Solutions – Coorgeo2_2

Part -I Slope of Line

1) Find the slope of the line parallel to y-axis ?

Solution:

The line parallel to y – axis intersects y axis at infinity.

Slope = $\frac{-y-\text{intercept}}{x-\text{interecept}}$

The line parallel to y – axis intersects the x – axis at point (a ,0)

So, the slope of the line = $\frac{-\infty}{a} = \infty$

2) What is the slope of the line if the point A is (4,-3) and point B is (1,2) ?

Solution:

Given:

Point A is A(4, -3)

Point B is B(1, 2)

Slope of the line = $\frac{y_2-y_1}{x_2-x_1} = \frac{2-(-3)}{1-4} = \frac{-5}{3}$

Slope of the line = $\frac{-5}{3}$

3) Find the slope of the line CD which is parallel to the line AB. Where point A is (-6,-7) and B is (0, 5) ?

Solution:

Given:

The line CD is parallel to the line AB.

Point A is A(-6, -7) and

Point B is B(0, 5).

Slopes of parallel lines are equal.

That is, slope of AB = Slope of CD.

Slope of AB = $\frac{y_2-y_1}{x_2-x_1} = \frac{5-(-7)}{0-(-6)} = \frac{12}{6} = 2.$

Slope of CD = 2.

4) Find the slope of the line parallel to x-axis ?

Solution:

Slope of the line = $\frac{-y-\text{intercept}}{x-\text{interecept}}$

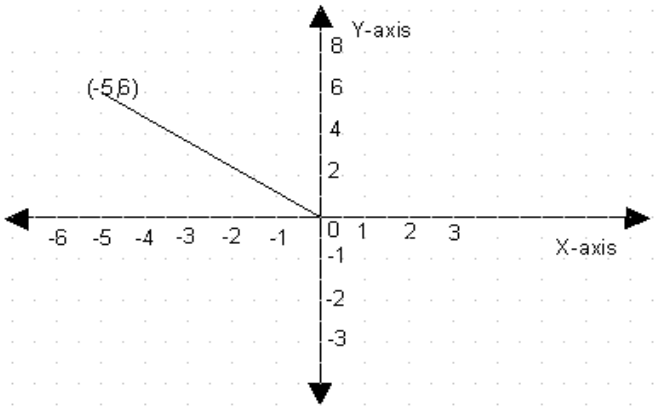
The line parallel to x – axis meets the y axis at (∞ , b), where b is the y – intercept.

So, the x – intercept is infinity and the y – intercept is b.

Slope of the line = $\frac{-b}{\infty} = 0$

Slope of the line parallel to x – axis is 0.

5) From the diagram below, find the slope of the line from the origin



Solution:

The given line passes through origin (0, 0) and the point (-5, 6).

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

$= \frac{6-0}{-5-0} = \frac{-6}{5}$

Slope = $\frac{-6}{5}$

6) Find the slope of the line which is perpendicular to the line MN, where M is (0,-9) and N is (-5,6)?

Solution:

Given:

M(0, -9) and N(-5, 6) are two points of the line MN.

Slope of the line MN $= \frac{y_2 - y_1}{x_2 - x_1} = \frac{6-(-9)}{-5-0} = -3$

Slope of the line perpendicular to perpendicular to a line with slope m is $\frac{-1}{m}$

Slope of the line perpendicular to the line MN $= \frac{-1}{(-3)} = \frac{1}{3}$

7) Determine the slope of the line making 90 degree with x-axis?

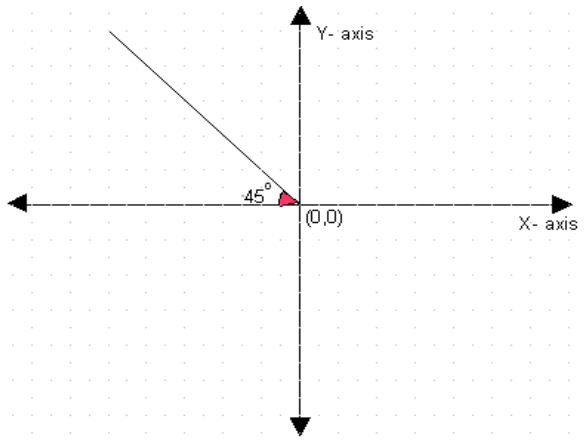
Solution:

The line making 90 degree with x – axis is parallel to y – axis.

Slope of the line parallel to y – axis is infinity.

Slope of the line making 90 degree with x – axis is infinity.

8) Find the slope of the line given below



Solution:

In the diagram, the angle is given as 45 degree in anti clockwise direction in the negative x - axis, which means the second quadrant is divided into two equal halves.

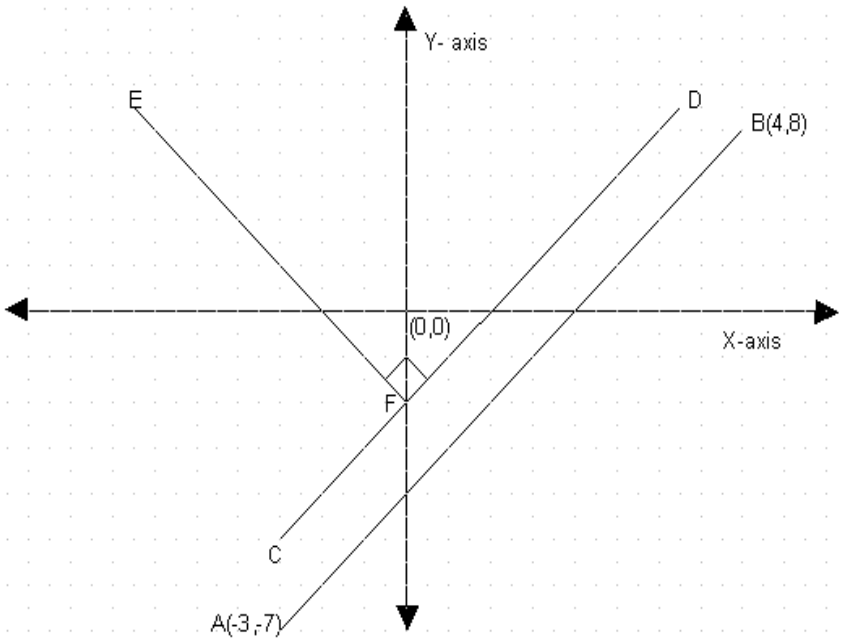
Therefore, any point on the line will be (-a, a), where a is a real number.

The line passes through the origin (0, 0).

Slope of the line $= \frac{y_2 - y_1}{x_2 - x_1} = \frac{0-(-a)}{0-(a)} = -1$

Slope of the given line is -1.

9) Find the slope of EF



Solution:

Given:

The line EF is perpendicular to CD and CD is parallel to AB.

Slope of AB = Slope of CD.

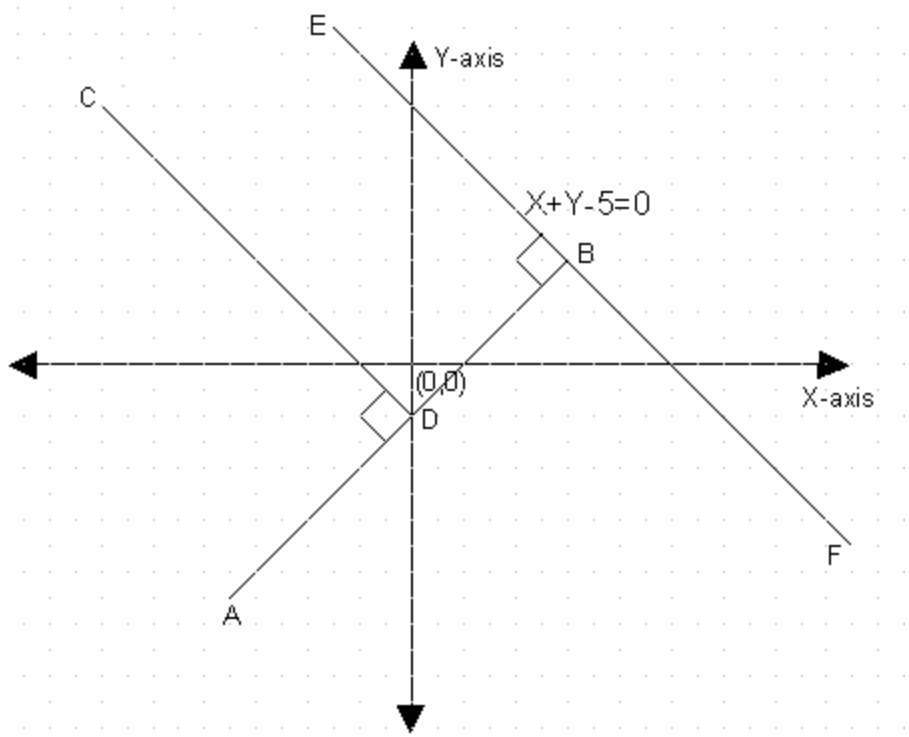
The points of the line AB are A(-3, -7) and B(4, 8).

Slope of AB $= \frac{y_2 - y_1}{x_2 - x_1} = \frac{8-(-7)}{4-(-3)} = \frac{15}{7}$

Since EF is perpendicular to AB, slope of EF = -1 / slope of AB

Slope of the line EF $= \frac{-7}{15}$

10) Find the slope of CD



Solution:

Given:

Equation of the line EF is x + y – 5 = 0 =====> x / 5 + y / 5 = 1

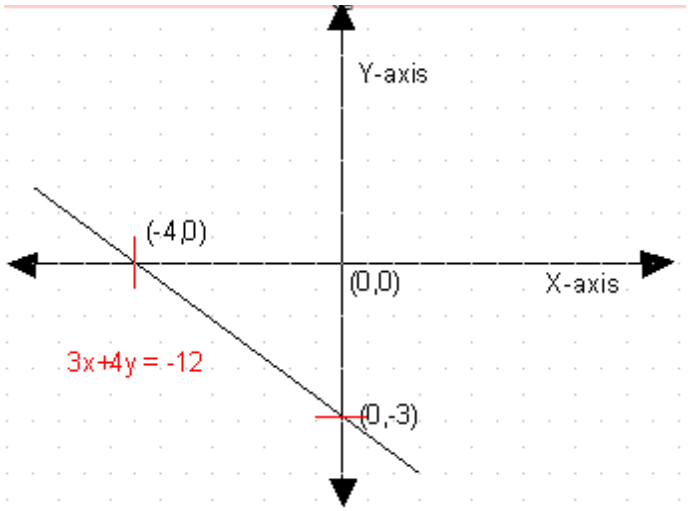
x – intercept = 5 and y – intercept = 5.

Since Cd and EF are parallel, slope of CD = slope of EF

Slope of EF = $-\frac{y-\text{intercept}}{x-\text{intercept}}$ = - 5 / 5 = -1.

Slope of CD = -1

Part – II – Intercepts



X intercept of the above line = - 4
Y intercept of the above line = - 3

X intercept of the X axis = All the points along the x - axis
Y intercept of the Y axis = All the points along the y – axis

Part – III – Equation of a Line

1) Find the equation of the line, where slope is 5 and one point is (2,-4) ?
Solution:
Given:
Slope of the line = 5
The given point is (2, -4)
Point – slope form of a line is $(y - y_1) = m(x - x_1)$
Equation of the required line is y - (-4) = 5(x – 2)
==========> y = 5x – 14

2) What is the equation of the line parallel to x- axis?
Solution:
If the line is parallel to x – axis, then the slope of the line will be 0 and the line intersects the y – axis at a constant point (0, c).
So, the equation of the line with slope 0 and the point (0, c) is $(y - y_1) = m(x - x_1)$
The required equation of the line is y – c = 0(x – 0)
==========> y = c is the equation of the line parallel x axis.

3) What is the equation of the line parallel to y-axis?
Soltion:
If the line is parallel to y – axis, then the slope of the line will be 1 / 0, that is infinity and the line intersects the x – axis at a constant point (a , 0).
So, the equation of the line with slope 1 /0 and the point (a, 0) is $(y - y_1) = m(x - x_1)$
The required equation of the line is y – 0 = (1 / 0)(x – a)

==========> x = a is the equation of the line parallel x axis.

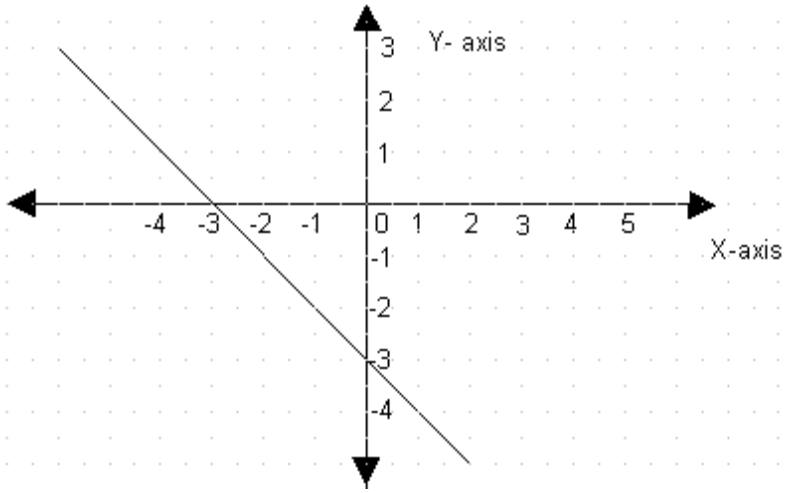
4) Find the equation of the line passing through the origin from the point (6,-2) ?
Solution:
Given:
A line is passing through the point (6, -2) and the origin (0,0)
If two points are given equation of the line is $\frac{(y-y_1)}{(x-x_1)}=\frac{(y_2-y_1)}{(x_2-x_1)}$

Equation of the required line $= \frac{(y-(-2))}{(x-6)}=\frac{(0-(-2))}{(0-6)}$

$\Longrightarrow$ $-6(y+2) = 2(x-6)$
$-6y - 12 = 2x - 12$
The required equation is $y = -x / 3$

5) If the x - intercept is -1/5 and y intercept is 2/3, Find the equation of the line ?
Solution:
Given:
x – intercept = - 1/5
y – intercept = 2/3
If a is the x intercept and b is the y intercept, then the question of the line is x/a + y/b = 1.
The required equation of the line $= \frac{x}{(\frac{-1}{5})}+\frac{y}{(\frac{2}{3})}=1$
That is, $3y = 10x + 2$
The required equation of the line is $10x - 3y + 2 = 0$

6) Find the equation of the line from the diagram below

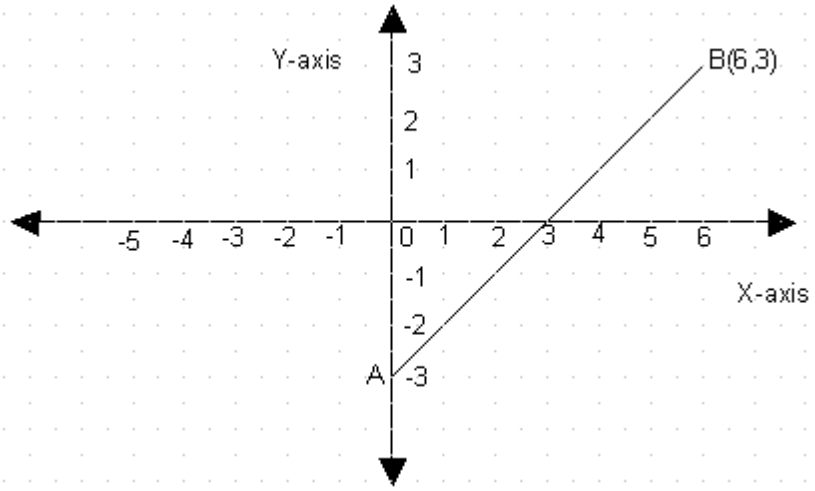


Solution:
From the diagram, x intercept of the line is -3 and y intercept of the line is also -3.
The equation of the line in intercept form is $\frac{x}{a}+\frac{y}{b}=1$
Equation of the required line is
$\frac{x}{(-3)}+\frac{y}{(-3)}=1$
The required equation of the line is x + y + 3 = 0.

7) Find the value of Y intercept, if slope is 2 and one point is (5,2) ?
Solution:
Given:
Slope of the line = 2
a point on the line is (5,2)
To find y intercept, put x = 0 in the equation of the line.
Equation of the line if a point and slope is given $(y-y_1)=m(x-x_1)$

y – intercept is y – 2 = 2(-5)
y = -8.
y – intercept of the line is -8.

8)Find the equation of the line



Solution:
The line AB passes through the point (6,3) and the y – intercept -3.
Equation of the line if slope m and y – intercept is given y = mx + c.

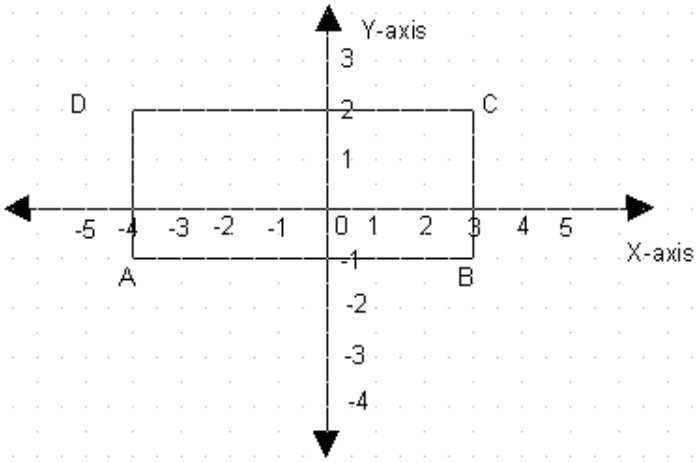
Plug in the point (6, 3) and y intercept -3 in the above equation.
3 = 6m – 3
m = 1.
So, the required equation is y = x – 3.

9) Find the slope of the line if X-intercept is 5 and Y-intercept is -3 ?
Solution:
Given:
x – intercept = 5
y – intercept = -3

Slope of the line $= -\frac{\text{y}-\text{intercept}}{\text{x}-\text{intercept}}$

$= \frac{-(-3)}{5} = \frac{3}{5}$

Slope of the line is $\frac{3}{5}$



10) Answer the following with the help of the above diagram.
1) What is the distance between AB , BC , CD , DA ?
Solution:
Given:
Point A is A(-4, -1).
Point B is B(3, -1).
Point C is C(3, 2).
Point D is D(-4, 2).
ABCD is a rectangle.
AB is parallel to x – axis.
Distance AB = |x - intercept of AD| + |x – intercept of BC|

= |-4| + |3| = 7.

AB = CD = 7.

BC is parallel to y axis.

Distance BC = |y – intercept of AB| + | y – intercept of DC|

= |-1| + |2| = 3

Distance BC = 3.

BC = AD = 3

2) Find the slopes of AB , BC , CD and DA ?

Solution:

AB and CD are parallel. AD and BC are parallel.

AD and BC are perpendicular to AB and CD.

Slope of parallel lines is equal.

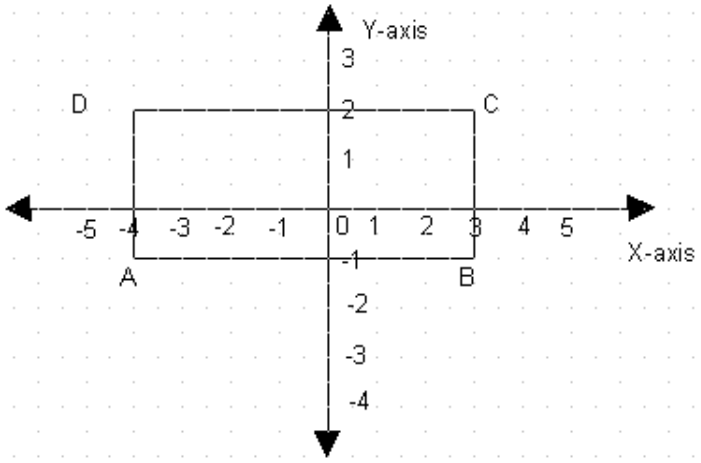
Slope of perpendicular line = -1 / (slope of another line)

AB is parallel to x – axis.

Slope of the line parallel to x – axis is 0.

Slope of AB = CD = 0.

Slope of AD = BC = -1/0 = infinity.



3) Find the equation of the lines AB , BC, CD, DA?

Solution:

The lines AB and CD are parallel to x – axis.

Their slope is 0.

So, the equation of the line parallel to x axis is y = k, where k is the y – intercept.

Y – intercept of the line AB is -1 and CD is 2.

Equation of the line AB is y = -1

Equation of the line CD is y = 2.

The line BC and AD are parallel to y – axis.

Equation of the line parallel to y – axis is x = a, where a is the x – intercept.

x – intercept of BC = 3

x – intercept of AD = -4

Equation of the line BC is x = 3

Equation of the line AD is x = -4.

4) Find the area of the figure?

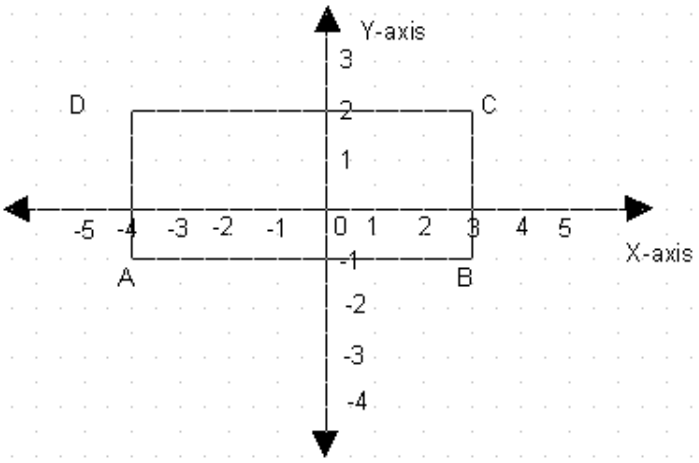
Solution:

This is a rectangle.

Length AB = 7 units.

Width BC = 3 units.

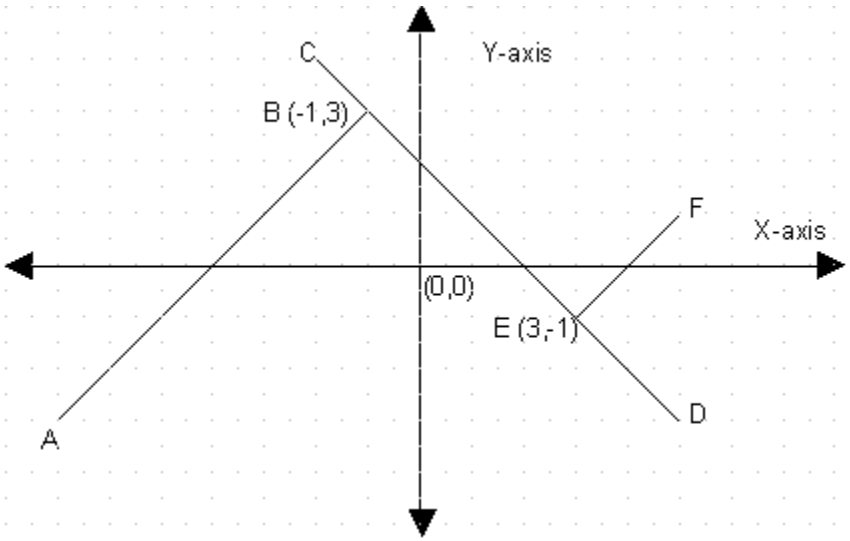
Area of the rectangle = 7 x 3 = 21 sqr unit.



5) Find the coordinates of A, B, C and D .
Solution:
Coordinate of A is A(x – intercept of AD, y – intercept of AB)
That is, A(-4, -1).
Coordinate of B is B(x – intercept of BC, y – intercept of AB)
That is, B(3, -1)
Coordinate of C is (x – intercept of BC, y – intercept of CD)
That is, C(3, 2).
Coordinate of D is (x – intercept of AD, y – intercept of CD)
that is, D(-4, 2).

6) Find the perimeter of the figure ?
Solution:
Perimeter = 2(length of AB + length of BC)
= 2(7+ 3) = 20 units.

11) Find the equation of the line EF and AB, if the equation of the line CD is x+y-2=0



Solution:
Given:
Equation of the line CD is $x + y - 2 = 0$.
AC is perpendicular to CD.
Slope of the line $y = -x - 2$ is -1.
slope of the line perpendicular to the line $y = -x - 2$ is 1.
So, the equation of the line AB is $y = x + c$, where c is y intercept.
The line AB passes through B(-1, 3).
Plug in the point in the equation $y = x + c$.
$3 = -1 + c \Rightarrow c = 4$.
So, the equation of the line is $y = x + 4$.
EF is parallel to the line AB.
So, equation of the line EF is $y = x + k$, where k is the y intercept.
EF passes through the point E(3,-1).
Plug in the point E(3, -1) in the equation.
$-1 = 3 + k \Rightarrow k = -4$
So, the equation of the line is $y = x - 4$.

12) If the equation of the line is $Y = 3x - 7$, what is the Y- intercept ?
Solution:
To find y intercept, put $x = 0$ in the given equation.

$Y = 3(0) - 7 = -7$
$y = -7$ is the y intercept of the given line.

13) If the equation of the line is $Y = 5x+2$, what is the X- intercept ?
Solution:
To find the x – intercept of a line, put $y = 0$.
$0 = 5x + 2 \Rightarrow x = -2/5$.
x – intercept of the given line is $-2/5$.