Q. If the circles $x^2 + y^2 + 2a'x + 2b'y + \frac{c'}{2} = 0$ and $2x^2 + 2y^2 + 2ax + 2by + c = 0$ intersect orthogonally, Then which of the following is **TRUE**?

[A] $2aa' + 2bb' = c + c'$

[B] $2aa' + 2bb' = c + \frac{c'}{2}$

[C] $2aa' + 2bb' = \frac{c}{2} + \frac{c'}{2}$

[D] $aa' + bb' = c + c'$

Sol. The given circles are

$$x^2 + y^2 + 2a'x + 2b'y + \frac{c'}{2} = 0$$

$$x^2 + y^2 + 2\left(\frac{a}{2}\right)x + 2\left(\frac{b}{2}\right)y + \frac{c}{2} = 0$$

Applying condition of orthogonality

$$2a'\left(\frac{a}{2}\right) + 2b'\left(\frac{b}{2}\right) = \frac{c'}{2} + \frac{c}{2}$$

$$2aa' + 2bb' = c + c'$$

Option [A] is correct.