Day 323 **B Tier 10-a-day: Model Solutions**

1 Angles on a line and round a point

The diagram shows 3 angles on a straight line.
Work out the value of x.
The diagram is not drawn accurately.

Angles on a straight line add up to 180°
(3x + 25) + (2x + 10) + (x + 25) = 180
6x + 60 = 180
6x = 120
x = 120 ÷ 6 = 20
Answer: x = 20°

2 Cost formulae

A plumber charges a call-out fee of £18 plus £6 for each hour of work.
(a) Work out the total cost for 7 hours.
(b) The total cost is £102. Work out the number of hours.

(a) 6 × 7 = 42, then 18 + 42 = 60
(b) Take off the fixed charge: 102 − 18 = 84
Divide by the cost for each: 84 ÷ 6 = 14
Answer: (a) £60 (b) 14

3 Ordering fractions

Write these in order of size.
Start with the smallest.

0.7, 0.4, 75%, $\frac{5}{8}$

Write each as a decimal:

0.7 = 0.7, 0.4 = 0.4, 75% = 0.75, $\frac{5}{8}$ = 0.625

Order: 0.4, $\frac{5}{8}$, 0.7, 75%

Answer: 0.4, $\frac{5}{8}$, 0.7, 75%

4 Expanding and simplifying

Expand and simplify 2(x − 6) + 6(x − 3)

Expand each bracket: 2x − 12 + 6x − 18
Collect like terms: 8x − 30
Answer: 8x − 30

5 Mean from a frequency table

The table shows the numbers of brothers and sisters of some students.
Work out the mean.

Multiply each value by its frequency and add: 3 × 3 + 4 × 7 + 5 × 9 + 6 × 3 + 7 × 5 = 135
Total frequency = 3 + 7 + 9 + 3 + 5 = 27
Mean = 135 ÷ 27 = 5
Answer: 5

6 Ordering standard form

Write these numbers in order of size.
Start with the smallest.

2.1×10^{-2}, 920,000, 3.6×10^{4}, 0.0027

Write each in standard form: 2.1×10^{-2}, 9.2×10^{5}, 3.6×10^{4}, 2.7×10^{-3}
Compare the powers of 10 first (the bigger the power, the bigger the number)
Order: 0.0027, 2.1×10^{-2}, 3.6×10^{4}, 920,000
Answer: 0.0027, 2.1×10^{-2}, 3.6×10^{4}, 920,000

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7 Volume of cones and pyramids

A cone has base radius 3 cm and vertical height 8 cm. (Calculator)

Volume of a cone = $\frac{1}{3}\pi r^2 h$

Work out the volume of the cone.
Give your answer correct to 1 decimal place.

Volume = $\frac{1}{3} \times \pi \times 3^2 \times 8$

= 75.398...

= 75.4 cm^3 (1 d.p.)

Answer: 75.4 cm^3

8 Trial and improvement

The equation $x^3 + x = 63$ has a solution between 3 and 4. (Calculator)
Use trial and improvement to find this solution.
Give your answer correct to 1 decimal place.

x = 3.5: $3.5^3 + 3.5 = 46.375$ (too small)

x = 3.7: $3.7^3 + 3.7 = 54.353$ (too small)

x = 3.8: $3.8^3 + 3.8 = 58.672$ (too small)

x = 3.9: $3.9^3 + 3.9 = 63.219$ (too big)

x = 3.85: value = 60.917 (too small), so the solution is above 3.85

So x = 3.9 to 1 decimal place

Answer: x = 3.9

9 Frequency trees

There are 150 visitors.

$\frac{3}{10}$ of them are men and the rest are women.

$\frac{2}{5}$ of the men and $\frac{4}{5}$ of the women buy a drink.

One person is chosen at random. Work out the probability that they buy a drink.

men: $\frac{3}{10} \times 150 = 45$ and women: $150 - 45 = 105$

men who buy a drink: $\frac{2}{5} \times 45 = 18$

women who buy a drink: $\frac{4}{5} \times 105 = 84$

P = (18 + 84) out of 150

Answer: $\frac{17}{25}$

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 5% of the new price.
The final price is £684.
Work out the original price of the sofa.

Multipliers: 0.9 and 0.95

Overall multiplier = 0.9 × 0.95 = 0.855

Original price = £684 ÷ 0.855 = £800

Answer: £800