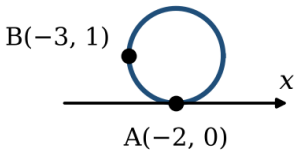
Day 247	A Level Maths: A Tier 10-a-day
1 Simplify $\frac{x^2 - 1}{(x - 1)} \div \frac{(x + 1)}{(x - 2)}$.	
2 Find the exact value of $\int_0^{\frac{\pi}{2}} (\sin 2x + \cos x)\, dx$.	
3 X has a binomial distribution with mean 16 and variance 8. (a) Find n and p. (b) Find P(X = 14) to 3 significant figures.	
4 A 2000 kg car has engine power 60 kW and constant resistance 1200 N. Find (a) its greatest steady speed on a horizontal road, (b) its acceleration at 12 m s^{-1} up a hill where sin $\alpha = \frac{1}{20}$. Take g = 10.	
5 Find the coefficient of x^3 in the expansion of $(2 + x)(1 - x)^7$.	

Day 247 **A Level Maths: A Tier 10-a-day**

6 The vectors $\begin{pmatrix} k \\ k \\ -1 \end{pmatrix}$ and $\begin{pmatrix} k \\ -1 \\ 20 \end{pmatrix}$ are perpendicular.
Find the possible values of k and, for the larger value, the exact length of the first vector.

7 The diagram shows a circle that touches the x-axis at A(−2, 0) and passes through B(−3, 1).
Find the equation of the circle.



8 A ball is projected from a point O on horizontal ground at angle α above the horizontal, tan α = $\frac{4}{3}$, and passes through A, 12 m horizontally from O and 6 m above the ground. Find the speed of projection. Take g = 9.8.

9 $y = (x - 2)e^{-x}$.
Find the exact coordinates of the stationary point and determine its nature.

10 X ~ B(40, 0.6). Use a normal approximation to estimate P(X ≥ 22) to 3 significant figures.