# Line Drawing Algorithm Steps

**Step-02:**

Find the number of steps or points in between the starting and ending coordinates.

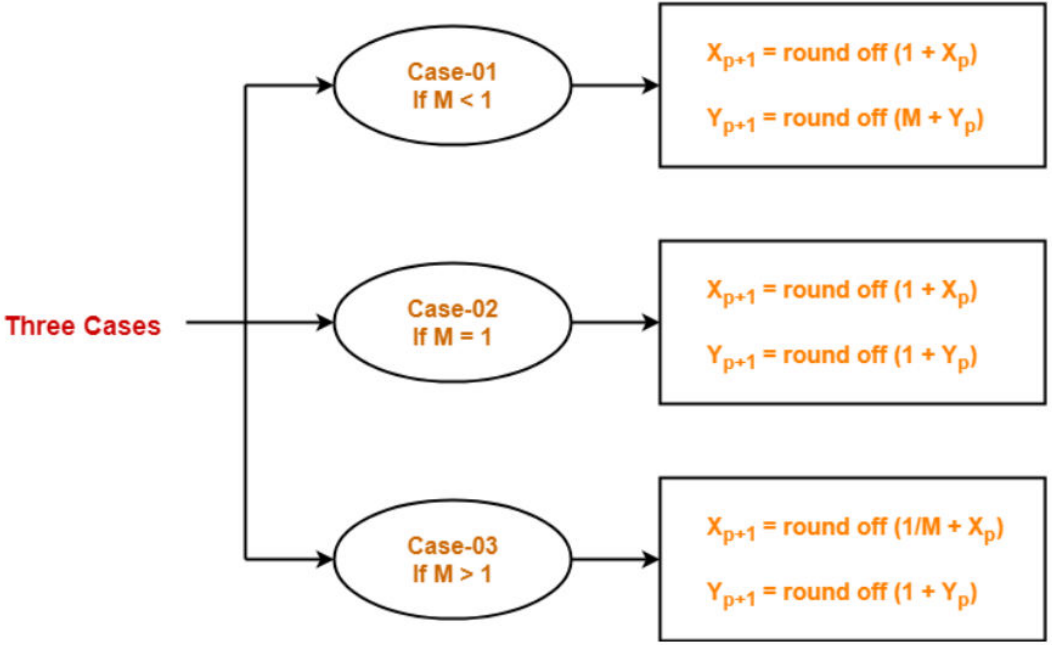
```
if (absolute (ΔX) > absolute (ΔY))
Steps = absolute (ΔX);
else
Steps = absolute (ΔY);
```

**Step-03:**

Suppose the current point is ($X_p$, $Y_p$) and the next point is ($X_{p+1}$, $Y_{p+1}$).

Find the next point by following the below three cases-

# Line Drawing Algorithm Steps


Three Cases
Case-01
If M < 1
$X_{p+1}$ = round off (1 + $X_p$)
$Y_{p+1}$ = round off (M + $Y_p$)
Case-02
If M = 1
$X_{p+1}$ = round off (1 + $X_p$)
$Y_{p+1}$ = round off (1 + $Y_p$)
Case-03
If M > 1
$X_{p+1}$ = round off (1/M + $X_p$)
$Y_{p+1}$ = round off (1 + $Y_p$)

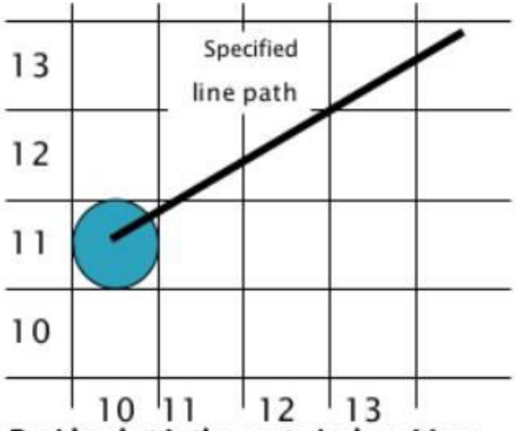
**Step-04:**

Keep repeating Step-03 until the end point is reached or the number of generated new points (including the starting and ending points) equals to the steps count.

# Bresenham`s Line Drawing Algorithm

Bresenham Line drawing algorithm is used to determine closest points to be illuminated on the screen to form a line.

As we know a line is made by joining 2 points, but in a computer screen, a line is drawn by illuminating the pixels on the screen

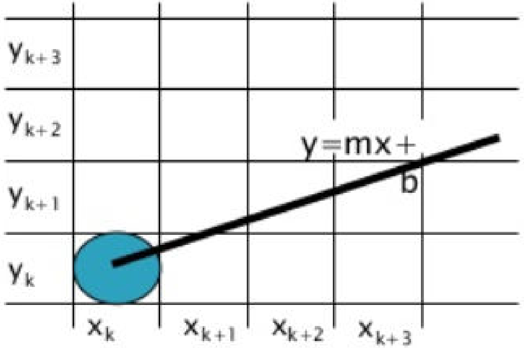


**Decide what is the next pixel position: (11,11) or (11,12)**

# Illustrating Bresenham`s Line Approach

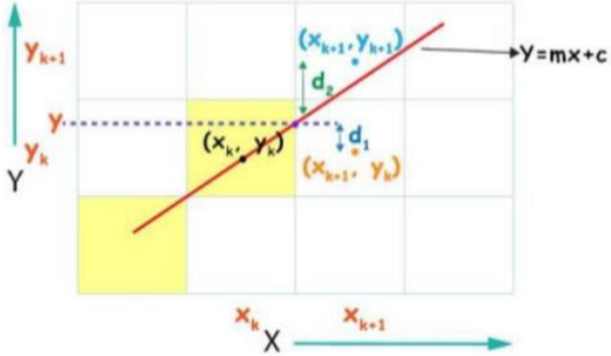
The slope of a line plays a major role in the line equation that's why Bresenham line drawing algorithm calculates the equation according to the slope of the line.

The slope of the line can be greater than 1 (m>1) or less than or equal to 1 (m<=1). Now enough talking let's derive the equation.



- For the pixel position $x_{k+1}=x_k+1$, which one we should choose:
- $(x_{k+1},y_k)$ or $(x_{k+1}, y_{k+1})$

To draw a line we have to calculate the points or pixels to be illuminated on the screen. Now while drawing a line a sometimes it passes through 2 pixels at the same time then we have to choose 1 pixel from the 2 to illuminate it. so, the bresenham algorithm calculates the distance from the intersection point y to both the pixels and whichever is smaller we choose that pixel.


$y_{k+1}$
$(x_{k+1}, y_{k+1})$
Y=mx+c
$d_2$
y
$d_1$
$(x_k, y_k)$
$y_k$
$(x_{k+1}, y_k)$
Y
$x_k$
X
$x_{k+1}$