Day 310	S Tier 10-a-day
1 Given that $\frac{5^3 \times 25}{25^2} = 5^n$, find the value of n.	
2 Sparkle Cleaners has a call-out fee of £5 plus £2 per hour. Fresh Start has a call-out fee of £12.50 plus £1.50 per hour. (a) Work out the number of hours for which the two costs are the same. (b) Which is cheaper for 24 hours, and by how much?	
3 A metal pipe is a hollow cylinder of length 25 cm. (Calculator) The outer radius is 6 cm and the inner radius is 5 cm. The density of the metal is 8.9 g/cm^3. Work out the mass of the pipe. Give your answer in kilograms correct to 3 significant figures.	
4 A biased spinner lands on one of four outcomes with these probabilities. red: 3x; blue: 2x; green: x + 0.15; yellow: 0.25 (a) Work out the value of x. (b) The biased spinner is used 100 times. Work out an estimate for the number of times it lands on red.	
5 The mass of one grain of sand is 8×10^{-2} g. A bucket of sand has a total mass of 5.12×10^5 g. Work out how many there are in the bucket. Give your answer in standard form.	

Day 310 **S Tier 10-a-day**

6 The 3rd term of a geometric sequence is 9.
The 5th term of the sequence is 1.
All the terms of the sequence are positive.
(a) Work out the common ratio.
(b) Work out the first term.

7 T is inversely proportional to the cube of n.
When n = 4, T = 1.
Find the value of T when n = 1.

8 OA = $\mathbf{a}$ and OB = $\mathbf{b}$.
OP = $2\mathbf{a} - 3\mathbf{b}$, OQ = $8\mathbf{a} + 6\mathbf{b}$ and OR = $16\mathbf{a} + 18\mathbf{b}$.
(a) Show that P, Q and R lie on a straight line.
(b) Work out the ratio PQ : QR in its simplest form.

9 The table gives information about the times of some people.
Work out an estimate for the mean time.
Give your answer correct to 1 decimal place.
(Calculator)

Time, t (minutes)	Frequency density
$0 < t \leq 10$	1.8
$10 < t \leq 20$	0.7
$20 < t \leq 40$	1.9
$40 < t \leq 60$	1

10 In the diagram, DE is parallel to BC. AD = 8 cm, DB = 4 cm and the area of triangle ADE is 80 cm^2.
Work out the area of the trapezium DBCE.
The diagram is not drawn accurately.

