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**Pure Mathematics-1**

**TOPIC- Quadratics**

Mixed ( Diff. ,Func. )

## QUADRATICS-MIXED(Diff., Func.)

1. The equation of a curve is  $y = 8x - x^2$ .

(i) Express  $8x - x^2$  in the form  $a - (x + b)^2$ , stating the numerical values of  $a$  and  $b$ . [3]

(ii) Hence, or otherwise, find the coordinates of the stationary point of the curve. [2]

(iii) Find the set of values of  $x$  for which  $y \geq -20$ . [3]

The function  $g$  is defined by  $g : x \mapsto 8x - x^2$ , for  $x \geq 4$ .

(iv) State the domain and range of  $g^{-1}$ . [2]

(v) Find an expression, in terms of  $x$ , for  $g^{-1}(x)$ . [3]

## QUADRATICS-MIXED(Diff., Func.)

57-4-1  
2  
The curve  $y = 9 - \frac{6}{x}$  and the line  $y + x = 8$  intersect at two points. Find

- (i) the coordinates of the two points, [4]  
(ii) the equation of the perpendicular bisector of the line joining the two points. [4]

57-8-1  
3  
The equation of a curve  $C$  is  $y = 2x^2 - 8x + 9$  and the equation of a line  $L$  is  $x + y = 3$ .

- (i) Find the  $x$ -coordinates of the points of intersection of  $L$  and  $C$ . [4]  
(ii) Show that one of these points is also the stationary point of  $C$ . [3]

## QUADRATICS-MIXED(Diff., Func.)

The equation of a curve is  $xy = 12$  and the equation of a line  $l$  is  $2x + y = k$ , where  $k$  is a constant.

- 7-5-18
- (i) In the case where  $k = 11$ , find the coordinates of the points of intersection of  $l$  and the curve. [3]
- (ii) Find the set of values of  $k$  for which  $l$  does not intersect the curve. [4]
- (iii) In the case where  $k = 10$ , one of the points of intersection is  $P(2, 6)$ . Find the angle, in degrees correct to 1 decimal place, between  $l$  and the tangent to the curve at  $P$ . [4]
- 4

## QUADRATICS-MIXED (Diff., Func., Cor Geo.)

5 The equation of a curve is  $y = x^2 - 4x + 7$  and the equation of a line is  $y + 3x = 9$ . The curve and the line intersect at the points  $A$  and  $B$ .

(i) The mid-point of  $AB$  is  $M$ . Show that the coordinates of  $M$  are  $(\frac{1}{2}, 7\frac{1}{2})$ . [4]

(ii) Find the coordinates of the point  $Q$  on the curve at which the tangent is parallel to the line  $y + 3x = 9$ . [3]

(iii) Find the distance  $MQ$ . [1]

## QUADRATICS-MIXED (Diff., Func., Cor Geo.)

The equation of a curve is  $y = x^2 - 3x + 4$ .

6

(i) Show that the whole of the curve lies above the  $x$ -axis. [3]

(ii) Find the set of values of  $x$  for which  $x^2 - 3x + 4$  is a decreasing function of  $x$ . [1]

The equation of a line is  $y + 2x = k$ , where  $k$  is a constant.

(iii) In the case where  $k = 6$ , find the coordinates of the points of intersection of the line and the curve. [3]

(iv) Find the value of  $k$  for which the line is a tangent to the curve. [3]