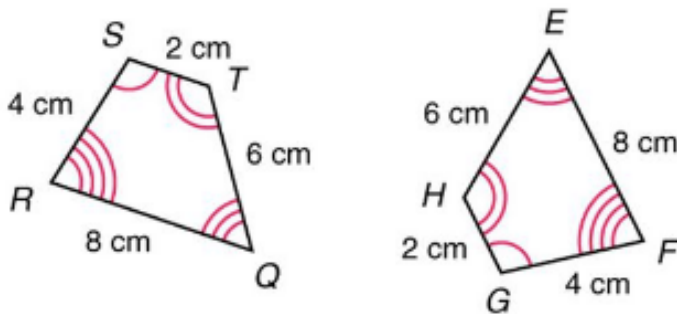
56. Using the coordinate plane below, plot the following line:  $y = -\frac{1}{4}x + 2$



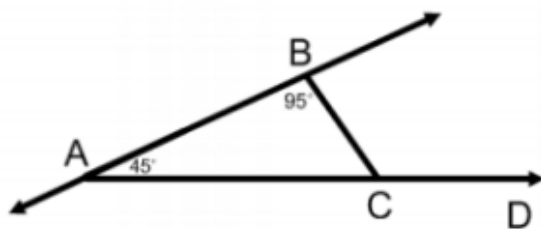
**Part 5: Applying Geometric Properties to Find Measurements**

**\*Complete ALL in this Part\***

57. Determine whether or not the two polygons are congruent. Explain.



58. What is the measure of  $\angle BCD$ ?

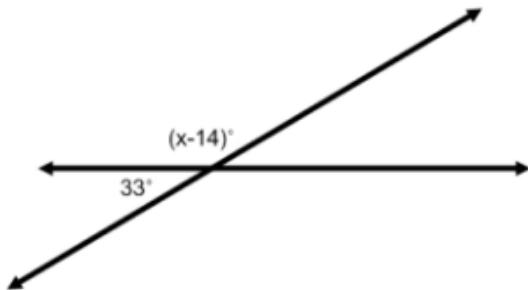


59. Complete the following chart:

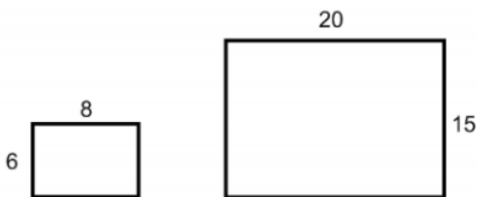
Number of Sides	Polygon Name
3	Triangle
4	
5	
6	
7	
8	
9	
10	
12	
n	

60.  $\angle X$  and  $\angle Y$  are supplementary angles. What is the measure of  $\angle X$  if  $\angle Y$  is  $30^\circ$ .

61. What is the value of  $x$  in the diagram below?



62. Determine whether or not the two rectangles below are similar. Explain.



## Part 6: Basics of Geometry Vocabulary

*This section includes all of the important terms from Topic 1: Basics of Geometry. **For each term, please include a definition and if applicable, a diagram.** Feel free to do this on another piece of paper (hand-written) or using index cards. Your textbook will be a great help in completing this task. At the minimum, your list should be completed. Please note that knowing these terms before entering Geometry will put you at a great advantage in understanding the beginning of the Geometry material. You can expect a vocabulary quiz on these terms soon after entering Geometry.*

- undefined terms
- point
- line
- plane
- collinear points
- coplanar points
- defined terms
- line segment/segment
- endpoints
- ray
- opposite rays
- intersection
- postulate/axiom
- coordinate
- distance (include the distance formula in the coordinate plane)
- construction
- congruent segments
- between (in terms of three collinear points)
- midpoint (include the midpoint formula in the coordinate plane)
- segment bisector
- angle
- vertex
- sides of an angle
- interior of an angle
- exterior of an angle
- measure of an angle
- acute angle
- right angle
- obtuse angle
- straight angle
- congruent angles
- angle bisector
- complementary angles
- supplementary angles
- adjacent angles
- linear pair
- vertical angles