Chapter 3 § 3

Slopes of Lines

Definition :

Slope – the steepness of a line. (m)

Rise – vertical change (ΔY)

Run – horizontal change (ΔX)

Negative reciprocal – the negative inverse of a number.

$$\frac{2}{7} \longrightarrow -\frac{7}{2} \qquad \frac{-5}{1} \longrightarrow \frac{1}{5}$$

Special Formula

$$M = \frac{\Delta Y}{\Delta X} = \frac{Y_2 - Y_1}{X_2 - X_1} \qquad \frac{\text{Rise}}{\text{Run}}$$

Postulate :

(3-2) – Two non-vertical lines have the same slope if and only if they are parallel.

(3-3) – Two non-vertical lines are perpendicular if and only if the product of their slopes is -1.

Determine the slope of the line that passes through :

(2 , -5) and (7 , -10)

X_1 , Y_1 $\quad$ X_2 , Y_2

$$\mathbf{m} = \frac{Y_2 - Y_1}{X_2 - X_1} = \frac{-10 - (-5)}{7 - 2}$$

$$= \frac{-10 + 5}{7 + (-2)}$$

$$= \frac{\mathbf{-5}}{\mathbf{5}} = \mathbf{-1}$$

Determine the slope of the line that passes through :

(7 , -8) and (14 , -6)

$$\mathbf{m} = \frac{Y_2 - Y_1}{X_2 - X_1} = \frac{-6 - (-8)}{14 - 7}$$

$$= \frac{-6 + 8}{14 + (-7)}$$

$$= \frac{\mathbf{2}}{\mathbf{7}}$$

(3 , 11) and (-12 , 18)

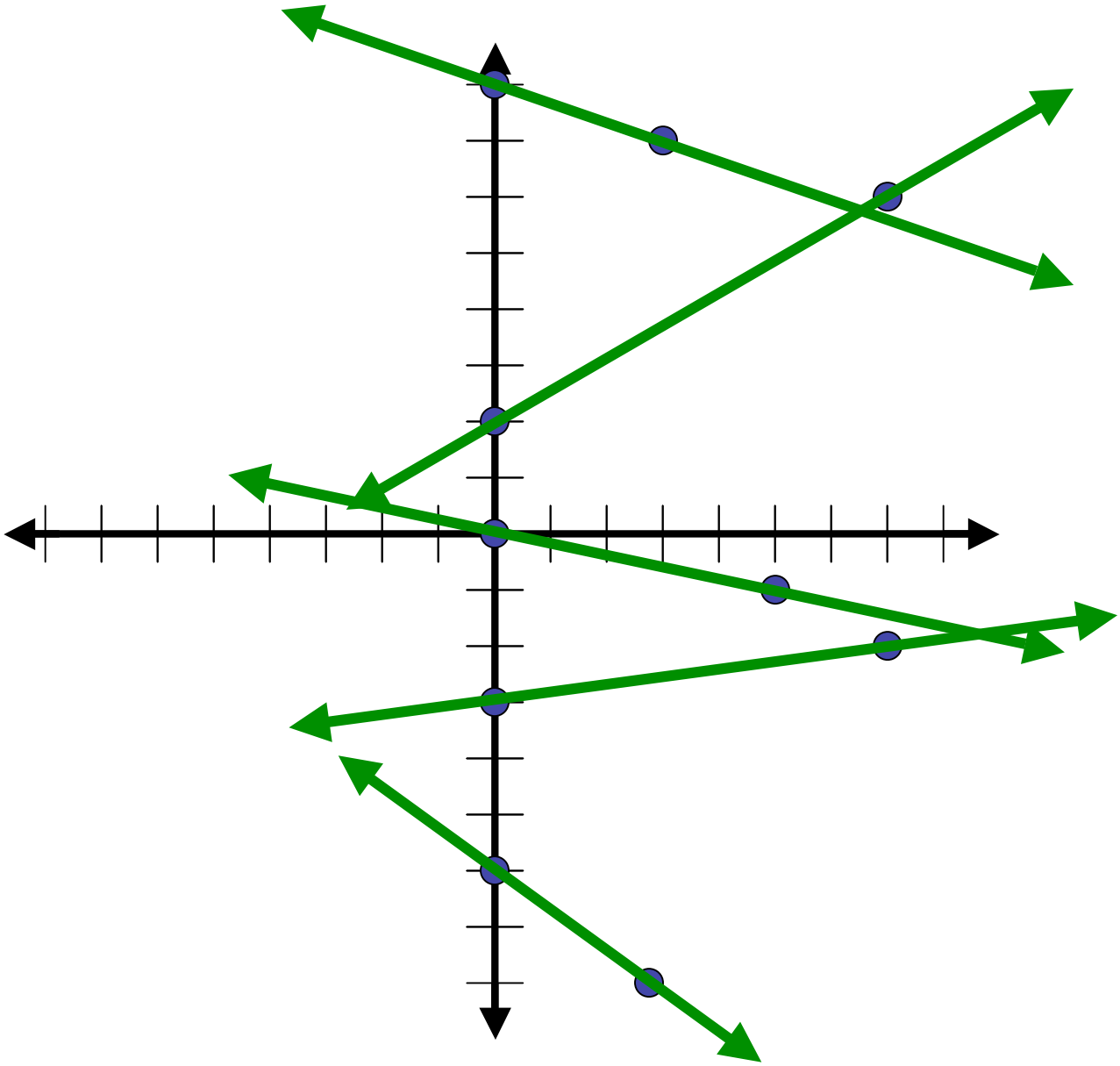
$$\mathbf{m} = \frac{Y_2 - Y_1}{X_2 - X_1} = \frac{18 - 11}{-12 - 3}$$

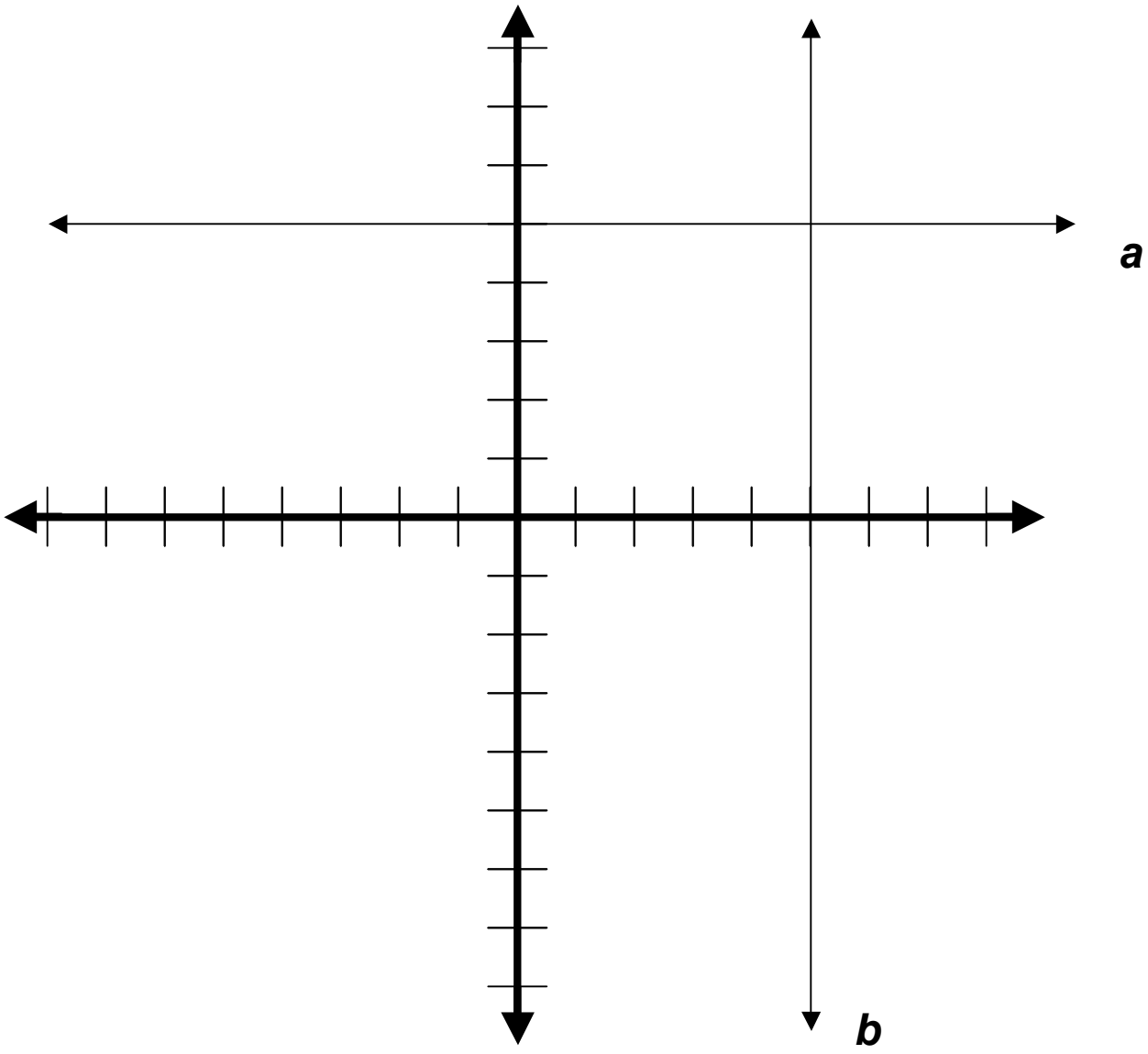
$$= \frac{18 + (-11)}{-12 + (-3)}$$

$$= \frac{\mathbf{7}}{\mathbf{-15}} = -\frac{\mathbf{7}}{\mathbf{15}}$$

Graph a line with the following slope :

$\frac{-1}{3}$ $\frac{4}{7}$ $\frac{-1}{5}$ $\frac{1}{7}$ $\frac{-2}{3}$





Line ***a*** has a slope of zero (m = 0)

Line ***b*** has an undefined slope (m = Ø)

Note :

If there is more than one line and the slopes are the same, then they are parallel.

If there is more than one line and the slopes are negative reciprocals of each other, then they are perpendicular.