MULTIPLICATIVE COMPARISONS

- Multiplicative comparisons focus on comparing two quantities by showing that one quantity is a specified number of times larger or smaller than the other (e.g., Deb ran 3 miles. Karen ran 5 times as many miles as Deb. How many miles did Karen run?). A simple way to remember this is "How many times as much?" or "How many times as many?

MGSE4.OA.1 Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.

A multiplicative comparison is a situation in which one quantity is multiplied by a specified number to get another quantity (e.g., "a is n times as much as b"). Students should be able to identify and verbalize which quantity is being multiplied and which number tells how many times.

Students should be given opportunities to write and identify equations and statements for multiplicative comparisons. Examples: 5 x 8 = 40: Sally is five years old. Her mom is eight times older. How old is Sally's Mom? 5 x 5 = 25: Sally has five times as many pencils as Mary. If Sally has 5 pencils, how many does Mary have?

MGSE4.OA.2 Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.

This standard calls for students to translate comparative situations into equations with an unknown and solve. Examples:

• Unknown Product: A blue scarf costs $3. A red scarf costs 6 times as much. How much does the red scarf cost? (3 × 6 = p)

• Group Size Unknown: A book costs $18. That is 3 times more than a DVD. How much does a DVD cost? (18 ÷ p = 3 or 3 × p = 18)

• Number of Groups Unknown: A red scarf costs $18. A blue scarf costs $6. How many times as much does the red scarf cost compared to the blue scarf? (18 ÷ 6 = p or 6 × p = 18) When distinguishing multiplicative comparison from additive comparison, students should note the following.

• Additive comparisons focus on the difference between two quantities. o For example, Deb has 3 apples and Karen has 5 apples. How many more apples does Karen have? o A simple way to remember this is, "How many more?"

• Multiplicative comparisons focus on comparing two quantities by showing that one quantity is a specified number of times larger or smaller than the other.

Examples:

- **The giraffe is 18 feet tall. She is 3 times as tall as the kangaroo. How tall is the kangaroo?**

(18 ÷ 3 = k; k = 6 feet)

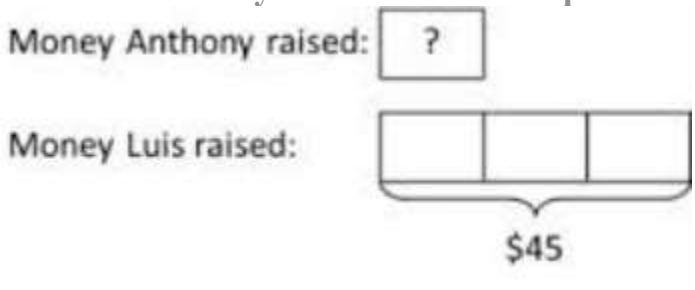
- **The giraffe in the zoo is 3 times as tall as the kangaroo. The kangaroo is 6 feet tall. How tall is the giraffe?**

(6 x 3 = g; g = 18 feet)

- The giraffe is 18 feet tall. The kangaroo is 6 feet tall. The giraffe is how many times taller than the kangaroo?

(6 x t = 18 or 18 ÷6 = t; t= 3 times)

Example: Luis raised $45 dollars. This is three times what Anthony raised. How much did Anthony raise? Write an equation to go with your answer.



#1 A gray umbrella costs $8.00.

A yellow one costs 3 times as much as the gray umbrella.

How much does the yellow umbrella cost?

#2 Tom ran 4 laps of the football field.

Sam ran 5 times as many laps of the football field as Tom.

How many laps did Sam run?

#3 A rubber band is 6 cm long.

How long would the rubber band be if it were stretched to be 3 times as long?

#4 A giraffe in the zoo is 4 times as tall as the gorilla.

The gorilla is 4 feet tall.

How tall is the giraffe?