Day 213 **B Tier 10-a-day: Model Solutions**

1 Scaling a recipe

Here are the amounts needed to make soup for 6 people.
360 g of carrots, 900 ml of stock
Work out the amounts needed to make soup for 3 people.

For 1 person: 360 ÷ 6 = 60 g and 900 ÷ 6 = 150 ml
For 3 people: 60 × 3 = 180 and 150 × 3 = 450
Answer: 180 g of carrots, 450 ml of stock

2 Function notation

f(x) = 7x − 7
(a) Work out f(7)
(b) Solve f(x) = −21

(a) f(7) = 7 × 7 − 7 = 42
(b) 7x − 7 = −21
Add 7 to both sides: 7x = −14
Divide both sides by 7
Answer: (a) 42 (b) x = −2

3 Perimeter and area of compound shapes

The diagram shows the shape of a kitchen floor.
All the corners are right angles. All lengths are in cm.
(a) Find the perimeter.
(b) Find the area.

(a) Missing lengths: 13 − 4 = 9 and 9 − 5 = 4
Perimeter = 13 + 5 + 9 + 4 + 4 + 9 = 44
(b) Split into two rectangles: 13 × 5 = 65 and 4 × 4 = 16
65 + 16 = 81
Answer: (a) 44 cm (b) 81 cm^2

4 Ordering standard form

Write these numbers in order of size.
Start with the smallest.
6.2×10^{-3}, 0.55, 6.3×10^{4}, 0.078

Write each in standard form: 6.2×10^{-3}, 5.5×10^{-1}, 6.3×10^{4}, 7.8×10^{-2}
Compare the powers of 10 first (the bigger the power, the bigger the number)
Order: 6.2×10^{-3}, 0.078, 0.55, 6.3×10^{4}
Answer: 6.2×10^{-3}, 0.078, 0.55, 6.3×10^{4}

5 Arc length and sector area

The diagram shows a sector of a circle with radius 12 m and angle 150°.
Work out the length of the arc of the sector.
Give your answer in terms of π.
The diagram is not drawn accurately.

Arc length = $\frac{150}{360} \times 2 \times \pi \times 12$

$= \frac{150}{360} \times 24\pi = 10\pi$

Answer: 10π m

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6 Combined mean

In a test, the mean mark of 9 Class A is 55.
The mean mark of 6 Class B is 80.
Work out the mean mark of all 15 students.

Total for Class A = 9 × 55 = 495
Total for Class B = 6 × 80 = 480
Overall mean = (495 + 480) ÷ 15 = 975 ÷ 15 = 65
Answer: 65

7 Congruent triangles

Triangle PQR has a right angle, a hypotenuse of 12 cm and another side of 7 cm.
Triangle DEF has a right angle, a hypotenuse of 12 cm and another side of 7 cm.
Are the two triangles congruent?
Give a reason for your answer.

Both are right-angled with equal hypotenuses and one other equal side
So the triangles are congruent (RHS)
Answer: Yes, RHS (right angle, hypotenuse, side)

8 Fraction problems

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

65 litres of oil are added.

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

Work out the capacity of the storage tank.

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

$\frac{1}{4}$ of the capacity = 65 litres
Whole capacity = 65 × 4 = 260 litres
Answer: 260 litres

9 Points on a line

The point (3, k) lies on the line $y = -x + 2$
Work out the value of k.

Substitute x = 3: $k = -1 \times 3 + 2$
$k = -1$
Answer: $k = -1$

10 Reverse repeated percentages

In a sale, the price of a sofa is reduced by 40%. (Calculator)
Two weeks later it is reduced by a further 25% of the new price.
The final price is £67.50.
Work out the original price of the sofa.

Multipliers: 0.6 and 0.75
Overall multiplier = 0.6 × 0.75 = 0.45
Original price = £67.50 ÷ 0.45 = £150
Answer: £150