Math 9 Tripp

Name: _________**KEY**___________

Chapter 6 - Geometry

Test Date: _______________________________________

To do:

6.1/6.2 – Equivalent Ratios

- Complete Notes ◯
- Quiz 1 ◯

6.3 – Scale Models

- Complete Notes ◯

6.4 – Similar Triangles

- Complete Notes ◯
- Quiz 2 ◯

Assignment # 3 (Units 5 & 6) ◯

Write Unit Test ◯

Math 9 **Lesson 6.1/6.2 – Equivalent Ratios** Tripp

A ratio is a **comparison** of amounts.

There are many ways to compare and express ratios:

- Part-to-part
- Part-to-whole
- Multiple term ratios

Part-to-part

Ratios that compare one part to another part:

- there are 3 apples and 2 oranges - apples to oranges - 3:2
- there are 2 oranges and 3 apples - oranges to apples - 2:3

Part-to-whole

Ratios that compare one part to the whole group:

- there are 3 apples and 5 fruit - apples to fruit - 3:5
- there are 5 fruit and 2 oranges - fruit to oranges - 5:2

****Part-to-whole ratios can also be expressed with fractions and percents.**

Multiple term ratios

Multiple term ratios will compare more than 2 amounts:

- In a backpack, there are 3 pens, 4 marbles, 7 comics, and 1 apple.
    - The ratio of marbles to comic books to pens is four to seven to three (or 4:7:3)

Practice:

1. A juice from concentrate instructs that you need to combine 3 cans of water with 1 can of frozen juice. What is the ratio of cans of juice to cans of water?

2. The ratio of cans of juice to cans of water is 1 : 3.

3. Jenna has a bag full of school supplies. She has 4 pencils, 7 pieces of paper, 1 pen, and 2 erasers.

   What is the ratio of erasers to pencils?

   The ratio of erasers to pencils is 2 : 4 → 1 : 2.

   What is the ratio of pieces of paper to the total number of items in the bag? Express as a fraction and a percent:

   The ratio of pieces of paper to the total number of items is 7 : 14 → 1 : 2 (1/2 or 50%).

Equivalent ratios are **pairs** of numbers, written as ratios that are **equivalent** to each other.

Equivalent ratios can be formed by **multiplying** or **dividing** the terms by the same non-zero number.

Practice:

1. Write 3 ratios equivalent to 2 : 6

   4 : 12, 6 : 18, 20 : 60, ...

2. Write a ratio equivalent to $\frac{18}{12}$ in lowest terms

   18 : 12 = 3 : 2

3. A class of 28 students had some blue-eyed students and some brown-eyed students. The ratio of blue-eyed to brown-eyed was 4 : 3. How many blue-eyed students were in the class?

4. 4 : 3 → 7 “parts” with 4 blue-eyed and 3 brown-eyed
5. So, there are 16 blue-eyed students and 12 brown-eyed students.

Math 9 **Lesson 6.3 – Scale Models** Tripp

An enlargement of an image **increases** its size but does not change its **proportions**. An image expands its size by a **scale factor**. This can be described by the following ratio:

$$\frac{Enlargement}{Original} = \frac{Scale\ Factor}{1}$$

A reduction of an image **decreases** its size, or makes it smaller, but does not change its **proportions**. In this case, the scale factor will be a fraction less than 1. For example:

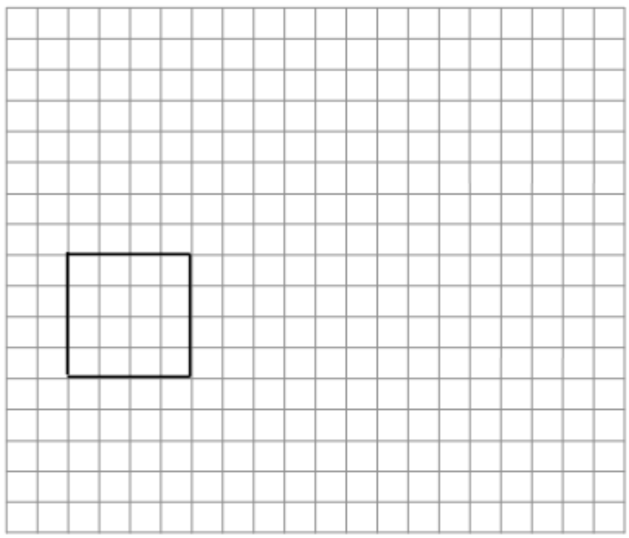
$$\frac{Reduction}{Original} = \frac{Scale\ Factor}{1}$$

To find a scale factor, given the original figure and its enlarged or reduced size, we need to measure **one pair** of corresponding sides of both the original and the changed figure, and compare the changed version to the original version. Hence,

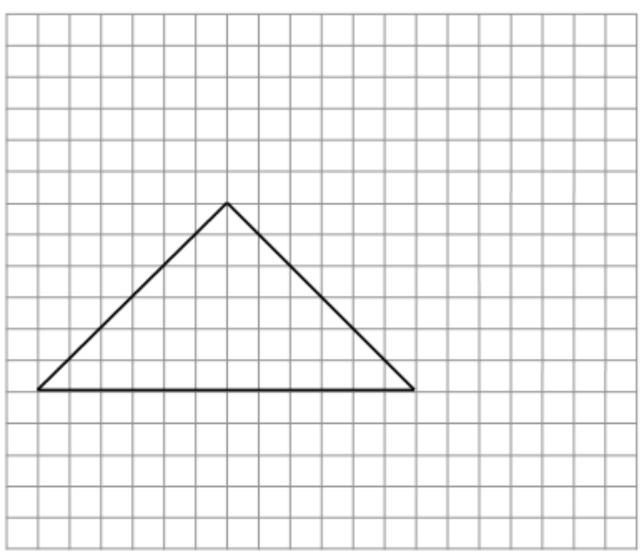
$$Scale\ Factor = \frac{Changed\ Figure}{Original\ Figure}$$

Examples:

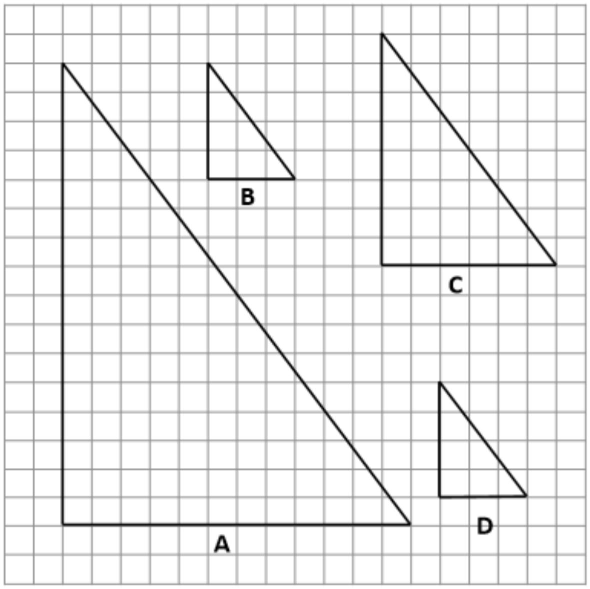
1. Enlarge the square by a scale factor of 2



2. Reduce the triangle by a scale factor of $\frac{1}{2}$



3. Identify the scale factors for each of the following:



a) From A to B

¼ (A is 4 times larger than B)

b) From C to D

½ (C is 4 times larger than D)

c) From D to B

1 (D is the same size as B)

d) From A to C

½ (A is 2 times larger than C)

A scale diagram is used to draw an object when it is **too large** or **too small** to draw the object to its actual size. For example:

The scale diagram has a scale factor that is the ratio of the length of one of the dimensions in the diagram compared to the corresponding dimension of the actual object. For example:

To find the scale we must write each term of the ratio in the same **base** units and reduce it to lowest terms. For example:

To find the actual length of one dimension of an object, given the scale and the length of the corresponding dimension in the drawing, use a **proportion** to solve for the unknown. For example:

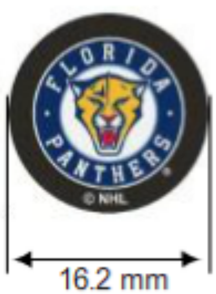
Examples:

1. Below is a scale diagram of a snowboard. The scale used is 1:36

What is the actual length of the snowboard?

$$4.5\ cm\ \times 36 = 162\ cm$$

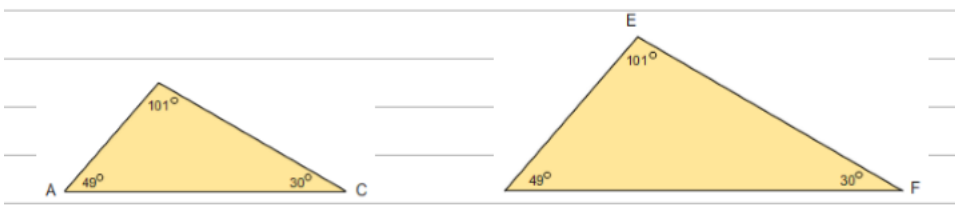
2. The official NHL hockey puck has a diameter of 7.6 cm. below is an image of the hockey puck with a diameter of 16.2 mm. Calculate the scale factor used to create the drawing of the hockey puck.



$$scale = \frac{changed}{original} = \frac{16.2\ mm}{76\ mm} \approx 0.21$$

Math 9 **Lesson 6.4 – Similar Triangles** Tripp

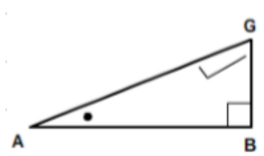
Two triangles are similar if the **ratios** of corresponding sides are **equal**.

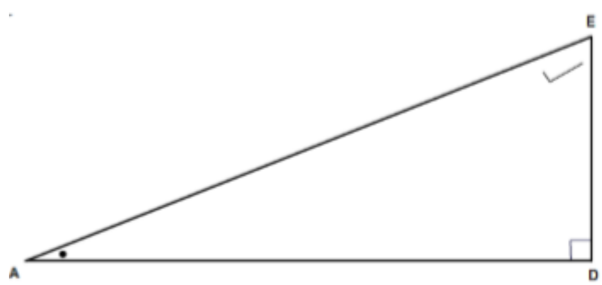


Two triangles are also similar if the corresponding pairs of angles are equal.

Examples:

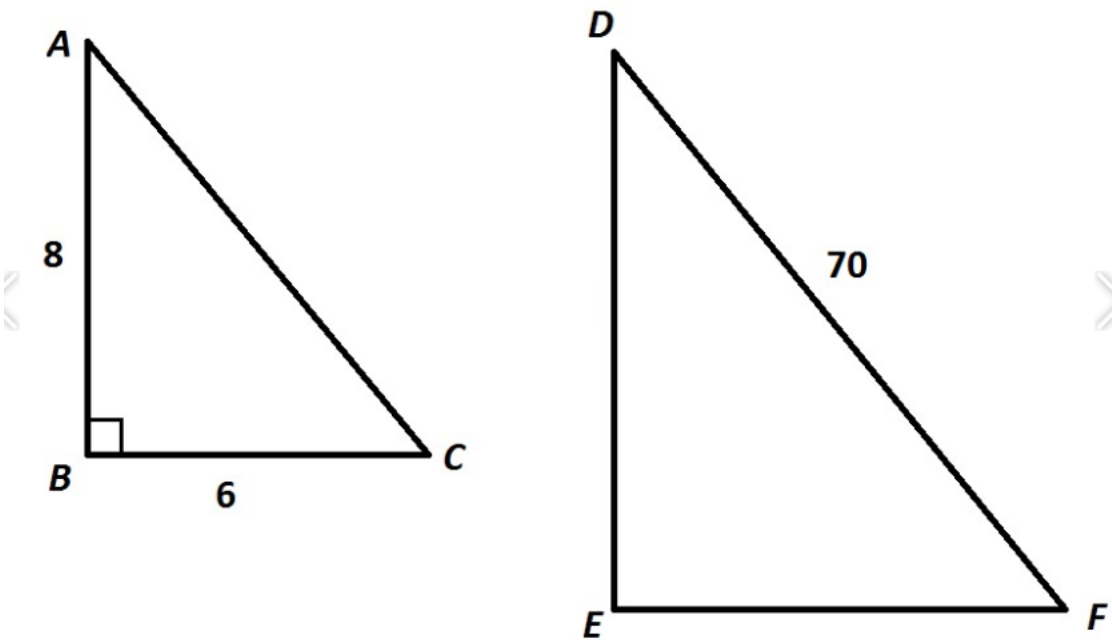
1. Write the ratios of the sides and the corresponding angles:





$$\frac{AB}{AD} = \frac{BG}{DE} = \frac{AG}{AE}$$

2. Find the unknown side lengths



$$AC = \sqrt{AB^2 + BC^2}$$

$$= \sqrt{64 + 36}$$

$$= 10$$

Therefore, triangle DEF is 7 times larger than triangle ABC.

$$DE = AB \times 7 = 8 \times 7 = 56$$

$$EF = BC \times 7 = 6 \times 7 = 42$$