

## TEST PAPER L

1. If  $\frac{x^2 + 100}{x + 10} = x - 10 + \frac{k}{x + 10}$ , find  $k$ .

2. If the points  $(3, -1)$ ,  $(a, 2)$  and  $(b, 5)$  are collinear, show that  $2a - b = 3$ .

3.  $K = 3 \cos \left( 3x - \frac{\pi}{2} \right)$ ,  $0 \leq x \leq 2\pi$ .

Find the maximum and minimum values of  $D$  and the values of  $x$  where these occur.

4. Solve  $2 \cos 2x - 1 = 0$ ,  $0 < x < 360$ .

5.  $f(x) = x(x^2 + 4)(x^2 - 3)(x^2 - 1)$ ,  $x \in R$ .

Find the number of values of  $x$  for which  $f(x) = 0$ .

State these values in a solution set.

6. If  $x^3 + 3x^2 - 4x + q$  is divisible by  $(x - 2)$ , find the value of  $q$ .

7. The vertices of a triangle are  $P(-1, 5)$ ,  $Q(-3, 2)$  and  $R(9, -1)$ . Find the equation of the altitude  $AP$ .

8. (a)  $u_{r+1} = ku_r + t$ . Find  $k$  and  $t$  if  $u_0 = 2$ ,  $u_1 = -2$  and  $u_2 = 10$ .

(b) Find the value of  $u_r$  such that  $u_{r+1} = u_r$ .

9. Sketch the graph of  $f(x) = 3 \cos 2x$  for  $0 \leq x \leq 2\pi$ .

Show clearly the maximum and minimum values and the  $x$ -,  $y$ -intercepts.

10.  $f(x) = ax^2 + 4x - 2$ . Find the value of  $a$  if the function

- (a) has equal roots
- (b) has real roots
- (c) has no real roots.
- (d) Make a sketch for each case.

11. (a) Find the equation of the tangent to the curve  $y = x^3 - 4x^2 + 2x$  at the point where  $x = 1$ .

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

12. Given  $A = (-1, 4, -2)$ ,  $B = (1, 2, -3)$  and  $C = (0, 3, -4)$ ,

show that the cosine of angle  $BAC = \frac{2}{\sqrt{6}}$

and comment on the type of angle.