

### Adding and subtracting fractions

You must have a common denominator.  
A common denominator can be found by choosing the LCM of the two numbers.  
Multiply the numerator by the same as the denominator before adding the fractions.

$$\begin{array}{l} \frac{1}{8} + \frac{2}{3} \\ \text{Rewrite with common denominator} \quad 3 \times \frac{1}{8} + \frac{2}{3} \times \frac{3}{8} \\ \text{Add the numerators} \quad \frac{3}{24} + \frac{16}{24} \\ \frac{19}{24} \end{array}$$

### Multiplying fractions

The easiest operation with fractions.

- 1) Multiply the numerators
- 2) Multiply the denominators
- 3) Simplify

$$\frac{1}{4} \times \frac{2}{3} = \frac{1 \times 2}{4 \times 3} = \frac{2}{12} = \text{reduces to } \frac{1}{6}$$

### Dividing fractions

Keep the first fraction the same.  
Change the divide for a multiply  
Flip the second fraction upside down.  
Now multiply the fractions together.

$$\begin{array}{c} \frac{3}{4} \div \frac{2}{7} \\ \swarrow \quad \downarrow \quad \searrow \\ \text{Keep} \quad \text{Change} \quad \text{Flip} \\ \frac{3}{4} \quad \times \quad \frac{7}{2} = \frac{21}{8} \end{array}$$

## Year 9 Higher Topic 4

### Topic title: Fractions, Ratio and Percentages

#### Reciprocal of a number

The reciprocal of a number is 1 divided by the number.

Examples:

Reciprocal of 7 is  $\frac{1}{7}$

Reciprocal of 3 is  $\frac{1}{3}$

Reciprocal of  $\frac{3}{4}$  is  $\frac{4}{3}$

Reciprocal of  $\frac{5}{2}$  is  $\frac{2}{5}$

#### Compound interest

The amount of interest changes with compound interest.

Formula :

Original amount  $\times$  multiplier<sup>number of years</sup>

Example:

Luke leaves £3000 in the bank for 2 years.  
It earns 2% compound interest per annum.  
Calculate the total amount Luke has in the bank at the end of the two years.

$$3000 \times 1.02^2 = £3132.20$$

This can also be used for depreciation. You simply subtract the percentage from 100 like decreasing percentages.

#### Ratio of an amount

Divide an amount in a given ratio.

Share £280 in the ratio 5:2

Add up the parts of the ratio  $5+2 = 7$

Share the amount by the total number of ratio parts.  $£280 \div 7 = £40$

This is equivalent to one part of the ratio. We now multiply it by each part.

$$£40 \times 5 = £200$$

$$£40 \times 2 = £80$$

#### Problem solving involving ratios

Ratios can be applied to many situations.  
When faced with problem solving you need to use your varied knowledge to apply a ratio in the right way.

Examples:

According to Charlie perfect cherry pies have a ratio of 240 cherries to 3 pies.  
How many cherries will Charlie need to make 9 pies?

Ratio's always increase in the same proportion so as 9 is a multiple of three we can multiply both parts by 3.

$$\begin{array}{l} 240 : 3 \\ ? : 9 \end{array}$$

$240 \times 3 = 720$  so it's 720 cherries needed.

#### Increasing and decreasing by a percentage

Use the multiplier method.

Add or subtract the percentage to 100 then divide by 100 to get a decimal. Finally multiply by the original amount.

Example:

Increase £120 by 35%

$$100+35 = 135\%$$

$$135 \div 100 = 1.35$$

#### Simplifying a ratio

Divide all parts of the ratio by the same number until you cannot divide any more.  
Sometimes this takes a while sometimes is very quick.

Examples:

$$\begin{array}{ll} 40:30 & 25:55:75 \\ 4:3 & 5:11:15 \end{array}$$

#### Direct proportion

Direct proportion means things increase at the same rate.

Example:

The amount of money Megan earns (M) is directly proportional to the amount of hours (h) she works.

After working 9.5 hours she earns £155.80  
How many hours does she have to work to earn £688.80?

$M \propto h$   $\propto$  means directly proportional

$M = kh$  replace  $\propto$  with  $k$ —a constant

$$155.80 = k \times 9.5$$

$$k = 16.40$$

$$688.80 = 16.4 \times h \quad h = 42 \text{ hours}$$