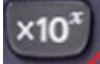

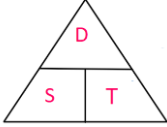
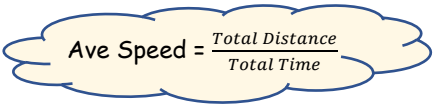


Topic 1: Arithmetic

1) The Basics:

<p>a) Types of Numbers:</p> <ul style="list-style-type: none"> Natural (N): Positive Whole Numbers: e.g. 1, 2, 3, Integers (Z): Positive and Negative Whole Numbers: e.g. -3, -2, -1, 0, 1, 2, 3,..... Real (R): All numbers: e.g.s -3, -1.4, 0.2, 6, 7/2, $\sqrt{8}$..... Rational (Q): Numbers that <u>can</u> be written in the form $\frac{a}{b}$ e.g.s -5, 3, 1/2, -9/4..... Irrational: Numbers that <u>cannot</u> be written in the form $\frac{a}{b}$ e.g.s $\sqrt{3}$, $\sqrt{2}$, π..... Prime: A natural number bigger than 1 with only itself and 1 as divisors. e.g.s 2, 3, 5, 7, 11, 13, 17..... Composite: A number that is not prime. e.g.s., 6, 9, 15, 20 	<p>b) Rounding:</p> <p>Rounding to Decimal Places:</p> <ul style="list-style-type: none"> To round to 2 decimal places, look at the 3rd number after the decimal point. <ul style="list-style-type: none"> If it's 5 or more we round UP the 2nd number If it's 4 or less we round DOWN the 2nd number Similar approach for rounding to other decimal places <p>Examples: i) 4.768 = 4.77 ii) 3.2745 = 3.27</p> <p>Rounding to Significant Figures:</p> <ul style="list-style-type: none"> To round to 3 significant figures, we look at the 4th significant figure. <ul style="list-style-type: none"> If it's 5 or more we round UP the 3rd number and replace subsequent numbers with 0s If it's 4 or less we round DOWN the 3rd number and replace subsequent numbers with 0s <p>Examples: i) 132,421 = 132,000 ii) 0.00472543 = 0.00473</p>
<p>c) Scientific Notation</p> <p>Notes:</p> <ul style="list-style-type: none"> A number is in scientific notation if it's in the form $a \times 10^n$, where 'a' has to be between 1 and 10. <p>Examples: i) 3400 = 3.4×10^3 ii) 0.004 = 4×10^{-3}</p> <ul style="list-style-type: none"> On a Casio calculator the button you will need to type in numbers in scientific notation is:  <ul style="list-style-type: none"> To type in 7×10^4, press "7" and the button above and then "4" To convert numbers into scientific notation on your calculator: <ul style="list-style-type: none"> Type in the number and press = to enter it on the screen. Press "Shift" + "Mode" and select "Sci" from the menu. Then press "0". 	<p>d) Foreign Exchange</p> <p>Steps:</p> <ol style="list-style-type: none"> Write the conversion with the currency you want on the right. Get a 1 on the left-hand side, by dividing both sides. Multiply both sides to get the value you want. <p>Example: If €1 = \$1.32, how many euro would you get for \$200?</p> <p>Step 1: Put euro on the right \$1.32 = €1</p> <p>Step 2: Get a 1 on the left-hand side $\\$1 = \frac{\text{€}}{1.32}$ (dividing both sides by 1.32)</p> <p>Step 3: Multiply both sides $\\$200 = \frac{1}{1.32} \times 200 = \text{€}151.52$</p>
<p>e) HCF/LCM using Prime Factors:</p> <p>Notes:</p> <ul style="list-style-type: none"> When asked to find the HCF and LCM of 2 numbers using prime factors, use your calculator. Type in the number first and then press Shift + Button below.  <ul style="list-style-type: none"> For HCF: pick the lowest power of each prime number. For LCM: pick the highest power of each prime number. <p>Example: Find the HCF and LCM of 60 and 80. Using calculator: $60 = 5^1 \times 3^1 \times 2^2$ $80 = 2^4 \times 5^1$</p> <p>HCF:</p> <ul style="list-style-type: none"> Lowest Power of 2 is 2^2 Lowest Power of 3 is 3^1.....but 3^1 doesn't go into 80 so exclude Lowest Power of 5 is $5^1 \Rightarrow$ HCF of 60 and 80 is $2^2 \times 5^1 = 10$ <p>LCM:</p> <ul style="list-style-type: none"> Highest Power of 2 is 2^4 Highest Power of 3 is 3^1 Highest Power of 5 is $5^1 \Rightarrow$ LCM of 60 and 80 is $2^4 \times 3^1 \times 5^1 = 240$ 	<p>f) Speed, Distance and Time:</p> <p>Notes:</p> <ul style="list-style-type: none"> For all speed, distance and time calculations remember: "Dads Silly Triangle"  <p>If you want Distance, you cover the D in the triangle, so: $D = S \times T$ (Units are usually m or km)</p> <ul style="list-style-type: none"> If you want Time, you cover the T in the triangle, so: $T = D / S$ (Units are usually secs or hrs) If you want Speed, you cover the S in the triangle, so: $S = D / T$ (Units might be m/s or km/h) <p>Average speed can be calculated using:</p>  <p>Careful with units of time. E.g. 1hr 45mins = 1.75hrs etc.</p>
<p>g) Ratio</p> <p>Notes:</p> <ul style="list-style-type: none"> Ratio shows how to break up a quantity proportionally. When given a ratio, add the values in the ratio together to get the total number of parts the quantity is being broken into. Write down the fraction each person gets. <p>Example: Divide €200 between Alan and Brian in the ratio 3:2. 3:2 means there are 3 + 2 = 5 parts \Rightarrow Alan gets $\frac{3}{5}$ and Brian gets $\frac{2}{5} \Rightarrow$ Alan gets $\frac{3}{5}$ of €200 = €120 and Brian gets $\frac{2}{5}$ of €200 = €80</p>	

2) Percentages/Profit/Loss/VAT:

<p>a) Percentages:</p> <p>To find the percentage of a number: Example: Find 24% of 250. Method 1: Calculate $\frac{24}{100} \times \frac{250}{1} = 60$ Method 2: Multiply 250 by 0.24 = 60</p> <p>To find the total when given percentage: Example: 25% of the marks in an exam are going for the practical part. If there are 50 marks for the practical, how many marks is the whole exam worth? Steps: 1) Let % = value you're given $25\% = 50$ 2) Find what 1% represents by dividing both sides $1\% = \frac{50}{25} = 2$ 3) Find 100% by multiplying by 100: $100\% = 2 \times 100 = 200\text{marks}$</p> <p>Note: In this particular example, we could also have just multiplied 50 by 4, as 25% represents $\frac{1}{4}$ of the total marks</p>	<p>b) % Profit / Loss / Discount:</p> <div style="border: 1px solid blue; border-radius: 50%; padding: 10px; width: fit-content; margin: 10px auto;"> $\% \text{ Profit or Mark-Up} = \frac{\text{Profit}}{\text{Cost Price}} \times 100 \%$ $\% \text{ Loss} = \frac{\text{Loss}}{\text{Cost Price}} \times 100 \%$ $\% \text{ Discount} = \frac{\text{Discount}}{\text{Cost Price}} \times 100 \%$ </div> <p>c) VAT:</p> <p>VAT excluded: Example: Bill comes to €120. Find final bill with 13.5% VAT. $\text{VAT} = 13.5\% \text{ of } 120$ $= 120 \times 0.0135 = \text{€}16.20$ $\Rightarrow \text{Final Bill} = \text{€}120 + \text{€}16.20 = \text{€}136.20$</p> <p>VAT included: Example: Bill including VAT comes to €340.50. Find bill without VAT, if VAT is 13.5%. $\text{Bill} + \text{VAT} = \text{€}340.50$ $\Rightarrow 113.5\% = \text{€}340.50$ $\Rightarrow 1\% = \text{€}3$ $\Rightarrow 100\% = \text{€}300$</p>
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3) Income Tax:

<p>a) Income Tax Terminology:</p> <ul style="list-style-type: none"> Gross Income: total pay someone gets before any taxes or deductions are taken Net Income: Take home pay Standard Rate of Tax (usually about 20%) Gross Tax: Total tax owing to the government before credits are deducted Tax Credits: Money deducted from the gross tax Tax Payable: Tax that you actually pay 	<p>b) Answering Questions:</p> <ul style="list-style-type: none"> The questions are nearly always made up of 3 parts: <ul style="list-style-type: none"> Part 1: Calculation of Gross Tax Part 2: Calculation of Tax Payable using the equation $\text{Tax Paid} = \text{Gross Tax} - \text{Tax Credits}$ Part 3: Working out Net Income by taking off all deductions including Tax Paid.
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4) Compound Interest/Depreciation:

<p>a) Terminology:</p> <ul style="list-style-type: none"> Principal: Amount of money invested or borrowed Interest: Money added by the bank Rate: what percentage the interest is added at Amount or Final Value: The value of money at the end of the term it has been borrowed or invested for. 	<p>Method 2: Formula</p> <div style="border: 1px solid blue; border-radius: 50%; padding: 10px; width: fit-content; margin: 10px auto;"> $F = P(1 + i)^t$ </div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto; text-align: center;"> See Tables pg 30 </div> <p>where F is the Amount, P is the Principal, i is the Rate of Interest as a decimal (e.g. 3% = 0.03) and t is the time in years the money is invested/borrowed for.</p>
<p>b) Answering Compound Interest Questions:</p> <p>Method 1: Used if rates change from year to year or payments/withdrawals are being made between years</p> <ul style="list-style-type: none"> Lay out Year 1, Year 2, Year 3 etc. Work out interest each year and add to Principal at start of the year 	

5) Household Bills:

<p>Notes:</p> <ul style="list-style-type: none"> With utility bills (e.g.s. gas, electricity, water) there is usually a unit rate i.e. a charge per unit used To calculate the units used, subtract the previous units reading from the current units reading With many bills there is also a standing charge that has to be added on. VAT is also added to the bills. With Gas Bills, there is also a Carbon Tax that needs to be added on. 	<p>Example: Calculate the cost of electricity if the previous meter reading was 21310 and the current reading is 21836, with a standing charge of €21.60. The cost per unit is €0.15 and VAT of 13.5% is added on.</p> <p>Units used = Current Reading - Previous Reading $= 21836 - 21310 = 526 \text{ units}$ Cost for electricity = $526 \times \text{€}0.15 = \text{€}78.90$ Standing Charge = €21.60 $\Rightarrow \text{Total Before VAT} = \text{€}78.90 + \text{€}21.60 = \text{€}100.50$ VAT = 13.5% of €100.50 = €13.57 $\Rightarrow \text{Final Bill} = \text{€}100.50 + \text{€}13.57 = \text{€}114.07$</p>
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