The locus of a point, which moves such that the sum of squares of its distances from the points (0, 0), (1, 0), (0, 1), (1, 1) is 18 units, is a circle of diameter d. Then d^2 is equal to _____.

Answer

Correct Answer is **16**

Explanation

Let point P(x, y)

A(0, 0), B(1, 0), C(0, 1), D(1, 1)

$(PA)^2 + (PB)^2 + (PC)^2 + (PD)^2 = 18$

$x^2 + y^2 + x^2 + (y-1)^2 + (x-1)^2 + y^2 + (x-1)^2 + (y-1)^2 = 18$

$\Rightarrow 4(x^2 + y^2) - 4y - 4x = 14$

$\Rightarrow x^2 + y^2 - x - y - \frac{7}{2} = 0$

$d = 2\sqrt{\frac{1}{4} + \frac{1}{4} + \frac{7}{2}}$

$\Rightarrow d^2 = 16$

Question 1: Let the tangents drawn from the origin to the circle $x^2 + y^2 - 8x - 4y + 16 = 0$ touch it at the point A and B. The $(AB)^2$ is equal to

(a) 32/5   (b) 64/5   (c) 52/5

      (d) 56/5

Answer: (b)

Solution:
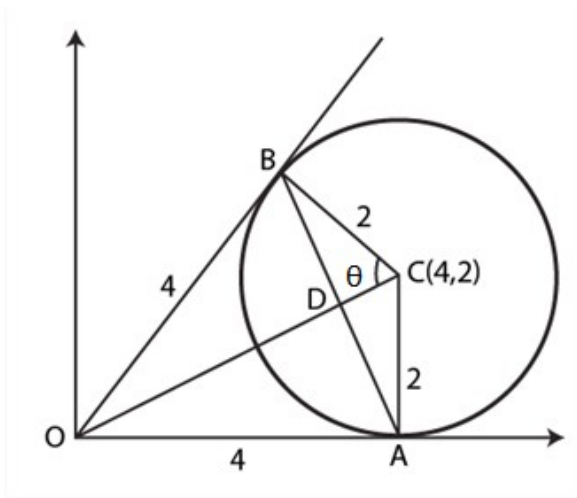
$x^2 + y^2 - 8x - 4y + 16 = 0$

Rearranging above equation, we get

$(x - 4)^2 + (y - 2)^2 = 4$

Centre = (4, 2) and

Radius = 2

OA = OB = 4

In triangle, OBC,

tan θ = 4/2 = 2

and sinθ = 2/√5

In triangle, BDC

sinθ = BD/2 => BD = 4/√5

Length of chord of contact = AB = 8/√5