Exercise 4.2

➢ **Tell whether the ordered pair is a solution of the inequality.**

Q1. $(0,0)$; $x+y<-4$

Solution:

We are given the inequality $x+y<-4$ and the ordered pair $(0,0)$.
To determine if the ordered pair is a solution to the inequality, we substitute $x=0$ and $y=0$ into the inequality:

$\Rightarrow \quad 0+0<-4 \quad \Rightarrow \quad 0<-4$

Since 0 is not less than -4, the ordered pair $(0,0)$ is not a solution to the inequality $x+y<-4$.
So the answer is No.

Q2. $(-2,-3)$; $y-x>-2$

Solution:

We are given the inequality $y-x>-2$ and the ordered pair $(-2,-3)$.
To determine if the ordered pair is a solution to the inequality, we substitute $x=-2$ and $y=-3$ into the inequality:

$\Rightarrow \quad -3-(-2)>-2 \quad \Rightarrow \quad -3+2>-2 \quad \Rightarrow \quad -1>-2$

Since -1 is greater than -2, the ordered pair $(-2,-3)$ is a solution to the inequality $y-x>-2$.
So the answer is Yes.

Q3. $(5,2)$; $2x+3y\geq 14$

Solution:

We are given the inequality $2x+3y\geq 14$ and the ordered pair $(5,2)$.
To determine if the ordered pair is a solution to the inequality, we substitute $x=5$ and $y=2$ into the inequality:

$\Rightarrow \quad 2(5)+3(2)\geq 14 \quad \Rightarrow \quad 10+6\geq 14 \quad \Rightarrow \quad 16\geq 14$

Since 16 is greater than or equal to 14, the ordered pair $(5,2)$ is a solution to the inequality $2x+3y\geq 14$.
So the answer is Yes.

Q4. $(-1,5)$; $4x-7y>28$

Solution:

We are given the inequality $4x-7y>28$ and the ordered pair $(-1,5)$.
To determine if the ordered pair is a solution to the inequality, we substitute $x=-1$ and $y=5$ into the inequality:

$\Rightarrow \quad 4(-1)-7(5)>28 \quad \Rightarrow \quad -4-35>28 \quad \Rightarrow \quad -39>28$

Since -39 is not greater than 28, the ordered pair $(-1,5)$ is not a solution to the inequality $4x-7y>28$.
So the answer is No.

Q5. $(-9,-7)$; $y \leq 8$

Solution:

We are given the inequality $y \leq 8$ and the ordered pair $(-9,-7)$.

To determine if the ordered pair is a solution to the inequality, we substitute $y = -7$ into the inequality:

$\Rightarrow \quad -7 \leq 8$

Since -7 is less than or equal to 8, the ordered pair $(-9,-7)$ is a solution to the inequality $y \leq 8$.

So the answer is Yes.

Q6. $(-4,0)$; $x \geq -3$

Solution:

We are given the inequality $x \geq -3$ and the ordered pair $(-4,0)$.

To determine if the ordered pair is a solution to the inequality, we substitute $x = -4$ into the inequality:

$\Rightarrow \quad -4 \geq -3$

Since -4 is not greater than or equal to -3, the ordered pair $(-4,0)$ is not a solution to the inequality $x \geq -3$.

So the answer is No.

➢ **Graph the inequality.**

Q7. $x - y < -3$

Solution:

First, we'll rewrite the inequality as an equation to find the boundary line:

$\Rightarrow \quad x - y = -3$

To graph this line, we can find two points.

Let $x = 0$.

$\Rightarrow \quad 0 - y = -3 \quad \Rightarrow \quad y = 3$

So, $(0,3)$ is a point on the line.

Let $y = 0$.

$\Rightarrow \quad x - 0 = -3 \quad \Rightarrow \quad x = -3$

So, $(-3,0)$ is a point on the line.

Now we plot the points $(0,3)$ and $(-3,0)$ and draw a dashed line through them since the inequality is strict $(<)$.

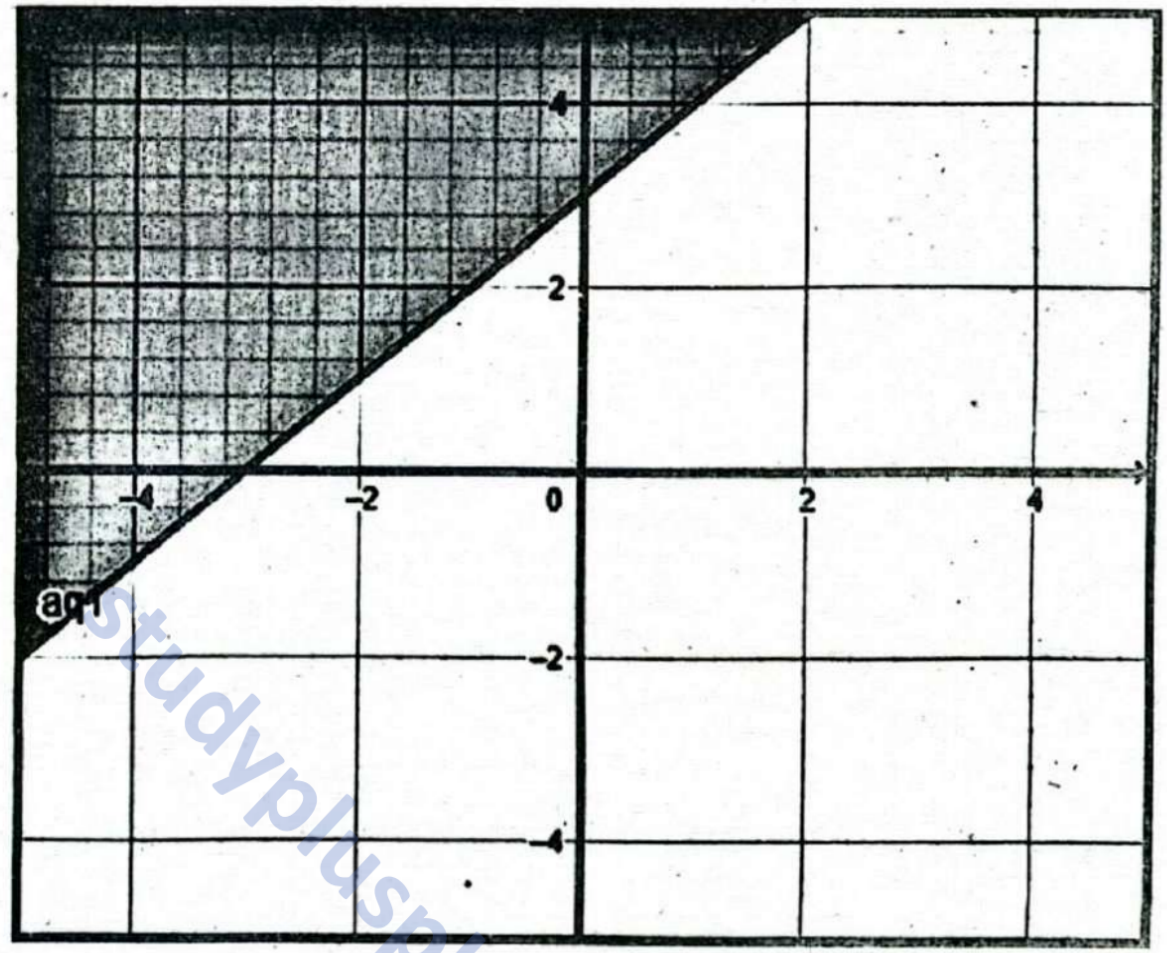
To determine which side of the line to shade, we can test the point $(0,0)$:

$\Rightarrow \quad 0 - 0 < -3$

$\Rightarrow \quad 0 < -3$

This is false, so we shade the region that does not contain $(0,0)$.

- **Graph of the solution:**



Q8. $-3y - 2x < 12$

Solution:

First, we'll rewrite the inequality as an equation to find the boundary line:

$\Rightarrow \quad -3y - 2x = 12$

To graph this line, we can find two points.

Let $x = 0$.

$\Rightarrow \quad -3y - 2(0) = 12 \quad \Rightarrow \quad -3y = 12 \quad \Rightarrow \quad y = -4$

So, $(0, -4)$ is a point on the line.

Let $y = 0$.

$\Rightarrow \quad -3(0) - 2x = 12 \quad \Rightarrow \quad -2x = 12 \quad \Rightarrow \quad x = -6$

So, $(-6, 0)$ is a point on the line.

Now we plot the points $(0, -4)$ and $(-6, 0)$ and draw a dashed line through them since the inequality is strict $(<)$.

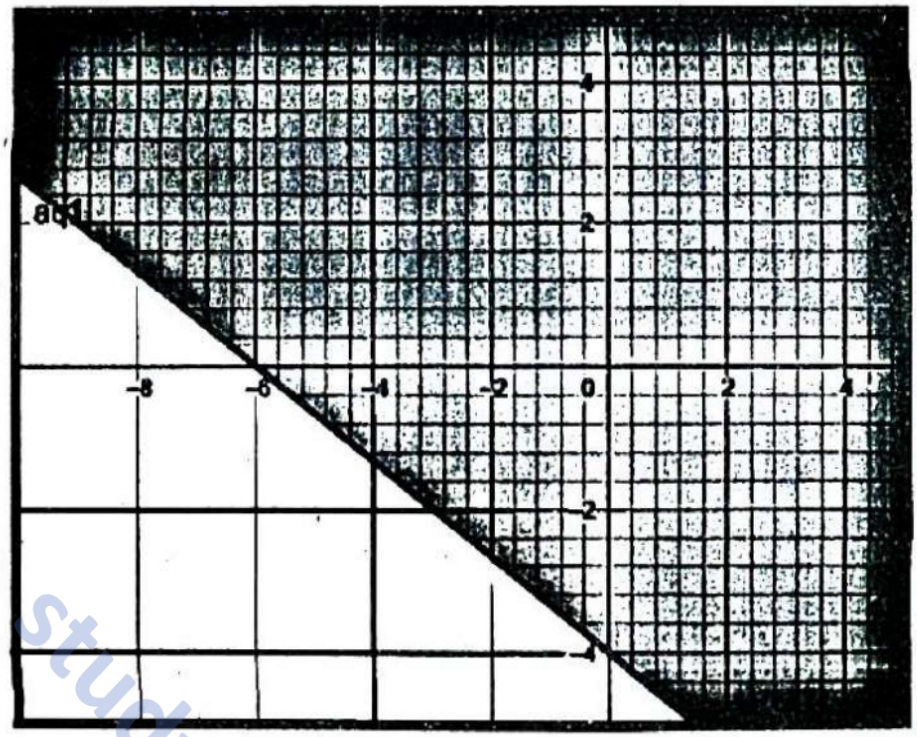
To determine which side of the line to shade, we can test the point $(0, 0)$:

$\Rightarrow \quad -3(0) - 2(0) < 12$

$\Rightarrow \quad 0 < 12$

This is true, so we shade the region that does contain $(0, 0)$.

- **Graph of the solution:**



Q9. $x - y \geq 2$

Solution:

To graph the inequality $x - y \geq 2$, we first consider the equation of the boundary line, which is obtained by replacing the inequality sign with an equality sign:

$\Rightarrow \quad x - y = 2$

To graph this line, we can find two points on the line.

Let $x = 0$. Substituting $x = 0$ into the equation $x - y = 2$, we get:

$\Rightarrow \quad 0 - y = 2 \quad \Rightarrow \quad y = -2$

So, the point $(0, -2)$ is on the line.

Let $y = 0$. Substituting $y = 0$ into the equation $x - y = 2$, we get:

$\Rightarrow \quad x - 0 = 2 \quad \Rightarrow \quad x = 2$

So, the point $(2, 0)$ is on the line.

Now we plot the points $(0, -2)$ and $(2, 0)$ on the coordinate plane and draw a line through them. Since the inequality is $\geq$ (greater than or equal to), the boundary line should be a solid line to indicate that the points on the line are *included in the solution*.

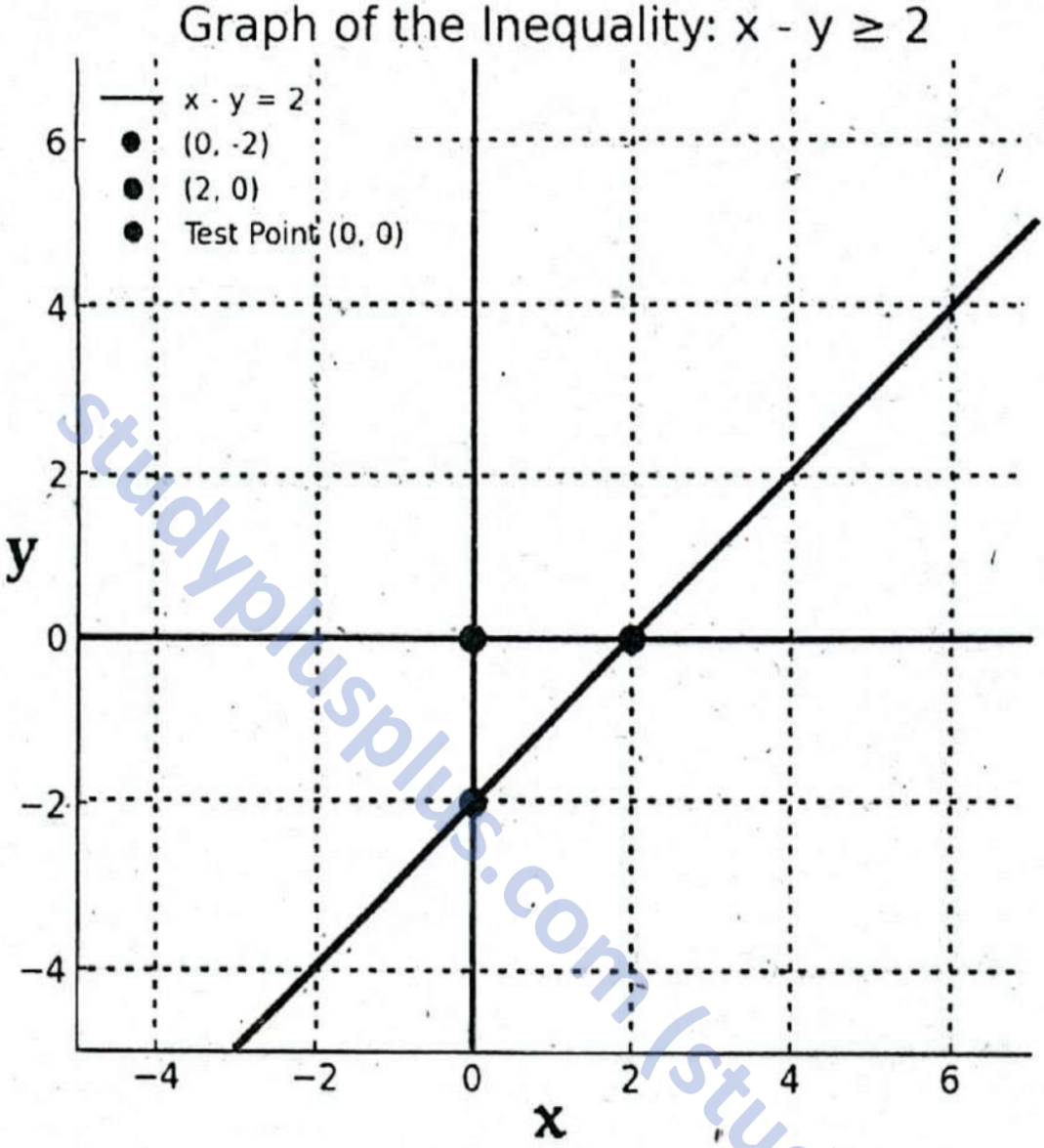
To determine which side of the line to shade, we can test a point that is not on the line. A convenient test point is the origin $(0, 0)$.

Substitute $x = 0$ and $y = 0$ into the inequality $x - y \geq 2$.

$\Rightarrow \quad 0 - 0 \geq 2 \quad \Rightarrow \quad 0 \geq 2$

This statement is false. Since the origin $(0, 0)$ does not satisfy the inequality, we shade the region that does not contain the origin. This is the region below and to the right of the solid line $x - y = 2$.

- **Graph of the solution:**



Q10. $2x + y \geq 8$

Solution:

First, we consider the equation of the boundary line, which is obtained by replacing the inequality sign with an equality sign:

$\Rightarrow \quad 2x + y = 8$

To graph this line, we can find two points on the line.

Let $x = 0$. Substituting $x = 0$ into the equation $2x + y = 8$, we get:

$\Rightarrow \quad 2(0) + y = 8 \quad \Rightarrow \quad y = 8$

So, the point $(0, 8)$ is on the line.

Let $y = 0$. Substituting $y = 0$ into the equation $2x + y = 8$, we get:

$\Rightarrow \quad 2x + 0 = 8 \quad \Rightarrow \quad 2x = 8 \quad \Rightarrow \quad x = 4$

So, the point $(4, 0)$ is on the line.

Now we plot the points $(0, 8)$ and $(4, 0)$ on the coordinate plane and draw a line through them. Since the inequality is $\geq$ (greater than or equal to), the

boundary line should be a solid line to indicate that the points on the line are included in the solution.

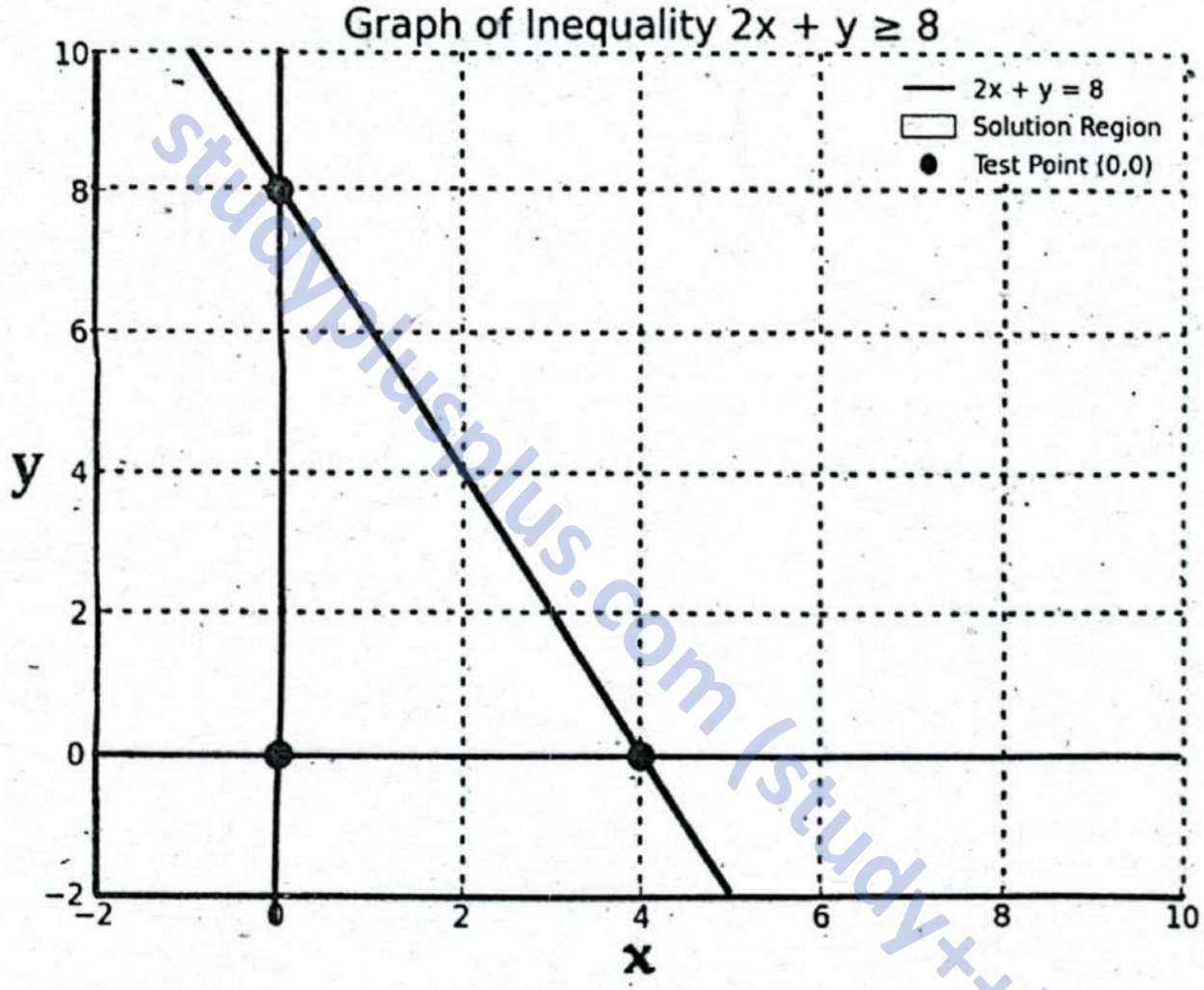
To determine which side of the line to shade, we can test a point that is not on the line. A convenient test point is the origin $(0, 0)$.

Substitute $x = 0$ and $y = 0$ into the inequality $2x + y \geq 8$.

$\Rightarrow \quad 2(0) + 0 \geq 8 \quad \Rightarrow \quad 0 \geq 8$

This statement is false. Since the origin $(0, 0)$ does not satisfy the inequality, we shade the region that does not contain the origin. This is the region above and to the right of the solid line $2x + y = 8$.

- **Graph of the solution:**



Q11. $x - y \leq -11$

Solution:

First, we consider the equation of the boundary line, which is obtained by replacing the inequality sign with an equality sign:

$\Rightarrow \quad x - y = -11$

To graph this line, we can find two points on the line.

Let $x = 0$. Substituting $x = 0$ into the equation $x - y = -11$, we get:

$\Rightarrow \quad 0 - y = -11 \quad \Rightarrow \quad y = 11$

So, the point $(0, 11)$ is on the line.

Let $y = 0$. Substituting $y = 0$ into the equation $x - y = -11$, we get:

$\Rightarrow \quad x - 0 = -11 \quad \Rightarrow \quad x = -11$

So, the point $(-11, 0)$ is on the line.

Now we plot the points $(0, 11)$ and $(-11, 0)$ on the coordinate plane and draw a line through them. Since the inequality is $\leq$ (less than or equal to), the boundary line should be a solid line to indicate that the points on the line are included in the solution.

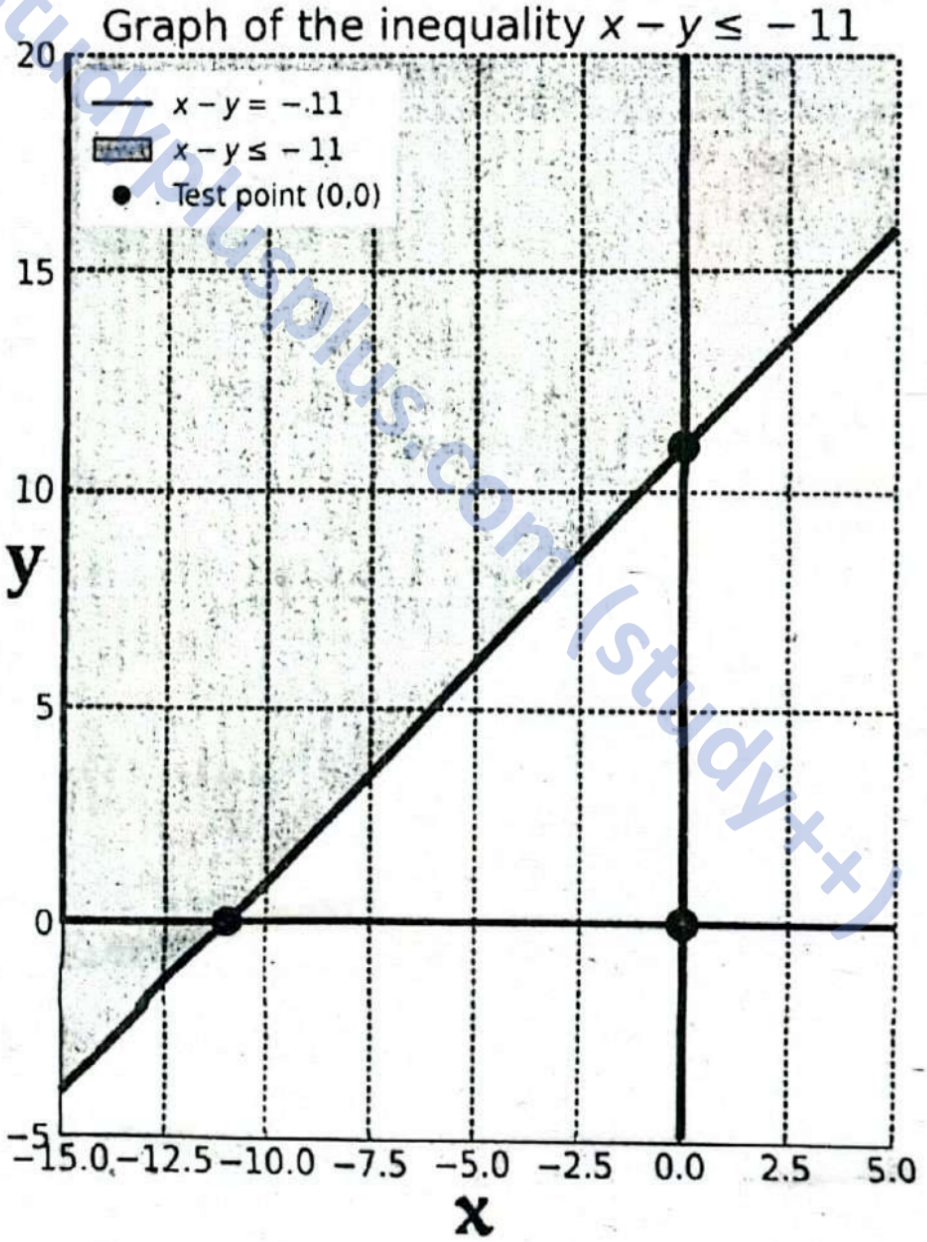
To determine which side of the line to shade, we can test a point that is not on the line. A convenient test point is the origin $(0, 0)$.

Substitute $x = 0$ and $y = 0$ into the inequality $x - y \leq -11$.

$\Rightarrow$ $0 - 0 \leq -11 \quad \Rightarrow \quad 0 \leq -11$

This statement is false. Since the origin $(0, 0)$ does not satisfy the inequality, we shade the region that does not contain the origin. This is the region above and to the right of the solid line $x - y = -11$.

- **Graph of the solution:**



Q12. $y < -5$

Solution:

First, we consider the equation of the boundary line, which is obtained by replacing the inequality sign with an equality sign: