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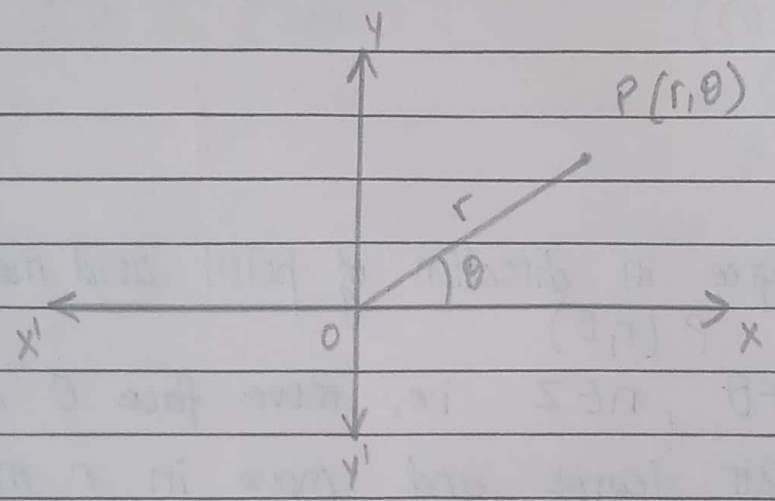
Unit : 1

COORDINATE SYSTEM

Polar Coordinates:

A pair of coordinates locating the position of a point in a plane, the first being the length of the straight line (r) connecting the point to the origin, and the second the angle (θ) made by this line with a fixed line.



*) Needed thengs:

i) Fixed point 'O' (origin) and the line OX ie, positive x-axis is taken as reference line / initial ray.

ii) Angle made 'θ' by OP line ie, directed line with $OP = r$

iii) The point P is denoted by (r, θ).

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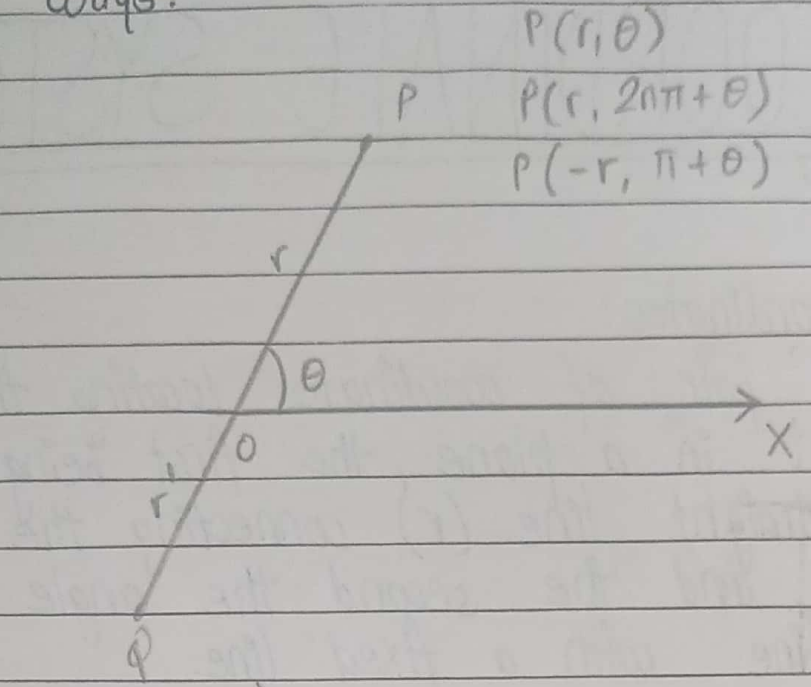
→ Polar coordinates can be represented in many ways.



i) Moving θ degree in direction of point and move r magnitude. P(r, θ)

ii) Moving 2nπ+θ, n∈Z i.e, ~~move~~ face θ direction and spin 2π degree and move in r magnitude.
P(r, θ+2nπ)

iii) Face towards opposite point to the original point (in +ve direction) and move in negative direction
P(-r, θ)

iv) Face towards point in negative direction and then move r' magnitude.
Q(r', -(π-θ))

*) Note: Angle 1st, magnitude 2nd.

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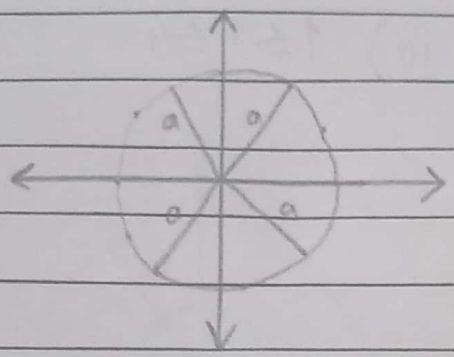
Graphing Polar Coor

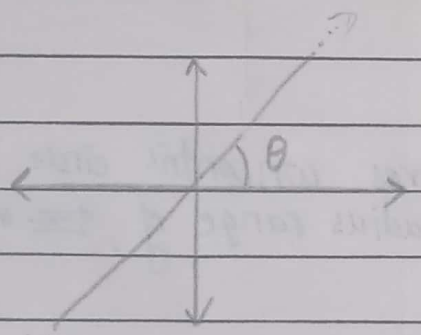
<Q>: What do the following represent?

(i): $r = a$ (const.)



Circle with center at origin with radius a.

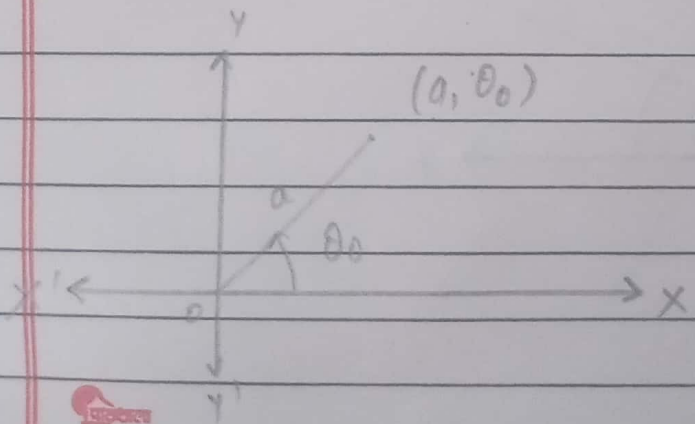
(ii) $\theta = \theta_0$ (const)



Gives straight line making angle θ_0 with reference lie passing through origin.

(iii): $r = a$ (const), $\theta = \theta_0$ (const)

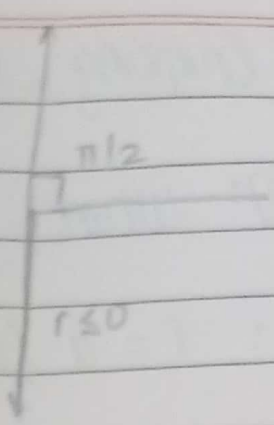
Gives a point.



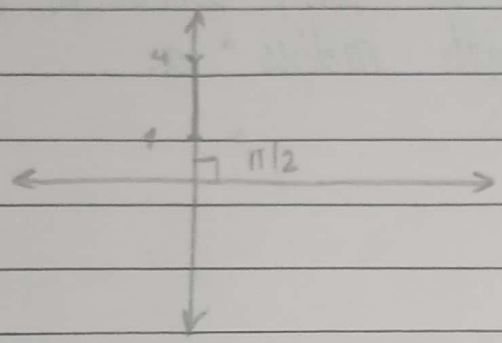
Graph the following:

i) $\theta = \pi/2$, $r \leq 0$.

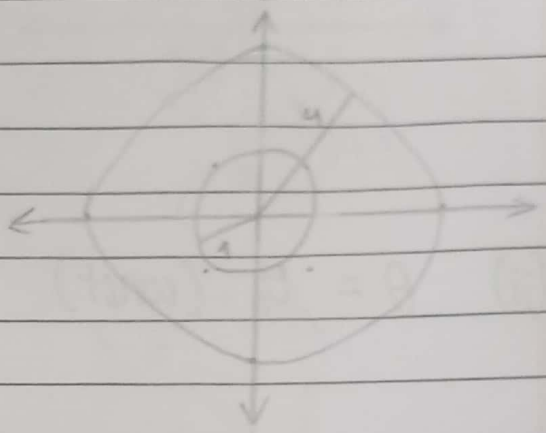
- Represents negative y-axis.



ii) $\theta = \pi/2$, $1 \leq r \leq 4$



iii) $1 \leq r \leq 4$



gives concentric circle with radius range of 1≤r≤4

(iii): $\frac{\pi}{6} \leq \theta \leq \pi$ gives region of plane.