**Day 164** **B Tier 10-a-day: Model Solutions**

## 1 Speed unit conversion

A kite flies at 28 metres per second.
Work out this speed in kilometres per hour.

In 1 hour (3600 s) it travels 28 × 3600 = 100,800 m
100,800 m = 100.8 km
**Answer: 100.8 km/h**

## 2 Exterior angles of polygons

Each interior angle of a regular polygon is 160°.
Work out the number of sides of the polygon.

Exterior angle = 180° − 160° = 20°
Number of sides = 360 ÷ 20 = 18
**Answer: 18 sides**

## 3 Estimation

Estimate the value of

$\frac{48.4}{0.506} + 6.74$

Show your rounding to 1 significant figure.

Round each number to 1 significant figure: 48.4 → 50, 6.74 → 7, 0.506 → 0.5
Estimate = 50 ÷ 0.5 + 7 = 107
**Answer: 107**

## 4 Currency conversion

£1 = 1.15 dollars
A holiday costs $230.
Work out the cost in pounds.

Divide by the rate: 230 ÷ 1.15
= £200
**Answer: £200**

## 5 Pythagoras' theorem

Work out the length of x. (Calculator)
Give your answer correct to 1 decimal place.
The diagram is not drawn accurately.

Use Pythagoras: $a^2 + b^2 = c^2$
$x^2 = 14^2 + 8^2 = 196 + 64 = 260$
$x = \sqrt{260} = 16.125...$
x = 16.1 m (1 d.p.)
**Answer: x = 16.1 m**

## 6 Factorising

Factorise $a^2 + 8a$

Both terms have a as a factor
$a^2 \div a = a$ and $8a \div a = 8$
**Answer: a(a + 8)**

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## 7 Multiplying and dividing fractions

Work out

(a) $\frac{5}{8} \times \frac{2}{9}$

(b) $\frac{2}{3} \div \frac{8}{9}$

Give each answer in its simplest form.

(a) Multiply the tops and the bottoms: $\frac{10}{72} = \frac{5}{36}$

(b) Turn the second fraction upside down and multiply: $\frac{2}{3} \times \frac{9}{8} = \frac{18}{24} = \frac{3}{4}$

**Answer: (a) $\frac{5}{36}$ (b) $\frac{3}{4}$**

## 8 Simultaneous equations

Solve the simultaneous equations

$x + y = 6$

$2x - y = 9$

The y terms have opposite signs, so add the equations: $3x = 15$

$x = 5$

Substitute $x = 5$ into the first equation: $y = 6 - 5 = 1$

$y = 1$

**Answer: $x = 5$, $y = 1$**

## 9 Direct proportion

F is directly proportional to m.

When m = 6, F = 30.

Find a formula for F in terms of m.

$F = km$

$30 = k \times 6$, so $k = 30 \div 6 = 5$

**Answer: $F = 5m$**

## 10 Growth in standard form

There are $9.7 \times 10^5$ fish in a lake.

The number triples every day.

How many are there after 3 days?

Give your answer in standard form.

Each day multiply by 3, so multiply by $3^3 = 27$

$9.7 \times 10^5 \times 27 = 261.9 \times 10^5$

In standard form: $2.619 \times 10^7$

**Answer: $2.619 \times 10^7$**