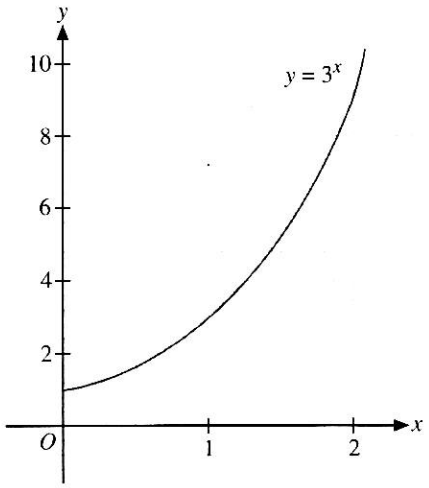
9.



The diagram shows the graph of $y = 3^x$. It cuts the y-axis at the point A.

(a) Find the coordinates of A.

(b) By drawing a tangent, find the gradient of the curve at $x = 1$.

(c) By adding a suitable line on the graph, find the value of x such that $x > 0$ and $x + 4 = 3^x$.

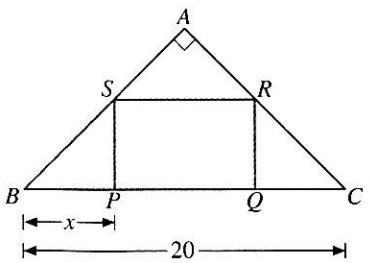
10. The equation of a graph is $y = (x - p)(x - q)(x + 3) - 5$, where p and q are positive integers, and $p > q > 0$. The point (1, 3) lies on the graph.

(a) Show that $(p - 1)(q - 1) = 2$.

(b) Using **(a)** and the given information, deduce the values of p and q.

(c) Find the y-intercept of the graph.

11. In the diagram, $\triangle ABC$ is a right-angled isosceles triangle. $PQRS$ is a rectangle inscribed in $\triangle ABC$. $BC = 20$ cm and $BP = x$ cm. Let y cm^2 be the area of $PQRS$.



(a) Show that $y = 20x - 2x^2$.

(b) Draw the graph of $y = 20x - 2x^2$ for $0 \leqslant x \leqslant 10$.

(c) Find the maximum area of $PQRS$ and the corresponding value of x.

(d) Use the graph to find two values of x such that the area of $PQRS$ is 40 cm^2.

12. A cannon ball is fired from a cliff into the sea. The height, h metres, of the cannon ball above sea level at time t seconds after firing is given by the equation $h = 5(10 + 4t - t^2)$, where $0 \leqslant t \leqslant 6$.

(a) Find the height of the cliff above sea level.

(b) Draw the graph of h against t for $0 \leqslant t \leqslant 6$.

(c) Find the greatest height of the cannon ball above sea level.

(d) Use the graph to find

(i) the length of time for which the height of the cannon ball is more than 60 m above sea level,

(ii) the time at which the cannon ball hits the sea.