Cambridge International AS & A Level

Mathematics

9709

Paper 1 Pure Mathematics 1

Topic 1-Quadratics

Question No (17)

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The equation of a curve is $y = 2x^2 + m(2x + 1)$, where m is a constant,

And the equation of a line is y=6x+4 . Show that, for all values of m, the line intersects the curve at two distinct points.

Solution

Equation of curve

$$j = dx^2 + m(2n+1) \rightarrow 0$$

Equation of line

 $j = 6x + 4 \rightarrow 0$

80 ling 0×2
 $6x + 4 = 2x^2 + m(2n+1)$
 $2x^2 + 2mx + m - 6x - 4 \neq 0$
 $2x^2 + (2m - 6)x + (n - 6) \neq 0$

By differentiat

 $a = 2, b = 2m - 6, c = m - 4$
 $b^2 - 4ac = (2m - 6)^2 - 4(2)(m - 4)$
 $= 4m^2 - 2um + 36 - 8(m - 4)$
 $= 4m^2 - 2um + 36 - 8m + 52$
 $= 4m^2 - 32m + 68$
 $= 4(m^2 - 8m) + 63$
 $= 4(m^2 - 2(4)m) + 63$
 $= 4(m^2 - 2(4)m + 6)^2 - (4)^2 + 68$
 $= 4(m - 4)^2 - 64 + 63$

= 4 6m-4) +4 As 470 and (m-4) always greates than 0 due to square \(\text{ (m-4)} + 4 > 0 \) for all m \(\text{ b}^2 - 400 \) > 0 80 The line Intersects The word at two distinct points		
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