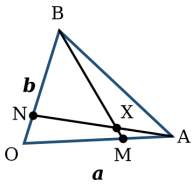
Day 301	S Tier 10-a-day
1 Find the smallest positive integer k such that $90 \times k$ is a square number.	
2 The vectors $\begin{pmatrix} k \\ 36 \end{pmatrix}$ and $\begin{pmatrix} 2 \\ 2k \end{pmatrix}$ are parallel. k is a positive number. Work out the value of k.	
3 Use the iteration formula $x_{n+1} = \sqrt[3]{2x_n + 2}$ with $x_0 = 4$ (Calculator) to work out x_1, x_2 and x_3. Give each answer correct to 3 decimal places.	
4 a = 6.3 and b = 2.1, both correct to 1 decimal place. Work out the upper bound of a ÷ b. Give your answer correct to 3 significant figures.	
5 A and B are points on the curve $y = -x^2 + x + 5$. The x coordinate of A is 3 and the x coordinate of B is 5. Work out the gradient of the line AB.	

Day 301	S Tier 10-a-day
6 A metal crate in the shape of a cuboid weighs 240 N. Its smallest face has area 600 cm^2. Its largest face has area 1,200 cm^2. Pressure = force ÷ area Work out (a) the greatest pressure and (b) the least pressure the metal crate can exert on the ground, in N/m^2.	
7 A boat leaves a harbour P and travels 55 km on a bearing of 345° to Q. (Calculator) It then travels 32 km on a bearing of 260° to R. (a) Work out the distance PR. (b) Work out the bearing of R from P. Give distances to 1 decimal place and the bearing to the nearest degree.	
8 A train travels at a constant speed of 36 km/h. It takes 25 seconds to cross completely over a bridge which is 120 m long. Work out the length of the train, in metres.	
9 OAB is a triangle. OA = **a** and OB = **b**. M is on OA with OM : MA = 2 : 1. N is on OB with ON : NB = 1 : 3. AN and BM intersect at X. (a) Find BM in terms of **a** and **b**. (b) Find OX in terms of **a** and **b**. The diagram is not drawn accurately. 	
10 The lengths of the sides of a right-angled triangle are (x − 2) cm, (x − 3) cm and (x − 1) cm. The longest side is (x − 1) cm. (a) Show that $x^2 - 8x + 12 = 0$ (b) Hence work out the area of the triangle.	