

# Imagine Schools Summer Math Challenge

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## Third Grade

Dear Imagine Student,

We hope you will enjoy this Math Challenge Packet and work hard to complete all problems on your own or with help from a parent or guardian. All projects in the challenge packet are based on the Common Core Standards. Therefore, this should be a review for you in some ways, but should stretch you as you apply your understanding of concepts you learned throughout this past year. We suggest doing one project each day. Once you have finished with the project you select for the day, 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.

Sincerely,

Imagine Schools National Academic & Character Team

# Project # 1

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**Domain: Numbers and Operations-Fractions (NF)**

**3.NF.1.** Understand a fraction  $1/b$  as the quantity formed by 1 part when  $a$  whole is partitioned into  $b$  equal parts; understand a fraction  $a/b$  as the quantity formed by  $a$  parts of size  $1/b$ .

Draw a picture to illustrate each fraction.

Illustrate the fraction  **$1/2$**  below.

Illustrate the fraction  **$1/3$**  below.

Illustrate the fraction  **$3/4$**  below.

# Project #2

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**Domain: Number and Operations in Base Ten (NBT)**

**3.NBT.1.** Use place value understanding to round whole numbers to the nearest 10 or 100.

**Directions:** Write the numbers below in expanded form.

Example:

**A. 15,492**

$10,000 + 5,000 + 400 + 90 + 2$

**B. 156**

**C. 12,943**

**D. 57,846**

**E. 23,456**

# Project # 3

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**Domain: Operations and Algebraic Thinking (OA)**

**3.OA.1.** Interpret products of whole numbers, e.g., interpret  $5 \times 7$  as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as  $5 \times 7$

**Directions:** Draw a picture of groups/sets of a number to represent the meaning of multiplication. Then, write the number sentence and the answer to go with the picture. Write the answer in a complete sentence.

**Example:** There are 5 pots (groups) of 2 flowers. How many flowers in all?



$5 \times 2 = 10$ . There are 10 flowers in all.

1) There are 6 bags of candy. There are 3 pieces of candy in each bag. How many pieces of candy are there in all?

2) There are 15 children. Each child has 4 markers. How many markers are there in all?

# Project # 4

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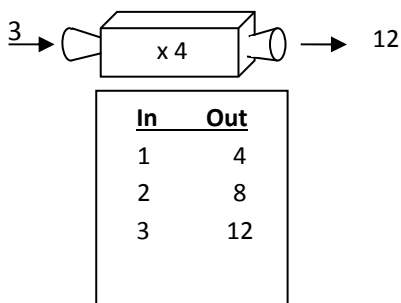
**Domain: Operations and Algebraic Thinking (OA)**

**3.OA.3.** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

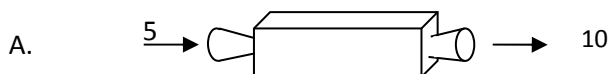
**3.OA.9.** Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.

**Directions:** Describe the pattern that is shown by the input/output machine. Write the pattern on the machine and then describe it in a complete sentence.

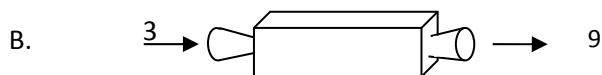
**Example:**



The pattern shown by the input/output machine is that each number is multiplied by 4 in the machine.



In	Out
2	4
3	6
4	8



In	Out
4	12
5	15
6	18

# Project # 5

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**Domain: Operations and Algebraic Thinking (OA)**

**3.OA.9.** Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*

**Directions:** Complete the pattern and then write a sentence describing the pattern.

A. 3, \_\_\_\_\_, 9, 12, 15, ...

B. 80, 72, 64, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, ...

C. 6, 16, 26, \_\_\_\_\_, 46, \_\_\_\_\_, ...

D. 12, \_\_\_\_\_, 36, \_\_\_\_\_, 60, 72, ...

# Project # 6

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## Domain: Operations and Algebraic Thinking (OA)

**3.OA.2.** Interpret whole-number quotients of whole numbers, e.g., interpret  $56 \div 8$  as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as  $56 \div 8$ .

**3.OA.9.** Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*

**Directions:** Use the pictures to help you fill out the chart following the pictures.

Example:

Picture



Stars	Number of Points
1	5
2	10
3	15
4	20

Picture



Triangles	Number of Points
1	3
2	
3	
4	
5	
6	

# Project # 7

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**Domain: Number and Operations in Base Ten (NBT)**

**3.NBT.2.** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

**Directions:** Solve the addition and subtraction problems below.

1)  $555 + 401 =$

2)  $333 + 211 =$

3)  $613 - 241 =$

4)  $524 - 201 =$



# Project #8

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**Domain: Operations and Algebraic Thinking (OA)**

**3.OA.3.** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.



**Directions:** Illustrate fair sharing through pictures.

A. Three sub sandwiches are shared among 2 friends. Each person gets  $1\frac{1}{2}$  sub sandwiches.

B. Three sub sandwiches are shared among 4 friends. Each person gets  $\frac{3}{4}$  of a sub sandwich.

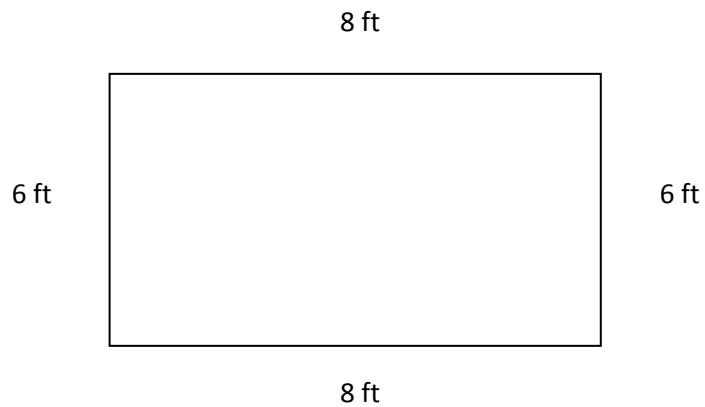
# Project # 9

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**Domain: Measurement and Data (MD)**

**3.MD.8.** Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

**Directions:** Find the perimeter of the rectangle below. Remember you find the perimeter of shape by adding up the measurements of the all the sides ( $2W + 2L=P$ ). Show your work below.

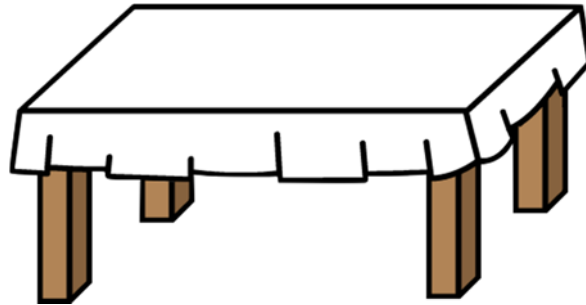


# Project # 10

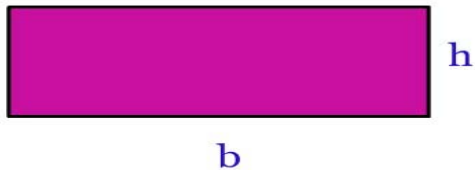
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**Domain:** Measurement & Data (MD)

**3.MD.C.7.B:** Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.



**Directions:** Your Aunt Karen wants to buy fabric to make a tablecloth. Aunt Karen wants the base (b) of the table cloth to be 5 feet long. Aunt Karen wants the height (h) of the table cloth to be 4 feet. How many square feet of the fabric should Aunt Karen buy to make her table cloth? Write a number sentence below to solve the problem and explain your answer with a sentence.



$$\text{Area} = b \times h$$

**Extension:** Explore area online by visiting:

<http://www.shodor.org/interactivate/activities/AreaExplorer/>

# Project # 11

**Domain: Measurement and Data (MD)**

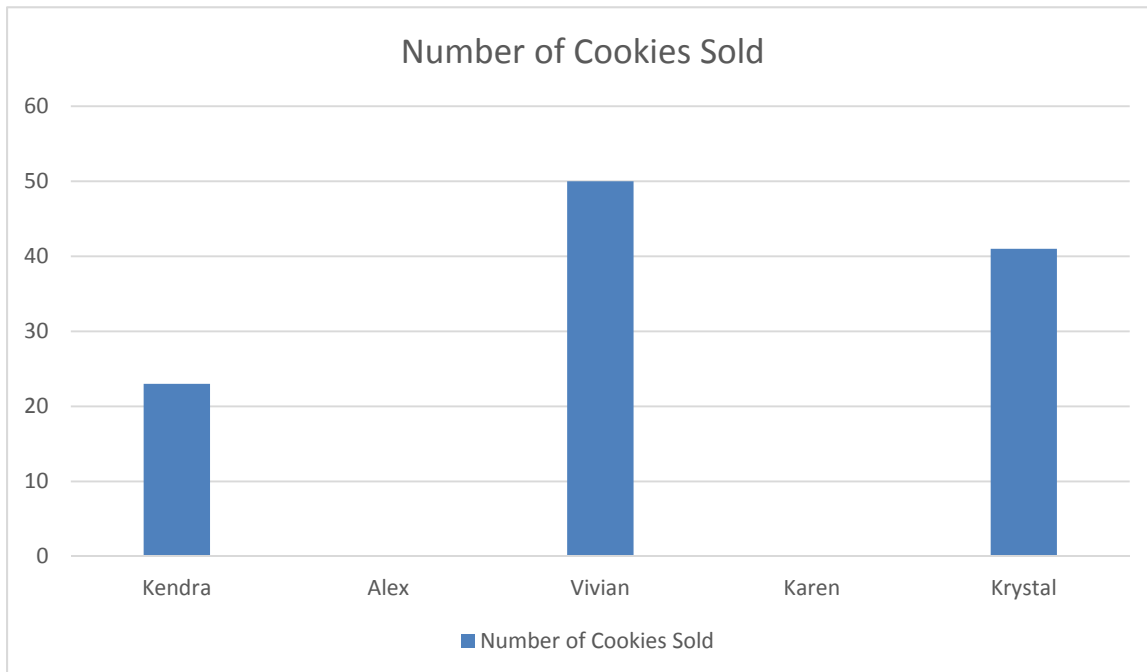
**3.MD.3.** Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.



**Directions:** Use the chart below to complete the bar graph and answer the questions.

Name of Girl Scout	Kendra	Alex	Vivian	Karen	Krystal
Number of Boxes of Cookies Sold	23	36	50	23	41

Complete the bar graph below. Input a bar to represent how many cookies Karen and Alex sold.



# Project # 11 (continued)

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Using the bar graph you created above answer the following questions:

1. Who sold the least amount of boxes?
2. Who sold the most cookies?
3. What is the range of boxes of cookies sold? Find the range by subtracting the least number of cookies sold from the most number of cookies sold.
4. Is there a number that occurs more than once? The number you see the most often is called the mode.
5. List the number of cookies sold from least to greatest. Then, circle the number in the middle.

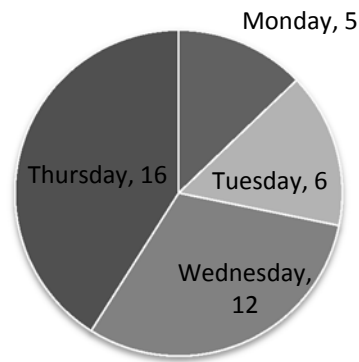
# Project # 12

## Domain: Measurement and Data (MD)

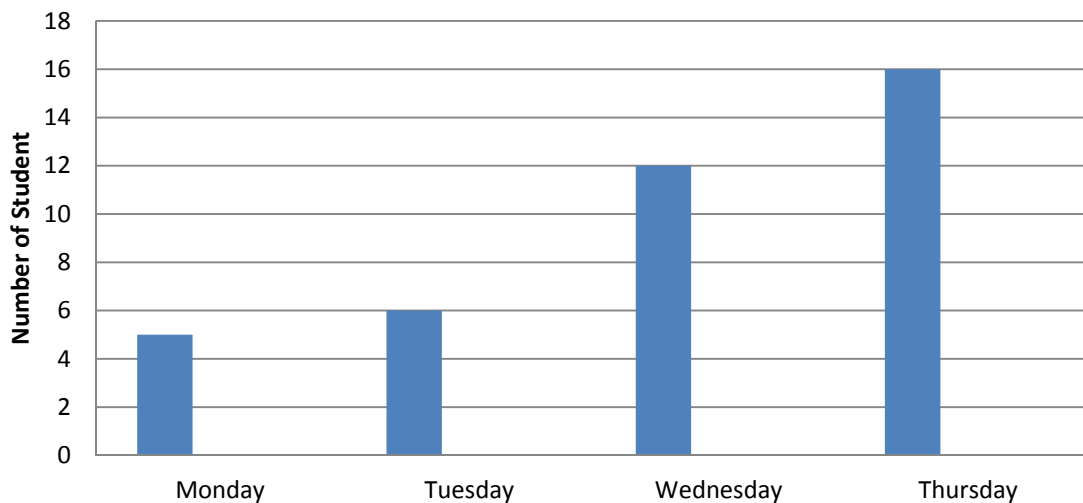
**3.MD.3.** Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.

**Directions:** Use the charts below to answer the questions on the following page.

### Number of Students Who Completed Homework in Ms. H's Class



### Number of Students Who Completed Homework in Ms. H's Class





# Project # 13

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**Domain: Number and Operations in Base Ten (NBT)**

**3.NBT.2.** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

**Directions:** Use the table below to answer the following questions.

Major League Baseball Player	Number of Home Runs
Barry Bonds	762
Hank Aaron	755
Babe Ruth	714
Willie Mays	660
Ken Griffey, Jr.	630
Alex Rodriguez	617
Sammy Sosa	609
Jim Thome	590
Frank Robinson	586
Mark McGwire	583



1. Which baseball player hit the number of home runs closet to 600?
2. How many baseball players on the chart had 600 or fewer home runs?
3. How many more home runs would Barry Bonds have needed to hit to reach 1,000 home runs?



# Project # 14

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**Domain: Measurement and Data (MD)**

**3.MD.1.** Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.

**Directions:** Read the poem below and use the information in the poem to answer the word problem.

## *Jimmy Jet*

by Shel Silverstein



I'll tell you the story of Jimmy Jet—  
And you know what I tell you is true.  
He loved to watch his TV set  
Almost as much as you.

He watched all day, he watched all night  
Till he grew pale and lean,  
From "The Early Show" to "The Late Late Show"  
And all the shows between.

He watched till his eyes were frozen wide,  
And his bottom grew into his chair.  
And his chin turned into a tuning dial,  
And antennae grew out of his hair.

**Word Problem:** About how many TV shows did Jimmy watch that day? Each show Jimmy watched was 30 minutes long. Jimmy woke up at 6:00 a.m. and went to bed at 12:00 a.m. Write a number sentence to solve the problem. Then, explain your answer in 2-3 complete sentences.

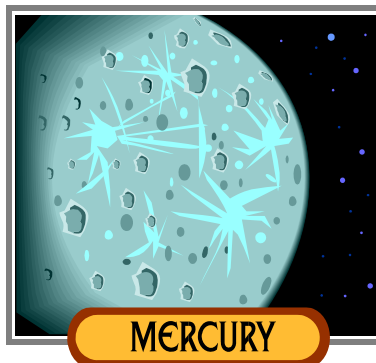
# Project # 15

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**Domain: Operations and Algebraic Thinking (OA)**

**3.OA.8.** Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

**Directions:** Solve the word problem below using a number sentence. You may estimate your answer. Explain your answer in 2-3 complete sentences.



**Word Problem:**

A year on Mercury —one complete orbit around the Sun—takes only 88 of our Earth days. About how many Mercury years are in one Earth year? Remember an Earth year is 365 days. Write a number below to solve the problem. Then, explain your answer in two to three sentences.



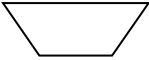
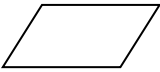

# Project # 16

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**Domain: Geometry (G)**

**3.G.1.** Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

**Directions:** Fill in the blanks in the table below.

Shape Name	Shape	Number of Sides	Describe the Shape	Name one item in your home that has a similar shape
Polygons		4 or more	Closed figure whose sides are all line segments	
Quadrilateral			Polygon with 4 sides	
Trapezoid			Quadrilateral that has one pair of parallel sides	
Parallelogram			Quadrilateral with 2 pairs of parallel sides	
Rhombus			Parallelogram with four sides with equal length	

Which shape would be the best to stack in a tower? Why?

What is the similar about the all the shapes described above? What is different about the shapes described above?

# Project # 17

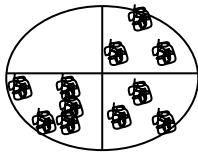
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**Domain: Numbers and Operations-Fractions (NF)**

**3.NF.1.** Understand a fraction  $1/b$  as the quantity formed by 1 part when  $a$  whole is partitioned into  $b$  equal parts; understand a fraction  $a/b$  as the quantity formed by  $a$  parts of size  $1/b$ .

**Directions:** Write the fractional part for each situation below.

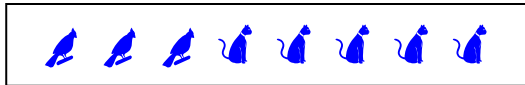
**Example: What fraction of the pizza has a mushroom topping?**



There are 4 pieces of pizza. 3 pieces have mushroom topping. Therefore  $\frac{3}{4}$  of the pizza has mushroom topping. The total number of parts is the bottom number, or denominator, of the fraction.

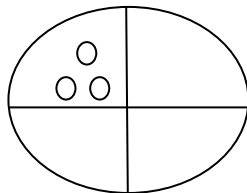
Now, use fractions to name part of a group or set.

1. There are eight animals in the group. 3 are birds. What fraction of the animals are birds?



Write the fraction here: \_\_\_\_\_

2. What fraction of the pizza below has pepperoni on it?



Write the fraction here: \_\_\_\_\_

# Extensions

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The following activities are based on standards you will learn in fourth grade. They may be challenging for you.

## Project # 18

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**Domain: Operations and Algebraic Thinking (OA)**

**4.OA.5.** Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule “Add 3” and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.

**Directions:** Cut out the shapes/pictures on the following page and use them to build simple patterns. Also, take turns starting a pattern and asking a member of your family to finish it. You may also use toys, food, or other objects to build patterns.

Examples of types of patterns:

AB pattern: !@!@!@

ABC pattern: !@#!@#!@#

ABBC: !@@#!@@#

AABB: !!@@!!@@

# Project # 19

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**Domain: Geometry (G)**

**4.G.3.** Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

**Directions:** Butterflies are one example of symmetry in nature. Butterflies are naturally symmetrical; their wings are a mirror image of each other. Color in the butterfly below to be symmetrical. Both sides of the butterfly should be the same.

Example:



Color in the butterfly below using a symmetrical pattern:

