Day 315	S Tier 10-a-day
1 20 beetles in a field are caught, marked and put back. Later, a second sample of 40 beetles is caught. 4 of these are marked. (a) Work out an estimate for the number of beetles in a field. (b) State one assumption you have made.	
2 Gareth cycles $\frac{5}{7}$ of a route before lunch. After lunch he cycles $\frac{5}{9}$ of the remaining distance. The distance he cycles after lunch is 30 km. How long is the route, in km?	
3 Kira changes £1000 into dollars at £1 = $1.15. Kira spends $170 and then changes the rest back into pounds at £1 = $1.6. How many pounds does Kira get back?	
4 The diagram shows a running track made from a rectangle and two semicircles. (a) Work out the total length of the boundary of the track. (b) Work out the area enclosed by the track. Give your answers in terms of π. The diagram is not drawn accurately. 	
5 Expand and simplify $(2x + 5)(x - 3)(x + 1)$	

Day 315	S Tier 10-a-day

6 An alloy is made by mixing 60 cm^3 of tin with 100 cm^3 of lead.
The density of tin is 7.3 g/cm^3. The density of lead is 11.3 g/cm^3.
Work out the density of the alloy.

7 Show that the line $y = -x - 14$ is a tangent to the circle $x^2 + y^2 = 98$.
Find the coordinates of the point where the line touches the circle.

8 Write $\frac{5+\sqrt{3}}{3+\sqrt{3}}$ in the form $p + q\sqrt{3}$
where p and q are rational numbers.

9 $f(x) = \frac{-5x-4}{3x+5}$ where $x \neq -\frac{5}{3}$
(a) Show that $ff(x) = x$.
(b) Write down $f^{-1}(x)$.

10 OAB is a triangle. OA = **a** and OB = **b**.
M is on OA with OM : MA = 3 : 2. N is on OB with ON : NB = 2 : 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.

