

**Example** A point moves such that its distance from the point  $(4, 0)$  is half that of its distance from the line  $x = 16$ . The locus of the point is

(A)  $3x^2 + 4y^2 = 192$

(B)  $4x^2 + 3y^2 = 192$

(C)  $x^2 + y^2 = 192$

(D) None of these

**Solution** The correct choice is (A). Let  $(h, k)$  be the coordinates of the moving point. Then, we have

$$\sqrt{(h-4)^2 + k^2} = \frac{1}{2} \frac{h-16}{\sqrt{1^2 + 0}} \quad (\text{Why?})$$

$$(h - 4)^2 + k^2 = \frac{1}{4} (h - 16)^2$$

$$4 (h^2 - 8h + 16 + k^2) = h^2 - 32h + 256$$

or 
$$3h^2 + 4k^2 = 192$$

Hence, the required locus is given by  $3x^2 + 4y^2 = 192$