Ratio and proportion

What is a ratio

A ratio is a comparison of two numbers

Ratios can be shown in different ways. Using the ":" to separate example values, or as a single number by dividing one value by the total.

Example: if there is 1 boy and 3 girls you could write the ratio as:

1:3 (for every one boy there are 3 girls)

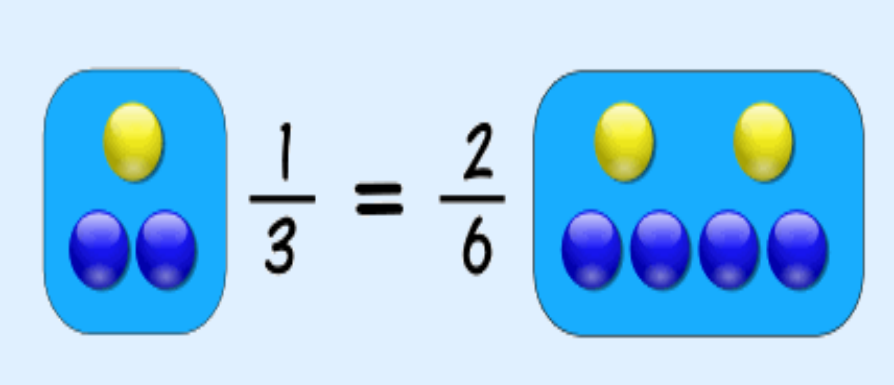
1/4 are boys and 3/4 are girls

0.25 are boys (by dividing 1 by 4)

25% are boys (0.25 as a percentage)

What is a proportion

Two equal ratios form a proportion



A percent is actually a ratio! Saying "25%" is actually saying "25 per 100":

$$25\% = \frac{25}{100}$$

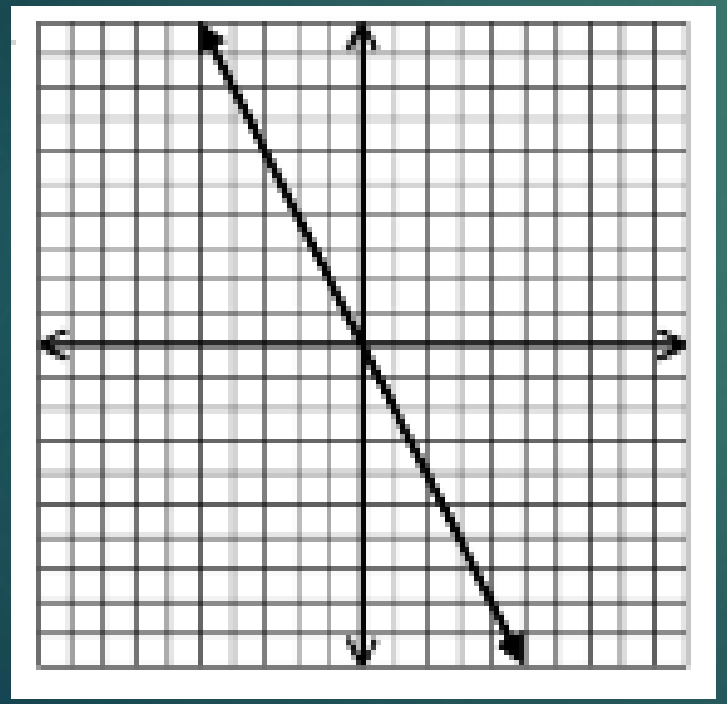
We can use proportions to solve questions involving percents.

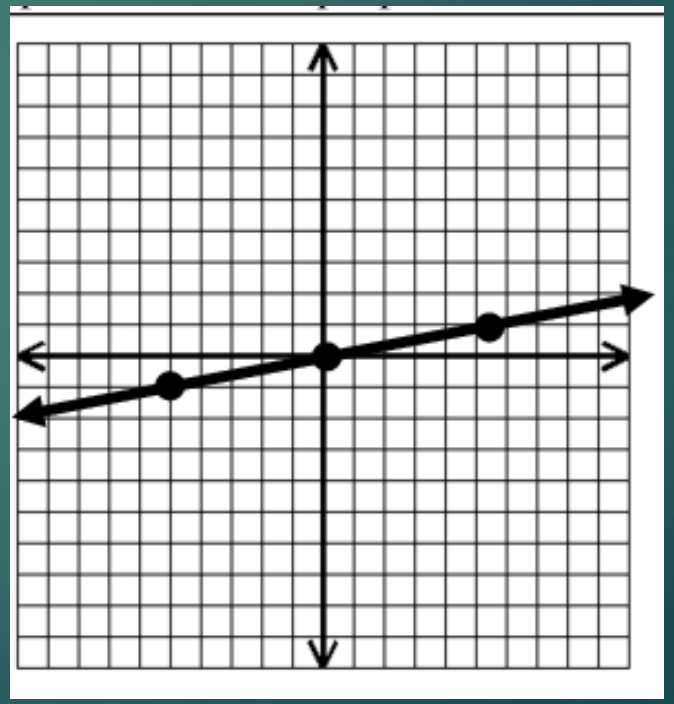
First, put what we know into this form:

$$\frac{\text{Part}}{\text{Whole}} = \frac{\text{Percent}}{100}$$

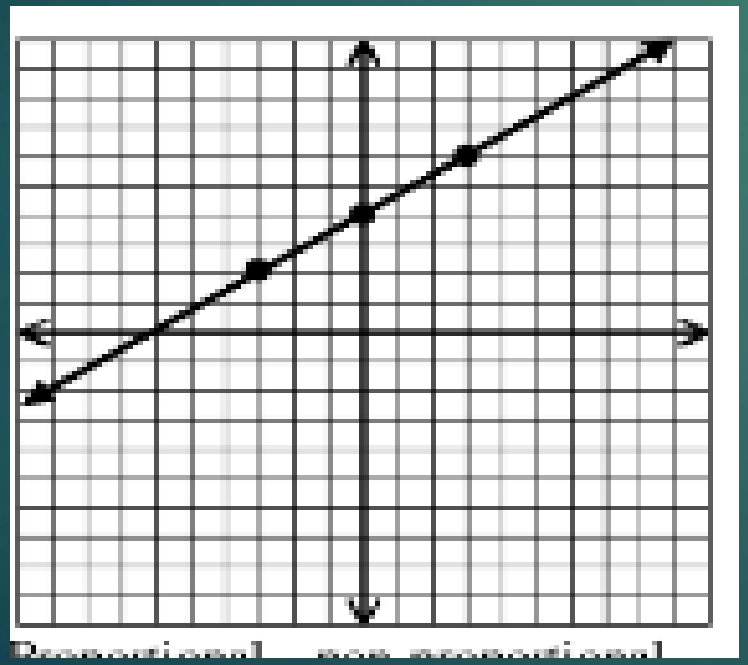

Proportional Relationship
x y
1 3
2 6
9 27
a b
1 3
2 6
PROPORTIONAL
RELATIONSHIPS
INTRO
KHANACADEMY

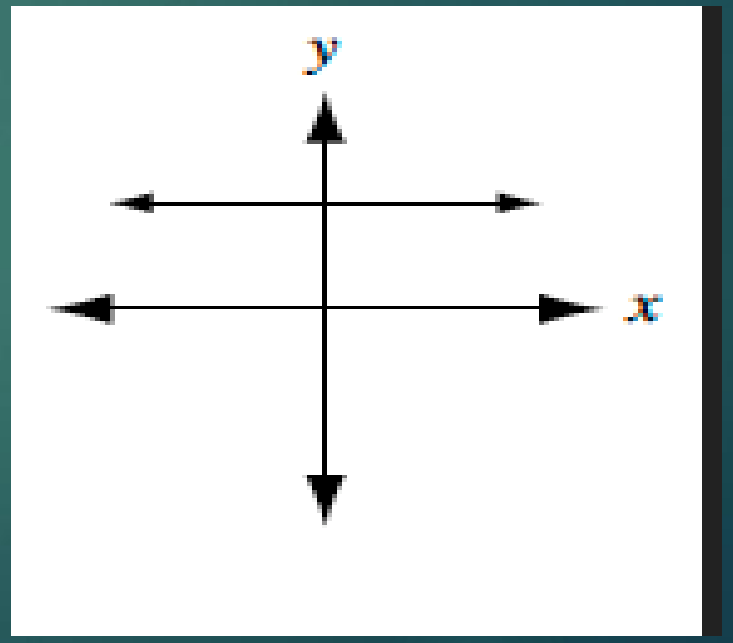
The graph of a **proportional** relationship will pass through the origin **(0, 0)**





The graph of a **non-proportional** relationship will not pass through the origin





Proportional

Time (min.)	Distance (ft.)
0	0
2	6
4	12
6	18

$$\frac{2}{6} = \frac{6}{18}$$

Ratios are equivalent.

Non-Proportional

Time (min.)	Distance (ft.)
0	4
2	10
4	16
6	22

$$\frac{1}{5} \quad \frac{2}{10} = \frac{6}{22} \quad \frac{3}{11}$$

Ratios are not equivalent.

How can I use my knowledge of Proportion to solve a Word Problem

The scale on a blueprint for the height of a house is 2 inches for 5 feet. If the roof on the blue print is 8.5 inches, write a proportion for the height of the house.

http://www.virtualnerd.com/pre-algebra/ratios-proportions/proportion-word-problem-set-up.php

We can use proportions to solve questions involving percents.

First, put what we know into this form:

$$\frac{\text{Part}}{\text{Whole}} = \frac{\text{Percent}}{100}$$

Example: what is 25% of 160 ?

The percent is 25, the whole is 160, and we want to find the "part":

$$\frac{\text{Part}}{160} = \frac{25}{100}$$

Example: what is 25% of 160 (continued) ?

$$\frac{\text{Part}}{160} = \frac{25}{100}$$

Multiply across the known corners, then divide by the third number:

$$\text{Part} = (160 \times 25) / 100 = 4000 / 100 = \mathbf{40}$$

Answer: 25% of 160 is 40.

Example: what is $12 as a percent of $80 ?

Fill in what we know:

$$\frac{\$12}{\$80} = \frac{\text{Percent}}{100}$$

Multiply across the known corners, then divide by the third number. This time the known corners are top left and bottom right:

$$\text{Percent} = (\$12 \times 100) / \$80 = 1200 / 80 = \mathbf{15\%}$$

Answer: $12 is **15%** of $80

Example: The sale price of a phone was $150, which was only 80% of normal price. What was the normal price?

Fill in what we know:

$$\frac{\$150}{\text{Whole}} = \frac{80}{100}$$

Multiply across the known corners, then divide by the third number:

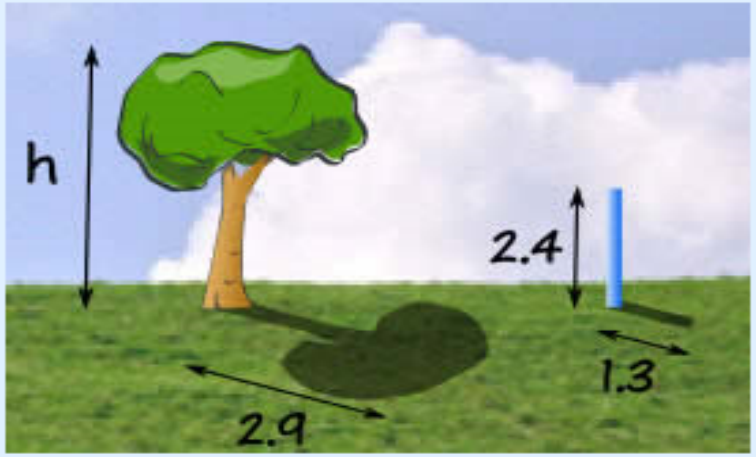
$$\text{Whole} = (\$150 \times 100) / 80 = 15000 / 80 = \mathbf{187.50}$$

Answer: the phone's normal price was **$187.50**

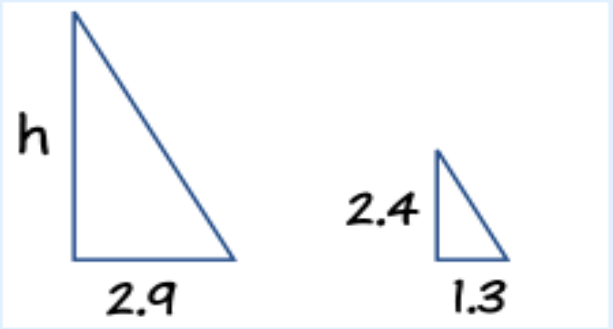
Sam tried using a ladder, tape measure, ropes and various other things, but still couldn't work out how tall the tree was.

But then Sam has a clever idea ... similar triangles!

Sam measures a stick and its shadow (in meters), and also the shadow of the tree, and this is what he gets:



Now Sam makes a sketch of the triangles, and writes down the "Height to Length" ratio for both triangles:



$$\frac{\text{Height:}}{\text{Shadow Length:}} \qquad \frac{h}{2.9\text{ m}} = \frac{2.4\text{ m}}{1.3\text{ m}}$$

Multiply across the known corners, then divide by the third number:

$$h = (2.9 \times 2.4) / 1.3 = 6.96 / 1.3 = \mathbf{5.4\ m} \text{ (to nearest 0.1)}$$

Answer: the tree is 5.4 m tall.


So What's the Ratio?
A song about ratios and proportions