

TEST PAPER F

- (a) Given that $(x + 2)$ is a factor of $f(x) = x^3 - 3x^2 - 6x + 8$, fully factorise $f(x)$.

(b) State the coordinates of the points where $f(x)$ meets the axes.
(To show that $(x + 2)$ is a factor of $f(x)$ show that $f(-2) = 0$ and factorise the function fully.)
- (a) A is the point $(1, -2, 4)$, B is the point $(-2, 4, 1)$. P divides AB in the ratio 2 : 1. Find the coordinates of P.

(b) State the ratio AP : BP.
- The vertices of a triangle are L(2, 4), M(-1, -2) and N(3, 7). Find the equation of the altitude LQ.
- (a) Find the coordinates of the centre and the length of the radius of the circle with equation
$$x^2 + y^2 - 6x + 8y + 9 = 0.$$

(b) Find the equation of this circle after reflection in the x -axis.
- Stationary values of the function $4x^3 + mx$ occur when $x = \pm \frac{\sqrt{3}}{2}$

(a) Find the value of m .

(b) State $f(x)$ and find $f(-2)$.
- Find the value of $(2\sqrt{3} - 5\sqrt{2})^2$.
- If $f(x) = \frac{x^3 + 2x^2 - 3x - 1}{3x^2}$ find $f'(x)$.
- $f(x) = x^3 - 5x^2 - x + d$. If $f(x)$ is divisible by $(x + 1)$, find d and fully factorise the function.

9. (a) If $u_{r+1} = mu_r + c$ and $u_0 = 3$, $u_1 = 2$ and $u_2 = 4$, 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 $u_{r+1} = u_r$.

10. (a) Find the value of p if $f(x) = 2x^2 + 6x + p$ has equal roots.
- (b) State the coordinates of this root.
- (c) Make a rough sketch of the curve showing clearly where $f(x)$ meets the axes.

11. Evaluate $\int_{\pi/3}^{\pi/2} \sin x \, dx$.

12. Solve $4 \sin 2x - 2 = 0$; $0 < x < 360$.