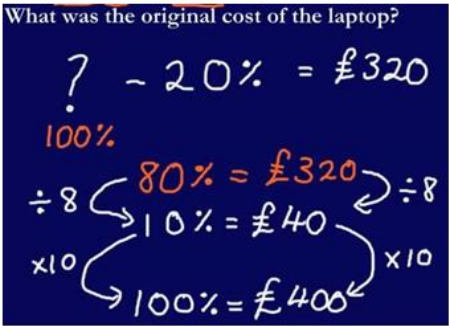
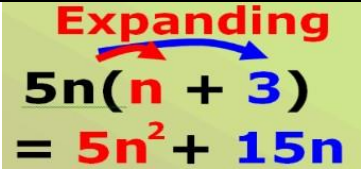
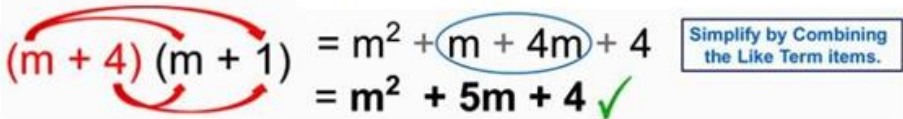
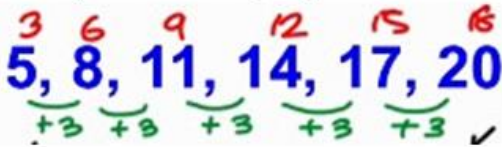
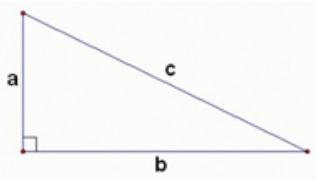
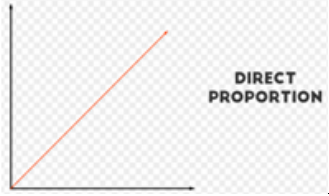
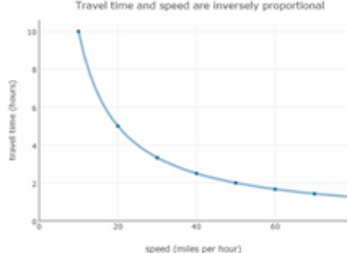


# Year 9 Autumn Maths Knowledge Organiser

Topic	Key fact	Hegarty maths clip number
Percentage of Amount	Turn the percentage into a decimal and multiply it by the amount. e.g. 45% of 60 is $0.45 \times 60 = 27$ The 0.45 is called the decimal multiplier.	83 to 87
Percentage Increase & Decrease	If it is a percentage increase, the decimal multiplier will be 1.something because you are getting more than 100%. If it is a percentage decrease, the decimal multiplier will be 0.something because you are getting less than 100% e.g increase £200 by 40% would be $200 \times 1.4$ decrease £200 by 40% would be $200 \times 0.6$	88 to 92
Reverse percentages	Sale price is £320 What was the original cost of the laptop? 	96
Expanding a single bracket		160 – 161
Expanding double brackets	Expanding – multiplying out the brackets. 	162 - 165
Linear sequences (n <sup>th</sup> term) & Special Sequences	Square: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, ... Cube: 1, 8, 27, 64, 125, ... Triangular: 1, 3, 6, 10, 15, 21, 28, 36, 45, ... n <sup>th</sup> term: General rule for a sequence. Find the difference between each term, then how do you get from that times table to the sequence: (e.g. $3n + 2$ ) 	196 – 198
Pythagoras' Theorem	 $c = \text{hypotenuse}$ $a^2 + b^2 = c^2$ $c^2 - b^2 = a^2$ $c^2 - a^2 = b^2$ Remember to square root your answer to find the missing side.	497 – 504
Indices	$a^m \times a^n = a^{m+n}$ $a^m \div a^n = a^{m-n}$ $(a^m)^n = a^{m \times n}$ $a^0 = 1$ $a^1 = a$	102 to 106

<b>Calculations with numbers in standard form</b>	<p>Multiplying &amp; dividing: do the 'normal' numbers like usual; then use index laws for the <math>\times 10^n</math></p> <p>Adding &amp; subtracting: make them ordinary numbers first; do column addition or subtraction; change back to standard form</p>	125 to 128
<b>Negative and Fractional Indices</b>	$m^{a/b} = \sqrt[b]{m^a}$ <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px;"><math>a^{-c} = \frac{1}{a^c}</math></div> <div style="border: 1px solid black; padding: 5px;"><math>\left(\frac{1}{a}\right)^{-c} = a^c</math></div> <div style="border: 1px solid black; padding: 5px;"><math>\left(\frac{x}{y}\right)^{-c} = \frac{y^c}{x^c}</math></div> </div>	104 to 108
<b>Direct Proportion</b>	<p>One quantity <b>increases</b> at the same rate as the other quantity <b>increases</b>.</p> 	339
<b>Inverse Proportion</b>	<p>One quantity <b>increases</b> at the same rate as the other quantity <b>decreases</b>.</p> 	342

### Key Vocabulary

- Integer – A whole number.
- Power/Indices - The index of a number says how many times to use the number in a multiplication. It is written as a small number to the right and above the base number.
- Square number - the answer you get when you multiply a number by itself.
- Cube number - the answer you get when you multiply a number by itself 3 times.
- Root – The inverse operation of a power.
- Expand – to multiply the term before bracket by the terms in the bracket using the
- Factorise – To put into brackets by taking out the highest common factor.
- Hypotenuse – the longest side in a right-angled triangle.
- Direct proportion - one quantity increases at the same rate as the other quantity increases.
- Inverse proportion - one quantity increases at the same rate as the other quantity decreases.
- $n^{th}$  term – the position to term rule for a sequence. Can be used to find any number in a sequence.