Day 351 **B Tier 10-a-day: Model Solutions**

1 Simple probability

A pot contains 9 pink beads, 4 blue beads and 5 gold beads.
One is taken at random. Find the probability that it is pink or blue.

Total = 9 + 4 + 5 = 18
pink or blue: 9 + 4 = 13
Simplify the fraction

Answer: $\frac{13}{18}$

2 Points on a line

Does the point (4, −5) lie on the line
y = −x − 4 ?
You must show your working.

Put x = 4 into the equation: y = −1 × 4 − 4 = −8
The y-coordinate of the point is −5, which is not −8
Answer: No, when x = 4 the line has y = −8

3 Fractions of amounts

Priya has £375.

They spends $\frac{4}{5}$ of the money on a book.

They then spends $\frac{4}{5}$ of the money left on a drink.

How much money is left?

Book: £375 ÷ 5 × 4 = £300
Left: £375 − £300 = £75
Drink: £75 ÷ 5 × 4 = £60
Money left: £75 − £60 = £15
Answer: £15

4 Tables of values

Complete the table of values for y = 5x + 6

x = 2: y = 5 × 2 + 6 = 16
x = 3: y = 5 × 3 + 6 = 21
x = 4: y = 5 × 4 + 6 = 26
Answer: x = 2: 16, x = 3: 21, x = 4: 26

5 Perimeter with algebra

A rectangle has length (4x + 2) m and width (3x + 1) m.
The perimeter of the rectangle is 34 m.
(a) Work out the value of x.
(b) Work out the area of the rectangle.

(a) 2(4x + 2) + 2(3x + 1) = 34
14x + 6 = 34
14x = 28
x = 2
(b) Length = 10, width = 7, area = 10 × 7 = 70
Answer: (a) x = 2 (b) 70 m^2

6 Metric units

(a) Change 6.9 tonnes to kg.
(b) Change 1805 cm to m.

(a) 1 tonne = 1000 kg, so multiply by 1000: 6.9 × 1000 = 6900
(b) 1 m = 100 cm, so divide by 100: 1805 ÷ 100 = 18.05
Answer: (a) 6900 kg (b) 18.05 m

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7 Radius from area or circumference

The circumference of a circle is 45 cm. (Calculator)
Work out the diameter of the circle.
Give your answer correct to 1 decimal place.

Circumference = π × diameter
Diameter = 45 ÷ π = 14.324...
= 14.3 cm (1 d.p.)
Answer: 14.3 cm

8 Fraction problems

A fuel tank is $\frac{1}{4}$ full.

80 litres of fuel are added.

The fuel tank is now $\frac{1}{2}$ full.

Work out the capacity of the fuel tank.

Fraction added = $\frac{1}{2} - \frac{1}{4} = \frac{1}{4}$

$\frac{1}{4}$ of the capacity = 80 litres

Whole capacity = 80 × 4 = 320 litres
Answer: 320 litres

9 Speed unit conversion

A kite flies at 6 metres per second.
Work out this speed in kilometres per hour.

In 1 hour (3600 s) it travels 6 × 3600 = 21,600 m
21,600 m = 21.6 km
Answer: 21.6 km/h

10 Quadratic equation problem

A rectangle has length (x + 2) cm and width (x − 7) cm.
The area of the rectangle is 22 cm^2.
(a) Show that $x^2 - 5x - 36 = 0$
(b) Hence work out the length of the rectangle.

(a) Area = length × width: $(x + 2)(x - 7) = 22$
Expand: $x^2 - 5x - 14 = 22$
Subtract 22 from both sides: $x^2 - 5x - 36 = 0$
(b) Factorise: $(x - 9)(x + 4) = 0$, so $x = 9$ or $x = -4$
A length cannot be negative, so x = 9. Length = 9 + 2 = 11
Answer: (b) 11 cm