eClassroom

GCSE Mathematics

Percentage Change & Reverse Percentage

Questions

Pearson Edexcel GCSE & iGCSE Mathematics

Section A — Foundation

Worked Examples

[Fluency]

Find the percentage increase from £40 to £52.

Change = £52 – £40 = £12

$$\%\ \text{increase} = \frac{12}{40} \times 100 = 30\%$$

[Reasoning]

A price is reduced by 20% to £64. Find the original price.

After 20% reduction, multiplier = 0.80

$$\text{Original} = \frac{64}{0.80} = \$80$$

[Problem Solving]

A TV costs £240 after a 20% increase then a 10% reduction. Was the original price more or less than £240?

Net multiplier: 1.20×0.90=1.08

So £240 is 108% of original → original=240/1.08=**£222.22** (less)

[Fluency]

1. Find the percentage increase from £80 to £100.

(2 marks)

[Fluency]

2. Find the percentage decrease from £150 to £120.

(2 marks)

[Fluency]

3. After a 20% increase, a price is £84. Find the original price.

(2 marks)

[Fluency]

4. After a 15% decrease, a price is £34. Find the original price.

(2 marks)

[Fluency]

5. A jacket rises from £45 to £54. Find the percentage increase.

(2 marks)

[Reasoning]

6. A price is marked up by 40% and then reduced by 10% in a sale.

What is the overall percentage change from the original price?

(3 marks)

[Reasoning]

7. A coat is on sale at 30% off. The sale price is £63.

What was the original price?

(2 marks)

[Reasoning]

8. A town's population increased by 12% to 22 400.

What was the population before the increase?

(2 marks)

[Problem Solving]

9. A car is bought for £8000 and sold 2 years later for £5379.20.

Assuming constant annual depreciation rate, find the annual percentage depreciation.

Show your working clearly.

(4 marks)

[Problem Solving]

10. A house is valued at £240 000. Its value is expected to increase by 3.5% each year.

(a) Find the value after 4 years. (3)

(b) After how many complete years will the value first exceed £275 000? (2)

(5 marks)

Section B — Higher

Worked Examples

[Fluency]

After 2 successive 10% increases, what is the equivalent single percentage increase?

Multiplier: 1.10×1.10=1.21

Equivalent single increase: **21%**

[Reasoning]

Show that increasing by p% then decreasing by p% always gives a net decrease.

$$(1+\frac{p}{100})(1-\frac{p}{100}) = 1-\frac{p^2}{10000} < 1$$

Since $p^2>0$, the result is always less than 1 — a net decrease. ✓

[Problem Solving]

After 3 years of 15% annual depreciation, a car is worth £7369.50. Find the original price.

$$\text{Original} = \frac{7369.50}{0.85^3} = \frac{7369.50}{0.614125} = \$12000$$

[Fluency]

1. A student measures a length as 4.8 cm. The actual length is 5.0 cm.
Calculate the percentage error.

(2 marks)

[Fluency]

2. After a 35% increase, a sofa costs £189. Find the original price.

(2 marks)

[Reasoning]

3. Show that two successive increases of 10% are equivalent to a single increase of 21%.

(2 marks)

[Reasoning]

4. A price is increased by x% and then decreased by x%.

(a) Show that the net effect is always a percentage decrease. (2)

(b) Find the net percentage decrease when x=20. (1)

(3 marks)

[Reasoning]

5. A car depreciates in value. After 3 years it is worth £7369.50.
The annual depreciation rate is 15%.
Find the original value of the car.

(2 marks)

[Reasoning]

6. A television costs £156 including VAT at 20%.
Find the price before VAT.

(2 marks)

[Problem Solving]

7. £5000 is invested at r% compound interest per annum.
After 5 years, the investment is worth £6083.26.
Find the value of r.

(3 marks)

[Problem Solving]

8. A town has population 45 000. The population grows by 2.5% per year.
Find the number of complete years before the population first exceeds 55 000.

(3 marks)

[Problem Solving]

9. A shopkeeper buys an item and sells it for £399, making a 14.5% profit.
Find the cost price of the item.

(2 marks)

[Problem Solving]

10. A price is increased by p% and then decreased by p%.
Prove that the net percentage decrease is $p^2/100$.
Illustrate with an example using p=30.

(4 marks)