GeeksforGeeks

# WORKSHEET

## Cartesian Plane

*Unsolved with Given Solutions*

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## Cartesian Plane

**Question 1.** Find the value of D in which the equation of the plane passes through (2,1,1) in which the value of constants are A=5, B=5, C=8.

**Question 2.** Identify the quadrants in which the points lie (5, 6), (-7, 8), (-2, -1), (2, -3).

**Question 3.** Find the distance between two points (-3, 4) and (-4, -5).

**Question 4.** Find the distance between two points (-2, 1,1) and (-3, -2,1).

**Question 5.** Find the slope of the line passing through the points (2,1) and (5,6).

**Question 6.** Find the midpoint of the line whose two endpoints are (9,8) and (1,6).

**Question 7.** Find the slope of the line passing through points (9, 8) and (9, 7) . Also find the angle(Hint: Slope is defined as tangent of the line).

**Question 8.** Find the equation of the line whose slope has value 2 and the y-intercept is 4.

**Question 9.** Find the equation of the line whose constant values A=9 B=2 C=3.

**Question 10.** Find the equation of the line which passes through (2,3) and slope is 3.

# Solutions

## Cartesian Plane

**Solution 1:**

Using the equation of the plane we will plug the values

$\Rightarrow Ax+By+Cz=D$

$\Rightarrow 5x+5y+8z=D$

Now this equation passes through the point (2,1,1)

$\Rightarrow 5\times2+5\times1+8\times1=D$

$\Rightarrow$ **D=23**

**Solution 2:**

Based on the signs we can determine in which quadrant the points lie

(5,6) : First Quadrant

(-7,8) : Second Quadrant

(-2,-1) : Third Quadrant

(2,-3) : Fourth quadrant

**Solution 3:**

To find the distance between two points $(-3, 4)$ and $(-4, -5)$, we use the distance formula:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Here, $(x_1, y_1) = (-3, 4)$ and $(x_2, y_2) = (-4, -5)$.

Substitute the coordinates into the formula:

$$d = \sqrt{((-4) - (-3))^2 + ((-5) - 4)^2}$$

Simplify the terms inside the square root:

$$d = \sqrt{(-4 + 3)^2 + (-5 - 4)^2}$$

$$d = \sqrt{(-1)^2 + (-9)^2}$$

$$d = \sqrt{1 + 81}$$

$$d = \sqrt{82}$$

So, the distance between the points $(-3, 4)$ and $(-4, -5)$ is:

$$d = \sqrt{82} \approx 9.06$$

**Solution 4:**

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

Given the points $(-2, 1, 1)$ and $(-3, -2, 1)$, we can identify the coordinates as follows:

- $(x_1, y_1, z_1) = (-2, 1, 1)$
- $(x_2, y_2, z_2) = (-3, -2, 1)$

Now, let's plug these values into the distance formula:

$$d = \sqrt{((-3) - (-2))^2 + ((-2) - 1)^2 + (1 - 1)^2}$$

Simplify inside the square root:

$$d = \sqrt{(-3 + 2)^2 + (-2 - 1)^2 + (1 - 1)^2}$$

$$d = \sqrt{(-1)^2 + (-3)^2 + 0^2}$$

$$d = \sqrt{1 + 9 + 0}$$

$$d = \sqrt{10}$$

So, the distance between the points $(-2, 1, 1)$ and $(-3, -2, 1)$ is $\sqrt{10}$.

**Solution 5:**

To find the slope of the line passing through the points $(2, 1)$ and $(5, 6)$, we use the formula for the slope $m$:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Here, $(x_1, y_1) = (2, 1)$ and $(x_2, y_2) = (5, 6)$.

Substituting the coordinates into the formula, we get:

$$m = \frac{6 - 1}{5 - 2} = \frac{5}{3}$$

Therefore, the slope of the line passing through the points $(2, 1)$ and $(5, 6)$ is $\frac{5}{3}$.

## Solution 6:

To find the midpoint of a line segment whose endpoints are $(9, 8)$ and $(1, 6)$, you can use the midpoint formula:

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Substitute the given points $(x_1, y_1) = (9, 8)$ and $(x_2, y_2) = (1, 6)$ into the formula:

$$\left(\frac{9+1}{2}, \frac{8+6}{2}\right)$$

Calculate each coordinate:

$$\left(\frac{10}{2}, \frac{14}{2}\right) = (5, 7)$$

Therefore, the midpoint of the line segment is $(5, 7)$.

## Solution 7:

To find the slope of the line passing through the points $(9, 8)$ and $(9, 7)$, we use the slope formula:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Plugging in the points $(x_1, y_1) = (9, 8)$ and $(x_2, y_2) = (9, 7)$:

$$m = \frac{7 - 8}{9 - 9} = \frac{-1}{0}$$

Since division by zero is undefined, the slope is undefined. This indicates that the line is vertical.

For the angle of the line, we need to consider the definition of the slope as the tangent of the angle $\theta$ that the line makes with the positive $x$-axis:

$$\tan(\theta) = m$$

Since the slope $m$ is undefined, the angle $\theta$ is $90^\circ$ (or $\frac{\pi}{2}$ radians), because a vertical line makes a $90^\circ$ angle with the $x$-axis.

Thus, the slope of the line is undefined, and the angle is $90^\circ$ (or $\frac{\pi}{2}$ radians).

**Solution 8:**

Given - m=2 , b=4

Now, Using the slope intercept formula - **y = mx+b**

We get the equation as :-

⇒**y=2x+4**

**Therefore, the equation of the line whose slope has value 2 and the y-intercept is 4, is y=2x+4.**

**Solution 9:**

Given - A=9 B=2 C=3

Here we will use the standard equation of the line - **Ax+By=C**

Putting the values we get

⇒**9x+2y=3**

**Therefore, the equation of the line whose constant values A=9 B=2 C=3, is y=2x+4.**

**Solution 10:**

To find the equation of the line that passes through the point (2,3) with a slope of 3, we can use the point-slope form of the equation of a line, which is given by:

$$y - y_1 = m(x - x_1)$$

where $(x_1, y_1)$ is a point on the line and $m$ is the slope.

Here, $(x_1, y_1) = (2, 3)$ and $m = 3$. Substituting these values into the point-slope form:

$$y - 3 = 3(x - 2)$$

Now, simplify the equation:

$$y - 3 = 3x - 6$$

Adding 3 to both sides to solve for $y$:

$$y = 3x - 6 + 3$$
$$y = 3x - 3$$

So, the equation of the line is:

$$y = 3x - 3$$