Day 5 **A Tier 10-a-day: Model Solutions**

1 Exchange rates

£1 = €1.25.
(a) Change £340 to euros.
(b) Change €300 to pounds.

(a) 340 × 1.25 = 425
(b) 300 ÷ 1.25 = 240
Answer: (a) €425 (b) £240

2 Equation of a straight line

A straight line passes through the points (1, 5) and (3, 13).
Find the equation of the line.

Gradient = $\frac{13-5}{3-1} = \frac{8}{2} = 4$

Use y = mx + c with m = 4 and the point (1, 5): 5 = 4 × 1 + c
c = 1
y = 4x + 1
Answer: y = 4x + 1

3 Compound shapes with circles

The diagram shows a shape made from a rectangle and a semicircle.
Work out the area of the shape.
Give your answer in terms of π.
The diagram is not drawn accurately.

Rectangle: 20 × 12 = 240

Semicircle: $\frac{1}{2} \times \pi \times 10^2 = 50\pi$

Total = 240 + 50π

Answer: 240 + 50π cm²

4 Fraction calculations

Work out $(1\frac{2}{5} + 3\frac{2}{3}) \div 2\frac{2}{3}$

Give your answer as a mixed number in its simplest form.

Brackets first, as improper fractions: $\frac{7}{5} + \frac{11}{3} = \frac{76}{15}$

Then divide by multiplying by the reciprocal: $\frac{76}{15} \times \frac{3}{8} = \frac{19}{10}$

$= 1\frac{9}{10}$

Answer: $1\frac{9}{10}$

5 Similar shapes: finding a length

The two triangles are similar.
Work out the value of x.
The diagrams are not drawn accurately.

Scale factor from the small triangle to the large triangle = 35 ÷ 28 = $\frac{5}{4}$

x = 24 × $\frac{5}{4}$ = 30

Answer: x = 30 cm

6 Box plots

The box plot shows the masses, in kg, of the parcels in delivery A.
(a) Write down the median and the interquartile range.
For delivery B the median is 70 and the interquartile range is 50.
(b) Compare the distributions of the two deliveries.

(a) Median = 60
Interquartile range = 85 − 45 = 40
(b) The median for Delivery B is higher (70 compared with 60), so it has the higher values on average
The IQR for Delivery A is smaller (40 compared with 50), so its values are more consistent
Answer: (a) Median 60, IQR 40 (b) Delivery B has the higher median; Delivery A has the smaller IQR so is more consistent

7 Terminating and recurring decimals

Here are four fractions: $\frac{6}{9}$ $\frac{3}{4}$ $\frac{10}{32}$ $\frac{12}{15}$

Which one of these fractions is equal to a recurring decimal?

Simplify each fraction: $\frac{6}{9} = \frac{2}{3}$, $\frac{3}{4}$, $\frac{10}{32} = \frac{5}{16}$, $\frac{12}{15} = \frac{4}{5}$

A fraction in simplest form is a terminating decimal only if its denominator has no prime factors other than 2 and 5.

$\frac{2}{3}$ has denominator 3, which includes a factor other than 2 and 5.

Answer: $\frac{6}{9}$

8 Is it a right-angled triangle?

A triangle has sides of length 10 cm, 24 cm and 26 cm.
Is the triangle right-angled?
You must show your working.

Longest side^2 = 26^2 = 676
Sum of the squares of the other two sides = $10^2 + 24^2 = 100 + 576 = 676$
676 = 676, so the triangle is right-angled
Answer: Yes, it is right-angled

9 Circles and tangents

The point P(8, 6) lies on a circle with centre O(0, 0).
(a) Work out the equation of the circle, in the form $x^2 + y^2 = r^2$.
(b) Find the equation of the tangent to the circle at P.

(a) The circle is $x^2 + y^2 = r^2$, so $r^2 = 8^2 + 6^2 = 100$

(b) Gradient of the radius OP = $\frac{6}{8} = \frac{3}{4}$

The tangent is perpendicular to the radius, so its gradient = $-1 \div \frac{3}{4} = -\frac{4}{3}$

$y = -\frac{4}{3}x + c$ through (8, 6): $6 = -\frac{4}{3} \times 8 + c$, so $c = \frac{50}{3}$

$y = -\frac{4}{3}x + \frac{50}{3}$

Answer: (a) $x^2 + y^2 = 100$ (b) $y = -\frac{4}{3}x + \frac{50}{3}$

10 Time

(a) A flight takes off at 0620. The journey takes 2 hours 56 minutes. Work out the time it ends.
(b) Change 150 minutes into hours. Give your answer as a decimal.

(a) 0620 + 2 hours 56 minutes = 0916
(b) 150 ÷ 60 = 2.5 hours
Answer: (a) 0916 (b) 2.5 hours