

Concept: Slope of a Line

Name:

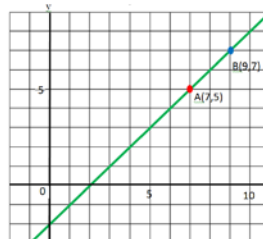
- You should have completed Graphing – Section 7 Part A and B: Slope of a Line before beginning this handout.

OFF COMPUTER EXERCISES

1. Find the slopes of each of the following lines:

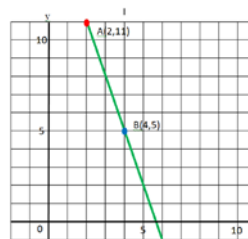
- a) Through the points (7,5) and (9,7)

$$\begin{aligned} \text{slope} &= \frac{\text{rise}}{\text{run}} \\ &= \frac{2}{2} \\ &= \frac{1}{1} \\ &= 1 \end{aligned}$$



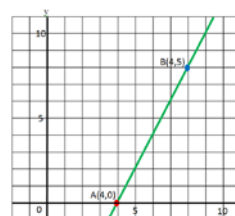
- b) Through the points (2, 11) and (4, 5)

$$\begin{aligned} \text{slope} &= \frac{\text{rise}}{\text{run}} \\ &= \frac{-3}{1} \\ &= -3 \end{aligned}$$



- c) Through the points (4, 0) and (8,8)

$$\begin{aligned} \text{slope} &= \frac{\text{rise}}{\text{run}} \\ &= \frac{2}{2} \\ &= 1 \end{aligned}$$



In each case, place the points on a grid with an x-y axis. **Draw the line.**

2. Apply your superior knowledge to the following scenario.

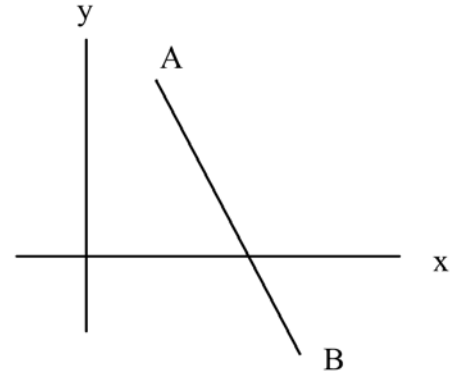
- (a) Predict whether the slope of the line below is **positive** or **negative**. negative
 (b) Take reasonable values for the coordinates of the points A and B.

A(4,10) and B(12,-6)

(c) Find the slope of the line through A and B

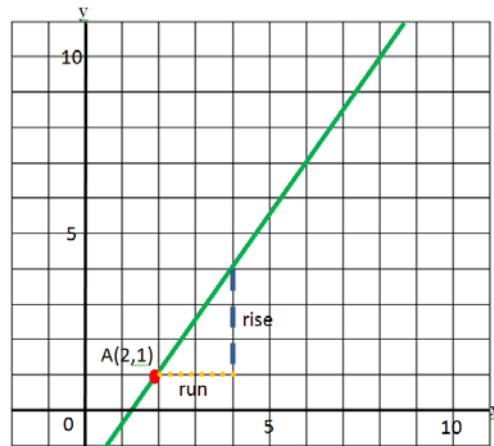
NB: Slope is negative

$$\begin{aligned}
 \text{slope} &= \frac{\text{rise}}{\text{run}} &= & \frac{\text{difference in the y coordinates}}{\text{difference in the x coordinates}} \\
 & &= & \frac{10 - (-6)}{4 - 12} \\
 & &= & \frac{16}{-8} \\
 & &= & \underline{-2}
 \end{aligned}$$

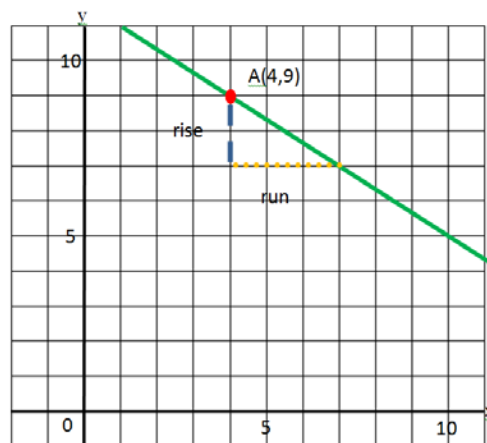


3. Draw each of the following lines. (You will need graph paper for this question)

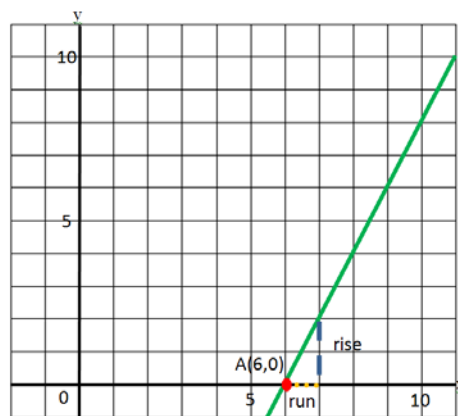
- a) Through (2, 1) with slope $\frac{3}{2}$



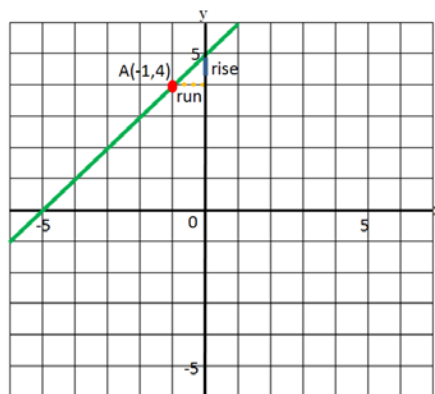
- b) Through (4, 9) with slope $-\frac{2}{3}$



c) Through (6, 0) with slope 2



d) Through (-1, 4) with slope 1



4. You are given a line through A (-1, -5) and B (5, 4).
 You are also given a second line through C (0, 7) and D (6, 3)

(a) Find the slopes of the 2 lines.

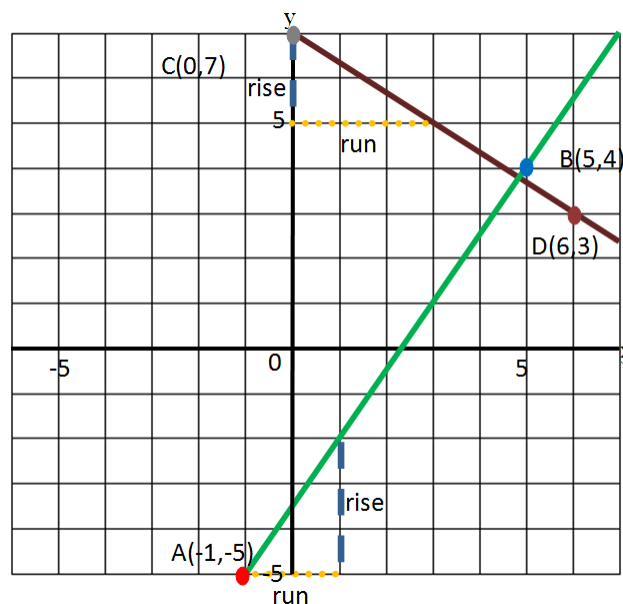
Slope of Line ■ $1 = \frac{\text{rise}}{\text{run}}$

$$= \frac{3}{2}$$

Slope of Line ■ $2 = \frac{\text{rise}}{\text{run}}$

$$= \frac{2}{-3}$$

$$= -\frac{2}{3}$$



- (b) Determine if the lines are parallel, perpendicular or neither perpendicular nor parallel.

The slopes $3/2$, $-2/3$ are negative reciprocals indicating that the lines are perpendicular.

5. Place 2 points A and B of your own choice on an x-y grid. (You will need graph paper for this question)

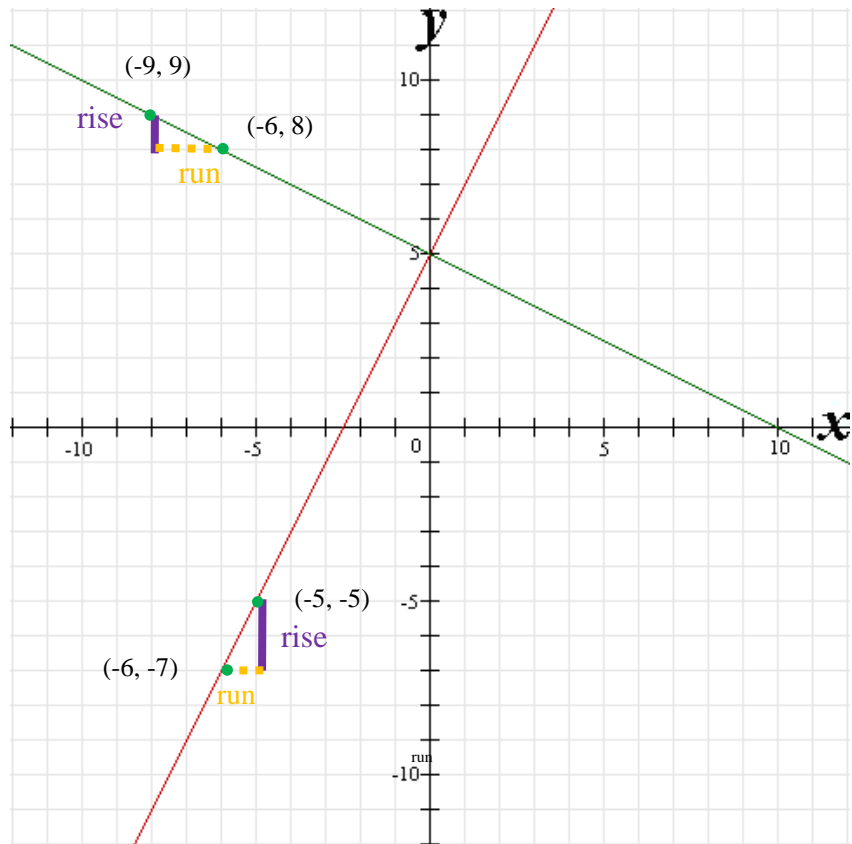
- (a) Draw another line, which is perpendicular to line AB. (*Answers will vary*)
- (b) Find the Coordinates of 2 points C and D on this second line. (*Answers will vary*)
- (c) Verify that AB is perpendicular to CD. (*Answers will vary*)

The slopes of the two lines will be negative reciprocals.

Example:

Slope of Line 1 ■ = $\frac{\text{rise}}{\text{run}}$
 = $\frac{2}{1}$

Slope of Line 2 ■ = $\frac{\text{rise}}{\text{run}}$
 = $\frac{1}{-2}$



The slopes of the two lines are negative reciprocals indicating the lines are perpendicular.

6. Repeat *question 5* above with lines that are *parallel*.

. (Answers will vary)

The slopes of the two lines will be the same.

$$\frac{\text{rise of Line 1}}{\text{run of Line 1}} = \frac{\text{rise of Line 2}}{\text{run of Line 2}}$$

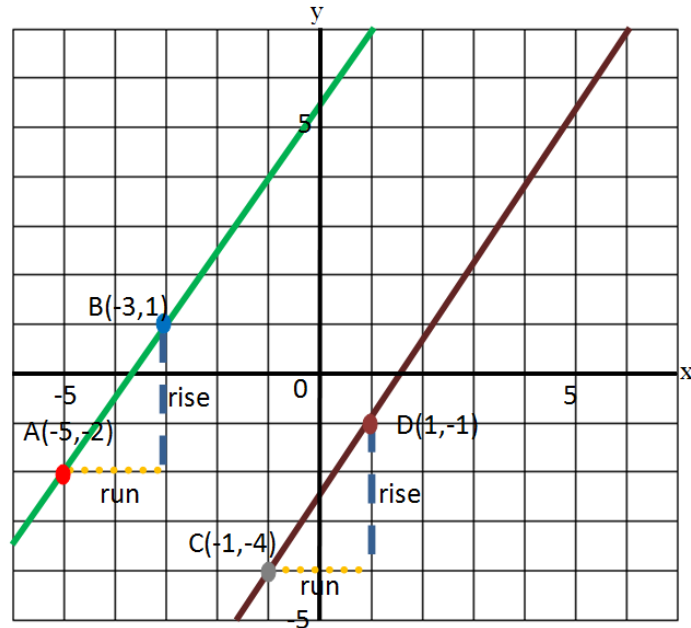
Example:

$$\begin{aligned} \text{Slope of Line 1} \quad \blacksquare &= \frac{\text{rise}}{\text{run}} \\ &= \frac{3}{2} \end{aligned}$$

$$\begin{aligned} \text{Slope of Line 2} \quad \blacksquare &= \frac{\text{rise}}{\text{run}} \\ &= \frac{3}{2} \end{aligned}$$

$$\frac{\text{rise of Line 1}}{\text{run of Line 1}} = \frac{3}{2} = \frac{\text{rise of Line 2}}{\text{run of Line 2}}$$

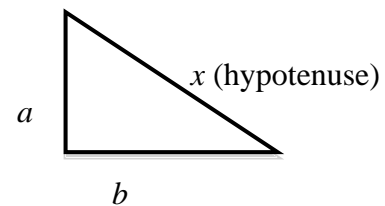
The slopes of the two lines are the same indicating the lines are parallel.



Pythagorean Theorem

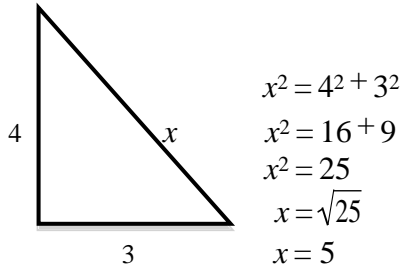
The square on the hypotenuse of a *right angle* triangle is equal to the sum of the squares on the other two sides.

$$x^2 = a^2 + b^2$$

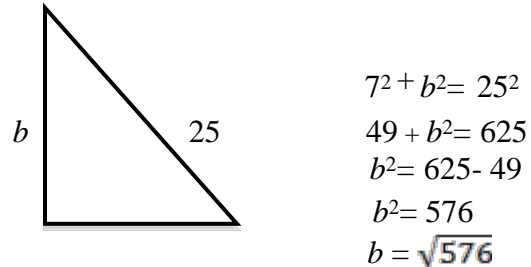


7. Use the **Pythagorean Theorem** to find an unknown side of a right triangle.

To find the length of the hypotenuse:
hypotenuse is given:

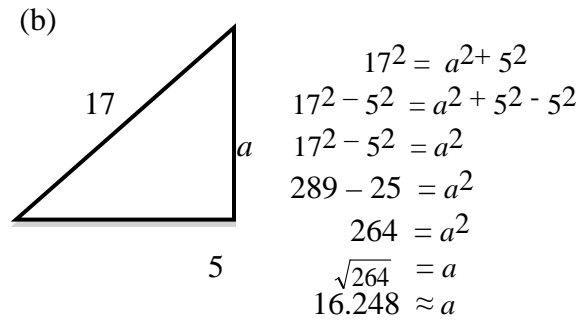
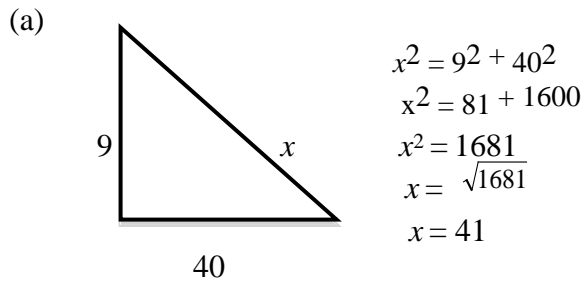


To find the length of a side when the

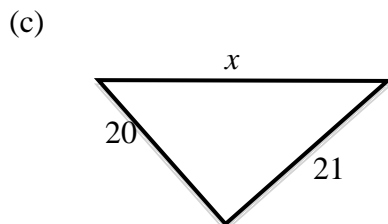


$$b = 24$$

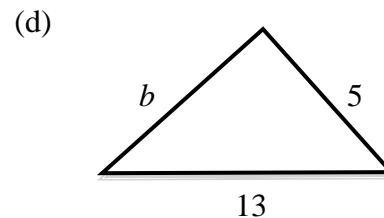
Find the unknown side of each triangle.



(Rounded to three decimal places)



$$\begin{aligned}
 x^2 &= 20^2 + 21^2 \\
 x^2 &= 400 + 441 \\
 x^2 &= 841 \\
 x &= \sqrt{841} \\
 x &= 29
 \end{aligned}$$



$$\begin{aligned}
 13^2 &= b^2 + 5^2 \\
 13^2 - 5^2 &= b^2 + 5^2 - 5^2 \\
 13^2 - 5^2 &= b^2 \\
 169 - 25 &= b^2 \\
 144 &= b^2 \\
 \sqrt{144} &= b \\
 12 &= b
 \end{aligned}$$