21 P is variable Point and coordinates of two Points A and B are (-2, 2, 3) and (13, -3, 13) respectively find the locus of P, if 3PA = 2PB

P: (x, y, z)

A: (-2, 2, 3) B = (13, -3, 13)

$$AP\ B = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

$$PA = \sqrt{(x+2)^2 + (y-2)^2 + (z-3)^2}$$

$$PB = \sqrt{(x-13)^2 + (y+3)^2 + (z-13)^2}$$

$$3PA = 2PB \Rightarrow 9(PA)^2 = 4(PB)^2$$

$$9\left((x+2)^2 + (y-2)^2 + (z-3)^2\right) = 4\left((x-13)^2 + (y+3)^2 + (z-13)^2\right)$$

$$9(x^2 + 4x + 4 + y^2 - 4y + 4 + z^2 - 6z + 9)$$

$$= 4(x^2 + 169 - 26x + y^2 + 6y + 9 + z^2 - 26z - 169)$$

$$5(x^2 + y^2 + z^2) + 140x - 60y + 50z$$

$$+153 \quad -1388$$

$$-1235$$

$$5(x^2 + y^2 + z^2) + 140x - 60y + 50z - 1236 = 0$$