2024 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 (9th grade), and statistics and probability concepts. Success on this exam is a requirement for graduation in the state of Massachusetts.

With this said, we have a lot to accomplish this year – and that begins now with this summer work packet! This assignment will likely be different than other math summer assignments you have encountered in the past. 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. On the final day of our first week of school, there will be an assessment on the attached readings, and review of math-content concepts. Please reach out to Mrs. Rachael DoRego (rachael.dorego@atlantiscs.org) or Ms. Amanda Boyle, the STEM Dean (amanda.boyle@altantiscs.org) at any point over the summer if you have questions.

We wish you all a great summer!

Most sincerely,

Your Future Geometry Teachers!

Summer Assignment Table of Contents

Part 1 of the Summer Assignment (Reading)

Part 2 of the Assignment (Content Review)

Suggested Timeline for Completion of Summer Work

Week 1 (July 10 – July 14)	Reading Sections 1
Week 2 (July 17 – July 21)	Reading Sections 2 and 3
Week 3 (July 24 – July 28)	Concepts 1 and 2
Week 4 (July 31 – Aug 4)	Concepts 3 and 4

Summer Assignment Part 1

Part 1 Instructions: Reading
There exist many myths about learning and succeeding in math classes that, each year, damage many student's performance in math. For Part 1 of the summer assignment, read a few sections from a book about myths in math education, and how best we can all learn math. Then, complete the comprehension questions following each reading section. Note: the readings in this summer assignment are excerpted from a book written by the author Dr. Joan Boaler: a college professor who teaches math teachers how to teach. When the readings say "my," or "I," they are referring to the author of this book].

Reading Section 1

- Reading 1 serves as an introduction to the other readings in this assignment
- Reading 1 discusses the myth in schools that many people are incapable of learning math. In other words, there exists a myth that math is "too difficult" to learn. This is not true, and the messages that we hear and say to ourselves about our capability to learn math are important.

Reading 1 :Introduction

(p1)"One of my former students teaches fourth grade in the South Bronx, an area of New York City with many underserved, underachieving students. Her students believe they are bad at math, and if you looked at their past performance, you might think so too. And yet, **after one year in her class**, her fourth graders became the #1 fourth-grade class in the state of New York: 100% of them passed the state math test, with 90% of them earning the top score. And this is just one of many examples of how all students can learn math.

(p2)When people think that some kids just can't do math, that success in math is reserved for only certain kids, thought of as "smart," or that it's just too late for kids who haven't had the right background, then they can easily accept that many students fail math and hate math. In fact, we have found that many teachers actually console their

students by telling them not to worry about doing poorly in math because not everyone can excel in it. These adult enablers—family members and teachers alike—allow kids to give up on math before they've barely gotten started. No wonder more than a few students simply dismiss their own poor performance by declaring: “I'm not a math person.”

(p3)Where do family members, teachers, and students get the idea that math is just for some people? New research shows that this idea is deeply embedded in the field of mathematics. Researchers asked scholars at American universities in a range of disciplines. They asked them how much they thought that success in their field depended on fixed, innate ability that cannot be taught, as opposed to hard work, dedication, and learning. Of all the STEM fields (science, technology, engineering, and math), math scholars were the most extreme in emphasizing fixed, innate ability vs. hard work in math classes. Other researchers are finding that many math instructors begin their courses by referring to students who have the aptitude and those who do not. One college instructor, on the first day of an introductory college course, was heard to say, “If it's not easy for you, you don't belong here”. If this message is passed down from generation to generation, no wonder students are afraid of math. And no wonder they conclude they're not math people when it doesn't come easily. But when we begin to see evidence that all students are capable of excelling in and enjoying math, as the following readings demonstrate, it is no longer acceptable that so many students fail math and hate math. So what can we do to make math learning happen for all students? That's what [these readings are] about.

Reading 1 Questions
1. **After only 1 year, how many of the referenced 4th grade math students passed their state examination? (paragraph 1)** *Your Answer: After just one year in the teacher’s class, _____ of 4th grade students passed the state exam. This indicates that a lot of progress in math can be made in the duration of one year.*

2. **Why is it damaging for the adults in your life and your friends to say that "not everyone can excel in math"? (paragraph 2)**

Your Answer: It is destructive to hear "not everyone can excel in math" because this is false. Research indicates that everyone can excel in math. These "enablers"—family members and teachers alike—allow kids to give up on math before _____.

3. **Can only people who are "smart" learn math?**

_____

_____.

4. **What do many math professors incorrectly emphasize as the reason for success in math? (paragraph 3)**

Your Answer: Math professors incorrectly emphasize _____ *vs. hard work and learning as the reason for success in math classes.*

Reading Section 2

- Reading 4 explains how mistakes – and how we approach mistakes – are key components to success in math

Reading 2: Mistakes

(p1) Brain science demonstrates that mistakes are crucial to learning any subject. Research also shows, however, that how we respond to making mistakes in learning affects the development of our brains as well. Indeed, all students' brains "light up" with activity when they make mistakes, but having a growth mindset means that the brain "lights up" even more. This is because students with growth mindsets are more likely to be aware of, and try to correct their own mistakes. The fact that individuals with a growth mindset have more brain activity when they make a mistake than those with a fixed mindset tells us something else very important. It tells us that the ideas we hold about ourselves—in particular, whether we believe in ourselves or not—change the ways our brains work and develop.

(p2) Mistakes are always opportunities for learning – even if we are not consciously aware of having made mistakes. Learning, in fact, cannot happen without experiencing mistakes. If you feel you have not made any mistakes, you have not effectively learned. More than this, though, identifying our own mistakes and trying to correct them independently without first asking for help is integral to learning success. If we never allow ourselves to make mistakes in math and attempt to correct them on our own – and are constantly asking for the teacher's help – it is no wonder that we cannot remember anything on tests/exams. This is because we did not truly learn in the first place.

(p3) If we believe that we can learn and that mistakes are valuable, our brains develop to a greater extent when we make a mistake. This result is highly significant, telling us again how important it is that all students believe in themselves—and how important it is for all of us to believe in ourselves, particularly when we approach something challenging. In learning, we must therefore all strive to:

- Feel comfortable being wrong

- Try seemingly wild ideas
- Be open to different math experiences
- Play with ideas without judging them
- Keep going through difficulties

Reading 2 Questions

5. Complete the following sentences from the passage: (paragraph 2)

a. Learning, in fact, cannot happen _____

_____. _____

_____, *you have not effectively learned.*

b. If we never allow ourselves to make mistakes in math and attempt to correct them on our own

_____ _____ *– it*

is no wonder that _____.

This is because we did not _____

_____.

6. What are the author's recommendations for success in learning listed at the end of this reading section? (paragraph 3)

- _____
- _____
- _____

- _____
- _____

7. Select the recommendation you feel is most important from question 13 and explain why you believe it is most important.

_____

is the most important recommendation. I believe this because _____

_____

_____

_____.

Reading Section 3 (final reading section)

- Reading 3 explains the importance of taking math classes as we prepare for our upcoming math class this year.

Reading 5: Why do we take math courses in high school?

(p1)"Taking math courses matters. Research studies have established that the more math classes students take, the higher their earnings ten years later, with advanced math courses predicting an increase in salary as high as 19.5% ten years after high school. Research has also found that students who take advanced math classes learn ways of working and thinking—especially learning to reason and be logical—that make them more productive in their jobs. Students taking advanced math learn how to approach mathematical situations so that once they are employed, they are promoted to more demanding and more highly paid positions than those who did not take mathematics to advanced levels. These are only a few of the reasons why math courses are important for success even after graduation."

Reading 5 Questions
8. What are two benefits after graduation from high school that result from taking advanced math classes now? (paragraph 1) Two benefits are: _____ _____ _____.

Summer Assignment Part 2

Part 2 Instructions: Algebra Foundations Review
For Part 2 of the summer assignment, complete the following problems or tables reviewing key concepts from Algebra I or pre-algebra. Be certain to prove your reasoning or answer when the question might ask that you do so. There are 4 sections in this part of the assignment.

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!

$1 = \ \ + 1$	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: $\begin{array}{r} 10 - 2x = 20 \\ -10 \quad = -10 \end{array}$ **Create your own example of this rule here:**
$1 = \frac{1}{1}$ also $x = \frac{x}{1}$	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: $\begin{array}{r} 12x = 144 \\ \div 12 = \ \ \div 12 \end{array}$ **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:**
$-x = -1x$	In words: a variable with only a negative symbol in front of it really has a silent negative coefficient of one. This is useful in the context of combining like terms. Example: $-x + x = -1x + 1x = 0$ **Create your own example of this rule here:**

Concept 2: Error Identification in Solving Equations

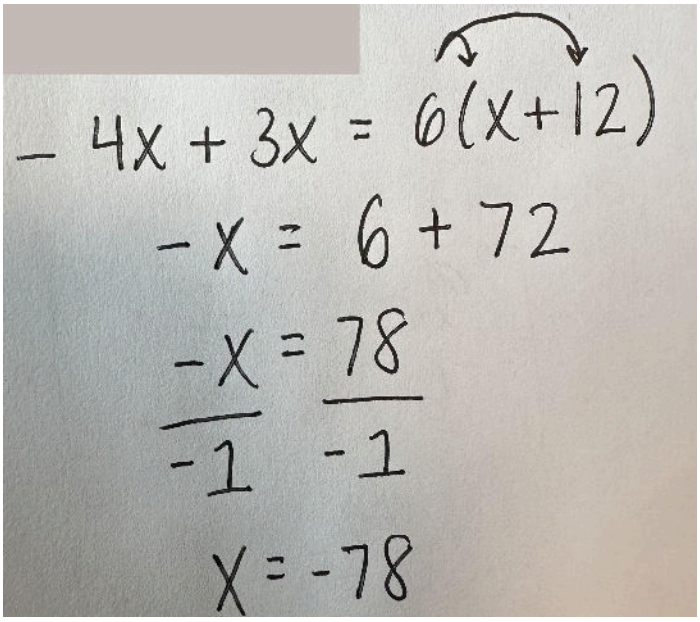
For each of the following problems,

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.*

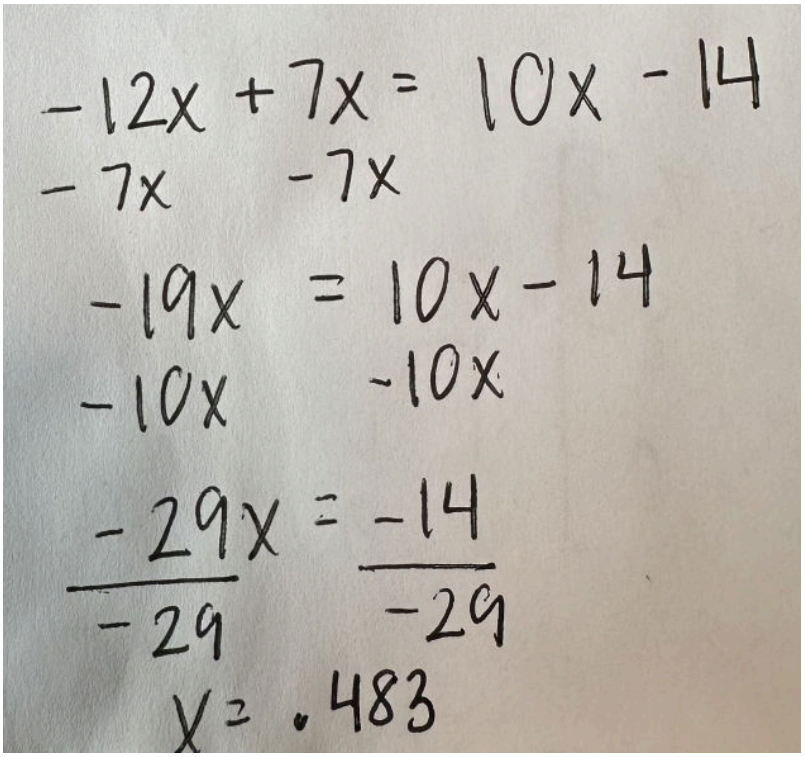
1a. Circle or underline the error in solving the equation.



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:

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.*
   - *Use the word bank*
2. *Then, Solve the problem given.*
   -Use your situation examples to help you solve.

Rule Bank (use each rule once)

Quotient Rule	Power of power rule	Power of a product rule
Product rule	Power of a quotient rule	Zero exponent rule
	Negative Exponent Rule	

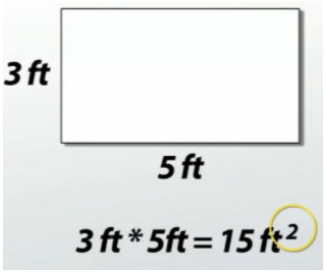
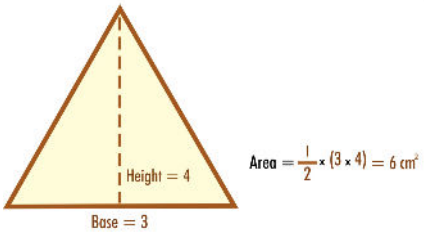
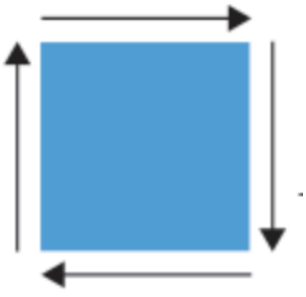
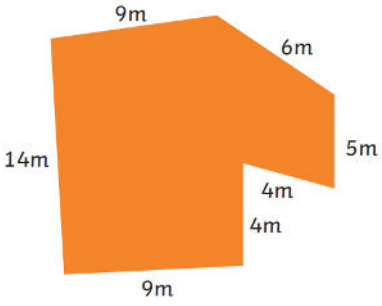
Situation	**Exponent Rule**
$x^3 \cdot x^2 = x^5$ $x^m \cdot x^n = x^{m+n}$	**Rule:** _____ **Solve:** 3^2 **x** 3^4 =_____
$x^3 \div x^2 = x^1$ or $\frac{x^3}{x^2} = x^1$	**Rule:** _____ **Solve:** $\frac{8^4}{4^2}$ =_____

$(x^3)^2 = x^6$	**Rule:** _____ **Solve:** $(m^5)^3 =$_____
$(x^4y^7)^3 = x^{12}y^{21}$	**Rule:** _____ **Solve:** $(m^3n^4) =$_____
$\left(\frac{x^2}{y^5}\right)^2 = \frac{x^4}{y^{10}}$	**Rule:** _____ **Solve:** $(\frac{m^3}{n^4})^2 =$_____
$x^0 = 1$	**Rule:** _____ **Solve:** $d^0 =$_____

$x^{-2} = \frac{1}{x^2}$	**Rule:** _____ **Solve:** $4^{-2} =$_____

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*  14 + 9 + 6 + 5 + 4 + 4 + 9 = 51m Perimeter = 51m

Concept 4 Questions

1. Determine the area of the polygon.

$4x^3 12g^{-1}$

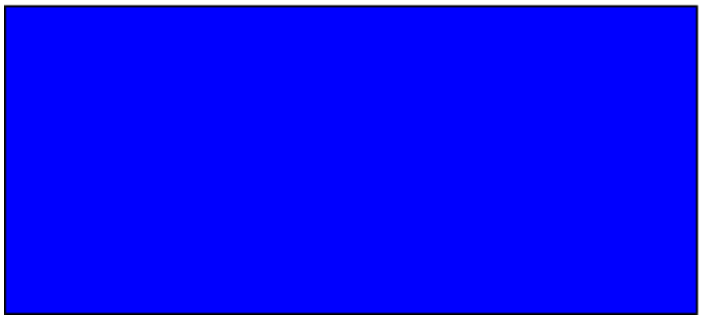
$3x^2 7g^4$

Area Formula = Length x Width

_____ x _____ = _____
Length Width Area squared

2. Determine the perimeter of the rectangle below:

6 cm



5 cm