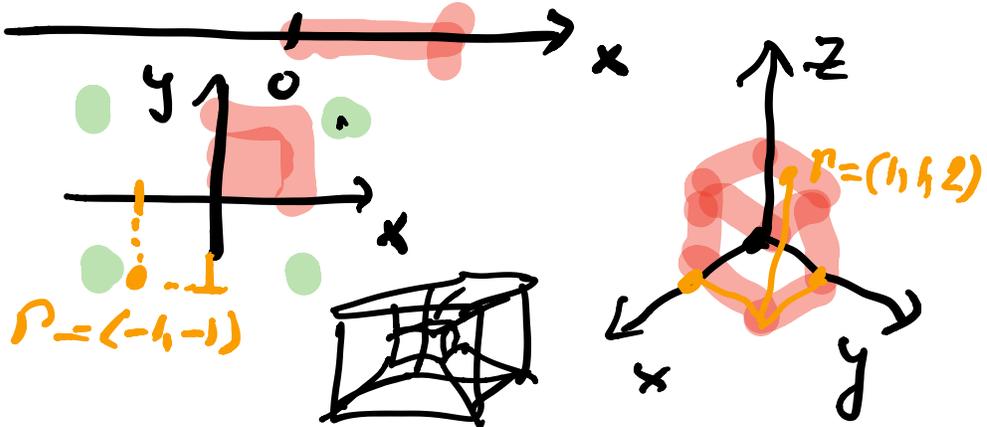


# Unit 1

1637

## ① Coordinates

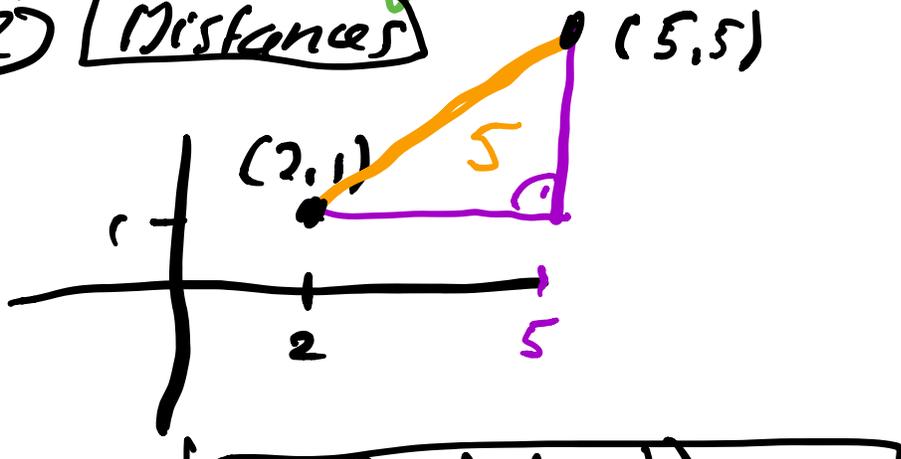
1636 Hq10



In how many pieces (chambers) do the coordinate planes cut up space? **⑧**  
8 octants.

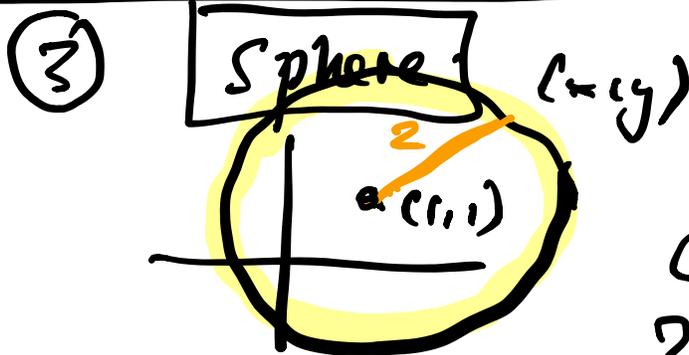
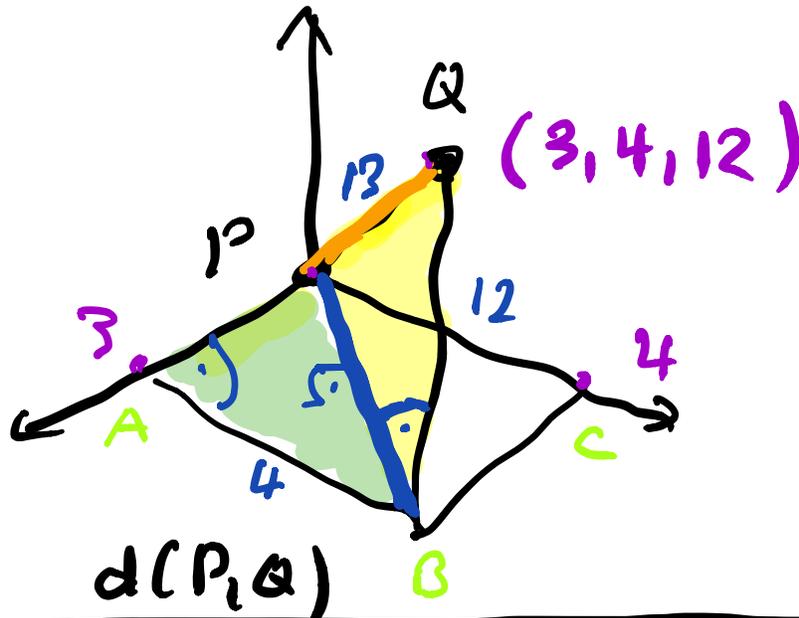
Polya: In how many pieces can we split up space using 4 planes.

## ② Distances



$$d((a,b),(x,y)) = \sqrt{(x-a)^2 + (y-b)^2}$$

Similar in space



$$(x-1)^2 + (y-1)^2 = 4$$





$$(x-1)^2 + (y-1)^2 + (z-1)^2 = 4$$

$$x^2 + 8x + 16 + y^2 + 2y + 1 + z^2 - 4z$$

$$(x+4)^2 + (y+1)^2 + (z-2)^2 = 12$$

$$= 11^2$$

completion of square

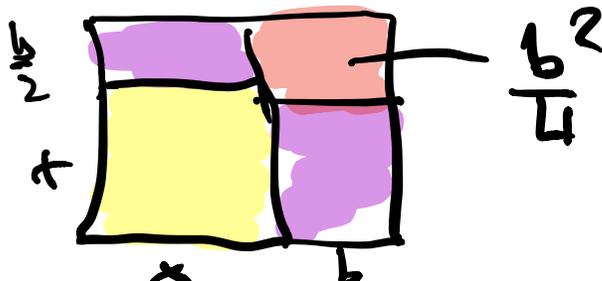
sphere centered

at  $(-4, -1, 2)$

of radius 11.

$$x^2 + bx + c = 0$$

$$x^2 + bx + \frac{b^2}{4} = c + \frac{b^2}{4}$$



$$\left(x + \frac{b}{2}\right)^2 = c + \frac{b^2}{4}$$

$$x + \frac{b}{2} = \pm \sqrt{c + \frac{b^2}{4}}$$

$$x = -\frac{b}{2} \pm \sqrt{c + \frac{b^2}{4}}$$

Al kharizmi

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UOUBC  
800 EC  
1637

Pyth  
Al kharizmi  
Descartes

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