Introducing ratios

⭐ By the end of the lesson I would hope that you have an understanding and be able to apply to questions the following concepts:

- Understand what a ratio is
- Understand the order of a ratio is important
- Understand the link between ratios and the unitary method
- Be able to write equivalent ratios

RECAP

This is the next lesson in the series dealing with Real Numbers at a Year 8 level.
Having looked at Fractions/Decimals/Percentage and now circles we move onto a different (but the same) concept.

Remember the work we did on the unitary method ...

LAUNDRY DETERGENT	$7.62
2.5 L	
$3.05 per 1 L	

LAUNDRY DETERGENT	$5.74
1.5 L	
$3.83 per 1 L	

Unit price   Unit price

$$L = S$$
$$2.5 = 7.62 \quad \div 2.5$$
$$\div 2.5 \qquad$$
$$1 = 3.05$$

When we wrote the working out, we were actually expressing it as a ratio.
We can interchange the "=" and another symbol for ratios.
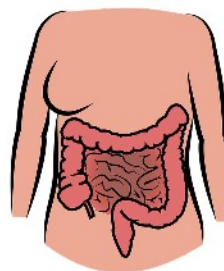
The colon

And I don't mean the colon in the human body!!!

There are many times I wish I was an English teacher.

I have many times sat and wondered at the correct use of the colon sign, ":"
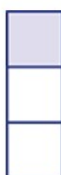
I also wonder at the correct usage of the semi-colon ";"

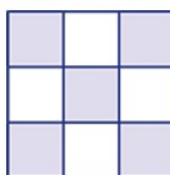I also wonder when the word "Fruits" became acceptable English!!!!

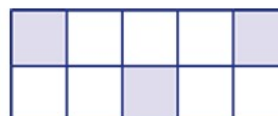The colon in mathematics, means a ratio is being expressed.
How could we describe the ratio of shaded and unshaded boxes in the following shapes?

Shaded : unshaded
1 : 2

Shaded : unshaded
5 : 4

Shaded : unshaded
3 : 7

Shaded : unshaded
$$1 : 2$$

Shaded : unshaded
$$5 : 4$$

Shaded : unshaded
$$3 : 7$$

The most important thing in the sentence above is the order of the wording.

How could we describe the ratio of **shaded** and **unshaded** boxes in the following shapes?

This tells you the order of the ratios which must be expressed.

Ratios and Fractions

Ratios are, really, fractions. Just expressed in a different way.

If we look at the above shapes, we can compare the ratios and fractions for each shape
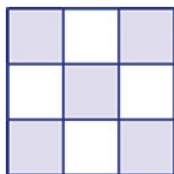
Shaded : unshaded

$$1 : 2$$

Shaded   unshaded
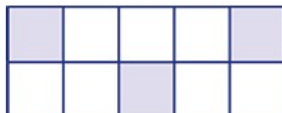
$$\frac{1}{3} : \frac{2}{3}$$

Shaded : unsh

$$5 : 4$$

Sh : unsh

$$\frac{5}{9} : \frac{4}{9}$$
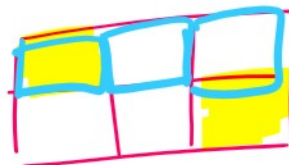
Sh : unsh

$$3 : 7$$

Sh : unsh

$$\frac{3}{10} : \frac{7}{10}$$

Sh : un

$$1 : 2$$

Can you see the link?

Ratios, like fractions, can be simplified and given as equivalent

Recap: Equivalent fractions

We know that equivalent means **the same**.

The following fractions are equivalent.
We simply multiplied the numerator and denominator by the same number.

×2

$$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10} = \frac{10}{20}$$

$$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10} = \frac{10}{20}$$

×2

Recap: Simplifying fractions

We know that we need to simplify fractions whenever we can.
We simplify by dividing the numerator and denominator by a number (the same number).

$$\frac{10}{20} = \frac{5}{10} = \frac{1}{2}$$

÷2   ÷5

÷2   ÷5

$$\frac{10}{20} = \frac{1}{2}$$

÷10

÷10

Ratios can also be equivalent and simplified.

If I'm baking a cake, the recipe might look like the following:

Classic butter cake

INGREDIENTS

☐ 250g butter, softened, chopped

☐ 1 cup (220g) caster sugar

☐ 1 teaspoon vanilla bean paste

☐ 3 Coles Australian Free Range Eggs, at room temperature

☐ 2 cups (300g) self-raising flour

☐ 1/2 cup (125ml) milk

☐ Coles Rainbow Confetti sprinkles, to decorate

VANILLA BUTTERCREAM

☐ 190g butter, softened

☐ 2 1/4 cups (360g) icing sugar mixture

☐ 2 tablespoons milk

☐ 1 teaspoon vanilla bean paste

☐ Pink liquid food colouring

Butter : Cakes

250g : 1

×10

×10

2500g : 10

What if I wanted to make 2 cakes, 3 cakes, 7 cakes?

Then I would be using Maths and equivalent ratios to find out how much of each ingredient I would need

Examples
The following examples are taken, with permission, from the Cambridge Essentials Year 8 Textbook

A sample of mixed nuts contains 5 cashews, 12 peanuts and 2 macadamia nuts. Write down:

- the ratio of cashews to peanuts to macadamias
- the ratio of cashews to the total number of nuts
- the ratio of peanuts to other nuts

REMEMBER: The order of the ratios is really important!

$$1 : 2 : 6$$

$$1 : 10 : 15 : 20 : 16$$
$$\times 2$$
$$2 : 20 : 30 : 40 : 32$$

- cash : pea : maca
  5 : 12 : 2

- cash : total
  5 : 19

- pea : nuts
  12 : 7

Complete each pair of equivalent ratios.

- $4 : 9 = 16 : ??$
- $30 : 15 = ?? : 5$

$$4 : 9$$
$$\times 4 \qquad \times 4$$
$$16 : \underline{36}$$

$$30 : 15$$
$$\div 3 \qquad \div 3$$
$$\underline{10} : 5$$