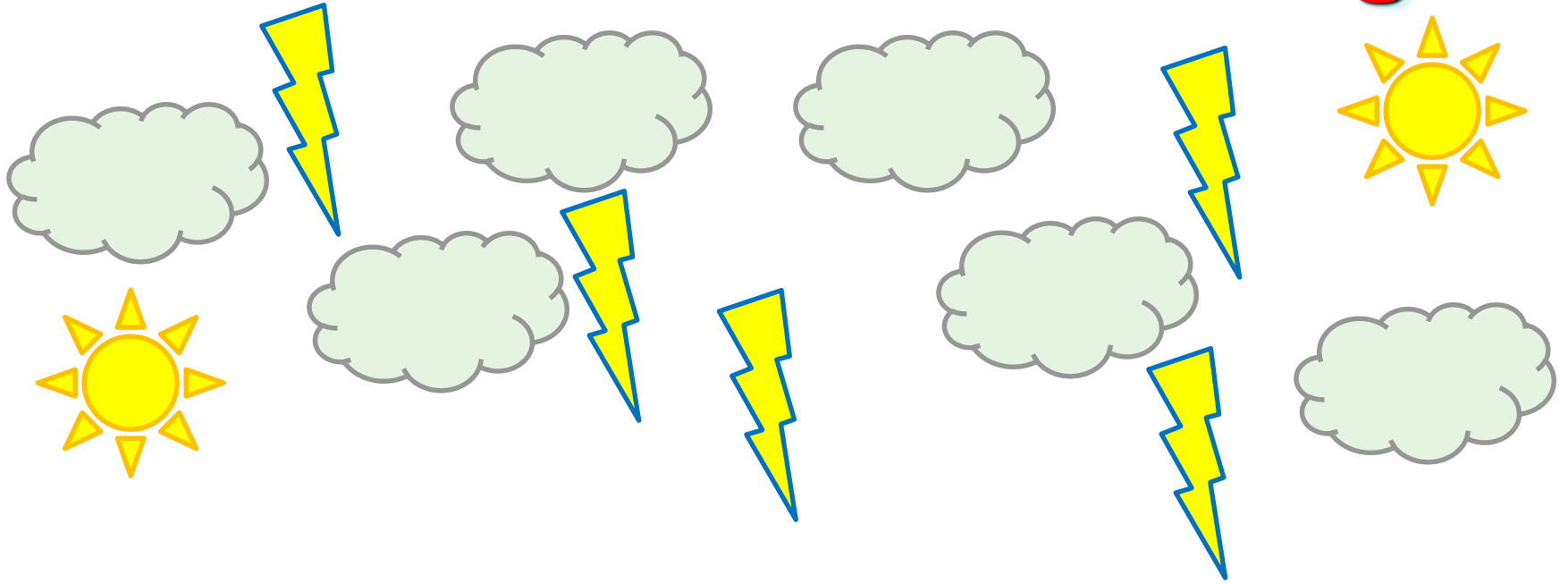# Proportions Review

What are ratios?

A ratio is a comparison between two or more things.

What is the ratio of stars to moons? Write this 3 different ways.

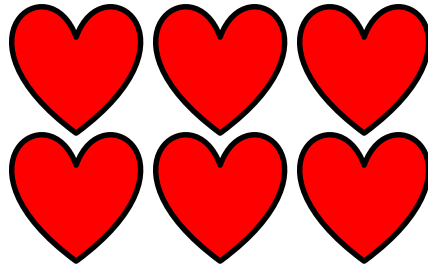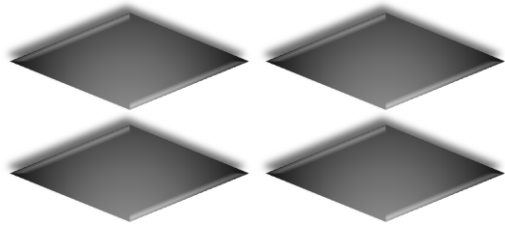**IN RATIOS, YOU ARE TO LEAVE ANY RATIOS "IMPROPER".**

Ratios with more than 2 things

What is the ratio of clouds, lightning bolts, and suns?

Simplifying Ratios

Ratios can act like fractions because they can be simplified like fractions.

To simplify a ratio, write it like a fraction and then simplify.

Converting Units Before Simplifying

When you have ratios that can be converted from one to the other…CONVERT AND THEN SIMPLIFY!

4) $2 hours : 10 min$

5) $8 in : 4 ft$

What are rates?

A rate is a ratio comparing two different things.

$$\frac{15\,miles}{1\,hour}$$

$$8\,dogs : 7\,cats$$

$$17\,girls\,to\,12\,boys$$

If you are comparing the same thing, it's a ratio but not a rate.

$$\frac{3\,\mathbf{min}}{15\,\mathbf{min}}$$

$$5\,cows : 7\,cows$$

UNIT RATE

A unit rate is a rate with a denominator of 1.
You use this to find how much you get for 1 thing.

Example 1
You are traveling 20 miles per hour for 4 hours. What is your unit rate?

$$\frac{20\,miles}{4\,hours}$$

Example 2
You paid $9.00 for 6 doughnuts. What is the unit rate for a doughnut?

$$\frac{\$9.00}{6\,doughnuts}$$

Important Formula:

$$\text{Average rate} = \frac{\text{Distance}}{\text{Time}}$$

Example 3

A skater took 2 minutes 30 seconds to complete a 1500 meter race. What was the skater's average speed?

Average speed = ————

Comparing Unit Rates

Example 4

A store sells the same pasta in two ways: 10 pounds of bulk pasta for $15.00 or 2 pounds for packaged pasta for $3.98. Which one is the better buy? (Which one is cheaper for the unit rate?)

$$\frac{\$15.00}{10\,lbs} \qquad\qquad \frac{\$3.98}{2\,lbs}$$

What are Proportions?

Proportions are EQUAL RATIOS

$$\frac{3}{5} = \frac{6}{10}$$

"3 is to 5 as 6 is to 10"

Using Cross Products to Solve Proportions

8) $\dfrac{x}{25} = \dfrac{6}{10}$

Using Cross Products to Solve Proportions

9) $\dfrac{3x+1}{5} = \dfrac{x}{2}$

Using Cross Products to Solve Proportions

10) $$\frac{x-5}{12} = \frac{x+2}{5}$$

Writing Proportions

Example 11

Jim bought 8 tacos for $4. Unfortunately, he was still hungry. So, he bought 6 more tacos. How much did he pay for the 6 tacos?
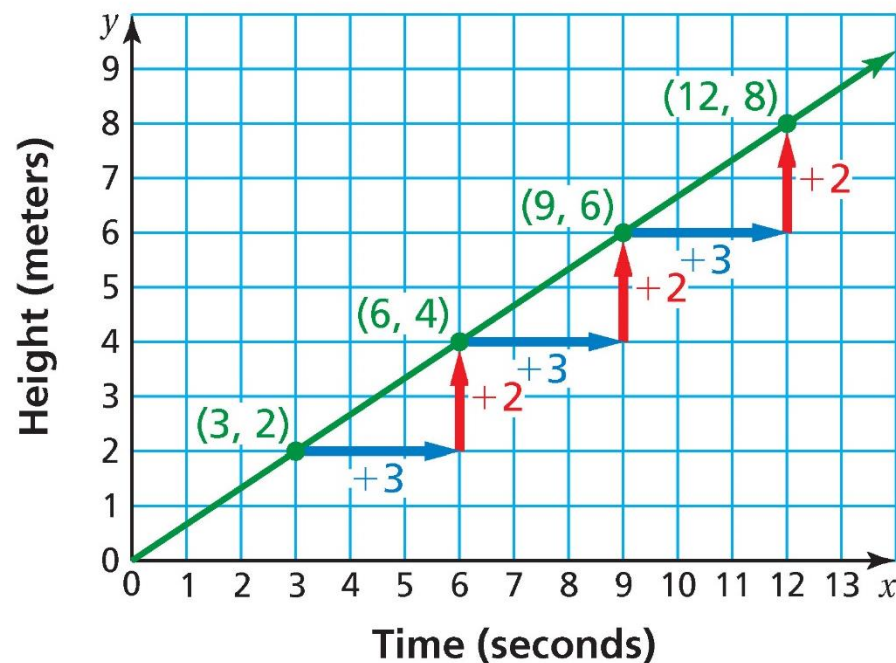
Writing Proportions

Example 12

A person who weighs 105 pounds on Earth would weigh about 17.5 on the moon. About how much would a 60 pound dog weigh on the moon?

Proportional Relationships

Recall that you can graph the values from a ratio table.

Time, x (seconds)	Height, y (meters)
3	2
6	4
9	6
12	8

+ 3 (between x rows)   + 2 (between y rows)

The structure in the ratio table shows why the graph has a constant *rate of change*. You can use the constant rate of change to show that the graph passes through the origin. The graph of every proportional relationship is a line through the origin.
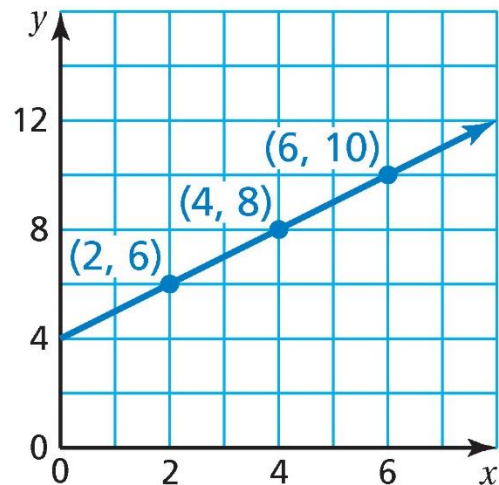
Proportional Relationships

Use a graph to tell whether x and y are in a proportional relationship.

a.

x	2	4	6
y	6	8	10

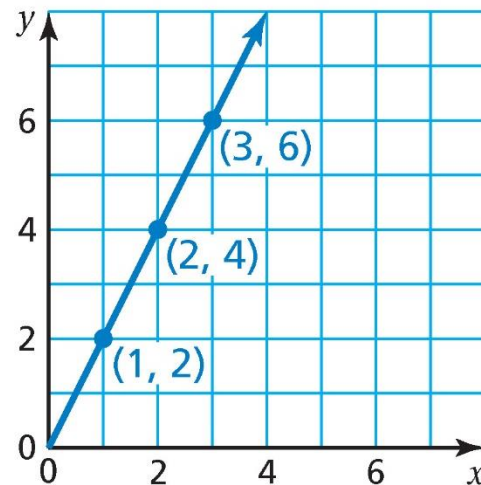Plot (2, 6), (4, 8), and (6, 10).
Draw a line through the points.

The graph is a line that does not pass through the origin.

⋮ So, x and y are not in a proportional relationship.

b.

x	1	2	3
y	2	4	6

Plot (1, 2), (2, 4), and (3, 6).
Draw a line through the points.

The graph is a line that passes through the origin.

⋮ So, x and y are in a proportional relationship.