



**eClassroom**

GCSE Mathematics

# Percentages

**Worked Solutions**

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Pearson Edexcel GCSE & iGCSE Mathematics



## Section A — Foundation — Worked Solutions

### [Fluency] Question 1

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$$30\% = 0.30$$

$$0.30 \times 150 = 45$$

$$\therefore \text{£}45$$

### [Fluency] Question 2

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$$\text{Multiplier for 25\% increase} = 1.25$$

$$80 \times 1.25 = 100$$

$$\therefore \text{£}100$$

### [Fluency] Question 3

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$$\text{Multiplier for 15\% decrease} = 0.85$$

$$200 \times 0.85 = 170$$

$$\therefore 170$$

### [Fluency] Question 4

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$$(36 \div 60) \times 100 = 60\%$$

$$\therefore 60\%$$

### [Fluency] Question 5

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$$\text{Multiplier for 20\% increase} = 1.20$$

$$\text{Original price} = 90 \div 1.20 = \text{£}75$$

$$\therefore \text{£}75$$

### [Reasoning] Question 6

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$$\text{VAT} = 20\%, \text{ so multiplier} = 1.20$$

$$48 \times 1.20 = \text{£}57.60$$

$$\therefore \text{£}57.60$$

**[Reasoning] Question 7**

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30% off: multiplier = 0.70

$$85 \times 0.70 = \text{£}59.50$$

**∴ £59.50**

**[Reasoning] Question 8**

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$$(42 \div 56) \times 100 = 75\%$$

**∴ 75%**

**[Problem Solving] Question 9**

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Shop A: original =  $120 \div 0.80 = \text{£}150.00$

Shop B: original =  $123.53 \div 0.85 = \text{£}145.33$  (2 d.p.)

Compare:  $\text{£}150.00 > \text{£}145.33$

**∴ Shop A had the higher original price (£150 vs £145.33).**

**[Problem Solving] Question 10**

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$$\text{Change} = 300 - 240 = 60$$

$$\% \text{ increase} = (60 \div 240) \times 100 = 25\%$$

**∴ 25%**



## Section B — Higher — Worked Solutions

### [Fluency] Question 1

Compound interest multiplier = 1.03

$$2000 \times 1.03^4 = 2000 \times 1.12550881 = 2251.018\dots$$

$\therefore$  **£2251.02**

### [Fluency] Question 2

Depreciation multiplier =  $1 - 0.18 = 0.82$

$$12000 \times 0.82^3 = 12000 \times 0.551368 = 6616.416\dots$$

$\therefore$  **£6616.42**

### [Fluency] Question 3

35% increase: multiplier = 1.35

$$\text{Original} = 162 \div 1.35 = \text{£}120$$

$\therefore$  **£120**

### [Reasoning] Question 4

$$\text{Year 1: } 25\,000 \times 1.04 = 26\,000$$

$$\text{Year 2: } 26\,000 \times 1.04 = 27\,040$$

$$\text{Year 3: } 27\,040 \times 1.04 = 28\,121.6$$

$$\text{Year 4: } 28\,121.6 \times 1.04 = 29\,246.5$$

$$\text{Year 5: } 29\,246.5 \times 1.04 = 30\,416.3 > 30\,000$$

$\therefore$  **After 5 complete years.**

### [Reasoning] Question 5

$$\text{(a) Combined multiplier: } 0.90 \times 0.85 = 0.765$$

$$\text{Reduction} = 1 - 0.765 = 0.235 = \mathbf{23.5\% \checkmark}$$

(b) A 25% single discount gives multiplier 0.75, not 0.765.

The two discounts act on different base amounts, so  $10\% + 15\% \neq 25\%$ .

$\therefore$  **(a) 23.5% reduction shown  $\checkmark$  (b) 25% single discount  $\neq$  10% then 15%**

**[Reasoning] Question 6**

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(a) Multiplier after  $+x\%$  then  $-x\%$ :  $(1 + x/100)(1 - x/100) = 1 - x^2/10000$

Since  $x^2 > 0$  for any  $x \neq 0$ , result is always  $< 1$  (a decrease).

(b)  $x = 20$ : multiplier =  $1.20 \times 0.80 = 0.96 \rightarrow$  decrease of 4%

**$\therefore$  (a) Always decreases (shown) (b) 4% decrease**

**[Problem Solving] Question 7**

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Option A (simple):  $5000 + 5000 \times 0.025 \times 5 = 5000 + 625 = \text{£}5625$

Option B (compound):  $5000 \times 1.02^5 = 5000 \times 1.10408 = \text{£}5520.40$

Compare:  $\text{£}5625 > \text{£}5520.40$

**$\therefore$  Option A (simple interest) gives a greater return:  $\text{£}5625$  vs  $\text{£}5520.40$**

**[Problem Solving] Question 8**

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$$2000 \times (1 + r)^2 = 2205$$

$$(1 + r)^2 = \frac{2205}{2000} = 1.1025$$

$$1 + r = \sqrt{1.1025} = 1.05$$

$$r = 0.05$$

**$\therefore r = 5\%$**

**[Problem Solving] Question 9**

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Year 1:  $18\,000 \times 0.88 = 15\,840$

Year 2:  $15\,840 \times 0.92 = 14\,572.80$

Year 3:  $14\,572.80 \times 0.92 = 13\,406.976$

**$\therefore \text{£}13\,406.98$  (nearest penny)**

**[Problem Solving] Question 10**

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(a) % error =  $|4.8 - 5.0| \div 5.0 \times 100 = 0.2 \div 5.0 \times 100 = 4\%$

(b) The student's statement is misleading. A measurement 4% in error is not '96% accurate' in the usual sense — percentage accuracy should be expressed relative to the true value.

**$\therefore$  (a) 4% (b) Statement is misleading; error is 4% of the true value.**