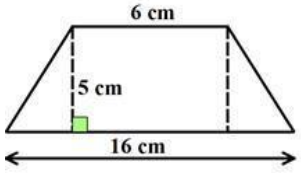
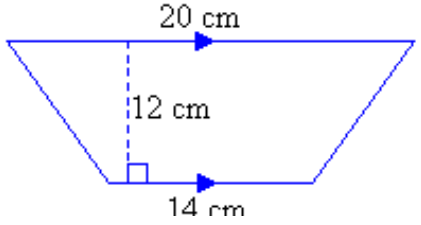
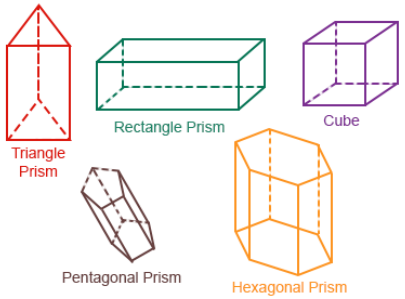
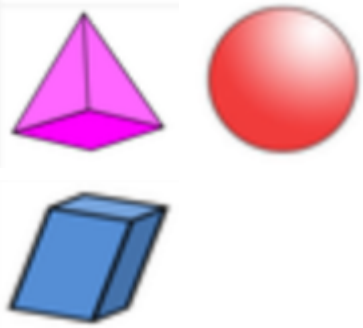
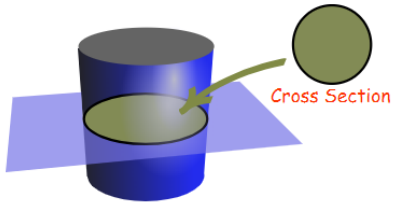
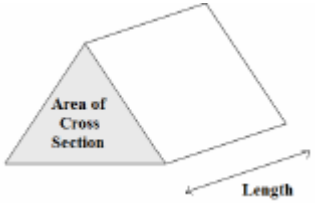
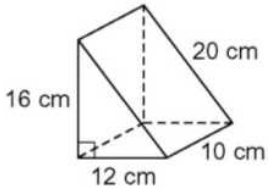
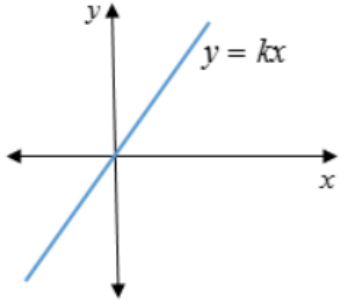
GCSE Mathematics – Unit 14: Multiplicative Reasoning **Name:……..**

Topic/Skill	Definition/Tips	Example	Your Turn
Increase or Decrease by a Percentage	Non-calculator: **Find the percentage** and **add** or **subtract** it from the **original** amount. Calculator: Find the **percentage multiplier** and multiply.	<u>Increase 500 by 20% (Non Calc):</u> 10% of 500 = 50 so 20% of 500 = 100 500 + 100 = 600 <u>Decrease 800 by 17% (Calc):</u> 100%-17%=83% 83% ÷ 100 = 0.83 0.83 x 800 = 664	**Increase 300 by 15%** **Decrease 400 by 40%**
Percentage Multiplier	The **number** you **multiply** a quantity by to **increase or decrease** it by a **percentage**.	The multiplier for increasing by 12% is 1.12 The multiplier for decreasing by 12% is 0.88 The multiplier for increasing by 100% is 2.	The multiplier for increasing by 128.2% is The multiplier for decreasing by 20.5% is
Reverse Percentage	Find the **correct percentage given in the question**, then work backwards to **find 100%** Look out for words like '**before**' or '**original**'	A jumper was priced at £48.60 after a 10% reduction. Find its original price. 100% - 10% = 90% 90% = £48.60 1% = £0.54	A jumper was priced at £45 after a 10% reduction. Find its original price.

		100% = £54	
Simple Interest	Interest calculated as a **percentage of the original** amount.	£1000 invested for 3 years at 10% simple interest. 10% of £1000 = £100 Interest = $3 \times £100 = £300$	£3000 invested for 6 years at 10% simple interest.
Compound Interest	Interest paid on the **original amount and the accumulated interest**.	A bank pays 5% compound interest a year. Bob invests £3000. How much will he have after 7 years. $3000 \times 1.05^{7} = £4221.30$	A bank pays 3% compound interest a year. Barry invests £2000. How much will he have after 4 years.
Area of a Trapezium	$\frac{(a+b)}{2} \times h$ "Half the sum of the parallel side, times the height between them. That is how you calculate the area of a trapezium"	 $A = 55cm^2$	
Prism	A prism is a 3D shape whose **cross section is the same** throughout.		**Tick the prism**

			
Cross Section	The **cross section** is the **shape** that **continues** all the way **through the prism**.		 **What shape is the cross section of this shape?**
Volume of a Prism	$V = Area\ of\ Cross\ Section \times Length$ $V = A \times L$		
Direct Proportion	If two quantities are in direct proportion, **as one increases**, the **other increases** by the **same percentage**. If y is directly proportional to x, this can be written as $y \propto x$ An equation of the form $y = kx$ represents direct proportion,		Are these numbers in direct proportion? Why? | Distance, d (miles)	8	16	24	3
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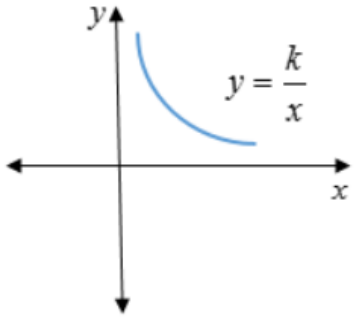
Time, t (minutes)	10	20	30	4	

<table>
<tr><td></td><td>where k is the constant of proportionality.</td><td></td><td></td></tr>
<tr><td>Inverse Proportion</td><td>If two quantities are inversely proportional, as one increases, the other decreases by the same percentage.

If y is inversely proportional to x, this can be written as $y \propto \frac{1}{x}$

An equation of the form $y = \frac{k}{x}$ represents inverse proportion.</td><td> 
</td><td>Are these numbers inversely proportionate?
Why?
<table><tr><th>x</th><th>y</th></tr><tr><td>2</td><td>12</td></tr><tr><td>4</td><td>6</td></tr><tr><td>6</td><td>4</td></tr><tr><td>8</td><td>3</td></tr></table></td></tr>
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