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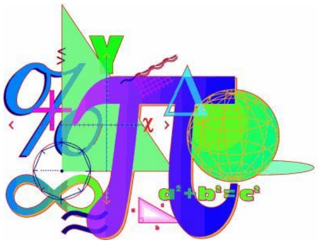
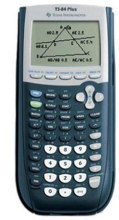


Watertown Public Schools

Geometry Summer Packet



Summer 2017

This packet contains topics that you are expected to know prior to entering Geometry. You have learned these skills over the past few years. These examples focus on both mathematical skills and problem solving. This packet should be completed independently. Upon your completion, your parent/guardian needs to sign the packet.

If you are having a difficult time adding, subtracting, and multiplying numbers, we suggest you study this over the summer. For example, flashcards can be used to help you with basic facts. Also, you can do a Google search for more practice problems.

This packet will help prepare you for the first assessment which will be about a week into the school year. ***The packet is expected to be completed for the first day of class.***

If you have any questions regarding this packet, please email your Geometry teacher listed on your schedule.

Below are helpful links to help you remember some topics.

- **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.
- **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.

Please show your work in the packet.

Parent/Guardian Signature:_____________________________ Date__________________

Read each question carefully. Be sure to answer each question in your own words. You may include examples to support your answers.

1.) Simplify the following expression:

$$2^3 + 6(3) - \frac{35}{5}$$

2.) Solve the following equation:

$$2c + 7 = 97 - 8c$$

3.) In the equation: $y = mx + b$:

a. What does m stand for?

b. What does b stand for?

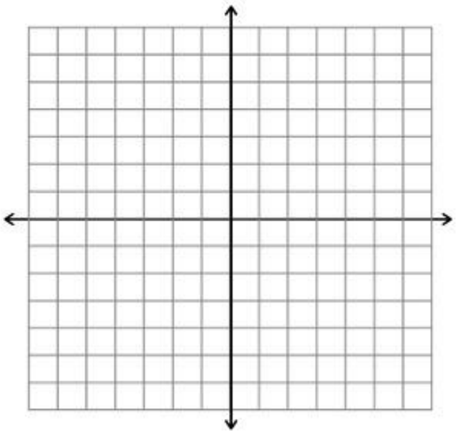
c. What are the “real world” meanings of m and b?

4.) Create a Real World Situation that can be modeled by an equation. Then state what the equation would be, explain your variables, solve the equation and explain the meaning of your answer.

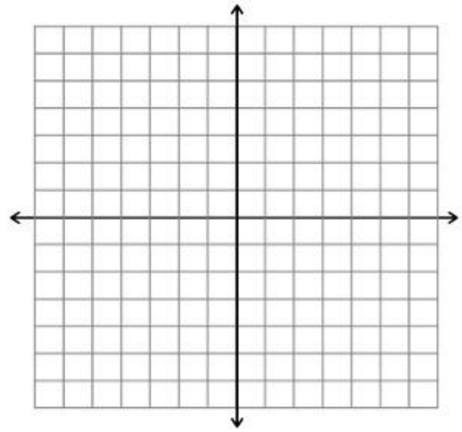
5.) Draw and label a coordinate plane completely. Include axes, labels, and horizontal and vertical numeric intervals. Then plot the following points: A(-2,4) B(0,3) C(1,0)

6.) Graph the following equations:

a. $y = \frac{1}{3}x - 4$



b. $6x + 2y = 4$



7.) Solve the following system of equations. Solve each a different way:

a.) $\begin{cases} 2x + 3y = 38 \\ 4x + y = 16 \end{cases}$

b.) $\begin{cases} 5x + 5y = 10 \\ x + 4y = 3 \end{cases}$

8.) What is the same as dividing by a fraction?

9.) What is a ratio?

10.) What is a proportion?

11.) What does it mean to “square” a number? What happens when you “square” a negative number?

12.) How do you “undo” a variable squared?

Simplifying Radical Expressions

Examples: a) $\sqrt{56}$ b) $\sqrt{\frac{7}{3}}$ c) $\left(3\sqrt{7}\right)^2$

Solutions: a) $\sqrt{56} = \sqrt{4 \cdot 14} = 2\sqrt{14}$

b) $\sqrt{\frac{7}{3}} = \frac{\sqrt{7}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{21}}{\sqrt{9}} = \frac{\sqrt{21}}{3}$

c) $\left(3\sqrt{7}\right)^2 = (3\sqrt{7})(3\sqrt{7}) = 3 \cdot 3 \cdot \sqrt{7} \cdot \sqrt{7} = 9 \cdot \sqrt{49} = 9 \cdot 7 = 63$

Simplify the following.

1) $\sqrt{36}$	2) $\sqrt{81}$	3) $\sqrt{24}$	4) $\sqrt{98}$	5) $\sqrt{300}$
6) $\sqrt{\frac{1}{4}}$	7) $\frac{\sqrt{5}}{\sqrt{3}}$	8) $\sqrt{\frac{80}{25}}$	9) $\frac{2\sqrt{3}}{\sqrt{12}}$	10) $\sqrt{\frac{250}{48}}$
11) $\sqrt{13^2}$	12) $\left(\sqrt{17}\right)^2$	13) $\left(2\sqrt{3}\right)^2$	14) $\left(3\sqrt{8}\right)^2$	15) $\left(9\sqrt{2}\right)^2$
16) $5\sqrt{18}$	17) $4\sqrt{27}$	18) $6\sqrt{24}$	19) $5\sqrt{8}$	20) $9\sqrt{40}$

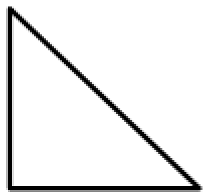
Identifying Figures

Hints/Guide:

Remember that shapes are often named by the number of sides that the figure has

Exercises: Identify each figure by name

1. ____________



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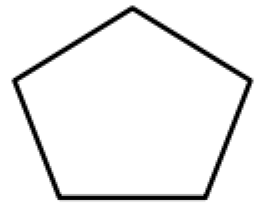

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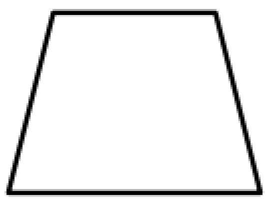

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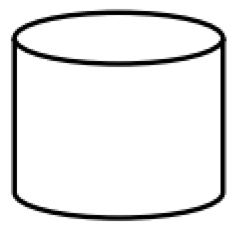

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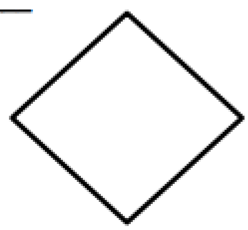

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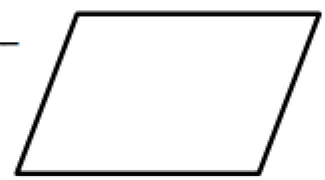

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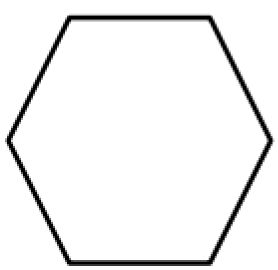

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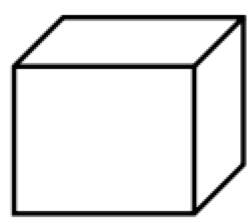


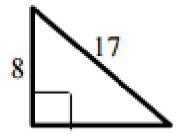
Pythagorean Theorem

Hints/Guide:

The Pythagorean Theorem:
$a^2 + b^2 = c^2$ c is the longest side (opposite the right angle)
a and b are the other sides

**Pythagorean Theorem can only be used on right triangles

Example: Determine the length of the missing side of the triangle.



17 is opposite the right angel, so it is c

$a^2 + b^2 = c^2$ Pythagorean Theorem
$a^2 + 8^2 = 172$ Substitute b and c
$a^2 + 64 = 289$ Square both numbers
$a^2 = 225$ Subtract 64
$a = 15$ Square root both sides

Exercise: Use the Pythagorean Theorem to determine the missing side. Write your answer as a simplified radical or as a decimal.

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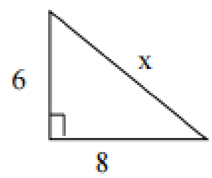

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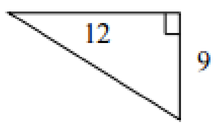

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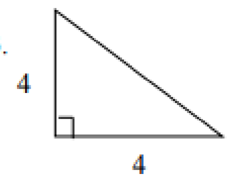

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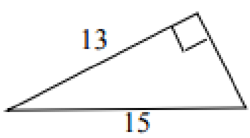

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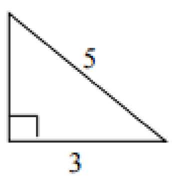

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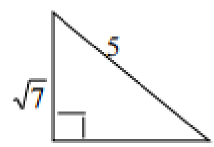


Proportions

Definition: $\frac{a}{b} = \frac{c}{d}$ if and only if ad = bc

Examples:

1) $\frac{3}{2} = \frac{y}{22}$

$3(22) = 2y$

$66 = 2y$

$33 = y$

2) $\frac{x + 4}{5} = \frac{x - 2}{3}$

$3(x + 4) = 5(x - 2)$

$3x + 12 = 5x - 10$

$22 = 2x$

$11 = x$

Solve the following proportions using the format used in the examples.

1) $\frac{7}{2} = \frac{y}{3}$

2) $\frac{7}{3} = \frac{21}{x}$

3) $\frac{25}{15} = \frac{10}{x}$

2) $\frac{10}{6x+7} = \frac{6}{2x+9}$

3) $\frac{4}{x-3} = \frac{6}{x+3}$

6) $\frac{3x-5}{2} = \frac{x-15}{4}$

7) $\frac{2-4x}{-6} = \frac{6x-8}{10}$

8) $\frac{x+2}{5} = \frac{4}{x+1}$

9) $\frac{2}{x-3} = \frac{x-2}{6}$

Distance and Midpoint Formulas

Hints/Guide:

To find the distance between two points, we use the distance formula, which is:

$$Distance = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

To find the midpoint of two points, we use the midpoint formula, which is:

$$Midpoint = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

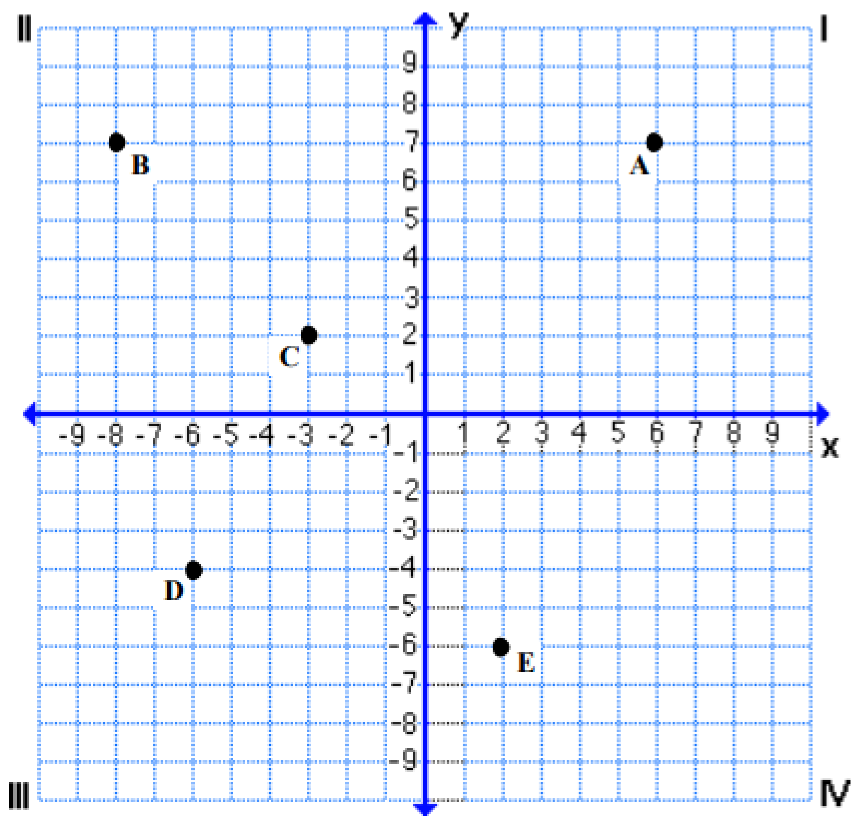
Exercises:

1. Find the distance between points

   a. A and B b. C and E c. D and E d. A and E

2. Find the midpoint of segment

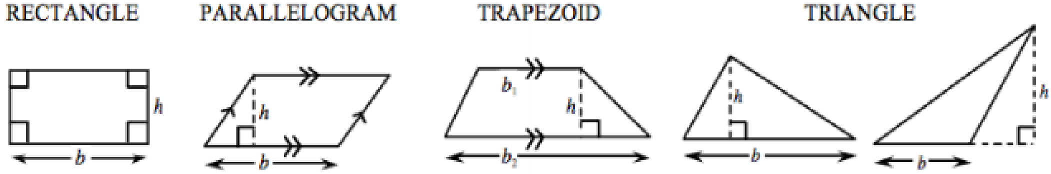
   a. AB b. CE c. DE d. AE



Area and Perimeter of Polygons

Area is the number of square units in a flat region. The formulas to calculate the area of several kinds of polygons are:

RECTANGLE | PARALLELOGRAM | TRAPEZOID | TRIANGLE

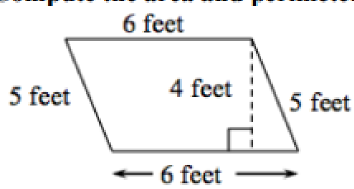


$A = bh$ | $A = bh$ | $A = \frac{1}{2}(b_1 + b_2)h$ | $A = \frac{1}{2}bh$

Perimeter is the distance around a figure on a flat surface. To calculate the perimeter of a polygon, add together the length of each side.

Example 1:

Compute the area and perimeter.

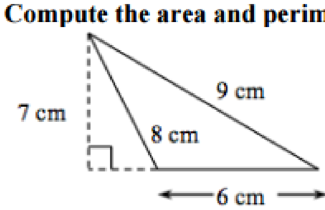


parallelogram

$A = bh = 6 \cdot 4 = 24$ feet^2
$P = 6 + 6 + 5 + 5 = 22$ feet

Example 2:

Compute the area and perimeter.



triangle

$A = \frac{1}{2}bh = 6 \cdot 7 = 21$ feet^2
$P = 6 + 8 + 9 = 23$ feet

Find the Area and Perimeter for each figure:

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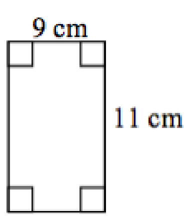

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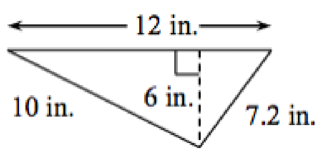

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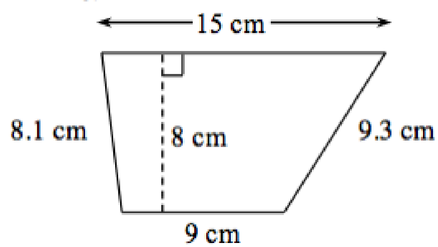

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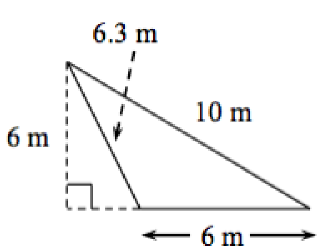

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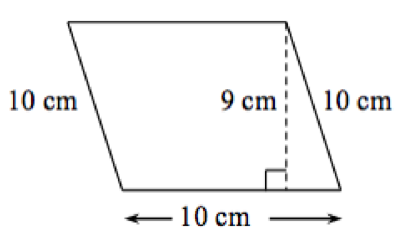

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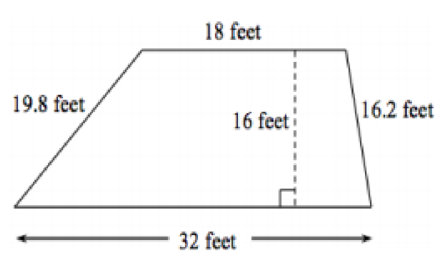
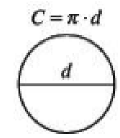


Circumference and Area of Circles



The **circumference** (C) of a circle is its perimeter, that is, the "distance around" the circle.

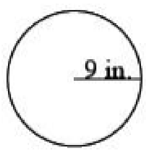
The number π (read "pi") is the ratio of the circumference of a circle to its diameter. That is $\pi = \frac{\text{circumference}}{\text{diameter}}$. This definition is also used as a way of computing the circumference of a circle if you know the diameter as in the formula $\mathbf{C = \pi\, d}$ where C is the circumference and d is the diameter. Since the diameter is twice the radius (that is, $d = 2r$) the formula for the circumference of a circle using its radius is $C = \pi(2r)$ or $C = 2\pi \cdot r$.

The first few digits of π are 3.141592.

To find the **area** (A) of a circle when given its radius (r), square the radius and multiply by π. This formula can be written as $A = r^2 \cdot \pi$. Another way the area formula is often written is $\mathbf{A = \pi\, r^2}$.

Use a calculator to find the Circumference and Area of each circle. Round to the nearest tenth.

1.



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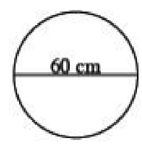

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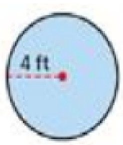

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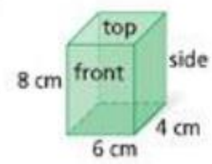
Surface Area and Volume of Rectangular Prisms

Surface Area of a Prism



Find the area of the front, top, and side, and multiply each by 2 to include the opposite faces.

Front: $6 \times 8 = 48 \rightarrow 48 \times 2 = 96$
Top: $6 \times 4 = 24 \rightarrow 24 \times 2 = 48$
Side: $4 \times 8 = 32 \rightarrow 32 \times 2 = 64$

$S = 96 + 48 + 64 = 208$ *Add the areas of the faces.*

The surface area is 208 cm^2.

Volume of a Prism

The **volume** of a prism can be calculated by dividing the prism into layers that are each one unit high. To calculate the total volume, multiply the volume of one layer by the number of layers it takes to fill the shape. Since the volume of one layer is the area of the base (B) multiplied by 1 (the height of that layer), you can use the formula below to compute the volume of a prism.

If h = height of the prism, V = (area of base) · (height)

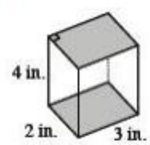
$V = Bh$

Example:

Area of base = (2 in.)(3 in.) = 6 $in.^2$

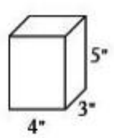
(Area of base)(height) = (6 $in.^2$)(4 in.) = 24 $in.^3$

Volume = 24 $in.^3$



Find the surface area and volume for each figure:

1.



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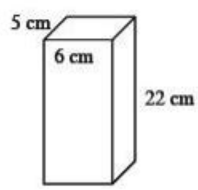

3.