Day 250 **B Tier 10-a-day: Model Solutions**

1 Multiplying and dividing fractions

Work out

(a) $\frac{7}{8} \times \frac{1}{4}$

(b) $\frac{3}{5} \div \frac{8}{9}$

Give each answer in its simplest form.

(a) Multiply the tops and the bottoms: $\frac{7}{32}$

(b) Turn the second fraction upside down and multiply: $\frac{3}{5} \times \frac{9}{8} = \frac{27}{40} = \frac{27}{40}$

Answer: (a) $\frac{7}{32}$ (b) $\frac{27}{40}$

2 Laws of indices

Simplify fully

(a) $15t^4 \div 5t^2$

(b) $(y^3)^2$

(a) Divide the numbers: $15 \div 5 = 3$. Subtract the powers: $4 - 2 = 2$

(b) Multiply the powers: $3 \times 2 = 6$

Answer: (a) $3t^2$ (b) y^6

3 Ratio, one part known

The ratio of pencils to pens among the items in a case is 9 : 8.

There are 24 pens.

How many pencils are there?

8 parts = 24 pens

1 part = 24 ÷ 8 = 3

pencils: 9 × 3 = 27

Answer: 27

4 Percentage as a fraction of

(a) Owen scores 62 out of 80 in a quiz. Write this as a percentage.

(b) Write £1.10 as a percentage of £5.

(a) $\frac{62}{80} \times 100 = 77.5\%$

(b) Change both to pence: 110p and 500p

$\frac{110}{500} \times 100 = 22\%$

Answer: (a) 77.5% (b) 22%

5 Transformations of a point

(a) The point P(4, −5) is rotated 90° clockwise about the origin. Write down the coordinates of the image.

(b) The point P(4, −5) is translated by the vector $\begin{pmatrix} 3 \\ -3 \end{pmatrix}$. Write down the coordinates of the image.

(a) A 90° clockwise turn takes (x, y) to (y, −x): (−5, −4)

(b) Add the vector: (4 + 3, −5 − 3) = (7, −8)

Answer: (a) (−5, −4) (b) (7, −8)

6 Expected outcomes

The probability that a biased dice lands on a six is $\frac{1}{5}$.

Work out how many times you would expect this to happen in 240 rolls of the dice.

Expected number = probability × number of trials

$\frac{1}{5} \times 240 = 48$

Answer: 48

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7 Isosceles triangles and Pythagoras

Triangle ABC is isosceles with AB = AC = 13 m.
The base BC = 24 m.
(a) Work out the perpendicular height of the triangle.
(b) Work out the area of the triangle.

(a) The height splits the base in half: 24 ÷ 2 = 12
$h^2 = 13^2 - 12^2 = 169 - 144 = 25$, so h = 5
(b) Area = ½ × 24 × 5 = 60
Answer: (a) 5 m (b) 60 m^2

8 Error intervals

The number x is rounded to the nearest 100.
The result is 6700.
Write down the error interval for x.

The rounding unit is 100, so x can be up to half of this, 50, either side of 6700
Lower bound = 6700 − 50 = 6650 and upper bound = 6700 + 50 = 6750
Answer: $6650 \leq x < 6750$

9 Equations with fractions

Solve $\frac{5x + 10}{5} = 5$

Multiply both sides by 5: 5x + 10 = 25
Subtract 10 from both sides: 5x = 15
Divide both sides by 5
Answer: x = 3

10 Bearings

A plane travels on a bearing of 040°.
It then turns right through 60° and continues in a straight line.
Work out the new bearing.

Turning right means adding 60°
40 + 60 = 100
Answer: 100°