Ex. $3x - 7y = 21$.

Q: Find the slope-intercept form.
Use it to determine the slope and the y-intercept.
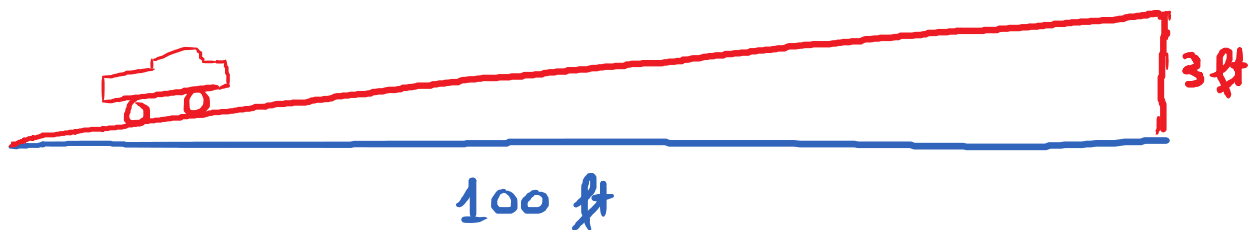
$$-7y = -3x + 21 \longrightarrow y = \frac{-3x + 21}{-7}$$

$$\longrightarrow y = \frac{3}{7}x - 3 \begin{cases} \text{Slope} = \frac{3}{7} \\ \text{y-intercept} : (0, -3) \end{cases}$$

③ Applications

E.g. A road rises 3 ft for every horizontal distance of 100 ft.

$$\text{Grade of Road} = \frac{\text{Vertical change}}{\text{Horizontal change}} = \frac{3 \text{ ft}}{100 \text{ ft}} = \boxed{0.03}$$

$\searrow 3\%$

Key: think about the slope as a rate of change.

$$\text{Slope} = \frac{\text{change in } y}{\text{change in } x}$$

E.g. By 7 pm, Joe had typed 4 pages of his paper.

At 8:30pm, he had completed 10 pages.

Find his typing rate in minutes per page.

By 6 pm, Sally had typed 2 pages of her paper. At 7 pm, she had completed 17 pages of her paper. What is her typing rate in minutes per page?

Who takes longer to write a page?

$$\text{Rate in minutes per page} = \frac{\text{change in time}}{\text{change in \# of pages}}$$

$$\text{Joe typing rate} = \frac{8:30pm - 7pm}{10 \text{ pages} - 4 \text{ pages}} = \frac{90 \text{ minutes}}{6 \text{ pages}}$$

$$= 15 \text{ minutes per page.}$$

$$\text{Sally typing rate} = \frac{7pm - 6pm}{17 - 2 \text{ pages}} = \frac{60 \text{ minutes}}{15 \text{ pages}}$$

$$= 4 \text{ minutes per page}$$

E.g. Data from a hair salon from a recent day of work

Q: Find the average # of haircuts they do per hour?

# of customers

(5,10)

(1,2)

14
12
10
8
6
4
2

O   1   2   3   4   5   6   x

Time of day
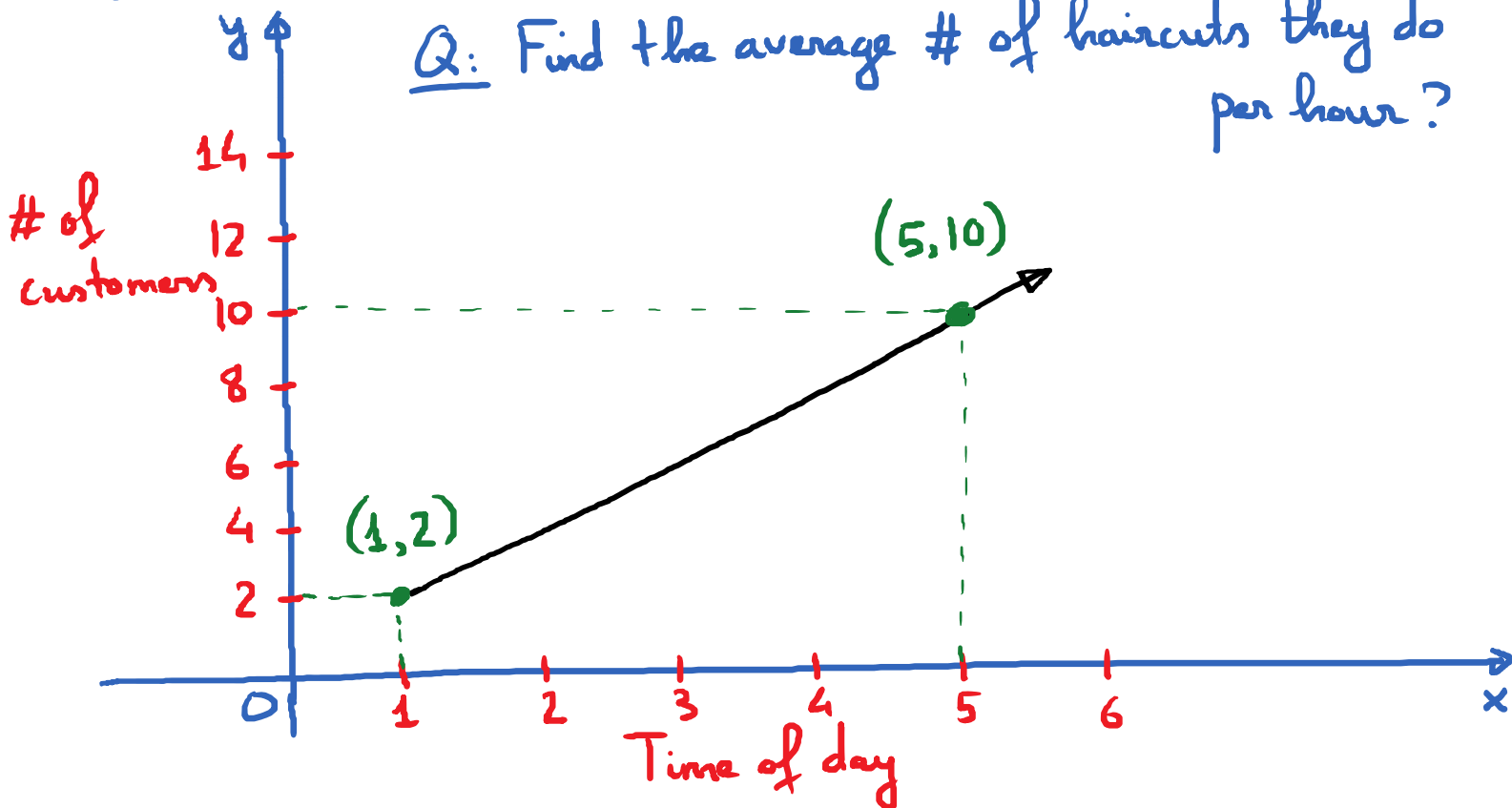
$$\text{Slope} = \frac{\text{change in \# of customers}}{\text{change in \# of hours}} = \frac{10-2}{5-1} = \frac{8}{4} = 2$$

haircuts per hour.

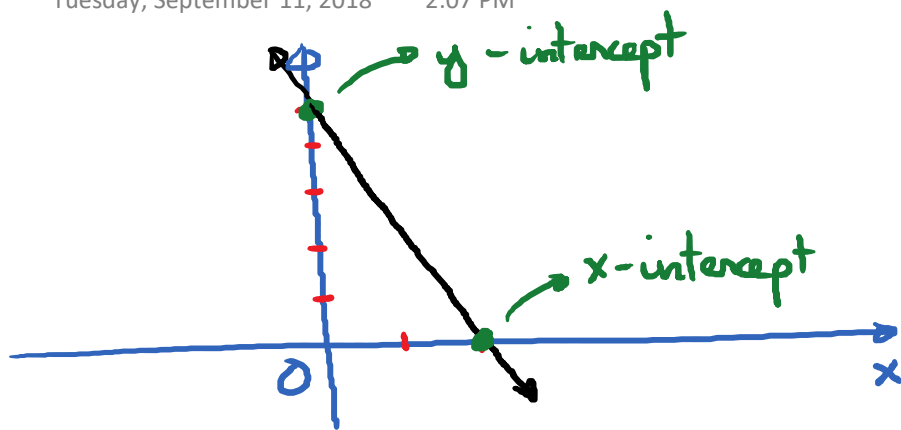④ Graphing Linear Equations.

＊ Using x-intercept and y-intercept.

E.g. $5x + 2y = 10$. Graph using x-intercept and y-intercept.

x	y
0	5	→ (0,5) ← y-intercept
2	0	→ (2,0) ← x-intercept

To find y-intercept, set $x = 0$:

$$5 \cdot (0) + 2y = 10$$
$$y = 5$$

To find x-intercept, set $y = 0$:

$$5x + 2(0) = 10$$
$$x = 2$$

y - intercept

x - intercept

O

x

* Graph using slope and y-intercept.

E.g. $y = \frac{1}{2}x - 4$

Slope = $\frac{1}{2}$

y-intercept : $(0, -4)$

Idea: Start with the y-intercept.

Every 2 units change in x corresponds to 1 unit change in y

$(2, -3)$

$(-2, -5)$