**Day 267** **B Tier 10-a-day: Model Solutions**

## 1 Equations with fractional answers

Solve $9x + 6 = 8$

Give your answer as a fraction in its simplest form.

Subtract 6 from both sides: $9x = 2$

Divide both sides by 9: $x = \frac{2}{9}$

**Answer: $x = \frac{2}{9}$**

## 2 Place value

Here are four digit cards.

2 1 7 9

Use all four cards to make the largest possible even number.

The last digit must be even. Put the biggest remaining digits first.
The largest even number is 9712
**Answer: 9712**

## 3 Cost formulae

A taxi firm charges £6 plus £5 for each mile travelled.
(a) Work out the total cost for 7 miles.
(b) The total cost is £81. Work out the number of miles.

(a) 5 × 7 = 35, then 6 + 35 = 41
(b) Take off the fixed charge: 81 − 6 = 75
Divide by the cost for each: 75 ÷ 5 = 15
**Answer: (a) £41 (b) 15**

## 4 Circumference and area of a circle

The diagram shows a circle with radius 8 m. (Calculator)
Work out the circumference of the circle.
Give your answer correct to 1 decimal place.
The diagram is not drawn accurately.

Circumference = 2 × π × radius
2 × π × 8 = 50.265...
= 50.3 m (1 d.p.)
**Answer: 50.3 m**

## 5 Using a given calculation

Use the fact that 28 × 34 = 952
to work out
(a) 2800 × 3.4
(b) 9.52 ÷ 28

(a) 2800 = 28 × 100 and 3.4 = 34 ÷ 10
So the answer is 952 × 10 = 9520
(b) 9.52 = 952 ÷ 100 and 28 is unchanged
952 ÷ 28 = 34, so the answer is 34 ÷ 100 = 0.34
**Answer: (a) 9520 (b) 0.34**

## 6 Distance, speed and time

A bus travels 36 km at an average speed of 24 km/h.
How long does the journey take?
Give your answer in hours and minutes.

Time = distance ÷ speed
36 ÷ 24 = 1.5 hours
1.5 hours = 1 hour 30 minutes
**Answer: 1 hour 30 minutes**

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## 7 Similar shapes

The two triangles are similar.
(a) Write down the scale factor of the enlargement from the smaller triangle to the larger triangle.
(b) Work out the value of a.
The diagram is not drawn accurately.

(a) Scale factor = 6 ÷ 3 = 2
(b) a is on the smaller triangle, so divide: 8 ÷ 2 = 4
**Answer: (a) 2 (b) a = 4 cm**

## 8 Trial and improvement

The equation $x^3 - 2x = 108$ has a solution between 4 and 5. (Calculator)
Use trial and improvement to find this solution.
Give your answer correct to 1 decimal place.

x = 4.5: $4.5^3 - 2 \times 4.5 = 82.125$ (too small)
x = 4.7: $4.7^3 - 2 \times 4.7 = 94.423$ (too small)
x = 4.8: $4.8^3 - 2 \times 4.8 = 100.992$ (too small)
x = 4.9: $4.9^3 - 2 \times 4.9 = 107.849$ (too small)
x = 4.95: value = 111.387 (too big), so the solution is below 4.95
So x = 4.9 to 1 decimal place
**Answer: x = 4.9**

## 9 Cumulative frequency

The cumulative frequency graph shows the times taken by 40 students to complete a puzzle.
(a) Use the graph to estimate the median.
(b) Work out an estimate for the interquartile range.

(a) Median is at 40 ÷ 2 = 20: read across from 20 on the vertical axis to the curve, then down: 85
(b) Lower quartile at 10: 65. Upper quartile at 30: 97.5
IQR = 97.5 − 65 = 32.5
**Answer: (a) 85 minutes (b) 32.5 minutes**

## 10 Loci

A goat is tied to a post in the middle of a large flat field by a rope 8 m long. (Calculator)
Work out the area of grass the goat can reach.
Give your answer correct to 1 decimal place.

The goat can reach a circle of radius 8 m
Area = $\pi \times 8^2 = 201.062...$
= 201.1 $m^2$ (1 d.p.)
**Answer: 201.1 $m^2$**