# Rates, Ratios, and Percents

| Day | Topic | Homework | IXL | Grade |
|---|---|---|---|---|
| 1 | Comparing Rates | Worksheet 1 | J.6 | |
| 2 | Calculating Unit Rates | Worksheet 2 | J.5 | |
| 3 | Using Ratios and Writing Comparison Statements | Worksheet 3 | J.13 | |
| 4 | Converting using unit rates | Worksheet 4 | J.14 | |
| 5 | IXL day K.2-K.6 | Finish K.2-K.6 | K.1 | |
| 6 | Formulas | Study for Quiz | L.1 | |
| 7 | Quiz | Worksheet 5 | L.5 | |
| 8 | Review/Discount/Sale Price | Worksheet 6 | L.7 | |
| 9 | Tax/Tip/Commission | Worksheet 7 | L.9 | |
| 10 | Simple Interest | Worksheet 8 | | |
| 11 | Percent Change/Percent Error | Worksheet 9 | | |
| 12 | Practice Day | Review Pack | | |
| 13 | Review | Study for Test; IXL due | | |
| 14 | Test Day | none | | |

**Unit Quiz: Tuesday, 11/6** **Unit Test: Friday, 11/16**

Name: _____

Date: 10/29/18 Day 1 Comparing Rates

# CC Investigation 1: Ratios and Rates

DOMAIN: Ratios and Proportional Relationships

$\frac{1}{5} \square \frac{1}{10}$ $\frac{15}{20} = \frac{3}{4} \square \frac{4}{5} = \frac{16}{20}$

## Problem 1.1

Some students volunteered to make posters for the animal shelter. The number of posters each student made and the time each student worked are shown in the table.

| Student Name | Number of Posters | Time in Minutes |
|---|---|---|
| Selena | 4 | 80 |
| Jason | 4 | 20 |
| Kai | 8 | 40 |
| Enrique | 3 | 30 |
| Andre | 3 | 6 |

"$\frac{D}{T}$" ← number of posters = Speed

**A.** How many posters per minute can each of the students make?

Selena: $\frac{4 \text{ posters}}{80 \text{ min}} \xrightarrow{\div 80} \frac{\frac{1}{20} \text{ poster}}{1 \text{ min}}$ .05 posters per min.

Jason: $\frac{1}{5}$ posters per min $\frac{4}{20}$ .2

Kai: $\frac{8}{40}$

Enrique: $\frac{1}{10}$ or .1 posters/min $\frac{3}{30}$

Andre: $\frac{1}{2}$ or .5 posters/min $\frac{3}{6}$

**B.** Which student makes the most posters per minute? The least?

Andre $\frac{1}{2}$ Selena $\frac{1}{20}$

**C.** If Selena makes 8 posters in 80 minutes, how does this change your answers to Parts A and B?

$\frac{8}{80} = \frac{1}{10} = .1$ posters per min. Part A (Selena)

Selena will no longer be the only one who makes the least posters per min. Enrique joins her.

**D.** Matt joins the group, and it takes him 6 minutes to make each poster. How many posters can he make in 30 minutes?

$\frac{1 \text{ poster}}{6 \text{ min}} = \frac{?}{30 \text{ min}}$ $\frac{30 \text{ min}}{6 \text{ min/poster}} = 5$ posters

5 posters

$\text{min} \div \frac{\text{min}}{\text{poster}}$

$\frac{\text{min}}{1} \cdot \frac{\text{poster}}{\text{min}}$

A **ratio** is a comparison of two quantities. Fractions, decimals, and percents are ways to represent ratios. You can use the word "to," a colon, or a fraction to write a ratio.

These statements contain ratios.

For Kai, the ratio of posters to minutes is 8 to 40.

For Kai, the ratio of posters to minutes is 8 : 40.

For Kai, the ratio of posters to minutes is $\frac{8}{40}$.

A **rate** is a ratio that compares quantities measured in different units.

- rate of production: 4 posters in 80 minutes
- rate of speed: 10 miles in 2 hours

A **unit rate** is a rate for which one of the numbers being compared is 1 unit.

one

- rate of production: 20 minutes per poster
- rate of pay: $15 for 1 hour

Date: 10/30/18 Day 2 Calculating Unit Rates

**A.** Enrique drives the van for the animal shelter. He records the number of miles he drove and the amount of gasoline he purchased.

**1.** Copy and complete the table. Round to the nearest hundredth.

Find unit rates.

| Date | Miles Driven | Gallons of Gasoline Purchased | Miles/ Gallon |
|---|---|---|---|
| March 25 | 185 | 7.0 | 26.43 |
| March 29 | 213 | 7.8 | 27.31 |
| April 8 | 189 | 7.4 | 25.54 |
| April 14 | 139 | 6.9 | 20.14 |

$10 \div 2 = 5$

$10 \div \bigcirc = 5$

$10 \div 5 = \bigcirc$

**2.** When Enrique notices that the miles per gallon is low, he drives to the mechanic. When do you think he went to the mechanic?

April 14 → This is when his mpg is the lowest.

**B.** Enrique drives 368 miles at a rate of 25.92 miles per gallon. About how many gallons of gasoline did Enrique purchase?

$368\text{ mi} \div 25.92 \frac{\text{mi}}{\text{gal}}$

$\frac{368\text{ mi}}{1} \cdot \frac{1\text{ gal}}{25.92\text{ mi}} = \frac{368}{25.92} = 14.2\text{ gal}$ OR $14\text{ gal}$

**C.** The table shows the number of daily trips Enrique made for the 50 days he volunteered.

| Number of Daily Trips | |
|---|---|
| Number of Trips | Number of Days |
| 1 or 2 | 13 |
| 3 or 4 | 15 |
| 5 or 6 | 10 |
| 7 or 8 | 5 |
| 9 or 10 | 3 |
| > 10 | 4 |

13+15+10=38

5+3+4=12

**1.** Use a ratio to compare the number of days Enrique made 6 or fewer trips to the number of days he made more than 6 trips.

38:12

**2.** What can Enrique determine from this ratio?

For about every 3 days he makes 6 or fewer trips he has 1 day of making more than 6. He makes 6 or fewer trips on more days than more than 6.

**3.** Write ratios that compare the number of days for each to the total number of days.

| 1-2 | 3-4 | 5-6 | 7-8 | 9-10 | >10 |
|---|---|---|---|---|---|
| $\frac{13}{50}$ | $\frac{15}{50}$ | $\frac{10}{50}$ | $\frac{5}{50}$ | $\frac{3}{50}$ | $\frac{4}{50}$ |

$\frac{12}{50}$

**4.** Over the next 30 days of volunteering, about how many days can Enrique expect to make 7 or more trips?

5+3+4=12 so $\frac{12}{50} = \frac{x}{30} \cdot 30$

$x = \frac{12}{50}(30) = 7.2$

$\frac{30}{50} = .6$

$12(.6) = 7.2$

$\frac{50}{12} = 4.2$

$\frac{30}{4.2} = 7.2$

7 DAYS

**D.** Andre is in charge of purchasing pet supplies for the animal shelter.

$\frac{94.79}{40}$ = \$2.37 per collar

Pet Palace
Package of
40 for \$94.79

Dog Digs
Package of
50 for \$109.95

$\frac{109.95}{50}$ = \$2.20 per collar

$\frac{49.50}{25}$ = \$1.98 per collar

Happy Pet
Package of
25 for \$49.50

Just Dogs
Package of
12 for \$25.45

$\frac{25.45}{12}$ = \$2.12 per collar

**1.** How can you use unit price to find the store that sells the least expensive collar?

We can find the collar that is the least money per collar.

**2.** From which store do you think Andre should buy collars?

Happy Pet

**3.** If Andre is asked to buy at least 150 collars, what is the least amount of money he needs?

Happy Pet $\frac{150}{25}$ = 6 packages

$6(49.50) = \boxed{\$297}$

**E.** Andre is told to use \$185 to buy the greatest number of collars possible. If he can purchase complete packages from only one store, where should he go to buy the collars?

Just Dogs

$\frac{185}{94.79} = 1.951682667$ (40)

$\frac{185}{109.95} = 1.682582992$ (50)

$\frac{185}{49.50} = 3.737373737$ $3(25) = 75$

$\frac{185}{25.45} = 7.269155206$ $7(12) = 84$

The k is y value when x=1.

Date: 11/1/18 Day 3 Using Ratios and Writing Comparison Statements

Kai is responsible for feeding the animals at the shelter.

**A.** He makes a table to record the amount of food each dog gets.

| Dogs (x) | | (y) |
|---|---|---|
| Name | Weight (in pounds) | Food (in cups) |
| Beauty | 24 | 2 |
| Scruffy | 48 | 4 |
| Sport | 36 | 3 |
| Fifi | 12 | 1 |
| Honey | 60 | 5 |

2 possible ratios

$\frac{\text{weight}}{\text{food}}$

$\frac{\text{food}}{\text{weight}}$

**1.** Write ratios for Beauty, Scruffy, and Sport that compare the dog's weight to the amount of food that the dog receives.

Beauty: $\frac{24 \text{ lbs}}{2 \text{ c}} = \frac{12 \text{ lbs}}{1 \text{ c}}$

Scruffy: $\frac{48 \text{ lbs}}{4 \text{ c}} =$

Sport: $\frac{36 \text{ lbs}}{3 \text{ c}} =$

unit rate

12 lbs per c.

lbs/c

**2.** Compare the ratios and explain what the comparison tells you about how the dogs are fed.

The ratios are all equivalent. For every 12 lbs of weight, the dogs get fed 1 c of food.

**3.** Complete the table for Fifi and Honey.

**4.** Explain how to use a ratio to find the amount of food any new dog at the shelter should receive.

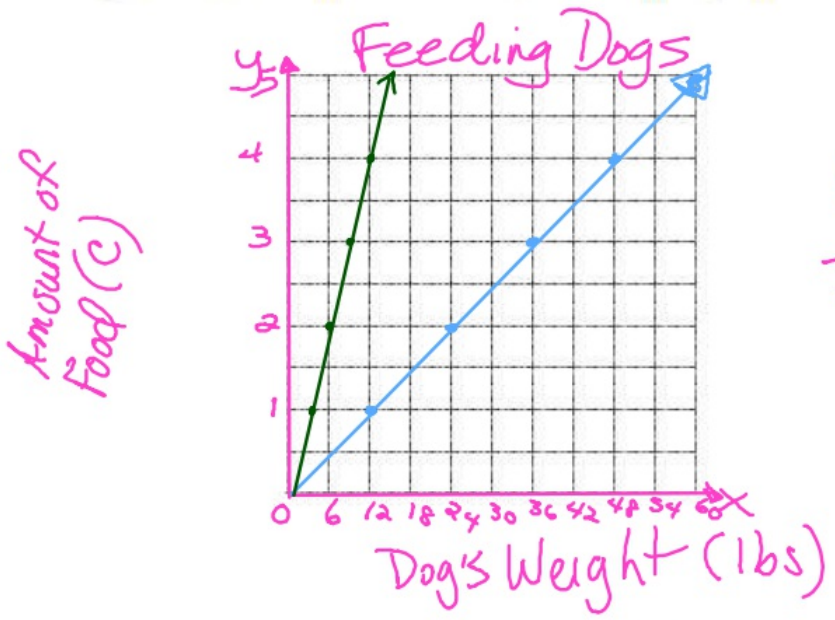
Ex 10 lbs $\frac{12}{1}$ Dogs Weight / 12 lbs/c.

$\frac{12 \text{ lb}}{1 \text{ c}} = \frac{\#\text{ lbs}}{x}$

Ex $\frac{30}{12} = 2.5$ c of food

**B.** Make a graph to show the feeding data.

**1.** Plot the pairs of values in the table on a coordinate plane.




7 Things Needed on Graph Before Plotting Points

- title
- x/y
- axes
- scale
- labels
- units
- arrows

**2.** Connect the points on the graph, and describe the shape that the data take. What does that shape tell you about the relationship between a dog's weight and the amount of food it receives?

This is a line.

Proportional relationship (0,0)

graph: always a line passing through origin

table: you can always multiply 1 variable by a set amount to get the other

$y = kx$

$k$ ↑ constant of proportionality

**3.** What $x$-value corresponds to a $y$-value of 0 on the graph? Would this pair of values be the same for any ratio table? Explain your answer.

When $x=0$ $y=0$
If the dog does not weigh anything, he gets no food.

**C.** Kai uses another table to record feeding data for the shelter's cats.

| Cats | | |
|---|---|---|
| **Name** | **Weight (in pounds)** | **Food (scoops)** |
| Star | 9 | 3 |
| Frisky | 6 | 2 |
| Patch | 12 | 4 |
| Whiskers | 3 | 1 |
| Blackie | 15 | 5 |

$\frac{9}{3} = 3$ lbs/scoop
$\frac{6}{2} = 3$
$\frac{12}{4} = 3$

**1.** Write ratios for Star, Frisky, and Patch to compare the cat's weight to the amount of food that the cat receives. ✓

**2.** Complete the table for Whiskers and Blackie.

**3.** Compare the ratios for the dogs and the cats. How would a graph of the values for the cats differ from the graph you made for the dogs?

Dogs: $\frac{12 \text{ lbs}}{1 \text{ c}}$ Cats: $\frac{3 \text{ lbs}}{1 \text{ scoop}}$

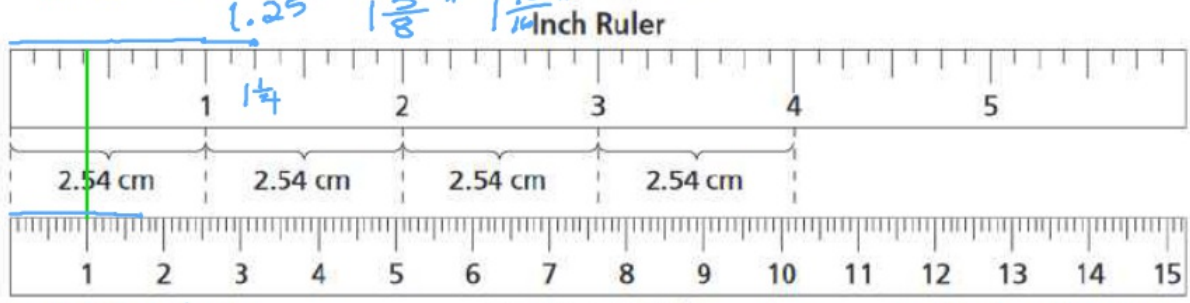
**D.** The shelter has a different food for older dogs. An older dog weighing 22 pounds gets 2 cups of the food, and an older dog weighing 55 pounds gets 5 cups of the food. Make a table showing the amounts of food to feed older dogs weighing 33 pounds, 44 pounds, and 77 pounds.

Date: 11/5/18 Day 4 Converting using unit rates

Comparing measurements is easy when they have the same unit. It's not difficult to tell that a $10\frac{1}{2}$-ounce can of juice contains less than a 12-ounce can. But when the units are different, comparing takes a bit more effort. You may need to change, or convert, one of the measurements so that both have the same unit.


**Getting Ready for Problem 1.4**

You can line up rulers to compare inches and centimeters.




Let I = #in
Let C = #cm

Centimeter Ruler #in · 2.54 = #cm

- What equation or formula could you use to convert inches to centimeters? C = 2.54I
- How would you calculate the number of centimeters in 9 inches? C = 2.54(9) = 22.86 cm
- What is a reasonable estimate for the number of inches in 1 centimeter?

$\frac{3}{8}$ in .375 in  C = 1 cm  $\frac{1}{2.54} = \frac{2.54I}{2.54}$  $I = \frac{1}{2.54}C = 0.3937007$ 87

.394 in

The large dog collars that the shelter buys from Cool Collars measure 18 in. long. Selena is shopping for longer collars for the dogs. A company called Dog Duds sells large dog collars that measure 40 cm long. Selena wants to know which collar is longer.

**A.** Selena decided to begin by converting the collars' dimensions.

**1.** Does it matter if she converts inches to centimeters or centimeters to inches? Explain.

If we want to compare lengths, we just need to make sure they're in the same units. (doesn't matter which)

**2.** Show how Selena can convert the length of the new collars to inches.

thousandth

$40\text{ cm} = c$

$c = 2.54\,I$

$\frac{40}{2.54} = \frac{2.54\,I}{2.54}$

$I = 15.748\text{ in}$

**B.** Selena found another store online, called Pretty Pooches, that sells large dog collars that measure 500 mm long. What unit conversions will Selena need to make to compare Pretty Pooches' collars to the others?

$\frac{500\text{ mm}}{10\text{ mm/cm}} = 50\text{ cm}$

$\frac{50}{2.54} = \frac{2.54\,I}{2.54}$

$19.685\text{ in.} = I$

**C.** List the collars in order of length from shortest to longest. Include the length of each store's collars in one system of units.

Cool Collars: 18 in

Dog Duds: 15.75 in $(15\frac{3}{4})$

Pretty Pooches: 19.685 in $(19\frac{5}{8})$

Dog Duds, Cool Collars, Pretty Pooches

$15\frac{3}{4}$ in, 18 in, $19\frac{5}{8}$ in

Date: 11/9/18 Day 6 Formulas

The amount of food a dog needs depends on its weight and how active it is.

**A.** Craig just adopted Ember, a dog who weighs 33 pounds and is moderately active. Craig plans to use this table to help him decide how much to feed Ember.

| Level of Activity | Food Calories Needed Each Day |
|---|---|
| Light activity | $60 \times m + 70$ |
| Moderate activity | $90 \times m + 70$ |
| Heavy activity | |

Value. Content. Power.
**1 cup provides 400 Calories.**
Feeding your dog the finest food providing the energy

$m$ = dog's mass in kilograms

**1.** The mass 1 kilogram corresponds to a weight of about 2.2 pounds. What is Ember's mass in kilograms?

$33 \div 2.2 = 15\text{kg}$

**2.** About how many cups of food should Craig give Ember each day?

Moderately Active

$90 \times m + 70$

$90 \times 15 + 70$

$1350 + 70$

1420 calories

$\frac{1420\text{cal}}{400} = 3.55\text{cups}$

$3.55 \approx 3.5\text{cups}$

**B.** Craig is thinking of getting another dog and wants to see how much food he will need to buy regularly if he gets one of the dog breeds shown in the table. Craig plans on taking his dogs on daily walks, which is classified as moderate activity.

| Breed | Weight (lb) | Calories Needed Each Day |
|---|---|---|
| Pomeranian | 5 | $90\left(\frac{5}{2.2}\right)+70 = 275$ cal |
| Dachshund | 24 | $90\left(\frac{24}{2.2}\right)+70 = 1052$ cal |
| Labrador retriever | 73 | $90\left(\frac{73}{2.2}\right)+70 = 3056$ cal |

1. Copy and complete the table.
2. Write a formula for the number of calories a moderately-active adult dog needs daily if it weighs $w$ pounds.

$90m+70$

$m=\frac{w}{2.2}$ $\quad 90\left(\frac{w}{2.2}\right)+70$ $\quad$ OR $\quad \frac{450}{11}w+70$

3. Why might a formula be more useful than a table?

A formula is more useful because

4. Use your formula to calculate the number of cups needed daily by each dog breed.

Date: 11/13/18 Day 8

Learning Target: I can use proportional reasoning and an equation to calculate the percent of a number.

100% is the whole.

## Concept Review: Percents

Percent - how much out of 100

$23\% = \frac{23}{100}$ $5\% = \frac{5}{100}$ $102\% = \frac{102}{100}$

## Finding the Percent of a Number

| Using a Proportion | Using an Equation |
|---|---|
| 18% of 30 | 18% of 30 |
| $\frac{18}{100} = \frac{n}{30}$ (30 · ... · 30) | $\frac{18}{100} \cdot 30 = n$ |
| $n = \frac{18}{100}(30) = 5.4$ | $0.18 \cdot 30 = n$ |
| | $5.4 = n$ |

## Practice

| Using a Proportion | Using an Equation |
|---|---|
| 8% of 48 | 8% of 48 |
| $\frac{8}{100} = \frac{x}{48}$ | $.08(48) = 3.84$ |
| $100x = 8(48)$ | |
| $\frac{100x}{100} = \frac{384}{100}$ | |
| $x = 3.84$ | |

## Try It Out

12% of 90

$\frac{12}{100}(90) = 10.8$

72% of 200

$.72(200) = 144$

Learning Target: I can use percents to calculate a discount and sale price

## Vocabulary

Discount Rate - percentage off

Discount - dollar amount being taken off

Sale Price - marked price − discount

A store that sells video games gives a 15% discount for customers who trade in a used game. Alex brought a game to trade, and bought a game that costs $29.99. How much will the game cost (before tax)?

100 − 15 = 85%

.85(29.99) = $25.49

| Finding the Discount | Finding the Sale Price |
|---|---|
| .15(29.99) = 4.4985 ≈ $4.50 | 29.99 − 4.50 = $25.49 |

## Practice Together

Jane is buying a tablet. The original price is $79. It is on sale for 10% off. Calculate the discount and sale price.

| Discount | Sale Price |
|---|---|
| .10(79) = $7.90 | 79 − 7.90 = $71.10 |

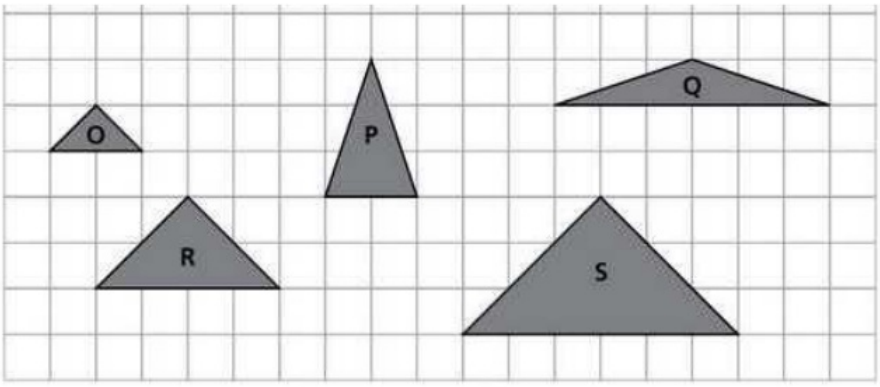
## Independent Practice

After Halloween, pumpkins were 25% off. Amy bought 2 big pumpkins that were originally $7 each. How much did she spend (before tax)?

7(2) = $14

100 − 25 = 75%

.75(14) = $10.50




B) 1) Which pairs of triangles are similar? Explain.

2) Find the areas and dimensions of the similar triangles.

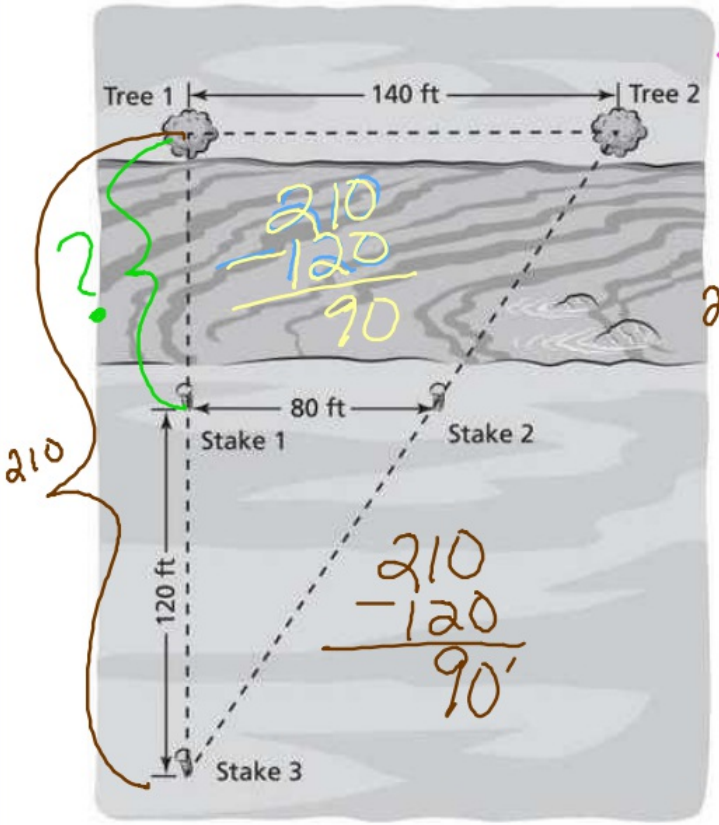
3) How does the scale factor affect the relationship between the dimensions of the similar triangles?

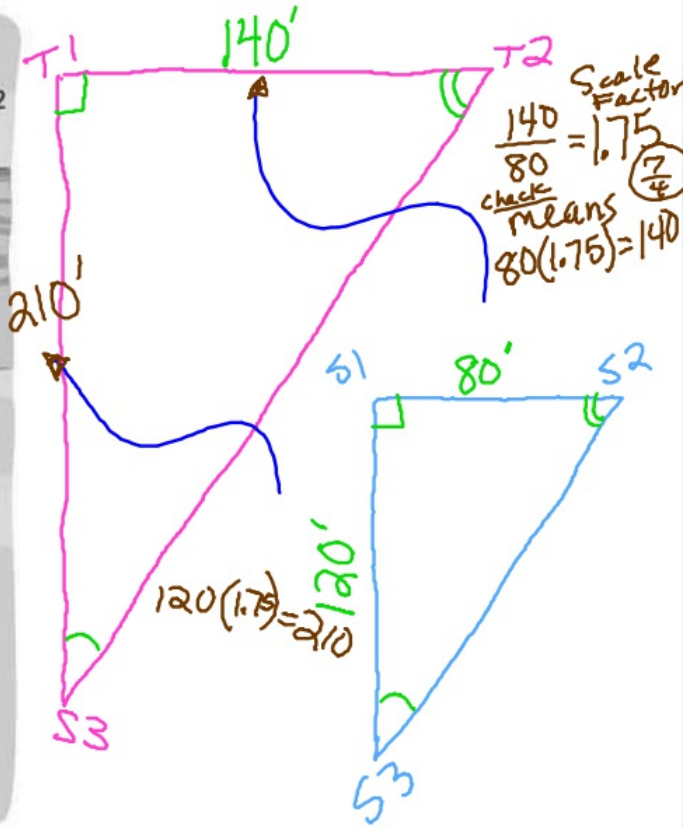
4) How does the scale factor affect the relationship between the areas of the similar triangles?

C)

Date: 10/10/18 Day 7 Inv 3.4 **Nested Triangles**

2 △'s are ~ if corresponding angles are ≅.




A) What is the distance across the river from stake 1 to tree 1?

Let x = distance from S3 to T1

$$\frac{80}{140} = \frac{120}{x}$$

$$120 \cdot \frac{140}{80} = \frac{x}{120} \cdot 120$$

$$120\left(\frac{140}{80}\right) = x$$

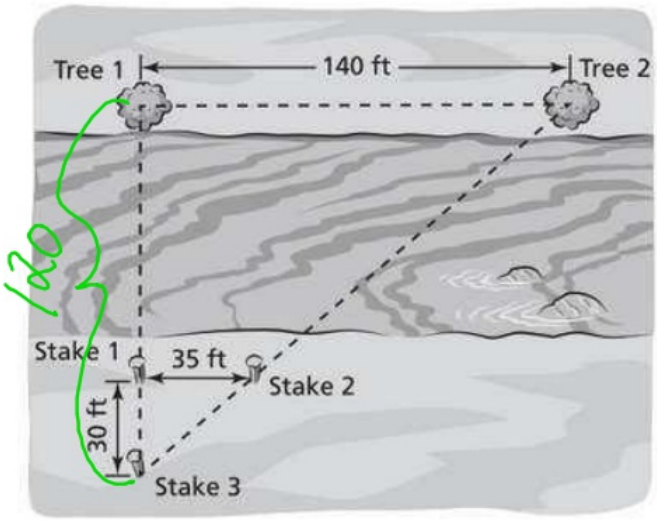
$$x = 210$$

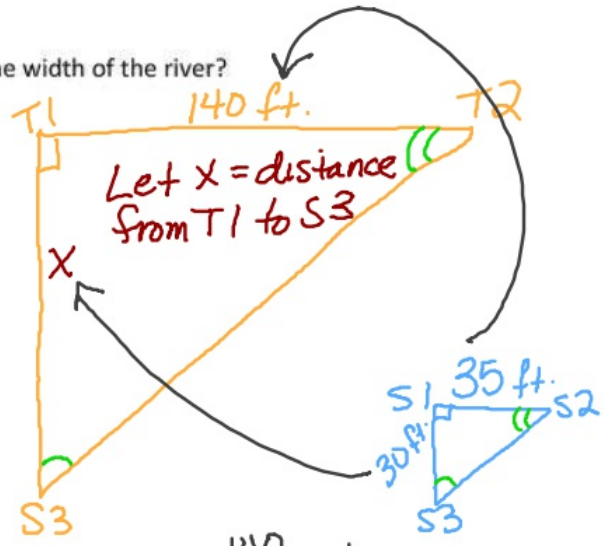
The distance across the river is 90 ft.

B) What is the relationship between the perimeter of the smaller triangle and the perimeter of the larger triangle.

The perimeter of larger △ is 1.75 times larger than the perimeter of the smaller △.

D) Does the second group get the same measurement for the width of the river?




Scale Factor $= \frac{140}{35} = 4$

So $30(4) = 120$ ft.

$30 \cdot \frac{140}{35} = \frac{x}{30} \cdot 30$

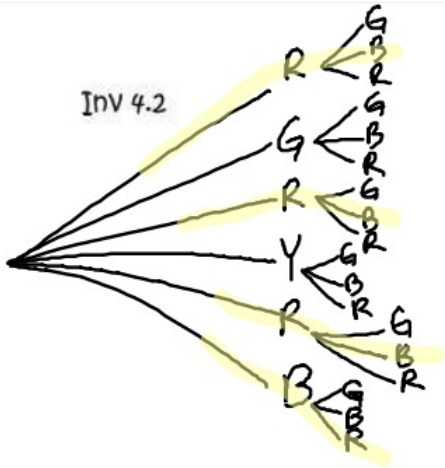
$x = \left(\frac{140}{35}\right)(30) = 120$ ft.

$120 - 30 = 90$ ft.

***Read pp. 80-81 before class tomorrow.***

Date 3/8/19 Day 10 Inv 4.2

A) Results:




$\frac{4}{18}$

~~Experimental probability~~

B) Construct an area model

Spinner 1

| | G | R | B |
|---|---|---|---|
| R | G R | R R | B R |
| G | G G | R G | B G |
| R | G R | R R | B R |
| Y | G Y | R Y | B Y |
| R | G R | R R | B R |
| B | G B | R B | B B |

What is the theoretical probability that a player will make purple? $P(\text{purple}) = \frac{4}{18}$

Construct a tree diagram to represent the spinners:

What is the theoretical probability that a player will make purple?