**EXCELLENCE QUESTION ON AREA BETWEEN CURVES.**



P

The tangent to the curve ***y = 4x2 – x3*** at the point ***x = 3*** meets the curve again at the point P.

Find the area enclosed between the tangent and the curve.

***SOLUTION:***



***Finding the equation of the tangent:***

***y = 4x2 – x3 If x = 3 the y = 9***

***yꞌ = 8x – 3x2***

***sub x = 3***

***yꞌ = - 3***

***The equ of the tan is of the form y = mx + c***

 ***Subs 9 = -3×3 + c***

 ***So c = 18***

***Tangent is y = -3x + 18***

 ***Finding the coords of P***

***The curves intersect when -3x + 18 = 4x2 – x3***

 ***So x3 – 4x2 – 3x + 18 = 0***

***(clever bit! Since the line is a tangent, there must be a double solution at x = 3)***

***So x3 – 4x2 – 3x + 18 = 0***

***Must have factors like (x – 3)(x – 3)( x – b)***

***By simple inspection, we get (x – 3)(x – 3)( x + 2) = 0***

***So P is at x = -2***

 ***The required integral is :***

 3

 = ***-3x2 + 18x – 4x3 + x4***

 ***2 3 4*** -2

 = 625/12 = 52.08333…