

A Percentages and Fractions of Amounts

Non-Calc

- 2 Work out 10% of 250.

$$250 \div 10 = 25$$

25 [1]

- 2 Work out 15% of 600.

$$10\% : 60$$

$$5\% : 30$$

$$15\% = 60 + 30 \\ = 90$$

NC

90 [2]

- 4 Find 2% of \$400.

$$1\% : 4$$

$$2\% = 2 \times 4 \\ = 8$$

NC

\$ 8 [1]

- 6 Each week Nisha is paid \$12 per hour for the first 40 hours that she works. She is paid 30% more per hour for any extra hours that she works. One week Nisha works for 45.5 hours.

Calculator

Calculate how much she is paid that week.

First 40 hours:

$$40 \times 12 = 480$$

Extra 5.5 hours:

$$\text{hourly rate: } 12 \times 1.3 = 15.6 \text{ per hour}$$

$$5.5 \times 15.6 = 85.8$$

$$480 + 85.8$$

\$ 565.80 [3]

- 5 Increase 42 by 16%.

$$100\% + 16\% = 116\%$$

$$42 \times 1.16 = 48.72$$

Calc

48.72 [2]

NC

- 6 The price of a computer is \$520.
This price is reduced by 15% in a sale.

Work out the sale price.

$$10\% : 52$$

$$5\% : 26$$

$$15\% : 52 + 26 \\ = 78$$

$$\begin{array}{r} 520 \\ - 78 \\ \hline 442 \end{array}$$

\$ 442 [2]

- 7 The price of a coat is \$126.
In a sale, this price is reduced by 18%. $\leftarrow 100\% - 18\% = 82\%$

Calc

Find the sale price of the coat.

$$126 \times 0.82 = 103.32$$

\$ 103.32 [2]

- 6 Marek buys a computer for \$420.
He sells it at a loss of 15%.

NC

Calculate the selling price of this computer.

$$10\% : 42$$

$$5\% : 21$$

$$15\% : 42 + 21 \\ = 63$$

$$\begin{array}{r} 420 \\ - 63 \\ \hline 357 \end{array}$$

\$ 357 [2]

- 3 Write 32 cm as a fraction of 2 m. $\leftarrow 200\text{cm}$
Give your answer in its simplest form.

NC

$$\frac{32}{200} = \frac{4}{25}$$

$\frac{4}{25}$ [2]

- 1 Write 26 g as a percentage of 208 g.

Calc

$$\frac{26}{208} \times 100 = 12.5\%$$

.....12.5..... % [1]

Calc

- (b) In 2021, Anil earns \$37 000.

- (i) He spends \$12 400 on bills in 2021.

Calculate the percentage of his earnings he spends on bills.

$$\frac{12400}{37000} \times 100 = 33.51\%$$

.....33.5..... % [2]

Calc

- (ii) His earnings of \$37 000 increase by 3.2% in 2022.

Calculate his earnings in 2022.

$$\rightarrow 100\% + 3.2\% = 103.2\%$$

$$37000 \times 1.032 = 38184$$

\$38 184..... [2]

NC

- (ii) In a sale, all prices are reduced by 15%.

- (a) Yasmin buys a blouse with an original price of \$40.

Calculate the sale price of the blouse.

$$10\% : 4$$

$$40 - 6 = 34$$

$$5\% : 2$$

$$15\% = 4 + 2 \\ = 6$$

\$34..... [2]

- 9 (a) Ahmed increases 40 by 300%. $\rightarrow 100\% + 300\% = 400\%$.

NC

From this list, put a ring around the correct calculation.

40×1.300

40×3

40×400

40×4

40×300

$$400\% \text{ of } 40 \\ = 4 \times 40$$

[1]

- 8 Hadi buys a dishwasher.

Calc

He can either pay a single payment of \$980 or he can pay using a monthly plan. The monthly plan is 20% of \$980 plus 12 payments of \$75.25.

- (a) Hadi uses the monthly plan.

Calculate the total amount Hadi pays.

$10\%: 98$

$$20\% = 2 \times 98 \\ = 196$$

$$196 + 12 \times 75.25 \\ = 196 + 903 \\ = \underline{1099}$$

$$\text{\$ } \underline{1099} \quad [2]$$

- (b) Find the percentage increase in the cost using the monthly plan compared to a single payment.

$$\% \text{ increase} = \frac{\text{increase}}{\text{original amount}} \times 100$$

$$\% \text{ increase} = \frac{119}{980} \times 100 \\ = 12.1\%$$

$$\text{increase} = 1099 - 980 \\ = 119$$

$$\underline{12.1} \% [2]$$

- 12 Roberto buys a toy for \$5.00. He then sells it for \$4.60.

Calc

Calculate his percentage loss.

$$\% \text{ loss} = \frac{\text{loss}}{\text{original amount}} \times 100$$

$$\% \text{ loss} = \frac{0.4}{5} \times 100 \\ = 8\%$$

$$\text{loss} = 5 - 4.6 \\ = 0.4$$

$$\underline{8} \% [2]$$

- (c) In May, the company had sales of \$6 million.
In June, the company had sales of \$7.5 million.

Find the percentage increase in sales from May to June.

$$\% \text{ increase} = \frac{\text{increase}}{\text{original amount}} \times 100$$

$$\begin{aligned} \text{increase} &= 7.5 - 6 \\ &= 1.5 \text{ (million)} \end{aligned}$$

$$\begin{aligned} \% \text{ increase} &= \frac{1.5}{6} \times 100 \\ &= \frac{1}{4} \times 100 \\ &= 0.25 \times 100 \end{aligned}$$

$$\underline{\quad 25 \quad} \% [3]$$

- (ii) For an afternoon flight, the cost of a Premium ticket is reduced from \$114 to \$96.90.

Calc

Calculate the percentage reduction in the cost of a ticket.

$$\% \text{ reduction} = \frac{\text{reduction}}{\text{original amount}} \times 100$$

$$\begin{aligned} \text{reduction} &= 114 - 96.9 \\ &= 17.1 \end{aligned}$$

$$\begin{aligned} \% \text{ reduction} &= \frac{17.1}{114} \times 100 \\ &= 15\% \end{aligned}$$

$$\underline{\quad 15 \quad} \% [2]$$

- 1 (a) In 2018, Gretal earned \$32 000.

Calc

- (i) She paid tax of 24% on these earnings.

Work out the amount she paid in tax in 2018.

$$0.24 \times 32\,000 = 7\,680$$

$$\text{\$ } \underline{\quad 7\,680 \quad} [2]$$

- (ii) In 2019, Gretal's earnings increased by 7%. $\rightarrow 100\% + 7\% = 107\%$

Work out her earnings in 2019.

$$32\,000 \times 1.07 = 34\,240$$

$$\text{\$ } \underline{\quad 34\,240 \quad} [2]$$

Calc

- (ii) Write \$24.60 as a fraction of \$2870.
Give your answer in its lowest terms.

$$\frac{24.6}{2870} = \frac{3}{350}$$

$$\frac{3}{350} \dots\dots [2]$$

- (iii) Write \$1.92 as a percentage of \$1.60.

$$\frac{1.92}{1.6} \times 100 = 120\%$$

$$120 \dots\dots \% [1]$$

- (b) In a sale the original prices are reduced by 15%. $\leftarrow 100\% - 15\% = 85\%$

NC

- (i) Calculate the sale price of a book that has an original price of \$12.

$$12 \times 0.85 = 10.2$$

$$\$ 10.20 \dots\dots [2]$$

Calc

- 6 Joseph spends $\frac{5}{24}$ of one week's earnings to buy a jacket.
The cost of the jacket is \$56.50.

Calculate the amount Joseph earns in a week.

$$\frac{5}{24} = 56.5$$

$$\frac{1}{24} = 11.3$$

$$\frac{24}{24} = 11.3 \times 24$$

$$= 271.2$$

$$\$ 271.20 \dots\dots [2]$$

- 6 At the end of the day, a shopkeeper has 12 tins of cat food left.
This is $\frac{3}{13}$ of the number he had at the beginning of the day.

Calculate the number of tins he had at the beginning of the day.

$$\begin{array}{l} \frac{3}{13} = 12 \text{ tins} \\ \div 3 \quad \quad \quad \div 3 \\ \frac{1}{13} = 4 \text{ tins} \\ \times 13 \quad \quad \quad \times 13 \\ \frac{13}{13} = 52 \text{ tins} \end{array}$$

52 tins [2]

- (b) Lucy spends $\frac{3}{8}$ of the money she has saved this month on a book that costs \$5.25.

Calculate how much money Lucy has saved this month.

$$\begin{array}{l} \frac{3}{8} = 5.25 \\ \div 3 \quad \quad \quad \div 3 \\ \frac{1}{8} = 1.75 \\ \times 8 \quad \quad \quad \times 8 \\ \frac{8}{8} = 14 \end{array}$$

\$ 14 [2]

Calc

- (ii) In 2021, the value of the team's players was \$2.65 million.
In 2022 this value has decreased by 12%. $\leftarrow 100\% - 12\% = 88\%$

Find the value in 2022.

$$2.65 \times 0.88 = 2.332$$

\$.....2.332..... million [2]

Calc

- (iii) The number of people at a football match is 1455.
This is 6.25% of the total number of people allowed in the stadium.

Find the total number of people allowed in the stadium.

$$6.25\% = 1455 \text{ people}$$

$$1\% = 232.8$$

$$100\% = 23280$$

23 280 [2]

- (b) In a sale, a shop reduces all prices by 12%. $\leftarrow 100\% - 12\% = 88\%$

Calc

- (i) Dina buys a book which has an original price of \$6.50.

Calculate how much Dina pays for the book.

$$6.5 \times 0.88 = 5.72$$

\$.....5.72..... [2]

(d) At the start of 2021 the value of a car was \$46 500.

At the end of 2021 the value of the car was 20% less. $\leftarrow 100\% - 20\% = 80\%$.

Calc

At the end of 2022 the value of the car was 15% less than its value at the end of 2021.

$\leftarrow 100\% - 15\% = 85\%$.

Calculate the value of the car at the end of 2022.

end of 2021: $46\,500 \times 0.8 = 37\,200$

end of 2022: $37\,200 \times 0.85 = 31\,620$

\$ 31 620 [2]

1 (a) The table shows the areas, in km^2 , of the four largest rainforests in the world.

Calc

Rainforest	Area (km^2)
Amazon	5 500 000
Congo	2 000 000
Atlantic	1 315 000
Valdivian	250 000

(i) Find the area of the Valdivian rainforest as a percentage of the area of the Amazon rainforest.

$$\frac{250\,000}{5\,500\,000} \times 100 = 4.5454\ldots \quad \underline{4.55} \% [1]$$

(iii) The Amazon rainforest has 60% of its area in Brazil and 10% of its area in Colombia. $43\frac{1}{3}\%$ of the **remaining area** of the rainforest is in Peru. Calc

Find the percentage of the Amazon rainforest that is in Brazil, Colombia and Peru.

Remaining area: $100\% - 60\% - 10\% = 30\%$

$43\frac{1}{3}\%$ of 30% : $0.4333\ldots \times 30 = \underline{13\%}$

Brazil + Colombia + Peru: $60\% + 10\% + 13\% = \underline{83\%}$

83 % [3]

- (c) In January 2020, the population of a town was 5% more than its population in January 2018. In January 2021, the population of this town was 2% less than its population in January 2020.

Calculate the overall percentage increase in the population from January 2018 to January 2021.

$$5\% \text{ more: } 100\% + 5\% = 105\%$$

$$2\% \text{ less: } 100\% - 2\% = 98\%$$

$$\begin{aligned} \text{Population in 2021: } P \times 1.05 \times 0.98 \\ = P \times 1.029 \end{aligned}$$

$$\rightarrow 1.029 \text{ is } 100\% + \underline{2.9\%} \dots\dots\dots 2.9\% \text{ [2]}$$

- 18 F is proportional to the product of m and a .

$$100\% + 40\% = 140\%$$

Calc

Calculate the percentage change in F when m is increased by 40% and a is decreased by 15%.

$$\rightarrow 100\% - 15\% = 85\%$$

$$F = m \times a$$

$$m \rightarrow 1.4m \text{ and } a \rightarrow 0.85a :$$

$$F = 1.4m \times 0.85a$$

$$= 1.4 \times 0.85 ma$$

$$= 1.19 ma$$

$$\dots\dots\dots 19\% \text{ [3]}$$

$$\rightarrow 1.19 \text{ is } 100\% + \underline{19\%}$$