

TEST PAPER B

1. The vertices of a triangle are $P(2, -1)$, $Q(3, 2)$ and $R(6, 5)$.

Find the equation of the altitude AQ .

2. $P = (2, a, -3)$, $Q = (1, a, a)$. If OP is perpendicular to OQ , find the value of a .

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

$$x^2 + y^2 - 4x + 2y + 1 = 0.$$

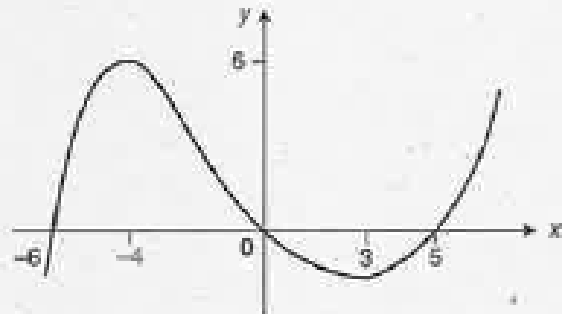
(b) Find the equation of this circle reflected in the x -axis.

4. Stationary values of the function $x^3 + mx$ occur when $x = \pm 1$. Find the value of m .

5. Find the value of $(\sqrt{3} + 2\sqrt{2})^2$.

6. The graph shown is $f(x)$.

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



7. If the function $3x^3 - 16x^2 + px + 10$ is divisible by $(x - 1)$, find p and fully factorise the function.

8. If $f'(x) = 3x - 2$ and $f(2) = 7$, find $f(x)$.

9. If $f(x) = 2x^2$ and $g(x) = 3x - 1$, find $f(g(x))$.

10. (a) Show that the function $3x^2 - 4x + 2$ has no real roots.
- (b) Show by completing the square that the function $3x^2 - 4x + 2$ has minimum value $\frac{2}{3}$.
- (c) Make a rough sketch of the function.
11. (a) If $u_{r+1} = mu_r + c$ and $u_0 = 1$, $u_1 = -3$ and $u_2 = 21$, find m and c and state the relationship in the form $u_{r+1} = mu_r + c$.
- (b) Find u_3 and u_{-1} .
- (c) Find a value for u_r such that $u_{r+1} = u_r$.
12. If $\sin x = \frac{2}{5}$ ($0 < x < 90$), find the exact values of $\sin 2x$ and $\cos 2x$.