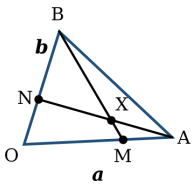
Day 64 **IGCSE 10-a-day**

1 The line $y = -7x + 3$ meets the curve $y = -x^2 - 3x - 1$.
Show that the line is a tangent to the curve and find the coordinates of the point where they touch.

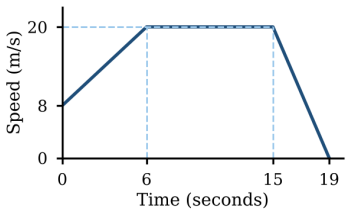
2 $f(x) = ax + b$, where a and b are constants.
$f(4) = -2$ and $f(0) = -6$.
Find the value of a and the value of b.

3 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 = 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.



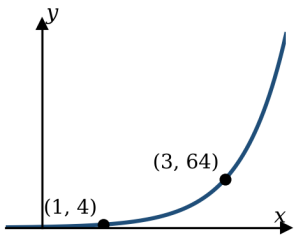
4 A particle moves in a straight line. After t seconds its displacement from O is s metres, where
$s = 8t^{\frac{3}{2}} + 2t^2$ $(t \geq 0)$
Find the velocity and the acceleration of the particle when t = 4.

5 The graph shows the speed of a train during 19 seconds.
(a) Work out the acceleration during the first 6 seconds.
(b) Work out the average speed over the whole 19 seconds.



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6 The diagram shows the graph of $y = ka^x$, where k and a are constants and $a > 0$.
The curve passes through the points (1, 4) and (3, 64).
Find the value of k and the value of a.



7 The number of fish in a lake, N, after t months is modelled by
$N = -t^3 + 9t^2 + 2t + 500$ for $0 \leq t \leq 12$
Find the time at which N is increasing most rapidly, and the rate of increase at this time.

8 The population of a town is decreased by 25%.
The new amount is then decreased by 10%.
Work out the overall percentage change.

9 Given that $(a + \sqrt{11})^2 = 75 + 16\sqrt{11}$,
where a is a positive integer, find the value of a.

10 $\mathbf{OA} = \mathbf{a}$, $\mathbf{OB} = \mathbf{b}$, $\mathbf{OP} = \frac{1}{2}\mathbf{a}$ and $\mathbf{OQ} = \frac{1}{4}\mathbf{b}$.
AQ and BP meet at X.
(a) Find $\mathbf{OX}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.
(b) Find the ratio AX : XQ.

