**Day 46** **S Tier 10-a-day**

**1** A tank is $\frac{3}{10}$ full.
18 more litres of water are added and the tank is then $\frac{3}{8}$ full.
Work out the capacity of the tank.

**2** The table shows the number of members in each of four groups.
(a) A stratified sample of 20 is taken. Work out how many come from Group D.
(b) A different stratified sample has 14 from Group B. Work out the size of this sample.

| | Group A | Group B | Group C | Group D |
|---|---|---|---|---|
| Number | 50 | 70 | 30 | 50 |

**3** Here are six numbers.
$\sqrt{0.25}, \sqrt{2} \times \sqrt{6}, \sqrt{2} + \sqrt{8}, \frac{1}{\sqrt{3}}, \sqrt{\frac{9}{16}}, \frac{\sqrt{20}}{\sqrt{5}}$
Write down the rational numbers.

**4** Two shapes are mathematically similar.
The smaller has height 21 cm and area 12 $cm^2$.
The larger has area $\frac{64}{3}$ $cm^2$.
Work out the height of the larger shape.

**5** (a) Show that the equation $x^3 + 2x - 24 = 0$ can be rearranged to give $x = \sqrt[3]{24 - 2x}$
(Calculator)
(b) Use the iteration formula $x_{n+1} = \sqrt[3]{24 - 2x_n}$ with $x_0 = 2$ to work out $x_1$ and $x_2$. Give each answer correct to 3 decimal places.

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| **6** A runner covers 800 metres, correct to the nearest 10 metres, in a time of 12.1 seconds, correct to 1 decimal place. (Calculator)<br>Work out the upper bound of the runner's average speed in metres per second. Give your answer correct to 3 significant figures. | |
| **7** Solve $x^4 - 5x^2 + 4 = 0$ | |
| **8** Write $\frac{8^{n+2} \times 4^{n+1}}{4^n}$ in the form $2^{an+c}$<br>where a and c are integers. | |
| **9** Machine A makes 40% of the bolts in a factory. Machine B makes the rest.<br>60% of the bolts from machine A are faulty.<br>30% of the bolts from machine B are faulty.<br>(a) Work out the probability that a bolt chosen at random is faulty.<br>(b) A faulty bolt is found. Work out the probability that it was made by machine A. | |
| **10** Solve $\frac{5}{x+2} - \frac{1}{x+5} = \frac{3}{2}$ | |