Summer Packet 2020
Geometry Grade 9

The following is a list of skills and concepts that you should have an understanding of upon entering Geometry your freshman year at Scituate High School. The first couple of class sessions will be spent answering and clarifying questions regarding these skills and concepts followed by our first assessment within the first week of classes.

1. Combining Like Terms
2. Simplifying Expressions using Distributive Property
3. Solving Linear Equations
4. Solving Proportions
5. Finding and Applying Patterns
6. Using the Pythagorean Theorem
7. Finding Perimeter and Area of Plane Figures
8. Finding Circumference and Area of Circles
9. Finding Volume of Solids
10. MCAS Open Response Practice

Khan Academy is an excellent resource if you need to clarify or strengthen your understanding of a mathematical concept. The link for Algebra is given below.

https://www.khanacademy.org/math/algebra

Like Terms	Unlike Terms
2x + 19x	2x + 19a
4w - 10w	4w - 10w²
14.2r - 12r	12r - 12s
32a² + 9a²	32a² + 9a³
8y + 5y	8y + 5

Example $4x+6+8x-2$
           $12x+4$

Combine like terms.

1. $12+15$	2. $6x+7x$
3. $17y-8y$	4. $9x+3-2x+7$
5. $10x-5y-7x+9y$	6. $7x-2y+18-5x+14y-11$

Simplifying Expressions using Distributive Property

Example

$$4(x+3)-2x+5$$
$$4x+12-2x+5$$
$$2x+17$$

Simplify each expression using Distributive Property.

1. $6(x+2)$	2. $8(x-4)$
3. $7(x+5)+15$	4. $9(x-3)+6x$
5. $5(x-8)-3x+75$	6. $11(x-6)+3(x+4)$

Example $2x + 4 = 10$
$$-4 \quad -4$$
$$\frac{2x}{2} = \frac{6}{2}$$
$$1x = 3$$
$$x = 3$$

Solve each linear equation.

1. $\quad x + 18 = 42$	2. $\quad x - 12 = 13$
3. $\quad 8x + 16 = 56$	4. $\quad 9(x - 3) = 126$
5. $\quad 6x + 8 = 3x + 35$	6. $\quad 6(x - 4) = 2(x + 18)$

Example $\dfrac{x}{3} = \dfrac{10}{15}$

$$\dfrac{15x}{15} = \dfrac{30}{15}$$

$$1x = 2$$

$$x = 2$$

if $\dfrac{a}{b} = \dfrac{c}{d}$ $b \neq 0$
$d \neq 0$

then $bc = ad$

$$\dfrac{a}{b} = \dfrac{c}{d}$$

means   extremes
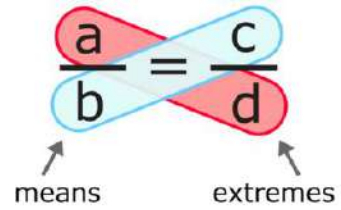
Solve each proportion.

1.	$\dfrac{x}{4} = \dfrac{6}{12}$	2. $\dfrac{6}{10} = \dfrac{15}{x}$
3.	$\dfrac{5}{4} = \dfrac{2x}{32}$	4. $\dfrac{16}{6x} = \dfrac{8}{30}$
5.	$\dfrac{x+5}{20} = \dfrac{1}{2}$	6. $\dfrac{x+2}{x+10} = \dfrac{3}{4}$

Example   5,10,15,20,_ **25** _

Find the next number in each pattern.

1.	$1, 4, 16, 64, \_\_\_\_\_$	2.	$18, 15, 12, 9, \_\_\_\_\_$
3.	$11, 15, 19, 23, \_\_\_\_\_$	4.	$40, 39, 36, 31, 24, \_\_\_\_\_$
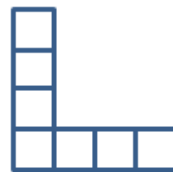
Figure 1   Figure 2   Figure 3

Use the diagrams above for Questions 5 and 6.

5. How many squares does Figure 4 have? Describe this pattern.	6. Which figure has 21 squares? Show or explain how you figured it out.

Pythagorean Theorem Formula

$a^2 + b^2 = c^2$
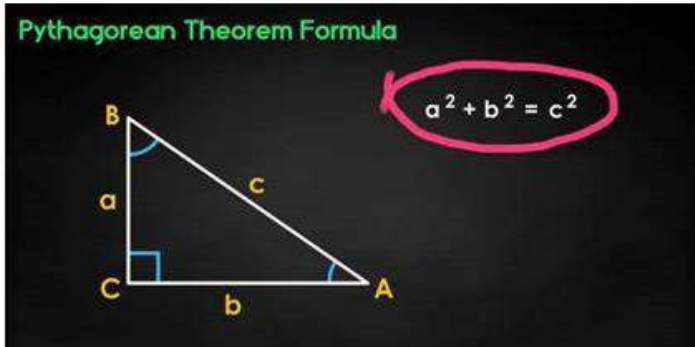
Examples

$6^2 + 8^2 = x^2$

$36 + 64 = x^2$

$100 = x^2$

$\sqrt{100} = \sqrt{x^2}$

$x = 10$

$12^2 + y^2 = 13^2$

$144 + y^2 = 169$

$y^2 = 25$

$\sqrt{y^2} = \sqrt{25}$

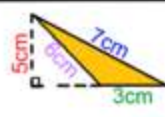$y = 5$
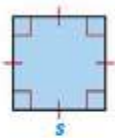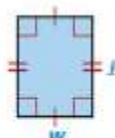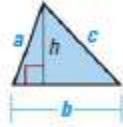
Use the Pythagorean Theorem to find each missing side length.

1.	2.
3.	4.
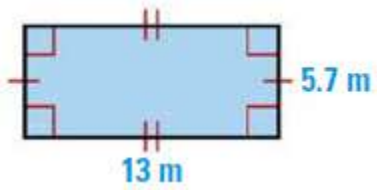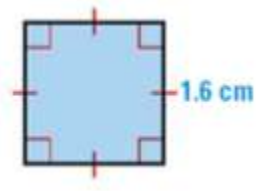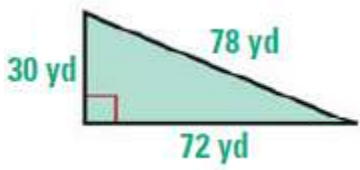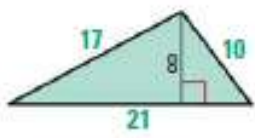
Finding Perimeter and Area of Plane Figures
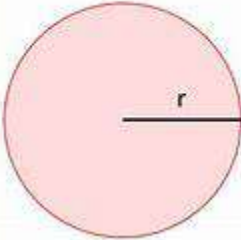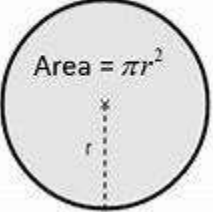

KEY CONCEPT   *For Your Notebook*

Formulas for Perimeter P, Area A, and Circumference C

Square
side length s
$P = 4s$
$A = s^2$

Rectangle
length ℓ and width w
$P = 2\ell + 2w$
$A = \ell w$

Triangle
side lengths a, b, and c, base b, and height h
$P = a + b + c$
$A = \frac{1}{2}bh$

Examples

Area of a Triangle
$a = \frac{1}{2}bh$
The base and height *must* be at right angles

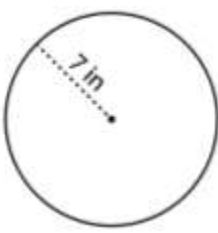|		
4.5cm, 4cm, 2cm	4cm, 5cm, 6cm	7cm, 5cm, 6cm, 3cm
a = ½ b h	a = ½ b h	a = ½ b h
a = ½ x 2 x 4	a = ½ x 6 x 4	a = ½ x 3 x 5
a = 1 x 4	a = 3 x 4	a = 1.5 x 5
a = 4cm²	a = 12cm²	a = 7.5cm²

Find the perimeter and area of each plane figure.

1.	2.
5.7 m, 13 m	1.6 cm
3.	4.
30 yd, 78 yd, 72 yd	17, 10, 8, 21
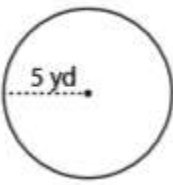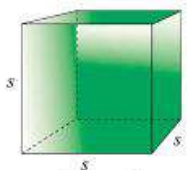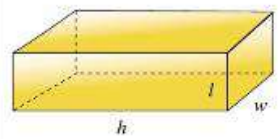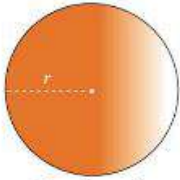
Example
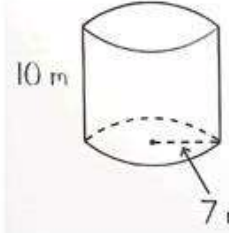
Find the circumference and area of each circle.

1.	Leave in terms of π.	2.	Leave in terms of π.
3 ft		5 yd	
3.	Use 3.14 for π.	4.	Use 3.14 for π.
6 yd		7 in	

CUBE	RECTANGULAR PRISM
$V = s^3$	$V = lwh$ or $V = Bh$
SPHERE	RIGHT CIRCULAR CYLINDER
$V = \frac{4}{3}\pi r^3$	$V = \pi r^2 h$

Example
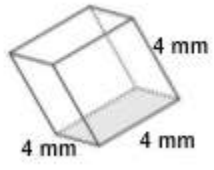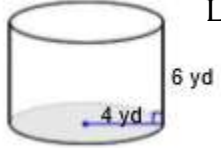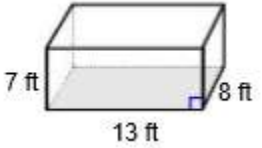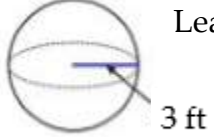
$V = Bh$
$V = \pi r^2 h$
$= \pi (7m)^2 (10m)$
$= \pi (49 m^2)(10m)$
$= 490\pi \ m^3$

10 m

7 m

Find the volume of each solid.

1. 4 mm, 4 mm, 4 mm	2. Leave in terms of π. 6 yd, 4 yd
3. 7 ft, 8 ft, 13 ft	4. Leave in terms of π. 3 ft

Complete the following MCAS open response question.

Stuart wrote the expression shown at the right. $\qquad$ $16 + 8^2 \div 4 - 4$

a. What is the value of Stuart's expression? Show or explain how you got your answer.

b. Insert one set of parentheses into Stuart's expression so that the value of the expression is undefined. Show or explain how you got your answer.

Talia wrote the expression shown at the right. $\qquad$ $(16 + 8^2) \div 4 \cdot 2 - 4$

Talia found the value of her expression
using the following steps:

Step 1: $(16 + 64) \div 4 \cdot 2 - 4$
Step 2: $80 \div 4 \cdot 2 - 4$
Step 3: $80 \div 8 - 4$
Step 4: $10 - 4$
Step 5: 6

c. Is the value that Talia found for her expression correct? Explain your reasoning.

Talia removed the set of parentheses from her expression $\qquad$ $16 + 8^2 \div 4 \cdot 2 - 4$
to create the new expression show at the right.

d. What is the value of Talia's new expression? Show or explain how you got your answer.

Summer Packet 2020
Geometry Grade 9
Answer Key

Week #1

1. 27
2. 13x
3. 9y
4. 7x+10
5. 3x+4y
6. 2x+12y+7

Week #2

1. 6x+12
2. 8x-32
3. 7x+50
4. 15x-27
5. 2x+35
6. 14x-54

Week #3

1. x=24
2. x=25
3. x=5
4. x=17
5. x=9
6. x=15

Week #4

1. x=2
2. x=25
3. x=20
4. x=10
5. x=5
6. x=22

Week #5

1. 256
2. 6
3. 27
4. 15
5. 9 squares
6. Figure 10

Week #6

1. y=24
2. y=8
3. x=41
4. x=5

Week #7

1. 37.4 m; 74.1 m²
2. 6.4 cm; 2.56 cm²
3. 180 yd;1080 yd²
4. 48 units; 84 units²

Week #8

1. 6π ft; 9π ft²
2. 10π yd; 25π yd²
3. 37.68 yd; 113.04 yd²
4. 43.96 in.; 153.86 in.²

Week #9

1. 64 mm³
2. 96π yd³
3. 728 ft³
4. 36π ft³

Week #10

http://www.doe.mass.edu/mcas/student/2017/answer.aspx?QuestionID=59044&AnswerID=150916