
# 7th Grade Cambridge Programme

# Summer Math Challenge

Dear Pasco Middle Cambridge Student,

I hope you will enjoy this Math Challenge Packet and work hard to complete all problems on your own or with help from a parent and/or guardian. All problems in the challenge packet are based on blended Cambridge Maths Stage 7 & 8 standards and Math Florida Standards 7th grade. Therefore, this will be a preview for you, but should stretch you as you apply your understanding of concepts you will learn throughout this next year. I suggest doing one project every 3 days. Once you have finished with the project you've selected, try to find a way to discuss it with a friend, parent, or relative. Think about how the skills and concepts in the problem you completed are connected to other things in your home, environment, or daily routine. Find ways to apply your new understanding to real world situations.

Math is all about problem solving. One of the best ways to learn math is to try out problems in which you have to devise your own strategy to find the solution. There is usually more than one way to solve math problems. While working on the problems in this packet, you may discover shortcuts and use your own process or set of rules to calculate or determine the appropriate solution. Make sure to keep notes, include your work so you can justify your solutions. In other words, be sure you can answer the question, "How do you know?" Explaining how you arrived at an answer immediately tells others what you're learning along the way.

Show all your work on each problem page. If you need additional room use the back or attach an additional page. The summer work packet will be due the first day of school. If you have questions you may reach me at pison@pasco.k12.fl.us
Enjoy the challenge!

Sincerely,
Mrs Ison
7th Grade Cambridge Math Teacher

# Project #1

**Domain:** Solving Equations
**Standard MAFS.7.EE.2.3 & 2.4 (8Ae1):** Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

**Directions:**

1. Read the problem below.

   The Murphys love to give parties. Last Friday they gave a party and the doorbell rang 15 times. At the first ring, one guest arrived. Each time the doorbell rang after that, two more guests arrived than the time before.

   On Saturday they had another party. At the first ring of the doorbell a single guest arrived, at the second ring two guests appeared, at the third ring three guests and so on. If the doorbell rang 20 times Saturday night, how many guests attended? Was this party bigger than Friday's? How do you know?

2. Draw a picture to show one way to solve this problem.

3. Draw a table to show a second way to solve.

4. Write your answer below and explain how you arrived at your solution.

# Project # 2

**Domain:** Percents
**Standard MAFS.7.RP.1.3 (8Nf5)**: Analyze proportional relationships and use them to solve real-world and mathematical problems.

**Directions:**

1. Complete the following three problems to apply your understanding of percentages and ratios.

   Problem #1:
   Al's Awesome Autos advertised a special sale on cars - Dealer cost plus 5%!!
   Jack and Margaret bought a luxury sedan for $23,727.90. What was the dealer's cost?

   Problem #2:
   You and some friends went out to T.G.I. Fridays for dinner. You ordered a root beer, sweet potato fries and cheese quesadillas. The total bill came to $21.86. Your dad has told you many times that it's important to leave a good tip; about 20%. You have $26.00 in your wallet. Can you leave a 20% tip? How much would the total be if you left a 20% tip? Can you cover the cost?

   Problem #3:
   Builders have observed that residence windows are most attractive if they have the width to length ratio 3:5. If a window is to be 48 inches wide, what should its length be for the most attractive appearance?

2. Create one original problem involving a percentage (discount or tax).
3. Create one original problem involving a ratio or part/whole relationship.
4. Solve both and keep the answer key.
5. Challenge a friend to solve your problems.

# Project # 3

**Domain:** Operations with Integers
**Standard MAFS.7.NS 1.1 & 1.2 (8Ni1). :** Apply and extend previous understand of operations with fractions to add, subtract, multiply, and divide rational numbers.

**Directions:**
Complete the two problems below.

**Problem 1:**

Using exactly four 4's and any operation [ +, -, x, ÷, *()*] write an expression to equal the following:

1 = _____ 4 = _____
2 = _____ 5 = _____
3 = _____ *Example 16 = 4 x 4 x 4 ÷ 4

**Problem 2:**
Find three different ways to fill in the operations in the boxes below to make the equations true.

$6 \square 1 \square 2 \square 2 = 5$ *Hint: Operations include: +, -, x, ÷,()

$6 \square 1 \square 2 \square 2 = 5$

$6 \square 1 \square 2 \square 2 = 5$

# Project #4

**Domain:** Number Systems
**Standard MAFS.7.NS1.1b (7Ni1)** Understand subtraction of rational numbers as adding the additive inverse, $p\ q = p + (q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

**Demonstrate your knowledge by giving a clear, concise solution to each problem. Be sure to include all relevant drawings and justify your answers. You may show your solutions in more than one way or investigate beyond the requirements of the problem. If necessary, record your answer on another piece of paper.**

1. Horatio, Glen, Carlos, and Meredith played in the company golf tournament. Their scores after the first round are listed below.

   Horatio: two over par (+2)
   Glen: three under par (–3)
   Carlos: four over par (+4)
   Meredith: one under par (–1)

   **a.** Explain what is meant by the *absolute value* of a number. Then find the absolute value of Glen's score.

   **b.** Glen's second round score is +2. Use counters to find Glen's total score after two rounds.

   **c.** Meredith's second round score is –3. Find her total score after two rounds.

2. The first year, an SUV was worth $43,500. Five years later, it was worth $13,000.

   **a.** If C is the current value and S is the starting value, write an expression to find the average change in value each year

   **b.** Find the average change in value each year. Show your work.

3. Describe how opposites can be used when subtracting integers. Give an example to support your answer.

4. Draw representation of each operation or explain the rules on how you add, subtract, multiply and divide integers.

# Project #5

**Domain:** Ratios and Proportions
**Standard: MAFS.7.RP.1.1 (7Nf9):** Analyze proportional relationships and use them to solve real-world and mathematical problems.

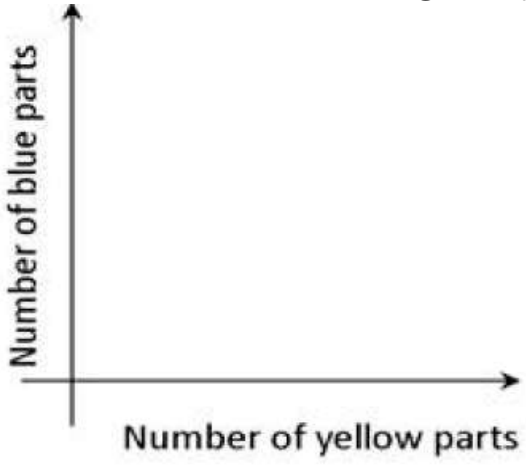
**Directions:** Solve the following problems.
The students in Ms. Baca's art class were mixing yellow and blue paint. She told them that two mixtures will be the same shade of green if the blue and yellow paint are in the same ratio.
The table below shows the different mixtures of paint that the students made.

| | A | B | C | D | E |
|---|---|---|---|---|---|
| Yellow | 1 part | 2 parts | 3 parts | 4 parts | 6 parts |
| Blue | 2 part | 3 parts | 6 parts | 6 parts | 9 parts |

a. How many different shades of paint did the students make?

b. Some of the shades of paint were bluer than others. Which mixture(s) were the bluest? Show work or explain how you know.

c. Carefully plot a point for each mixture on a coordinate plane like the one that is shown in the figure. (Graph paper might help.)




d. Draw a line connecting each point to (0,0). What do the mixtures that are the same shade of green have in common?

# Project #6

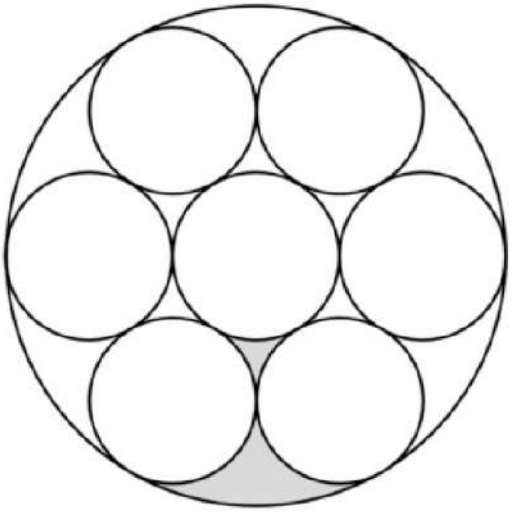
**Domain:** Number System
**Standard MAFS.7.NS.1.1 (8Ni1):** Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

**Directions:** Read the situation carefully and solve the problem.
Ocean water freezes at about $-2^{\circ}C$. Fresh water freezes at $0^{\circ}C$. Antifreeze, a liquid used to cool most car engines, freezes at $-64^{\circ}C$. Imagine that the temperature is exactly at the freezing point for ocean water. How many degrees must the temperature drop for the antifreeze to turn to ice?

# Project # 7

**Domain:** Geometry
**Standard MAFS.7.G.24 (8Ma2):** Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

**Directions:**
The figure below is composed of eight circles. Neighboring circles only share one point, and two regions between the smaller circles have been shaded. Each small circle has a radius of 5 cm.



Calculate:

a. What is the area of the large circle?

b. What is the area of the shaded part of the figure?

# Project # 8

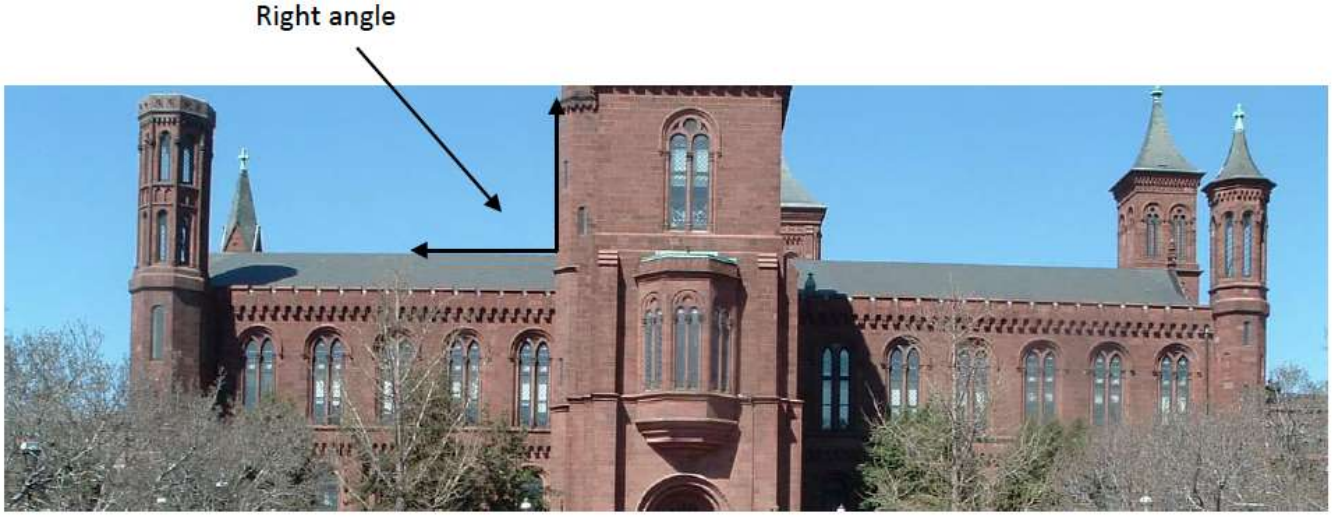
**Domain:** Geometry
**Standard MAFS.7.G.1.2 (7Gs1):** Draw, construct, and describe geometrical figures and describe the relationships between them.

**Directions:**

1. Using a sheet on graph paper and a ruler, draw an example of each type of angle: acute, obtuse, right, straight, complementary, supplementary, and vertical.
2. Label each of your angles.
3. Then, find an example of each in the real world (i.e., in your home, neighborhood, or natural environment, at the grocery store, baseball field, in your car, etc.).
4. Take a picture of each example and print it out and paste it on a piece of paper. Label each picture with the correct label.

   *If you do not have a camera, draw a sketch of each example you find in the real world and label as using the appropriate geometric terms.

Example:

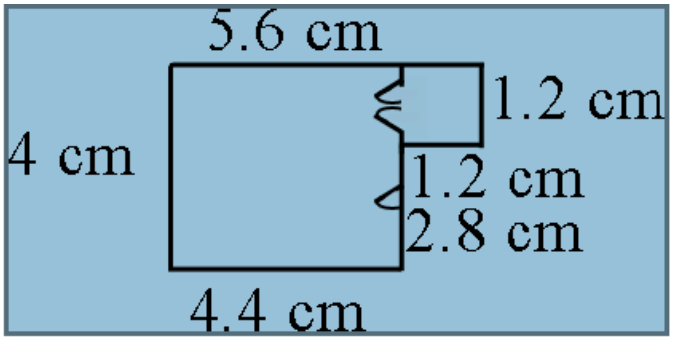


# Project #9

**Domain:** Geometry
**Standard MAFS.8.G.1.4 (9Gp4):** Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

**Directions:**
**Part 1:**
1. Read the problem below then study the scale drawing.

Kiera showed her best friend a scale drawing of a new game room her father is going to build for her and her brothers and sisters.




2. Solve: If each 2 cm on the scale drawing equals 5 ft, what are the actual dimensions of Kiera's room?
3. How much carpet needs to be purchased to cover the entire floor?

**Part 2:**
1. Design your own game room using Kiera's scale drawing as an example.
2. Using graph paper, determine the scale and be sure to write it in the top right corner of your paper. Example: (1 cm = 3 ft).
3. Then, create a scale drawing of the game room you have designed. Include game areas, furniture, and more to give the best visual representation possible.
4. Calculate the area of the floor that is showing versus the area of the floor under the furniture.

*Be sure to use a ruler to create straight lines and accurate measures.

# Project # 10

**Domain:** Statistics & Probability
**Standard MAFS.7.SP.1.1 (7DI2):** Use random sampling to draw inferences about a population.

**Directions:**
1. Look at the following data set. It represents the height in centimeters of a group of students

| Student | Height in cm |
|---|---|
| Tim | 145 |
| Liz | 136 |
| Latoya | 154 |
| Paloma | 178 |
| Sean | 173 |
| Juan | 164 |
| Andrea | 144 |
| Allie | 170 |
| Tyrone | 183 |
| Juanita | 144 |

1. Answer the following questions based on the data set above.
What is the mode of the set? _____
What is the range of the set? _____
Whose height is closest to the median height for the set? _____
Whose height is closest to the mean height for the set? _____
2. Create a scatter plot and box and whisker plot using all of the above data.

*If you need help, search on the internet to find examples of scatter plots and box and whisker plots. Be sure to do so only with permission from your parent or guardian.

# Bonus Project

**Domain:** Functions
**Standard: MAFS.8.F.2.4 (9As7):** Use functions to model relationships between quantities.

**Directions:**

1_. Use the information below to answer the riddle

Amy, Connor, Jalia, Stella, and Gozo live in apartments A, B, C, D, and E, in the same building. Their ages are 9, 10, 11, 13, and, 14. They each get up at a different time each morning, either 6:00, 7:00,7:30, 8:00, or 8:15. Using the clues below, determine the apartment, age and rising time for each student

- Connor gets up at 6:00 and is older that the student in Apt. B.
- Amy is 11 and gets up two hours later that the boy in Apt. A
- The ten – year old girl lives in Apt. B and it isn't Stella.
- The youngest student, a girl doesn't live in Apt. E
- The person in apt. B gets up later than everyone else.
- Gonzo is younger than Connor and he lives in Apt. D.

_The shades go up at 7:30 in Apt. C.

| | **Apartment** | **Time** |
|---|---|---|
| Amy | | |
| Connor | | |
| Jalia | | |
| Stella | | |
| Gonzo | | |

1. Create your own riddle for a friend to solve.