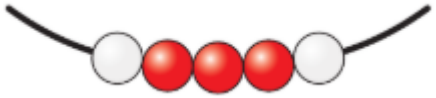
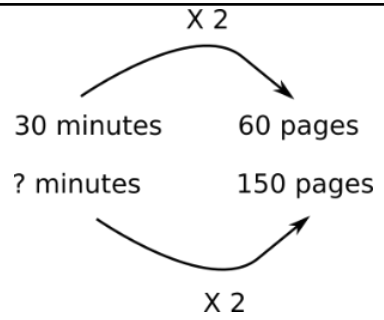
GCSE Mathematics – Unit 11: Ratio and Proportion **Name:……**

Topic/Skill	Definition/Tips	Example	Your Turn
1. Ratio	Ratio compares the size of **one part** to **another part**. Written using the ':' symbol. The numbers have to be in the **same order** as the parts are written.	3 : 1 **The ratio of blue to yellow is 3:1**	What is the ratio of red to white beads? 
2. Proportion	Proportion compares the size of **one part** to the size of the **whole**. Usually written as a fraction.	In a class with 13 boys and 9 girls, the proportion of boys is $\frac{13}{22}$ and the proportion of girls is $\frac{9}{22}$	In a class with 21 boys and 5 girls, the proportion of boys is … …and the proportion of girls is …
3. Simplifying Ratios	**Divide** all parts of the ratio by a **common factor**.	5 : 10 = 1 : 2 (divide both by 5) 14 : 21 = 2 : 3 (divide both by 7)	Simplify the ratios 15:40 28:70
4. Ratios in the form $1 : n$ or $n : 1$	**Divide** both parts of the ratio by one of the numbers to make **one part equal 1**.	5 : 7 = 1 : $\frac{7}{5}$ in the form 1 : n 5 : 7 = $\frac{5}{7}$: 1 in the form n : 1	25 : 20 = in the form 1 : n 25 : 20 = in the form n : 1
5. Sharing in a Ratio	**1. Add** the total parts of the ratio. **2. Divide** the amount to be shared by this value to find the value of one part. **3. Multiply** this value by each part of the ratio. Use only if you **know the total**.	Share £60 in the ratio 3 : 2 : 1. 3 + 2 + 1 = 6 60 ÷ 6 = 10 3 x 10 = 30, 2 x 10 = 20, 1 x 10 = 10 £30 : £20 : £10	Share £25 in the ratio 1 : 2 : 2
6. Proportional Reasoning	Comparing two things using **multiplicative reasoning** and applying this to a new situation.		5 miles = 8km 10 miles =

	Identify one multiplicative link and use this to find missing quantities.		160km =
7. Unitary Method	Finding the **value of a single unit** and then finding the necessary value by **multiplying** the single unit value.	3 cakes require 450g of sugar to make. Find how much sugar is needed to make 5 cakes. 3 cakes = 450g So 1 cake = 150g (÷ by 3) So 5 cakes = 750 g (x by 5)	5 cakes require 450g of butter to make. Find out how much butter is needed to make 13 cakes.
8. Ratio already shared	Find what **one part** of the ratio is worth using the **unitary method**.	Money was shared in the ratio 3:2:5 between Ann, Bob and Cat. Given that Bob had £16, found out the total amount of money shared. £16 = 2 parts So £8 = 1 part 3 + 2 + 5 = 10 parts, so 8 x 10 = £80	Money was shared in the ratio 5:2:8 between Usman, Ben and Jerry. Given that Bob had £6, found out the total amount of money shared.
9. Best Buys	Find the **unit cost** by **dividing** the **price by the quantity**. The **lowest** number is the best value.	8 cakes for £1.28 □ 16p each (÷by 8) 13 cakes for £2.05 □ 15.8p each (÷by 13) Pack of 13 cakes is best value.	10 eggs for £2.40 12 eggs for £3.00 Find the best deal

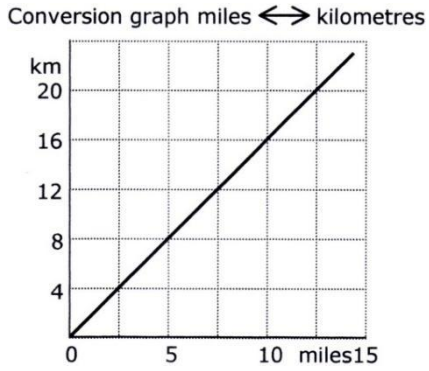
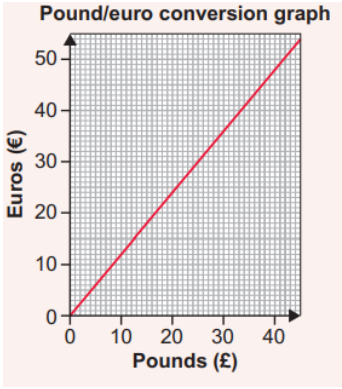
<table>
<tr>
<td>10. Units of Measurement</td>
<td>In Britain we used to use the Imperial system of measurements.
For example distance was measured in inches, feet and miles.
These can be difficult because they use lots of tricky numbers
In 18th Century France, there was a Revolution and they chopped the King's head off! They changed their measurements to the metric system, where everything works in multiples of 10, 100 and 1000</td>
<td>Liquid:
<table>
<tr><th>Unit</th><th>Imperial or Metric?</th></tr>
<tr><td>Gallon</td><td>Imperial</td></tr>
<tr><td>Pint</td><td>Imperial</td></tr>
<tr><td>Quart</td><td>Imperial</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Litre</td><td>Metric</td></tr>
<tr><td>Centilitre</td><td>Metric</td></tr>
<tr><td>Millilitre</td><td>Metric</td></tr>
</table></td>
<td>Weight:
<table>
<tr><th>Unit</th><th>Imperial or Metric?</th></tr>
<tr><td>Kilogram</td><td></td></tr>
<tr><td>Pound</td><td></td></tr>
<tr><td>Gram</td><td></td></tr>
<tr><td>Stone</td><td></td></tr>
<tr><td>Milligram</td><td></td></tr>
<tr><td>Ounce</td><td></td></tr>
<tr><td>Tonne</td><td></td></tr>
<tr><td>Metric Tonne</td><td></td></tr>
</table></td>
</tr>
<tr>
<td>11. Converting Metric Units</td>
<td>
<table>
<tr><td>1 centimeter</td><td>=</td><td>10 millimeters</td></tr>
<tr><td>1 meter</td><td>=</td><td>100 centimeters</td></tr>
<tr><td>1 kilometer</td><td>=</td><td>1000 meters</td></tr>
</table>
It is the same for litres and grams!

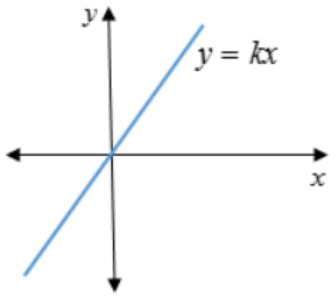
Use the same method you would with proportional reasoning</td>
<td>Convert 4.5cm into mm
1cm = 10mm
$\times 4.5 \times 4.5$
4.5cm = 45mm

Convert 520cm into m
100cm = 1m

520cm=5.2m</td>
<td>Convert 78m into cm

Convert 4055m into km</td>
</tr>
<tr>
<td>12. Converting Metric and Imperial Units</td>
<td>You don't need to know all the conversions between metric and imperial, but here are some that you should know:</td>
<td>Convert 10 inches into cm
1 inches ≈ 2.5cm
$\times 10 \times 10$
10 inches ≈ 25cm</td>
<td>Convert 5 ft into cm</td>
</tr>
</table>

	Length 1 inch ≈ 2.5 centimetres 1 foot ≈ 30 centimetres 1 mile ≈ 1.6 kilometres 5 miles ≈ 8 kilometres **Capacity** 1 pint ≈ 570 millilitres 1 gallon ≈ 4.5 litres $1\frac{3}{4}$ pints ≈ 1 litre **Weight** 1 pound ≈ 450 grams 2.2 pounds ≈ 1 kilogram	Convert 45 litres into pints 4.5 litres ≈ 1 pint ×10×10 45 inches ≈ 10 pints	Convert 6.6 pounds into kg
13. Conversion Graph	A line graph to **convert one unit to another**. Can be used to convert units (eg. miles and kilometres) or currencies ($ and £) Find the value you know on one axis, read up/across to the conversion line and read the equivalent value from the other axis.	 $8\ km = 5\ miles$	 How many Euros is £40?

14. Direct Proportion	If two quantities are in direct proportion, **as one increases**, the **other increases** by the **same percentage**. k is the ratio between x and y		How are **the gradient of a line** and direct proportion connected?