Day 308	A Level Maths: B Tier 10-a-day
1 Items numbered 1 to 240; systematic sample of size 24. (a) Find the sampling interval. (b) The first item is number 5. Find the 5-th item.	
2 Solve $5x - 8 \geq -3x - 7$.	
3 The vector $\mathbf{a} = \begin{pmatrix} -8 \\ -8 \\ 4 \end{pmatrix}$. Find $\lvert\mathbf{a}\rvert$ and a unit vector in the direction of $\mathbf{a}$.	
4 A geometric sequence has first term 50 and common ratio 0.9. Find the smallest n for which the nth term is less than 1.	
5 A car of mass 1000 kg moves along a horizontal road. The engine works at a constant rate of 36 kW. The resistance to motion is constant at 500 N. Find the acceleration when the speed is 8 m s^{-1}.	

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6 A circle has centre (5, 3) and passes through the point (2, −1). Find an equation of the circle.	
7 A particle moves in a straight line. At time t s its velocity is $v = 12t - 2t^2$ m s^{-1}, for $t \geq 0$. Find the maximum speed of the particle and the time at which it occurs.	
8 Line l_1: $\mathbf{r} = \begin{pmatrix} 4 \\ -3 \\ 2 \end{pmatrix} + \lambda \begin{pmatrix} -2 \\ 2 \\ 0 \end{pmatrix}$. Line l_2: $\mathbf{r} = \begin{pmatrix} 8 \\ -10 \\ -4 \end{pmatrix} + \mu \begin{pmatrix} -2 \\ 3 \\ 2 \end{pmatrix}$. Show that l_1 and l_2 intersect and find the point.	
9 A factory says a proportion 0.3 of its parts are defective. In a sample of 50 parts, 19 are defective. Test, at the 5% significance level, whether the proportion is different from 0.3.	
10 A chord AB subtends an angle of 1.2 radians at the centre O of a circle of radius 8 cm. Find the perimeter of the minor segment, to 3 s.f.	