

Q. If the circles $x^2 + y^2 - 2ax + b^2 = 0$ and $x^2 + y^2 - 2cy + b^2 = 0$ touch each other externally, Then

[A] a, b, c are in AP

[B] a^2, b^2, c^2 are in HP

[C] $\frac{1}{a^2}, \frac{2}{b^2}, \frac{1}{c^2}$ are in AP

[D] $a^2, 2b^2, c^2$ are in HP

Answer: [D]

Solution:

Condition of external touching $\Rightarrow d_{o_1o_2} = r_1 + r_2$

Centres: $(a, 0)$ and $(0, c)$

Radii: $r_1 = \sqrt{a^2 - b^2}$, $r_2 = \sqrt{c^2 - b^2}$

$$\sqrt{a^2 + c^2} = \sqrt{a^2 - b^2} + \sqrt{c^2 - b^2}$$

On solving we get

$$\frac{1}{b^2} = \frac{1}{a^2} + \frac{1}{c^2}$$