Topic: Percentages

Topic/Skill	Definition/Tips	Example
1. Writing a percentage	To write one quantity as a percentage of another, write as a fraction/decimal and x100.	**Write 28 out of 40 as a percentage** $\frac{28}{40} \times 100$ $= 0 \cdot 7 \times 100$ $= 70\%$
2. Find a percentage change	Percentage increase/decrease can be found as follows: $\text{Percentage change} = \frac{Difference}{Original\ Amount} \times 100$ Other words meaning increase include profit, inflation. Other words meaning decrease include loss, depreciation, reduction. You can use the same method for these questions. Remember that in each case: **Difference = New amount – Original amount**	**A house increased in value from £138,000 to £156,000 over the last five years. What percentage increase is this?** % increase = $\frac{156000 - 138000 \times 100}{138000}$ = 13.04347826 = 13 % (2sf) **Tracey kept chickens – unfortunately the chickens were traumatised by a fox and their mean average egg production went down from 32 eggs a week to 14 eggs a week. What % reduction in their egg production is this?** % reduction = $\frac{32 - 14 \times 100}{32}$ = 56.25%
3. Find a % of an amount without a calculator	To find 10% - divide by 10 To find 1 % - divide by 100 To find 25% - divide by 4 To find 50% - divide by 2 To find 75% - divide by 4 (to find 25%) then multiply by 3 These useful percentages can be used to build up any percentage of amount.	**Find 42% 0f £80** 10% = 80 ÷ 10 = 8 40% = 4 x 10% = 4 x 8 = 32 1% = 80 ÷ 100 = 0.8 2% = 2 x 1% = 2 x 0.8 = 1.60 42% = 40% + 2% = 32 + 1.60 = £33.60
4. To find a % of an amount using a multiplier	With a calculator, the quickest way to work out a % of a number is using a multiplier. The multiplier is just the decimal equivalent of the required percentage.	**Find 42% 0f £80** 80 x 0.42 = £33.60
5. % increase and decrease using a multiplier	To **increase** by a percentage add the percentage increase to 100%, convert to the decimal equivalent and multiply.	**Increase £50 by 12%** (100% + 12% = 112%) 50 x 112% = 50 x 1.12 = £56 (don't forget units) In this example 1.12 is the multiplier
	To **decrease** by a percentage subtract the decrease percentage from 100%, convert to the decimal equivalent and multiply.	**Decrease 85 kg by 4%** 85 x 96% = 85 x 0.96 = 81.6 kg (don't forget units) In this example 0.96 is the multiplier

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<td>6. Reverse percentages</td>
<td>Think of this as finding the original amount after a % increase or % decrease

Non-Calculator Method
After the reduction £34 = 20%
Therefore 1% = 34 ÷ 20
= 1.7
The original price would be equal to 100%
100% = 100 x 1.7
= £170</td>
<td>A dress was reduced by 80% in a sale and its new price was £34. What was the price before the sale?

Calculator method
First calculate the % that you have:
(100% - 80% = 20%)
So
£34 = 20%
Now divide by the percentage multiplier that would have been used to decrease the original amount.
Original price = 34 ÷ 0.2
= £170</td>
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<td rowspan="2">7. Repeated % change</td>
<td>If a value is being increased or decreased by the <u>same</u> percentage over regular intervals we can use the following formula.
Final amount =
Principal amount x (% multiplier)^{n}

Where n is the number of years/ months/days etc
This formula works for increases and decreases.</td>
<td>Tom invests £3000 for 5 years with a fixed compound interest rate of 3.5%. How much does Tom have after 5 years?

$3000 \times 1.035^{5} = £3563.06$
Principal amount
Multiplier
Number of regular intervals</td>
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<td>It may not always be the same percentage – in this case you cannot use the above formula but you can still work it out using just one calculation.

For example:
An investment of £4350 earns 5% interest in the first year, 4% in the second year and 3% in the following 2 years. What is the investment worth after these 4 years?

$4350 \times 1.05 \times 1.04 \times 1.03^{2} = £5039.49$</td>
<td>The population in a village is decreasing at a rate of 1% every 6 months. If the population is presently 2200, what will it be in 4 years?

$2200 \times 0.99^{8} = 2030.03\ldots$
$= 2030$
Principal amount
Multiplier
Number of regular intervals

Note here that the number of regular intervals is 8 as the decrease is given as every 6 months.</td>
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