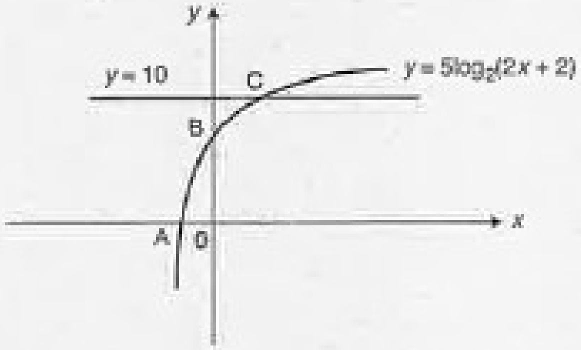
TEST PAPER C

1. Find the coordinates of A, B and C when the equation of the curve is $y = 5\log_2(2x + 2)$ and the equation of the line is $y = 10$.



2. Stationary values of the function $2x^3 + mx$ occur when $x = \pm 2$. Find the value of m. Hence state $f(x)$ and $f(-1)$.

3. *(a)* Find the coordinates of the centre and the length of the radius of the circle with equation

$$x^2 + y^2 - 2x + 6y + 1 = 0.$$

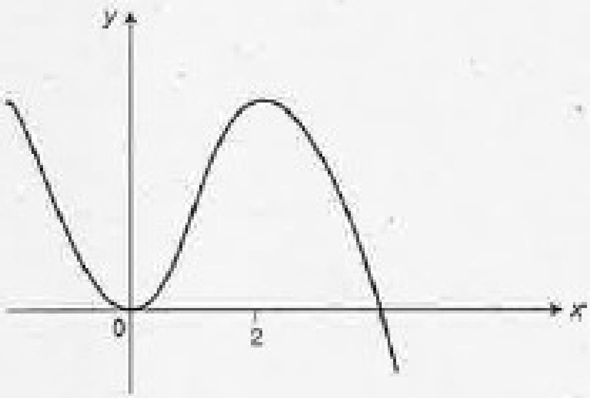
(b) State the equation of the circle after reflection in the y-axis.

4. The vertices of a triangle are A(–1, 3), B(2, –1) and C(5, 4).

Find the equation of the altitude BQ.

5. The graph of $f(x)$ is shown.

Make a rough sketch of $f'(x)$.



6. *(a)* Given that $(x + 1)$ is a factor of $f(x) = x^3 + 3x^2 - 13x - 15$, fully factorise $f(x)$.

(b) State the coordinates of the points where $f(x)$ meets the axes.

7. *(a)* A is the point (2, −1, 3), B is the point (1, 6, −4). P divides AB in the ratio 2 : −3. Find the coordinates of P.

(b) State the ratios AB : PB and AB : BP.

8. *(a)* Using the method of completing the square, find the minimum value of $y = x^2 + 4x + 11$.

(b) Make a rough sketch of the curve showing the turning point and any axis intercepts.

(c) From your sketch, state the nature of the roots of the equation, giving an explanation.

9. A certain sequence of numbers is defined by the recurrence relation $u_{n+1} = 0{\cdot}4u_n + 12$.

Explain why this sequence has a limit and find the limit of the sequence.

10. If the points (1, 2), $(a, 4)$ and $(b, 1)$ are collinear, show that $a + 2b = 3$.

11. If $\tan x = \frac{5}{12}$, $\tan y = \frac{3}{4}$. Show that $\cos(x - y) - \sin(x + y) = \frac{7}{65}$.

12. If $\int_b^2 (3x^2 - 2)\,dx = 3$, find b.