2025 SUMMER

ASSIGNMENT

– Geometry –

Hello students and families!

10th grade math is an especially important year in your high-school math career. In May 2025, you will sit for the only math MCAS you must complete in high school; this MCAS assesses not only geometry concepts, but also algebra (9^{th} grade), and statistics and probability concepts.

With this said, we have a lot to accomplish this year – and that begins now with this summer work packet! Geometry, as well as the type of learning strategies we will use this year, will likely differ from those you have encountered in past math courses as well. I have confidence that each of you will succeed if you commit to challenging yourself to learn each day.

As a notice: this assignment will be collected, and graded, by the end of the first week of school as a **formative assessment**. Please reach out to me, Ms. Carroll (kaitlyn.carroll@atlantiscs.org) or Ms. Boyle (amanda.boyle@altantiscs.org) at any point over the summer if you have questions.

I hope you all have a great summer!

Most sincerely,
Ms. Carroll

Suggested Timeline for Completion of Summer Work

Week 1 (July 7 – July 11)	Concept 1 and 2
Week 2 (July 14 – July 18)	Concept 3
Week 3 (July 21 – July 25)	Concepts 4
Week 4 (July 28 – Aug 1)	Concept 5

Concept 1: "Silent Math" Rules

It is important to know these rules for when we might need to manipulate an expression to solve a problem!

Rule:	
Rule: $1 = \ +1$	In words: a number without a negative symbol in front of it has a silent positive symbol. This is important in the context of inverse operations. Example: $10 - 2x = 20$ $-10 \qquad -10$ **Create your own example of this rule here:**
$1 = \frac{1}{1}$ also	In words: a number, or variable, without a pictured denominator has a silent denominator of 1. This is especially important when multiplying fractions. Example: $2 \cdot \frac{1}{3} = \frac{2}{1} \cdot \frac{1}{3} = \frac{2}{3}$ **Create your own example of this rule here:**

$5x = 5 \cdot x$	In words: a number glued to a variable is really being multiplied by that variable. This rule is also important in the context of inverse operations. Example: $12x = 144$ $\div 12 = \div 12$ **Create your own example of this rule here:**
$x = 1x$	In words: a variable without a pictured coefficient has a silent coefficient of one. This is useful in the context of combining like terms. Example: $x + x = 1x + 1x = 2x$ **Create your own example of this rule here:**

Concept 2: Error Identification in Solving Equations

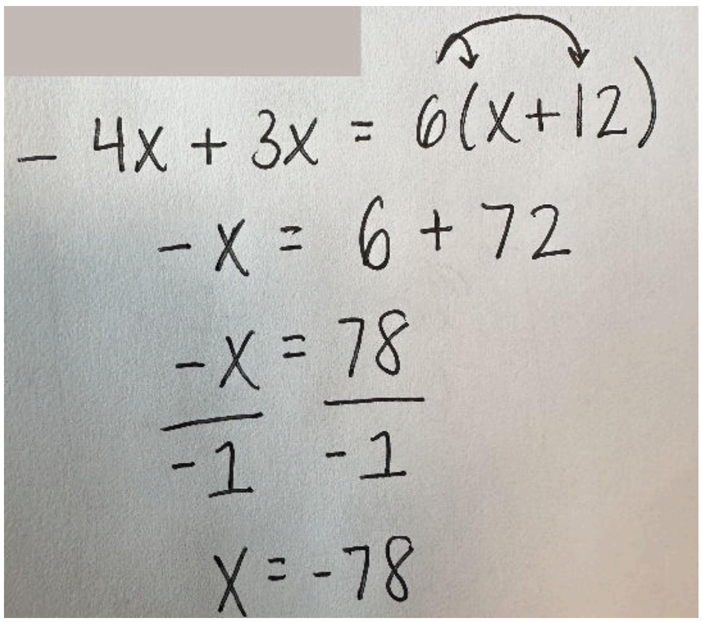
For each of the following problems,

a. Circle or underline the error in solving the equation.

b. Describe the error this student made.

c. Solve the equation in the correct manner.

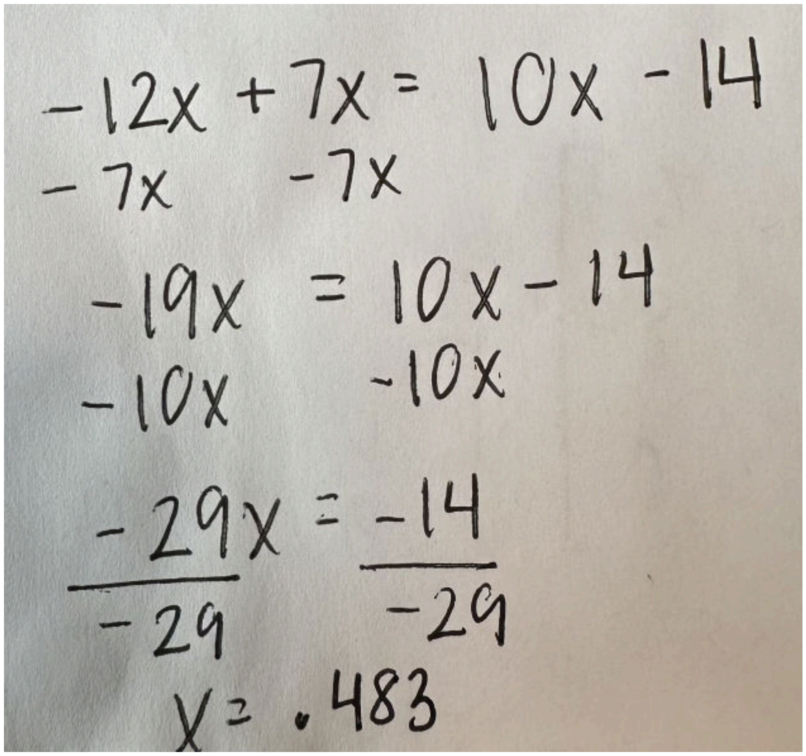
1a. Circle or underline the error in solving the equation.



1b. Describe the error this student made:

1c. Solve the equation in the correct manner here:

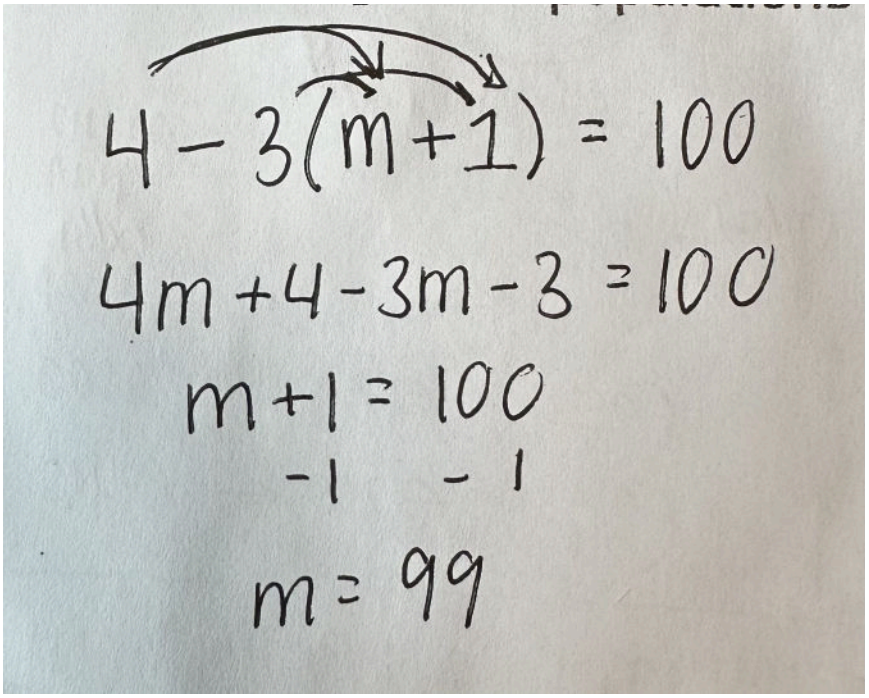
2a. Circle or underline the error in solving the equation.



2b. Describe the error this student made:

2c. Solve the equation in the correct manner here:

3a. Circle or underline the error in solving the equation.



3b. Describe the error this student made:

3c. Solve the equation in the correct manner here:

Concept 3: Exponent Rules

It is important to know these rules for when we might need to manipulate an expression to solve a problem!

Instructions:

1. Determine the general exponent rule based on the provided situations.
   - this means that there should be no numbers – only variables – in the rules you create
2. Then, create an example by plugging numbers into your calculator. These numbers should prove that your exponent rule is correct. See the example in the first row.

The first exponent "rule" has been completed for you.

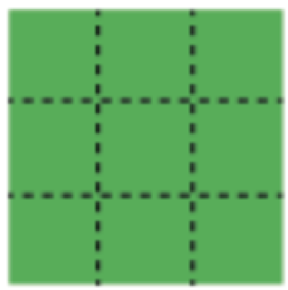
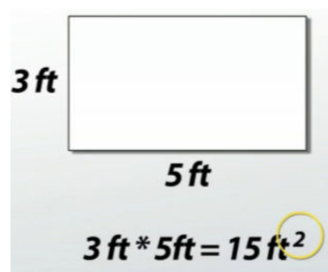
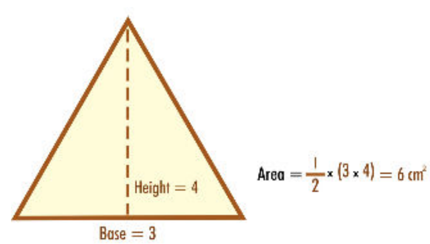
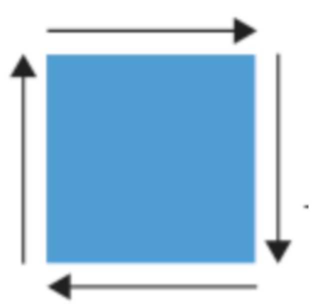
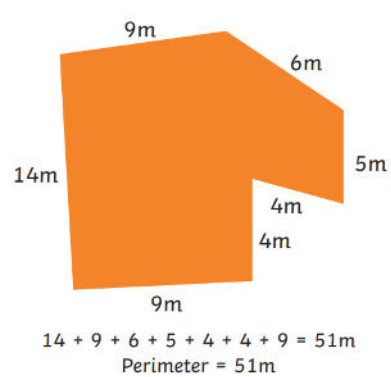
Situation	**Exponent Rule**
$x^3 \cdot x^2 = x^5$	**Rule:** $x^m \cdot x^n = x^{m+n}$ **Numerical Example:** $2^2 \cdot 2^3 = 2^{3+2} = 32 \neq 2^6$
$x^3 \div x^2 = x^1$ or $\frac{x^3}{x^2} = x^1$	**Write the Exponent Rule Here using the Example Above :** **Numerical Example of Your Rule:**

$(x^3)^2 = x^6$	**Rule:** **Numerical Example:**
$(x^4y^7)^3 = x^{12}y^{21}$	**Rule:** **Numerical Example:**
$\left(\frac{x^2}{y^5}\right)^2 = \frac{x^4}{y^{10}}$	**Rule:** **Numerical Example:**
$x^0 = 1$	**Rule:** **Numerical Example:**

$x^{-2} = \frac{1}{x^{2}}$	**Rule:** **Numerical Example:**

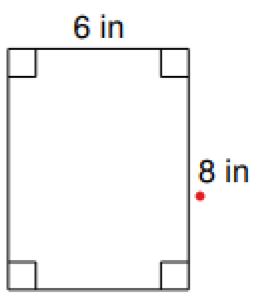
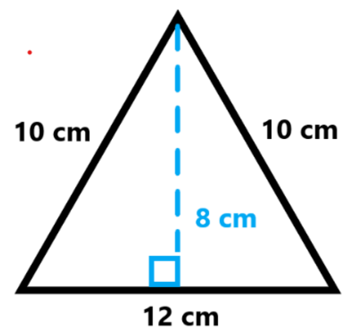
Concept 4: Area and Perimeter

Area and perimeter figure importantly on the MCAS each year. It is important that we are familiar with these formulas and can use them for a variety of problems!

Term	Definition	Formula
Area	The amount of space contained by the interior of a shape. 	$Area = length \cdot width$  **The area formula for a triangle is different…** $Area_{\Delta} = \frac{1}{2} base \cdot height$ 
Perimeter	The distance around the edge of a shape. 	$Perimeter = sum\ of\ all\ sides$ 

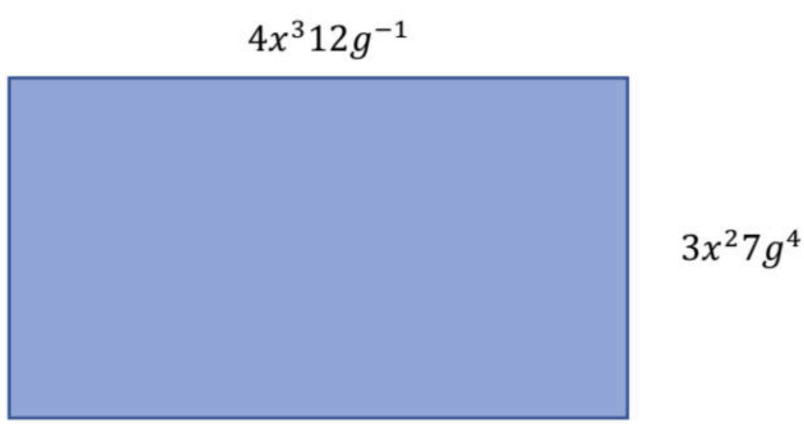
Concept 4 Questions

Warmup Questions —

Determine the area and perimeter of this rectangle using the formulas on the previous page:  	Determine the area and perimeter of this triangle using the formulas on the previous page: 

Use the SAME FORMULAS from the Warmup Questions to complete these problems below!

1. Determine the area of the polygon.

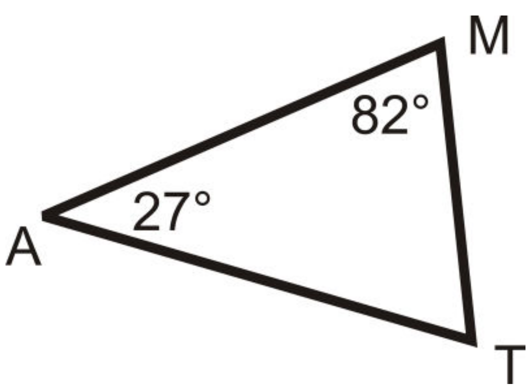
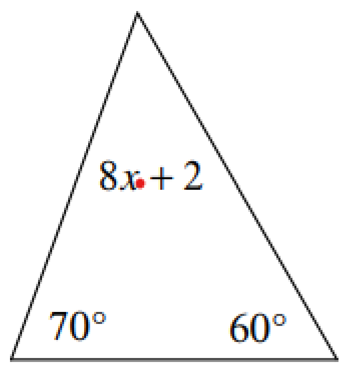


Concept 5: Triangles

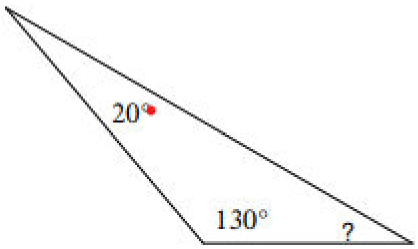
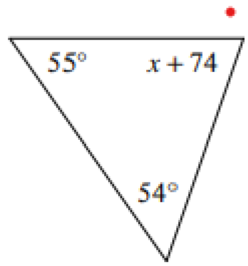
A key goal of Geometry is to understand the characteristics of triangles, and how we can determine missing information on a triangle given these characteristics.

Determining Missing Angles on the INTERIOR of a Triangle

Key Idea: All of the INTERIOR angles in a triangle ALWAYS sum to 180°. Two examples are shown below: one with only numbers, one with algebraic expressions too:

EXAMPLE 1	EXAMPLE 2
 $\angle A + \angle M + \angle T = 180$ $27 + 82 + x = 180$ $109 + x = 180$ $x = 71^\circ$	 $\angle 1 + \angle 2 + \angle 3 = 180$ $(8x + 2) + 70 + 60 = 180$ $8x + 132 = 180$ $-132 = -132$ $8x = 48$ x = 6, so the missing angle measure is: $8(6) + 2 = 50^\circ$

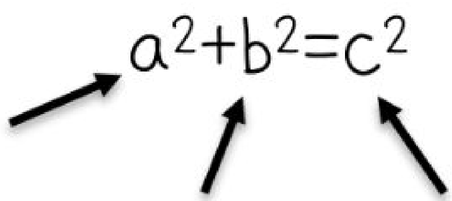
Instructions: Complete the practice questions below using the fact that all interior angles in a triangle sum to 180°.

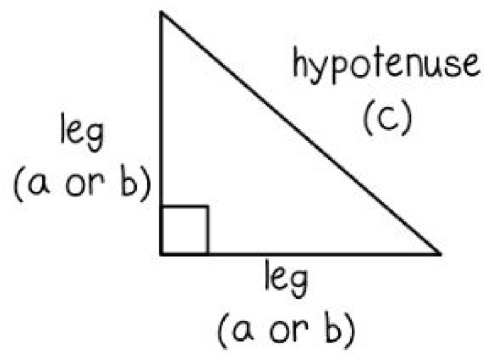
1. Determine the missing angle measure:	2. Determine the degree measures of the angle represented by (x+74):
	

Determining Missing Sides on a RIGHT Triangle

Key Idea: For the special case of the RIGHT triangle, we are able to use the PYTHAGOREAN THEOREM to find missing side measures. The Pythagorean Theorem can be represented by the following equation: $a^2 + b^2 = c^2$

If we are given two sides of a right triangle, then we can use the Pythagorean Theorem to find the remaining side.

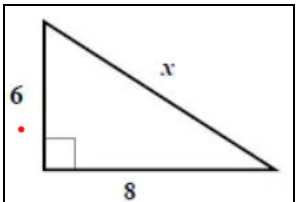




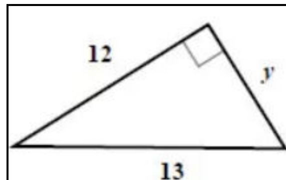
Here, “a” and “b” simply refer to the shorter sides (the legs) of the right triangle that are on either sides of the right angle. “C” here refers to the HYPOTENUSE, the longest side, of the triangle that is located across from the right angle.

Examples:

Determine which side of the triangle that is missing: side, or leg, then solve!



$$6^2 + 8^2 = x^2$$
$$36 + 64 = x^2$$
$$100 = x^2$$
$$\sqrt{100} = \sqrt{x^2}$$
$$x = 10$$



$$12^2 + y^2 = 13^2$$
$$144 + y^2 = 169$$
$$y^2 = 25$$
$$\sqrt{y^2} = \sqrt{25}$$
$$y = 5$$

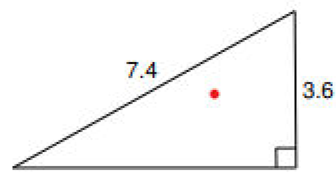
Complete the practice Pythagorean Theorem questions below:

3.

Use the Pythagorean Theorem to solve for the missing side!

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

4.



Use the Pythagorean Theorem to solve for the missing side!

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