

## Session 10: Percentages

- 1 Express 32 as a percentage of 240.

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**(Total 2 marks)**

- 2 Express 40 seconds as a percentage of 3 minutes.

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**(Total 3 marks)**

- 3 John's monthly salary was increased from £1300 to £1420.  
Work out the percentage increase in John's monthly salary.  
Give your answer to 2 significant figures.

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**(Total 3 marks)**

- 4 Pranav invested £3500 at an interest rate of 2.5% per year.  
Work out the total amount in his account after one year.

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**(Total 3 marks)**

- 5 In a sale, normal prices are reduced by 7%.  
The normal price of a microwave is £80.  
Work out the sale price of the microwave.

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**(Total 3 marks)**

- 6 An amount was decreased by 20% to 136.  
What was the original amount?

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**(Total 3 marks)**

- 7 Lucy buys a pack of 20 bottles of water. The pack costs £4.40.  
Lucy sells all the bottles for 30p each.  
Work out Lucy's percentage profit. Give your answer correct to 1 decimal place.

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**(Total 4 marks)**

8 Dean's wages are £200 per week.

He wants to save some money to buy a computer. The computer costs £272.

Dean is going to save 15% of his wages each week.

How many weeks will it take him to save enough money to buy the computer?

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**(Total 3 marks)**

9 Shruti buys a watch costing £104. This cost includes VAT at a rate of 20%.

How much is the watch without the VAT?

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**(Total 3 marks)**

10 Michael answered 70% of the questions in a Math test correctly.

He answered 28 questions correctly.

Work out the total number of questions in the Math test.

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**(Total 3 marks)**

11 Caroline's weight decreases from 64 kg to 58 kg.

Calculate the percentage decrease in Caroline's weight.

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**(Total 3 marks)**

- 12** Anne invests £1700 for 3 years in a savings account.  
She gets 3% per annum simple interest.  
How much money does Anne have at the end of 3 years?

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**(Total 3 marks)**

- 13** Alice invests £8500 for 4 years in a savings account.  
She gets 2.8% per annum compound interest.  
How much money does Alice have at the end of 4 years?

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**(Total 3 marks)**

- 14** Cameron bought a new car for £16 000.  
In the first year the value of the car depreciates by 20%.  
In the second year and the third year the car depreciates by 11%.  
Work out the value of the car after three years.

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**(Total 3 marks)**

- 15 Michelle wants to invest £6000 for three years.  
She can choose between Bank X and Bank Y.

<b>Bank X</b>
1.4% compound interest per annum

<b>Bank Y</b>
0.9% compound interest in the first year
1.1% compound interest for each extra year

Which bank will give Michelle the most interest after three years?  
You must show all of your working.

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**(Total 4 marks)**

- 16 Barry earns £1900 a month.  
He spends 35% of this money on rent and 21% on bills.  
How much of the £1900 has he left?

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**(Total 3 marks)**

- 17** Solomon bought a motorbike for £9380. He paid a deposit payment of 25% of this cost. He paid the remainder of the cost in 35 equal monthly instalments. Work out how much each instalment was.

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**(Total 4 marks)**

- 18** Mary invests £4000 in an account paying 2.5% compound interest per annum. Klaus invests £3500 in an account paying 3% compound interest per annum. Work out the difference between the amount of money Mary has after 5 years and the amount of money Klaus has after 5 years.

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**(Total 4 marks)**

- 19** Amber eats some yoghurt. The yoghurt contains 178 mg of calcium. This is 12% of the total amount of calcium that Amber should have each day. Work out the total amount of calcium that Amber should have each day.

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**(Total 3 marks)**

- 20** A bonus of £2200 is shared by 8 people who work for a company.  
40% of the bonus is shared equally between 2 managers.  
The rest of the bonus is shared equally between 6 salesmen.  
A salesman says, "If the bonus is shared equally between all 8 people I will get at least 30% more money."  
Is the salesman correct? Show how you get your answer.

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**(Total 5 marks)**

- 21** Elizabeth invests £5000 in a savings account for 3 years.  
The account pays compound interest at an annual rate of  $x\%$  per annum.  
There is a total amount of £5306.04 in the savings account at the end of 3 years.  
Work out the rate of interest.

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**(Total 4 marks)**

- 22** A cosmetic shop normally sells their goods at 70% above cost price.  
In a sale, the shop reduces the prices by 25%.  
What percentage profit does the shop make on cosmetics sold in the sale?

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**(Total 3 marks)**

- 23** Sheila bought a house. The value of the house decreased by 30% in 2015.  
For three consecutive years, 2016, 2017 and 2018 the value of the house increased.  
Each year the percentage increase in value was the same each time.  
The value of the house at the end of 2018 was 20.96% more than she paid for the house.  
Calculate the percentage increase in value of the house for each of the three of the three consecutive years.

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**(Total 5 marks)**

- 24** Louis and Yiming take part in training sessions to improve their performance running 200 metres. The table below shows Louis' and Yiming's times before and after the training sessions.

	Before training sessions	After training sessions
Louis	33.5 s	31.2 s
Yiming	32.7 s	30.9 s

Which athlete had the biggest percentage improvement? You must show your method.

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**(Total 4 marks)**



- 25** Samuel puts £1850 into a savings account.  
The savings account pays 4.5% compound interest per annum.
- (a)** How much will Samuel have after 3 years?

- (b)** How many years until Samuel has at least £2300?

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**(Total 4 marks)**

## RECAP:

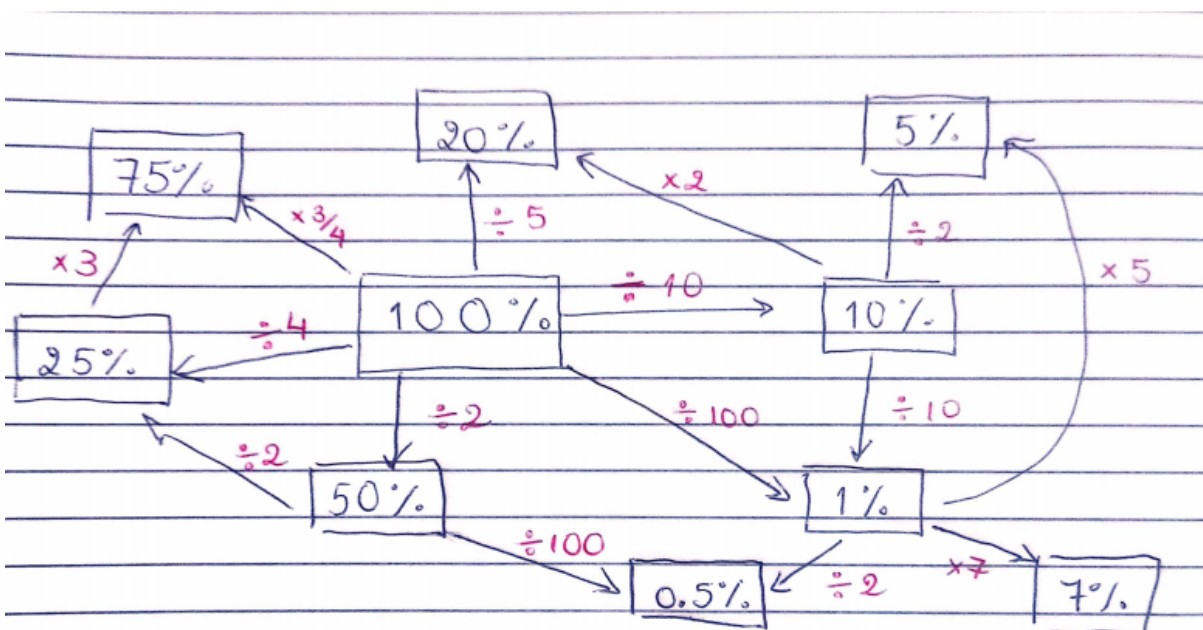
- To find a multiplier, you add/subtract the percentage from one hundred.
  - Increase, interest, VAT, growth (add to 100)
  - depreciation, decrease, decay (subtract from 100)
- Simple interest (the interest it is always the same across the years). So, you just find the percentage of interest and multiply it for the number of years required.
- Compound interest formula:

compound interest:

$$V_f = V_i \times \left( \frac{100 \pm \%}{100} \right)^t$$

$V_f$  → final value  
 $V_i$  → initial value  
 $t$  → time (in years)

- If you do not have a calculator and do not remember how to work with multipliers, use the following diagram to help you out calculating the percentages (you can find any percentage, applying this method):



- To find out the original price the normal price/total, it means you are looking for 100%.
  - If you prefer to use multipliers:

$$\text{New value} = \text{Original value} \times \text{multiplier}$$

Rearranging the formula, making the original value the subject:

$$\text{Original value} = \text{New value} \div \text{multiplier}$$

$$\frac{136}{0.8} = \underline{\underline{\pounds 170}}$$

- If you prefer to use ratios (always look for factors of 10):

$$\begin{array}{l} \pounds 136 : 80\% \\ \div 80 \quad \quad \quad \div 80 \\ \pounds 1.7 : 1\% \\ \times 100 \quad \quad \quad \times 100 \\ \pounds 170 : 100\% \end{array}$$