Day 36 **A Tier 10-a-day: Model Solutions**

1 Isosceles triangles and exterior angles

XYZ is an isosceles triangle with XY = XZ.
YZW is a straight line.
Angle YXZ = 92°.
Work out the size of angle x.
The diagram is not drawn accurately.

Base angles of an isosceles triangle are equal
Angle XYZ = (180 − 92) ÷ 2 = 44°
Exterior angle of a triangle = sum of the two opposite interior angles
x = 92 + 44 = 136
Answer: x = 136°

2 Finding a percentage change

The number of members of a club was 360 and is now 234.
Work out the percentage decrease.

Change = 360 − 234 = 126
Percentage decrease = $\frac{126}{360} \times 100 = 35\%$
Answer: 35% decrease

3 Circle theorems: angle in a semicircle

PQ is a diameter of the circle.
Angle QPR = 38°.
Work out the size of angle x.
Give a reason for each step of your working.

The angle in a semicircle is 90°, so angle PRQ = 90°
Angles in a triangle add up to 180°
x = 180 − 90 − 38 = 52
Answer: x = 52°

4 The quadratic formula

Solve $x^2 + 8x - 6 = 0$
Give your solutions correct to 2 decimal places. (Calculator)

Use $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ with a = 1, b = 8, c = −6
$x = \frac{-8 \pm \sqrt{8^2 - 4 \times 1 \times (-6)}}{2}$
$x = \frac{-8 \pm \sqrt{88}}{2}$
x = 0.69 or x = −8.69
Answer: x = 0.69 or x = −8.69

5 Percentages of percentages

30% of a number is 72. (Calculator)
Work out 45% of the same number.

30% = 72, so 1% = 72 ÷ 30 = 2.4
45% = 2.4 × 45 = 108
Answer: 108

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6 Algebraic formulae in context

A van hire company charges a fixed fee of £15 plus £15 for each day.
(a) Write a formula for the total cost, £C, after d days.
(b) Maria pays £180 in total. Work out the number of days.

(a) C = 15 + 15d
(b) 15 + 15d = 180
15d = 165
d = 11
Answer: (a) C = 15 + 15d (b) 11

7 Addition and multiplication rules

A spinner can land on red, blue or green.
P(red) = 0.55 and P(blue) = 0.25.
(a) Work out the probability that it lands on red or blue.
(b) Work out the probability that it lands on green.

(a) Mutually exclusive, so add: 0.55 + 0.25 = 0.8
(b) 1 − 0.8 = 0.2
Answer: (a) 0.8 (b) 0.2

8 Parallel and perpendicular lines

The line L has equation $y = -2x + 5$
Find the equation of the line that is parallel to L and passes through the point $(2, -2)$.

Parallel lines have the same gradient, so the gradient is -2
$y = -2x + c$, so $-2 = -2 \times 2 + c$
$c = 2$
$y = -2x + 2$
Answer: $y = -2x + 2$

9 Finding a rate of compound change

Oscar invests £13,000 in a savings account. (Calculator)
Compound interest is paid at a fixed rate each year.
After 2 years the investment is worth £14,332.50.
Work out the annual rate of interest.

Overall multiplier = £14,332.50 ÷ £13,000 = 1.1025
Take the square root: $\sqrt{1.1025} = 1.05$
Rate = (1.05 − 1) × 100 = 5%
Answer: 5%

10 Pressure

A crate exerts a force of 10 N on the floor.
The area in contact with the floor is 0.25 m^2.
Work out the pressure on the floor in N/m^2.

Pressure = force ÷ area
= 10 ÷ 0.25 = 40
Answer: 40 N/m^2