Day 135 **B Tier 10-a-day: Model Solutions**

1 Area of 2D shapes

Work out the area of the triangle.
The diagram is not drawn accurately.

Area of a triangle = ½ × base × height
½ × 16 × 4 = 32
Answer: 32 mm^2

2 Ratio, one part known

The ratio of pencils to pens among the items in a case is 8 : 3.
There are 9 pens.
How many pencils are there?

3 parts = 9 pens
1 part = 9 ÷ 3 = 3
pencils: 8 × 3 = 24
Answer: 24

3 Angles in quadrilaterals

WXYZ is a parallelogram.
Angle ZWX = 76°.
(a) Write down the size of angle XYZ.
(b) Work out the size of angle WXY.

(a) Opposite angles are equal, so angle XYZ = 76°
(b) Angles next to each other add up to 180°
180 − 76 = 104
Answer: (a) 76° (b) 104°

4 Decimal calculations

Work out
(a) 7.1 × 0.9
(b) 0.35 × 8

(a) 71 × 9 = 639
There are 2 decimal places in total, so the answer is 6.39
(b) 35 × 8 = 280, then divide by 100: 2.8
Answer: (a) 6.39 (b) 2.8

5 Density

A stone has a mass of 75 g and a volume of 30 cm^3.
Work out its density.
Give your answer in g/cm^3.

Density = mass ÷ volume
75 ÷ 30 = 2.5
Answer: 2.5 g/cm^3

6 Simple interest

Hannah invests £1500 for 4 years.
The account pays 3% simple interest per year.
(a) Work out the interest earned each year.
(b) Work out the total amount in the account after 4 years.

(a) 3% of £1500 = 1500 ÷ 100 × 3 = £45
(b) Interest over 4 years: 4 × £45 = £180
Total = £1500 + £180 = £1680
Answer: (a) £45 (b) £1680

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7 Radius from area or circumference

The circumference of a circle is 18 cm. (Calculator)
Work out the diameter of the circle.
Give your answer correct to 1 decimal place.

Circumference = π × diameter
Diameter = 18 ÷ π = 5.730...
= 5.7 cm (1 d.p.)
Answer: 5.7 cm

8 HCF and LCM

Find the (a) highest common factor (HCF), (b) lowest common multiple (LCM) of 45 and 35.

$45 = 3^2 \times 5$ and $35 = 5 \times 7$
(a) HCF: multiply the primes in both lists, using the smaller power: 5
(b) LCM: use the larger power of every prime: $3^2 \times 5 \times 7 = 315$
Answer: (a) 5 (b) 315

9 Algebraic proof

Show that $(2n + 3)^2 - (2n - 3)^2$ is a multiple of 24 for any whole number n.

Expand: $(2n + 3)^2 = 4n^2 + 12n + 9$ and $(2n - 3)^2 = 4n^2 - 12n + 9$
Subtract: the $4n^2$ terms and the 9s cancel, leaving 24n
24n is a multiple of 24
Answer: 24n is a multiple of 24

10 Solving quadratic equations

Solve $x^2 - 13x + 42 = 0$

Factorise: $(x - 7)(x - 6) = 0$
Either $x - 7 = 0$ or $x - 6 = 0$
Answer: x = 6 or x = 7