

GCSE MATHS

Percentages

Worked Solutions

Q1

*

$$250 \times 0.18$$

Convert 18% to a decimal multiplier.

$$45$$

Multiply.

Q2

*

$$1 + 0.15 = 1.15$$

Include the original 100%.

$$480 \times 1.15 = 552$$

Apply the increase multiplier.

Q3

*

$$1 - 0.24 = 0.76$$

Find the fraction of the price remaining.

$$75 \times 0.76 = 57$$

Apply the decrease multiplier.

Q4

**

$$196 - 160 = 36$$

Find the increase.

$$\frac{36}{160} \times 100 = 22.5\%$$

Divide by the original membership.

Q5

**

$$80 - 66 = 14$$

Find the reduction.

$$\frac{14}{80} \times 100 = 17.5\%$$

Compare the reduction with the original time.

Q6

**

$$60 - 48 = 12$$

Find the required reduction.

$$\frac{12}{60} \times 100 = 20\%$$

The reduction is measured from the new £60 price.

Q7

**

$$0.8p = 68$$

The sale price is 80% of the original.

$$p = 68 \div 0.8 = 85$$

Divide by the multiplier.

Q8

**

$$1.04s = 31200$$

The new salary is 104% of the old salary.

$$s = 31200 \div 1.04 = 30000$$

Divide by 1.04.

Q9

**

$$1.2p = 93.6$$

The given total includes the original cost and VAT.

$$p = 93.6 \div 1.2 = 78$$

Divide by 1.2.

Q10

**

$$0.88p = 748$$

The new population is 88% of the original.

$$p = 748 \div 0.88 = 850$$

Divide by the remaining fraction.

Q11

$$1.25 \times 0.9 = 1.125$$

Multiply the two change multipliers.

$$1.125p = 90$$

Relate the original price to the final price.

$$p = 90 \div 1.125 = 80$$

Undo the combined multiplier.

Q12

$$0.7 \times 0.95 = 0.665$$

Each reduction acts on the current price.

$$0.665p = 133$$

Write the final price equation.

$$p = 200$$

Divide 133 by 0.665.

Q13

**

$$1200(1.03)^2$$

Apply the 3% multiplier twice.

$$1273.08$$

Evaluate the power before multiplying.

Q14

**

$$18000(0.85)^3$$

Use the remaining fraction for each year.

$$11054.25$$

Evaluate without rounding intermediate years.

Q15

**

$$25000(1.02)^3$$

Apply the same growth multiplier three times.

$$26530.2$$

Evaluate the model.

$$26530$$

Round to a whole number of residents.

Q16

$$0.92 \times 0.88 = 0.8096$$

Multiply the remaining-value multipliers.

$$1 - 0.8096 = 0.1904$$

Find the total fraction lost.

$$19.04\%$$

Convert to a percentage.

Q17

$$2000(1.06)^3 = 2382.032$$

Check three years.

$$2000(1.06)^4 = 2524.95392$$

Check the following year.

$$n = 4$$

The value increases each year and first exceeds £2,500 here.

Q18

$$800(1 + 3 \times 0.05) = 920$$

$$800(1.05)^3 = 926.10$$

$$926.10 - 920 = 6.10$$

Simple interest uses the original £800 each year.

Compound interest uses the updated balance.

Compare the final balances.

Q19

$$0.8 \times 0.9 = 0.72$$

$$1 - 0.30 = 0.70$$

$$0.72 - 0.70 = 0.02$$

The two-stage offer leaves 72% of the price.

The other offer leaves 70%.

The difference is 2% of the starting price.

Q20

$$1.2 \times 0.8 = 0.96$$

$$1 - 0.96 = 0.04$$

Multiply the increase and decrease factors.

The final price is below the original by 4%.

Q21

$$m^2 = \frac{2756.25}{2500} = 1.1025$$

$$m = \sqrt{1.1025} = 1.05$$

$$r = 5\%$$

Let m be the annual multiplier.

Use the positive square root.

Subtract one and convert to a percentage.

Q22

$$m^2 = 0.64$$

$$m = 0.8$$

$$1 - 0.8 = 0.2 = 20\%$$

After two years, 64% remains.

Take the positive square root.

Find the annual fraction lost.

Q23

$$0.4n + 12 = 0.5(n + 12)$$

Both the junior count and total membership rise by 12.

$$0.4n + 12 = 0.5n + 6$$

Expand the new total.

$$0.1n = 6$$

Collect terms and solve.

$$n = 60$$

Q24

$$\left(1 + \frac{p}{100}\right) \left(1 - \frac{p}{100}\right) = 0.91$$

Write the combined multiplier.

$$1 - \frac{p^2}{10000} = 0.91$$

Use the difference of squares.

$$p^2 = 900$$

Rearrange.

$$p = 30$$

Use the positive root required by the question.