Ratio: comparison of two quantities

We can compare ratios in multiple ways.

In Problem 2.1 we compared the two tables with pizza on them and wanted to find at which table you would get more pizza.

	Large Table		Small Table	
Pizza / People	4 / 10	32 / 80	3 / 8	30 / 80

- In this case, we scaled both ratios to have the same amount of people. If we have the same amount of people we want more pizza to share. So the large table would get more pizza.

	Large Table		Small Table	
People / Pizza	10 / 4	2.5 people per pizza	8 / 3	2.6 people per pizza

- Here we have found how many people would share one pizza. The less people, the more each person will get. So the large table would get more pizza.

Rate: a comparison of two quantities measured in different units.

Ex. $5.50 per hour
8.5 kilometers per hour
8 sandwiches for 3 people

The word "per" loosely translates to mean "for each".
60 miles per hour = 60 miles for each hour

Rate table: table used to find and organize equivalent rates

x		4	8		24
y	3		12	24	

ALL ratios should be equal! REDUCE the given ratio first, then use that to fill in the rest.

<u>Unit rate</u>: rate in which the second quantity is 1 unit.

Ex. 3 slices per person
Price per person
Concentrate per 1 can water

To find a unit rate, we divide one quantity by another.

In Problem 2.3, we were given the rate 10 oranges costs $2. Find the unit rates involved.

$$\frac{10\ oranges}{\$2} = \frac{5\ oranges}{\$1} \qquad \frac{\$2}{10\ oranges} = \frac{\$0.20}{1\ orange}$$

5 oranges per dollar — $0.20 per orange

** Notice the thing we're dividing by is what becomes the 1 quantity.**

Unit rates are useful because it makes finding other values easier. If we know how much one orange costs, we can quickly find the cost of any number of oranges.

Typically unit rates are used in unit prices.

Ex. 1: If a 24 pack of soda costs $5.99, what is the unit price (cost for one soda)?

$$\frac{\$5.99}{24\ sodas} = \frac{\$0.25}{1\ soda}$$

With money, we always round to 2 decimal places

Ex. 2: At this rate, how much would 36 sodas cost?

0.25 * 36 = $9.00

Because we know 1 soda is $0.25, we can multiply this unit rate by 36 to get the cost of 36 sodas.

In Problem 2.2, we found that the price for $\boldsymbol{n}$ pizzas at Howdy's is $\boldsymbol{C = 13n}$. This situation represents a proportional relationship.

Proportional relationship: relationship where one variable is multiplied by a constant number to get the value of the other variable.

Constant of proportionality: the constant multiplier in a proportional relationship.

Ex. For Howdy's pizza we multiplied by 13. So 13 in $\boldsymbol{C = 13n}$.

When we added a delivery charge of $5, the relationship was no longer proportional. 13 is no longer a constant of proportionality, it is just a rate!

How do we know something is proportional?

- When one variable doubles, triples, halves, etc, the other variable does the same.
- All ratios are equal.
- If you make the ratio $\frac{y}{x}$ for any pair of variables, you get a **constant rate** (which is called the ***constant of proportionality***)

Proportional:

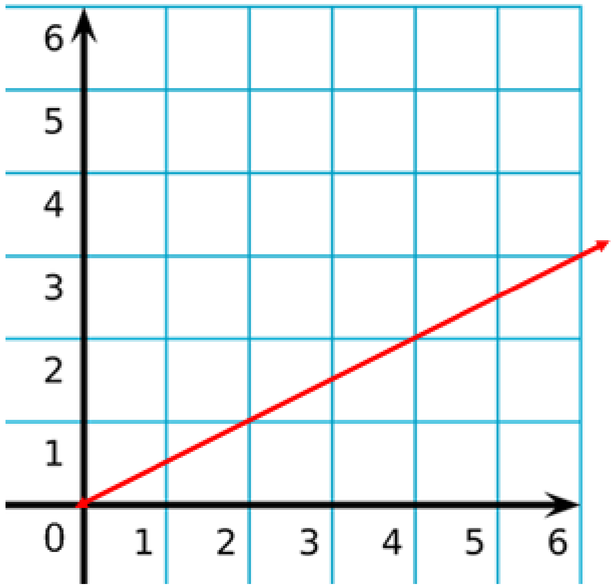
Number of Guests	2	4	6	8
Cookies	4	8	12	16

Non- Proportional:

Days	1	3	5	6
Pages Read	100	300	550	600

- Nothing added or subtracted in the **equation**.
  - Proportional: c = 13n 13 is C of P and rate
  - Non-proportional: c = 13n + 5 13 is just rate
- Must have a constant rate of change (the graph is a line).
- Graph goes through the origin. It passes through (0,0).
- When x = 1, y is the constant of proportionality and the rate.

Proportional:



Non- Proportional