Exercise walk-through

E1.13
Percentages

IGCSE Mathematics

You must be able to

- find a percentage of a quantity, and write one quantity as a percentage of another
- calculate a percentage increase or decrease using a multiplier
- find the original amount after a percentage change has already been applied

1 The method

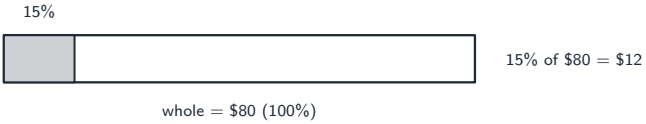
Method — One multiplier does an increase, a decrease, and the way back

- **Percentage of:** 15% of $240 = 0.15 \times 240 = 36$.
- **One as a percentage of another:** 18 out of $45 = \dfrac{18}{45} \times 100 = 40\%$.
- **Increase or decrease:** a rise of 12% is $\times 1.12$; a fall of 12% is $\times 0.88$. So 60 increased by 12% is 67.2.
- **Reverse percentage — DIVIDE:** if a price is \$96 **after** a 20% rise, the original was $96 \div 1.2 = \$80$. Taking 20% off \$96 gives \$76.80, which is wrong.

Answer shapes (marked by **method marks** — M1 for a correct method, A1 for the correct answer): the multiplier, or the fraction before it is turned into a percentage, is the method mark.

Method — One multiplier does an increase, a decrease, and the way back

Answer shapes (marked by method marks — M1 for a correct method, A1 for the correct answer): the multiplier,...



A bar split to show a percentage of a whole

2 Practice

Practice 2.1 ▪ 1 mark

Find 35% of 280.

Solution 2.1

Worked steps

- 0.35×280

$$= \mathbf{98}$$ B1

Practice 2.2 ▪ 2 marks

Write 21 as a percentage of 60.

Solution 2.2

Worked steps

- $\dfrac{21}{60} \times 100$ M1

$$= \mathbf{35}\% \quad \text{A1}$$

Practice 2.3 ▪ 2 marks

Increase 85 by 6%.

Solution 2.3

Worked steps

- a rise of 6% gives a multiplier of 1.06, so 85×1.06 M1

$$= \mathbf{90.1}$$ A1

Practice 2.4 ▪ 2 marks

A price falls from \$80 to \$68. Calculate the percentage decrease.

Solution 2.4

Method: One multiplier does an increase, a decrease, and the way back — p.4

Worked steps

- the fall is $80 - 68 = 12$, and the denominator is the ORIGINAL, 80 M1

$$\frac{12}{80} \times 100 = \mathbf{15}\% \qquad \text{A1}$$

3 Exam-style

Exam-style 3.1 ▪ 4 marks

In a sale, all prices are reduced by 30%. A coat costs \$84 in the sale.

Exam-style 3.1 (a) ▪ 3 marks

Calculate the original price of the coat.

Solution 3.1 (a)

Method: One multiplier does an increase, a decrease, and the way back — p.4

Worked steps

- the sale price is 70% of the original, so the multiplier is 0.7 M1
- original $= 84 \div 0.7$ M1

$$= \$\mathbf{120}$$ A1

Exam-style 3.1 (b) ▪ 1 mark

Calculate the amount saved.

Solution 3.1 (b)

Worked steps

- $120 - 84$

$$= \$\mathbf{36}$$ B1

Exam-style 3.2 ▪ 2 marks

The population of a town rises from $24\,500$ to $26\,215$. Calculate the percentage increase.

Solution 3.2

Method: One multiplier does an increase, a decrease, and the way back — p.4

Worked steps

- the increase is $26\,215 - 24\,500 = 1715$ **M1**

$$\frac{1715}{24\,500} \times 100 = \mathbf{7}\% \qquad \textbf{A1}$$