

Imagine Schools Summer Math Challenge



Third Grade Answer Key

When completing the problems we need to show all of our work and show all of our thinking. Compare your work to ours, especially if your answer is different than our answer. If the project listed is creative in its approach and each project created would be different, no answer is provided.

Project # 1

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

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

$$100 + 50 + 6$$

C. 12,943

$$10,000 + 2,000 + 900 + 40 + 3$$

D. 57,846

$$50,000 + 7,000 + 800 + 40 + 6$$

E. 23,456

$$20,000 + 3,000 + 400 + 50 + 6$$

Project # 3

Domain: Operations and Algebraic Thinking (OA)

3.OA.1. Interpret products of whole numbers, e.g., interpret 5×7 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 5×7

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?**

$6 \times 3 = 18$ There are 18 pieces of candy in all.

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

$15 \times 4 = 60$ There are 40 markers in all.

Project # 4

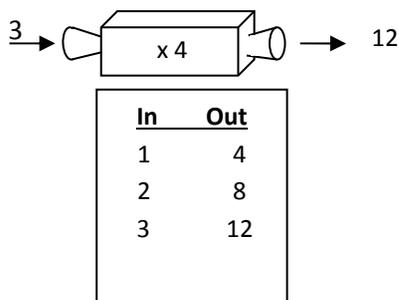
Domain: Operations and Algebraic Thinking (OA)

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.

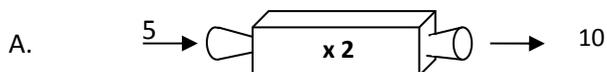
3.OA.9. Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.

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.

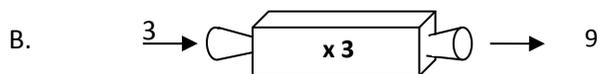
Example:



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

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, **6**, 9, 12, 15, ...

B. 80, 72, 64, **56**, **48**, **40**

C. 6, 16, 26, **36**, 46, **56**

D. 12, **24**, 36, **48**, 60, 72, ...

Project # 6

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.

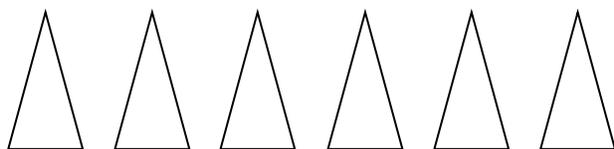
Example:

Picture



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

Picture



Triangles	Number of Points
1	3
2	6
3	9
4	12
5	15
6	18

Project # 7

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) $555 + 401 = \mathbf{956}$

2) $333 + 211 = \mathbf{544}$

3) $613 - 241 = \mathbf{372}$

4) $524 - 201 = \mathbf{323}$

Project # 8

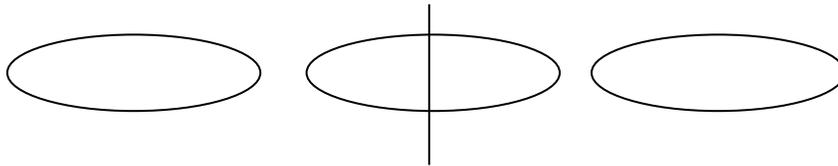
Domain: Operations and Algebraic Thinking (OA)

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.

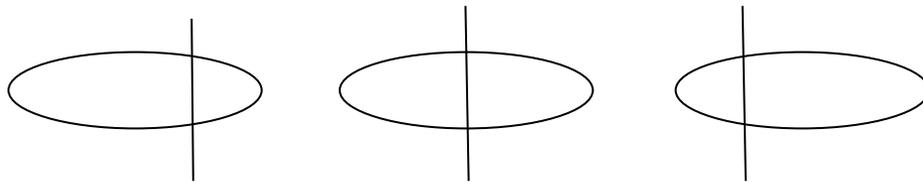


Directions: Illustrate fair sharing through pictures.

- 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.

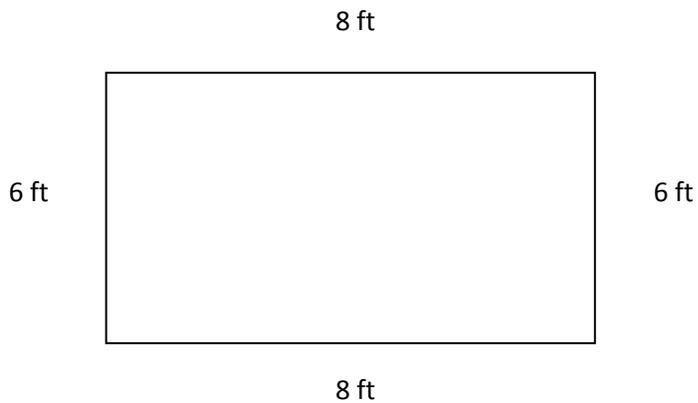


Project # 9

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.

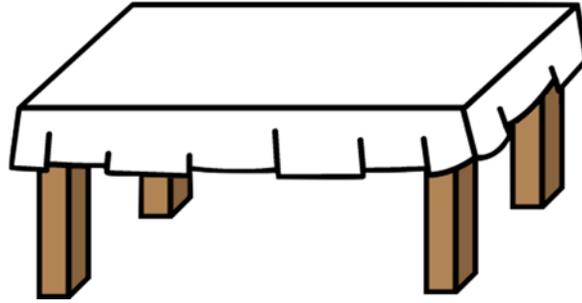


$$\begin{aligned}8 + 8 + 6 + 6 &= P \\16 + 12 &= P \\28 \text{ ft} &= P\end{aligned}$$

Project # 10

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.

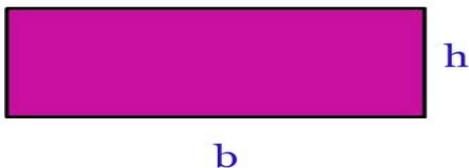


Directions: Your Aunt Karen wants to buy fabric to make a tablecloth. Aunt Karen wants the base (b) of the table cloth to be 5 feet long. Aunt Karen wants the height (h) of the table cloth to be 4 feet. How many square feet of the fabric should Aunt Karen buy to make her table cloth? Write a number sentence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

Base = 5 feet

Height = 4 feet

$5 \times 4 = 20$. Aunt Karen needs 20 ft² of fabric to make her table cloth.



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

Extension: Explore area online by visiting:

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

Project # 12

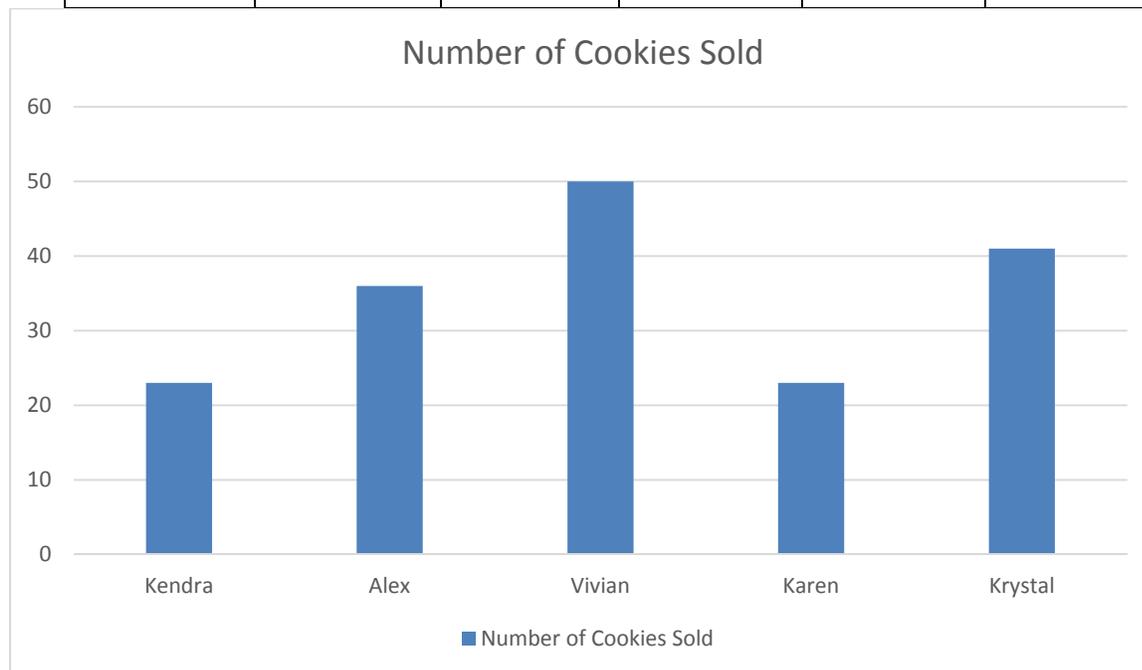
Domain: Measurement and Data (MD)

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 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



1. Who sold the least amount of boxes?

Kendra and Karen

2. Who sold the most cookies?

Vivian

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.

$50-23 = 27$ The range is 27.

4. Is there a number that occurs more than once? The number you see the most often is called the mode. **23**

5. List the number of cookies sold from least to greatest. Then, circle the number in the middle.

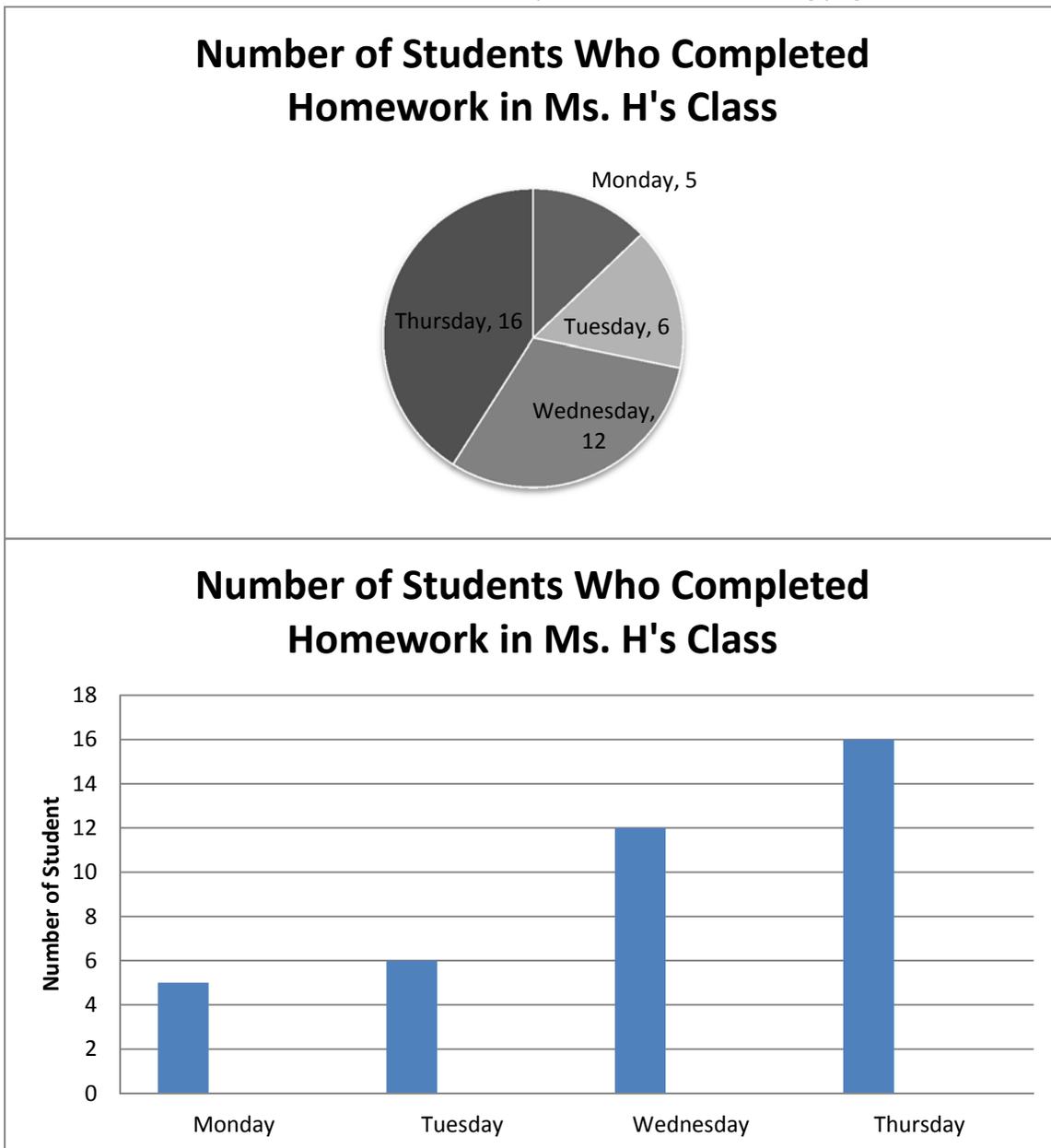
23, 23, 36, 41, 50

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.



Project #12 (continued)

There are two charts on the previous page. One is a circle graph and one is a bar graph. Both graphs show how many students in Ms. H's class handed in their homework from Monday through Thursday. Use the graphs to answer the following questions in complete sentences.

- 1. How many students handed in their homework on Monday?**

Five students handed in homework on Monday.

- 2. Which graph shows the information more clearly? Why?**

Answers could vary. The bar graph because it shows the information sequentially in order of the days of week. You can see the increase.

- 3. If you had a choice to show the data from Ms. H's class in a circle graph or a bar graph which would you choose? Why?**

A bar graph because it easier to see the exact numbers and to see the order of the data.

Project # 13

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 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?

Sammy Sosa. He was 9 home runs more than 600 while Jim Thome was 10 home runs less than 600.

2. How many baseball players on the chart had 600 or fewer home runs?

Three. Jim Thome, Frank Robinson, and Mark McGwire.

3. How many more home runs would Barry Bonds have needed to hit to reach 1,000 home runs?

$$1,000 - 762 = 238$$

Project # 14

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.

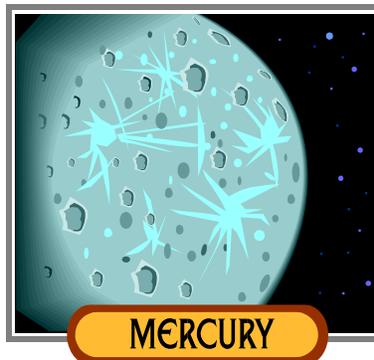
He watched TV for 18 hours. He watched 2 TV shows each hour. 18 times 2 equals 36. Jimmy watched 36 TV shows that day.

Project # 15

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.

365 divided by 88 equals 4 Remainder 1.

There are about 4 Mercury years in one Earth year. Each Mercury year is 88 days and each Earth year is 365 days. I had to divide 365 by 88 to get the answer of 4.

Project # 16

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	TV
Quadrilateral		4	Polygon with 4 sides	Table
Trapezoid		4	Quadrilateral that has one pair of parallel sides	Lampshade
Parallelogram		4	Quadrilateral with 2 pairs of parallel sides	Scarf
Rhombus		4	Parallelogram with four sides with equal length	The window in our front door

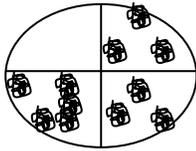
Project # 17

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.

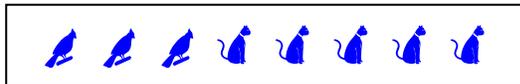
Example: What fraction of the pizza has a mushroom topping?



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.

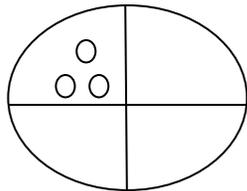
Now, use fractions to name part of a group or set.

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



Write the fraction here: **$\frac{3}{8}$**

2. What fraction of the pizza below has pepperoni?



Write the fraction here: **$\frac{1}{4}$**

Extensions

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

Project # 18

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

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:

