Day 253 **B Tier 10-a-day: Model Solutions**

1 Interior angles of regular polygons

Work out the size of one interior angle of a regular polygon with 18 sides.

Exterior angle = 360° ÷ 18 = 20°
Interior angle = 180° − 20° = 160°
Answer: 160°

2 Decimal calculations

Work out
(a) 7.5 × 0.3
(b) 0.32 × 4

(a) 75 × 3 = 225
There are 2 decimal places in total, so the answer is 2.25
(b) 32 × 4 = 128, then divide by 100: 1.28
Answer: (a) 2.25 (b) 1.28

3 Area of 2D shapes

The diagram shows a parallelogram.
Work out the area of the parallelogram.
The diagram is not drawn accurately.

Area of a parallelogram = base × perpendicular height
The slanting side is not needed
12 × 12 = 144
Answer: 144 mm^2

4 Distance-time graphs

The graph shows Priya's journey.
(a) How far did Priya travel in the first 60 minutes?
(b) Work out Priya's speed in the last 60 minutes. Give your answer in km/h.

(a) Read from the graph at 60 minutes: 20 km
(b) In the last section the distance changes by 2 km in 60 minutes
2 ÷ 1 = 2 km/h
Answer: (a) 20 km (b) 2 km/h

5 Expanding double brackets

Expand and simplify $(x - 6)(x + 4)$

Multiply every term in the first bracket by every term in the second:
$x^2 + 4x - 6x - 24$
Collect the x terms: $x^2 - 2x - 24$
Answer: $x^2 - 2x - 24$

6 LCM problems

Two lights flash at 08:00.
One light flashes every 8 minutes.
The other light flashes every 6 minutes.
At what time do both lights next flash together?

Multiples of 8: 8, 16, 24
Multiples of 6: 6, 12, 18, 24
The first common multiple is 24, so the LCM is 24 minutes
08:00 + 24 minutes = 08:24
Answer: 08:24

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7 Compound interest

£5,000 is invested for 3 years at 6% compound interest per year. (Calculator)
Work out the total interest earned.

Multiplier = 1.06

Value after 3 years = $5{,}000 \times 1.06^3 = £5{,}955.08$

Interest = £5,955.08 − £5,000 = £955.08

Answer: £955.08

8 Iteration

Here is an iteration formula.

$x_{n+1} = 4 + \frac{24}{x_n}$

$x_0 = 6$

(a) Work out x_1

(b) Work out x_2. Give your answer correct to 3 decimal places. (Calculator)

(a) $x_1 = 4 + \frac{24}{6} = 4 + 4 = 8$

(b) $x_2 = 4 + \frac{24}{8} = 7.0...$

= 7.000

Answer: (a) 8 (b) 7.000

9 Area of a triangle using sine

In triangle XYZ, XY = 16 m, YZ = 8 m and angle XYZ = 35°. (Calculator)
Work out the area of the triangle.
Give your answer correct to 1 decimal place.

Area = ½ab sin C

Area = ½ × 16 × 8 × sin 35°

= 36.709...

= 36.7 m^2 (1 d.p.)

Answer: 36.7 m^2

10 Reverse repeated percentages

In a sale, the price of a sofa is reduced by 10%. (Calculator)
Two weeks later it is reduced by a further 10% of the new price.
The final price is £648.
Work out the original price of the sofa.

Multipliers: 0.9 and 0.9

Overall multiplier = 0.9 × 0.9 = 0.81

Original price = £648 ÷ 0.81 = £800

Answer: £800