Day 186 **B Tier 10-a-day: Model Solutions**

1 Substitution

Work out the value of $5n - 9$ when $n = 8$

Replace n with 8: $5 \times 8 - 9$
$40 - 9 = 31$
Answer: 31

2 Perimeter and area of compound shapes

The diagram shows the shape of a garden.
All the corners are right angles. All lengths are in m.
(a) Calculate the perimeter.
(b) Calculate the area.

(a) Missing lengths: $10 - 7 = 3$ and $11 - 6 = 5$
Perimeter = $10 + 6 + 3 + 5 + 7 + 11 = 42$
(b) Split into two rectangles: $10 \times 6 = 60$ and $7 \times 5 = 35$
$60 + 35 = 95$
Answer: (a) 42 m (b) 95 m^2

3 Ordering fractions

Write these in order of size.
Start with the smallest.
0.75, $\frac{23}{25}$, 80%, 87.5%

Write each as a decimal:
$0.75 = 0.75$, $\frac{23}{25} = 0.92$, $80\% = 0.8$, $87.5\% = 0.875$
Order: 0.75, 80%, 87.5%, $\frac{23}{25}$
Answer: 0.75, 80%, 87.5%, $\frac{23}{25}$

4 Circle theorems

A, B and C are points on a circle.
AB is a diameter of the circle.
Angle CAB = 51°.
Work out the size of angle a.
Give a reason for each step of your working.
The diagram is not drawn accurately.

Angle ACB = 90° (the angle in a semicircle is a right angle)
$a = 180 - 90 - 51 = 39°$
(angles in a triangle add up to 180°)
Answer: a = 39°

5 Adding fractions

Work out
(a) $\frac{4}{5} + \frac{1}{9}$
(b) $\frac{1}{3} - \frac{1}{10}$
Give each answer in its simplest form.

(a) Common denominator 45: $\frac{36}{45} + \frac{5}{45} = \frac{41}{45}$
(b) Common denominator 30: $\frac{10}{30} - \frac{3}{30} = \frac{7}{30}$
Answer: (a) $\frac{41}{45}$ (b) $\frac{7}{30}$

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6 Inequalities on a number line

(a) Write down the inequality shown on the number line.
(b) Write down all the integers that satisfy the inequality.

(a) The circle at 0 is open and the circle at 4 is filled in
$0 < x \leq 4$
(b) The whole numbers on the shaded part: 1, 2, 3, 4
Answer: (a) $0 < x \leq 4$ (b) 1, 2, 3, 4

7 Grouped frequency tables

The table shows the lengths of some leaves.
(a) Write down the modal class.
(b) Work out an estimate for the mean.

(a) The highest frequency is 12
(b) Use the midpoint of each class: 25, 35, 45, 55
Sum of midpoint × frequency = 25 × 4 + 35 × 6 + 45 × 3 + 55 × 12 = 1105
Total frequency = 25
Estimate = 1105 ÷ 25 = 44.2
Answer: (a) $50 < l \leq 60$ (b) 44.2

8 Area of an isosceles trapezium

An isosceles trapezium has parallel sides of length 19 m and 9 m.
Each sloping side is 13 m long.
(a) Work out the perpendicular height of the trapezium.
(b) Work out the area of the trapezium.

(a) The difference in the parallel sides is 19 − 9 = 10, so each end sticks out 5
$h^2 = 13^2 - 5^2 = 169 - 25 = 144$, so h = 12
(b) Area = ½ × (19 + 9) × 12 = 168
Answer: (a) 12 m (b) 168 m^2

9 Pressure

A crate exerts a force of 160 newtons on the floor.
The area in contact with the floor is 8 m^2.
Work out the pressure on the floor.
Give your answer in N/m^2.

Pressure = force ÷ area
160 ÷ 8 = 20
Answer: 20 N/m^2

10 Reverse percentages

In a sale, all prices are reduced by 8%. (Calculator)
A jacket costs £110.40 in the sale.
Work out the original price of the jacket.

The sale price is 100% − 8% = 92% of the original price.
92% = £110.40, so 1% = £110.40 ÷ 92 = £1.20
100% = £1.20 × 100 = £120
Answer: £120