

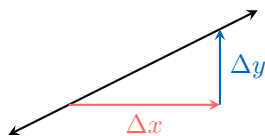
LINE EQUATIONS

A SLOPES

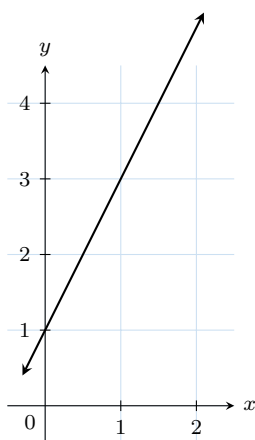
Definition Slope

The **slope** (or **gradient**) of a line is defined as the ratio of the change in the vertical direction (Δy) to the change in the horizontal direction (Δx):

$$\text{slope} = \frac{\Delta y}{\Delta x} = \frac{\text{vertical change}}{\text{horizontal change}}$$

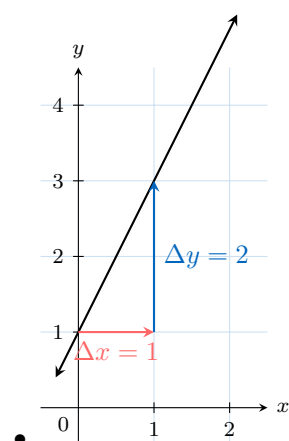


Ex:



Find the slope of the line.

Answer:



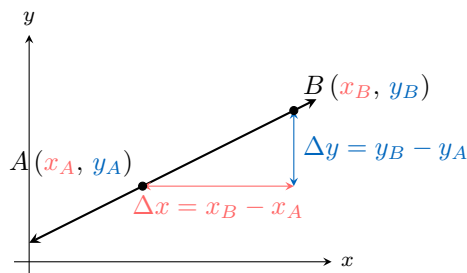
$$\begin{aligned}\text{slope} &= \frac{\Delta y}{\Delta x} \\ &= \frac{2}{1} \\ &= 2\end{aligned}$$

B SLOPE FORMULA

Proposition Slope Formula

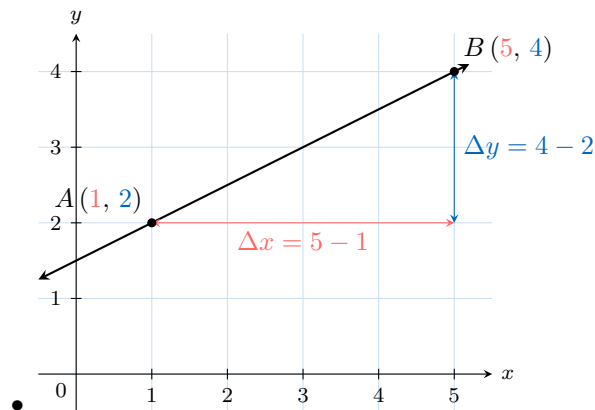
The slope of a line through $A(x_A, y_A)$ and $B(x_B, y_B)$ is

$$\text{slope} = \frac{y_B - y_A}{x_B - x_A}$$



Ex: Find the slope of the line \overleftrightarrow{AB} for $A(1, 2)$ and $B(5, 4)$.

Answer:



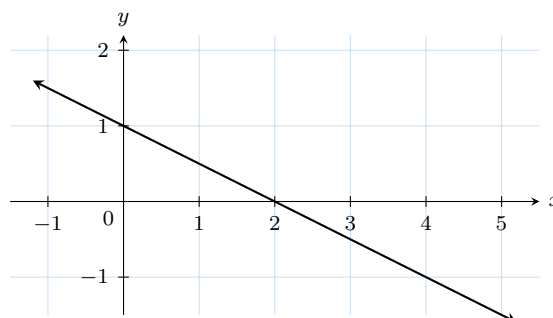
$$\begin{aligned} \text{slope of } \overleftrightarrow{AB} &= \frac{y_B - y_A}{x_B - x_A} \\ &= \frac{4 - 2}{5 - 1} \\ &= \frac{2}{4} \\ &= \frac{1}{2} \end{aligned}$$

C y-INTERCEPT

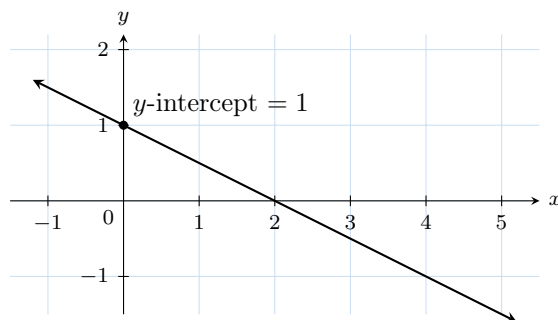
Definition y-Intercept

The **y-intercept** is the value of y where the graph crosses the y -axis (when $x = 0$).

Ex: Find the y -intercept.



Answer:



- The y -intercept is 1 because the graph crosses the y -axis at the point $(0, 1)$.

D LINE EQUATIONS

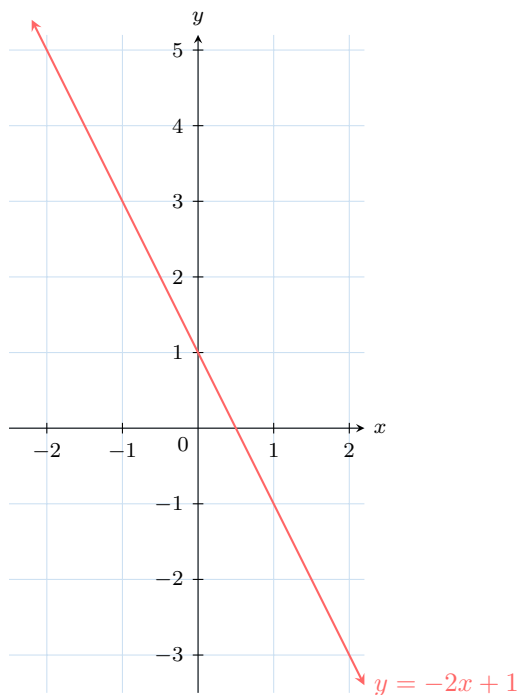
Definition Equation of a line

The **equation of a line** can be written as:

$$y = mx + c$$

where m is the **slope** and c is the **y -intercept**.

Ex:



E GRAPHING LINE EQUATIONS

Method Graphing a Line Using Two Points

To **graph a line** given by $y = mx + c$:

1. **Find the first point (x_1, y_1) :**

- Choose any value for x_1 .
- Substitute x_1 into the equation to calculate y_1 .

2. **Find a second point (x_2, y_2) :**

- Choose a different value for x_2 .
- Substitute x_2 into the equation to calculate y_2 .

3. **Draw the line:**

- Plot both points on a graph.
- Use a ruler to draw a straight line passing through both points.

Ex: Graph the line $y = -2x + 3$.

Answer:

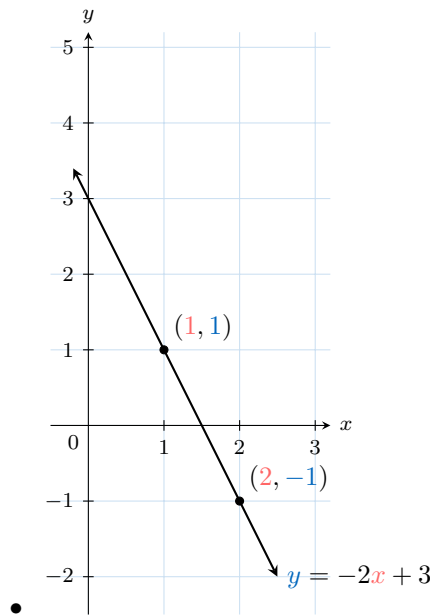
- For $x = 1$,

$$\begin{aligned} y &= -2 \times 1 + 3 \\ &= 1 \end{aligned}$$

- For $x = 2$,

$$\begin{aligned} y &= -2 \times 2 + 3 \\ &= -1 \end{aligned}$$

- So, the points $(1, 1)$ and $(2, -1)$ are on the graph.



Method Graphing a Line Using the y -Intercept and Slope

To graph a line $y = mx + c$:

1. Plot the y -intercept:

- Mark the point $(0, c)$ on the graph.

2. Use the slope m to find a second point:

- From $(0, c)$, move horizontally by Δx .
- Then move vertically by $\Delta y = m \cdot \Delta x$.
- Mark the second point.

3. Draw the line:

- Draw a straight line passing through both points.

Ex: Graph the line $y = 2x - 1$.

Answer:

- The y -intercept is -1 , so plot the point $(0, -1)$.
- The slope is 2: from $(0, -1)$, move 1 unit right ($\Delta x = 1$), then 2 units up ($\Delta y = 2$), to reach $(1, 1)$.
- Draw the line through these two points.

