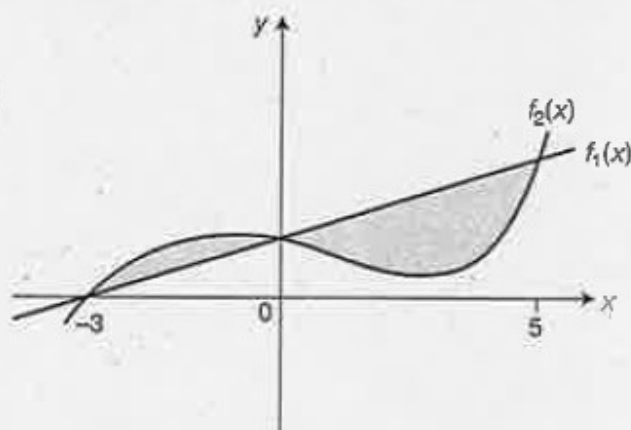


TEST PAPER J

1. A is the point $(3, 1, 3)$, B is the point $(-2, 2, -2)$. P divides AB in the ratio $2 : 3$. Find the coordinates of P.
2. The vertices of a triangle are $P(2, 7)$, $Q(0, -1)$ and $R(-5, 4)$. Find the equation of the altitude AR.
3. If the points $(1, -1)$, $(a, 2)$ and $(b, 1)$ are collinear, show that $3b - 2a = 1$.
4. Stationary values of the function $4x^3 + mx$ occur when $x = \pm \frac{3}{2}$. Find the value of m .
5. Find the value of $(2\sqrt{3} + 3\sqrt{2})^2$.
6. Give an expression for the total sum of the shaded areas as the sum of two integrals.

curve = $f_2(x)$
line = $f_1(x)$



7. A sequence is given by the recurrence relation $u_{r+1} = ku_r + t$.
 - (a) Find k and t if $u_0 = 0$, $u_1 = 2$ and $u_2 = -4$.
 - (b) Find u_4 and u_{-1} .
8. Show by completing the square that the function $4x^2 + 4x + 5$ has minimum value 4.

9. Find the equation of the tangent to the curve $y = 3x^2 - 2x + 1$ which is parallel to the line with equation $y = x - 3$.

10. $f(x) = 2x^2 - bx + 3$. Find the value of b if the function

(a) has equal roots

(b) has real roots

(c) has no real roots.

(d) Make a sketch for each case.

11. In a right-angled triangle $\sin A = \frac{2}{3}$. Show that the exact value of $\tan 2A = 4\sqrt{5}$.

12. (a) Find the centre of the circle $x^2 + y^2 - 10x + 2y + 1 = 0$.

(b) Find the equation of the tangent to this circle through the point $Q(1, 2)$ on the circle.

(c) Find the coordinates of the points where the tangent meets the axes.