

ACTIVITY NO. - 10

Subject	MATHEMATICS
Class	XII
Chapter/Unit	Three - dimensional Geometry
Topic	Vector equation of a plane.
Time	40 min
Nature of Activity	Individual

What will I learn (Learning Outcome)?

To demonstrate the equation of a plane in normal form.

Skills: Logical ability, Analytical thinking, Deductive reasoning, Creativity, Accuracy.

What I have to do?

Find equation of plane

What do I require?

One hardboard of size $10 \text{ cm} \times 12 \text{ cm}$, plastic straws, 3 pieces of wires, pen/pencil, pins

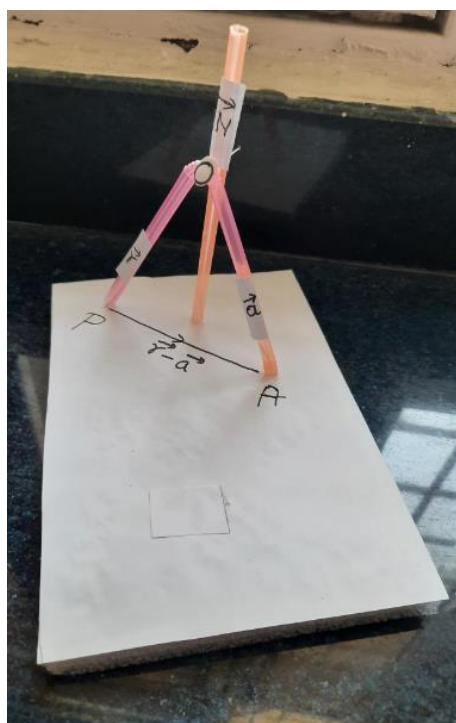
What do I need to know?

Vectors, position vector

➤ Teacher's Activity

Teacher will discuss vectors and will guide them to

Take three straws and fix, them as shown in Fig. 10 so that $\overrightarrow{OP}$ represents the vector $\vec{r}$ and $\overrightarrow{OA}$ represents $\vec{a}$ Then the wire $\overrightarrow{PA}$ represents the vector $\vec{r} - \vec{a}$



How will I proceed?

➤ Student's Activity

Student will take using straws

1. The line PA on the plane i.e., the vector $(\vec{r} - \vec{a})$ lies on plane. On representing $\vec{N}$ normal to plane $\hat{N}$ is perpendicular to $(\vec{r} - \vec{a})$, normal to the plane.
2. Hence $(\vec{r} - \vec{a}) \cdot \vec{N} = 0$ which gives the equation of plane in the normal form.

What have I observed?

<u>1</u>	$\vec{a}$ is the position vector of -----	
<u>2</u>	$\vec{r}$ is the position vector of ----- vector $\vec{N}$ is perpendicular to the vector -----.	
<u>3</u>	$(\vec{r} - \vec{a}) \cdot \vec{N} = 0$ is the equation of the plane in _____ form.	

What have I learnt?

The equation of plane can be demonstrated in the above manner.

What am I curious to learn?

This activity can also be utilised to show the position vector of a point in space (i.e., $\vec{a}$ as position vector of A, $\vec{r}$ the position vector of P).

Let me evaluate myself

Find the equation of the plane passing through the points (2, 3, -4) and (1, -1, 3) and parallel to the x - axis.

Q1.

Find the equation of a line passing through (2, 0, 5) and which is parallel to line $6x - 2 = 3y + 1 = 2z - 2$

Q2.

Find the equation of a plane containing the points (0, -1, -1), (-4, 4, 4) and (4, 5, 1). Also show that (3, 9, 4) lies on that plane.

Q3

Find the equation of the plane passing through the point $(3, 4, 2)$ and $(7, 0, 6)$ and is perpendicular to the plane $2x - 5y = 15$.

Q4.

Find the image of point $(3, -2, 1)$ in the plane $3x - y + 4z = 2$.

Q5.
