

2- Applications of Slope

November 28, 2018 1:40 PM

2) applications of slope

If you know **one point on the line**, you can **use the slope to find any other point** on the same line.

- Steps:
- ① plot the point you know
 - ② use the slope ($\frac{\text{rise}}{\text{run}}$) to find... AT LEAST 2 other points
 - ③ connect the points (with arrows at end) = continuous

Example #1:

- a) Draw a line segment passing through $A(0,0)$ with a slope of $\frac{2}{3}$ ← rise +2
 ← run +3

(reverse -2 and -3)

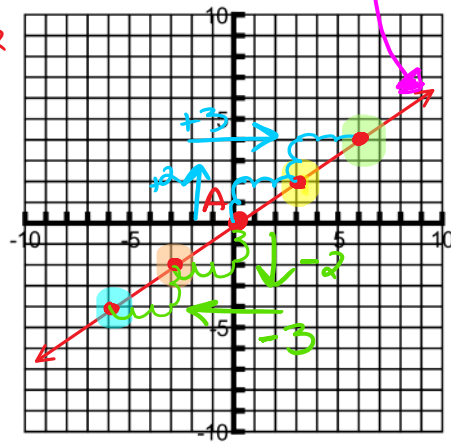
- b) Write the coordinates of 4 other points on the line. (x,y)

$(3, 2)$

$(6, 4)$

$(-3, -2)$

$(-6, -4)$



Example #2:

- a) Draw a line segment passing through $B(1,2)$ with a slope of $-\frac{3}{4}$. neg.
 x,y
 down 3 $-\frac{3}{4}$ or $-\frac{3}{4}$ up 3
 right 4 $-\frac{3}{4}$ or $-\frac{3}{4}$ left 4

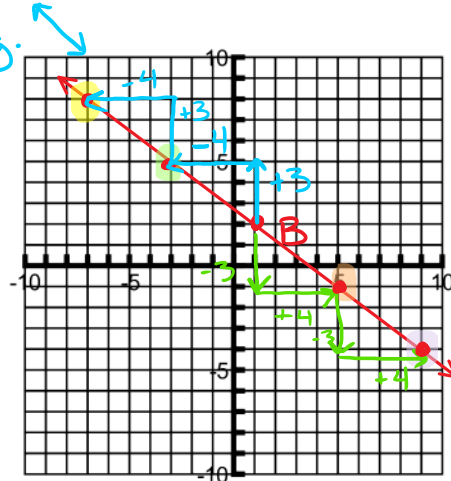
- b) Write the coordinates of 4 other points on the line.

$(-7, 8)$

$(-4, 5)$

$(5, -1)$

$(9, -4)$



Example #3:

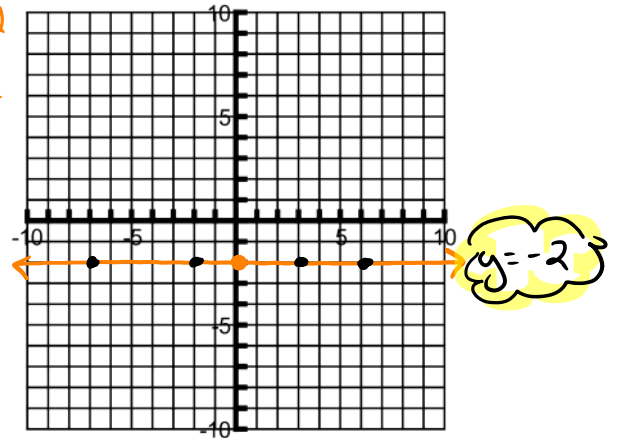
- a) Draw a line segment passing through $C(-4, -2)$ with a slope 0. = horizontal

$y = -2$ $m = 0 = \frac{\text{rise}}{\text{run}} = \frac{0}{?}$

- b) Write the coordinates of 4 other points on the line.

$(-7, -2)$
 $(-2, -2)$
 $(3, -2)$
 $(6, -2)$

Horizontal line, y-values will all be SAME



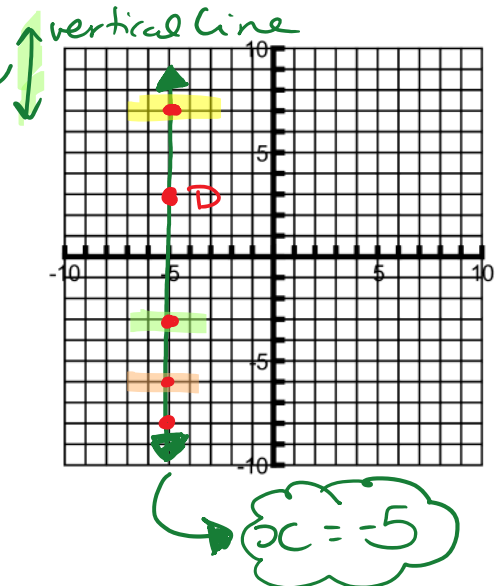
Example #4:

- a) Draw a line ~~segment~~ passing through $D(-5, 3)$ with a slope that is undefined.

$\div 0 = \text{"undefined"} = \frac{\text{rise}}{\text{run}} = \frac{\neq}{0}$

- b) Write the coordinates of 4 other points on the line.

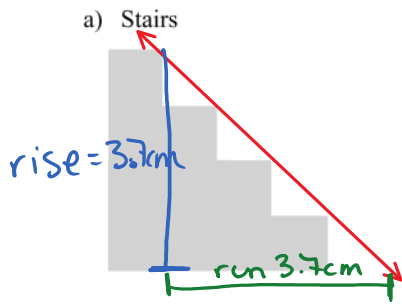
$(-5, 3)$
 $(-5, 7)$
 $(-5, -3)$
 $(-5, -6)$
 $(-5, -8)$



x-values are the same when we have a vertical line

Example #5: Calculate the slope of the following diagrams.

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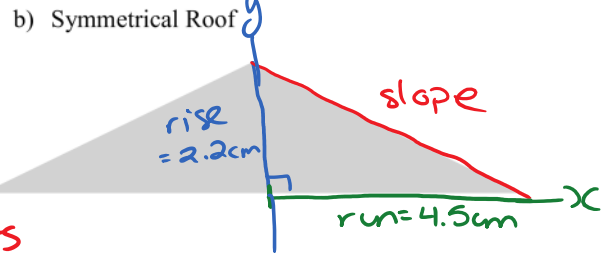


$$\text{Slope} = m = \frac{\text{rise}}{\text{run}} = \frac{3.7\text{cm}}{3.7\text{cm}}$$

slope has no units. (ratio)

$$= 1$$

same units



$$\text{Slope} = m = \frac{\text{rise}}{\text{run}} = \frac{2.2\text{cm}}{4.5\text{cm}}$$

$$= 0.48$$

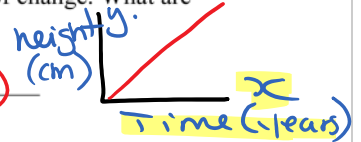
$$\approx 0.5$$

Example #6: Determine if the following represents a **positive, negative, or zero** rate of change. What are the units of the slope?

- a) **A baby's height over time.**

Units? $\frac{\text{rise}}{\text{run}} = \frac{\text{height}}{\text{time}} = \frac{\text{cm}}{\text{years}}$

positive (increasing)



- b) The number of fans seated when the **hockey game ends.**

Units? $\frac{\# \text{ of people}}{\text{min}}$

negative (decreasing)

- c) Driving at a steady speed of 100 km/h.

Units? $\frac{\text{speed}}{\text{time}} = \frac{\text{km/h}}{\text{hr}}$

zero (stays the same)

- d) The population of Europe during the **Black Plague.**

Units? $\frac{\# \text{ people}}{\text{months}}$

negative (decreasing)

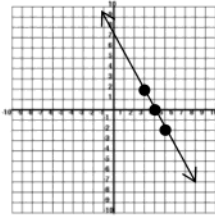
Time (independent variable)
x-axis.



ASSIGNMENT # 2
Pages 11-15 questions #35-60

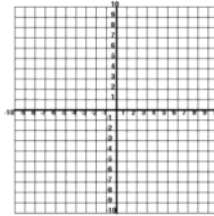
Given a point on the line and the slope, sketch the graph of the line.

35. $(2,3), m = -2$

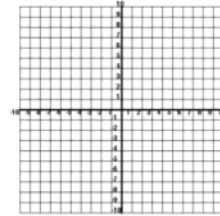


1. Plot the point: $(2,3)$
2. Use $\frac{\text{rise}}{\text{run}} = \frac{-2}{1}$ to get a second point...and a third.
3. Connect with a line.

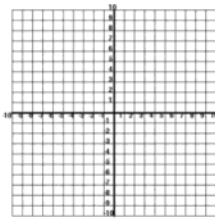
36. $(-3, -2), m = \frac{2}{3}$



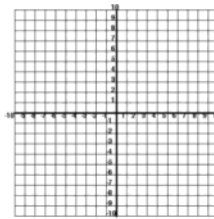
37. $(-4,5), m = 0$



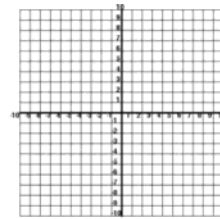
38. $(-3,4), m = -\frac{4}{3}$



39. $(-1,1), m = 3.5$



40. $(-5,7), m$ is undefined



Slope is a measure of **Rate of Change** for a relation. That is, how fast one quantity increases or decreases in respect to another.

Answer the following questions regarding slope and rate of change.

41. A fallen tree leans against a vertical cliff. The tree was 15 m from the cliff and now rests against the cliff 25 m from the ground.

Find the positive slope of the fallen tree.

42. A section of roller coaster falls 52 m in a horizontal distance of 4 m.

Find the slope of this section of track?

-
43. The cost for 8 students to go to the movies is \$80.

What is the cost per student, or rate?

45. To fill my gas tank that holds 70 litres, I paid \$68.53.

What is the rate for gasoline per litre (in cents to the nearest tenth)?

46. TSpray drove 735 kilometres in 7 hours.

Find his rate of travel per hour.

44. Write two ordered pairs for this relation.

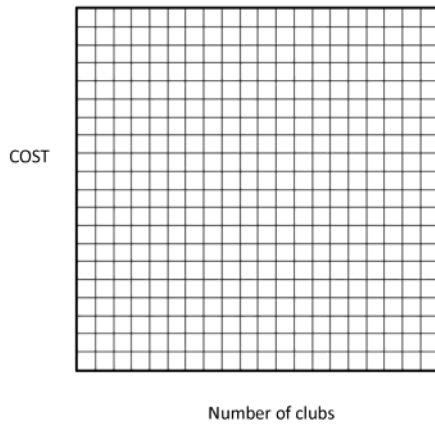
47. What name is given to this quantity?

Answer the following questions regarding slope and rate of change.

48. A round of golf for a group of hackers consists of the "green fee" and the club rental fee. Clubs are rented on a fee per club basis. Jack pays \$72.25 for his green fee and 3 clubs, and Jill pays \$95 for her green fee and 10 clubs. What is the rate to rent one club?

What is the green fee?

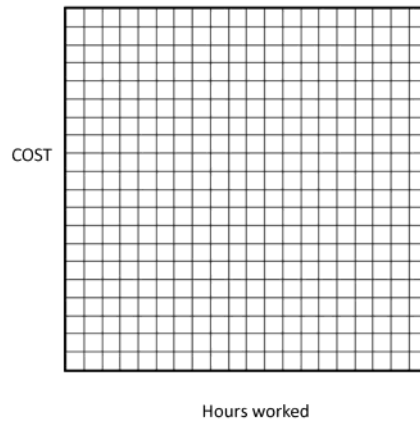
50. Plot the relation above.



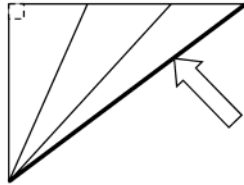
49. Pro-lectric charges their customers a fixed cost plus an hourly rate. To work in my basement, they charged me \$210 for 5 hours work. To complete my upstairs renovations they charged me \$720 for 22 hours work. What is the hourly rate?

What is the fixed cost?

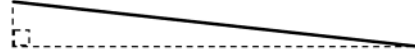
51. Plot the relation above.



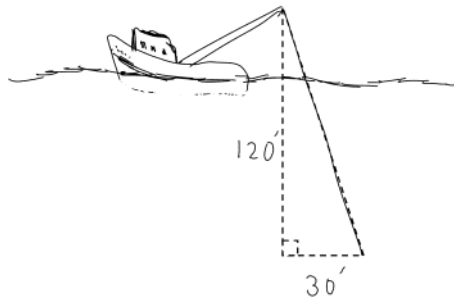
52. Below is a scale drawing of a bridge support. Perform the necessary measurements to determine the slope of the indicated beam.



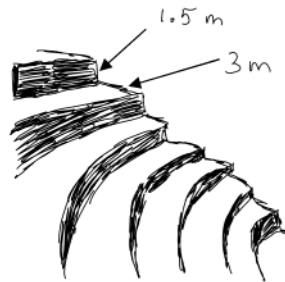
53. Below is a scale diagram of a section of road between Sidney and Victoria. Measure and calculate the slope of the road.



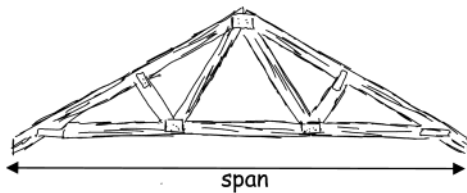
54. A fishing boat moving at 12 knots is shown below. Calculate the slope of the line in the water behind the boat.



55. Terraced landscapes are used by farmers to create useable space from seemingly unusable geography. Calculate the slope of the hill that has been terraced to support crops.



56. The pitch of a roof is a measure of its "steepness". Calculate the height of the roof truss below if its total span is 20 feet and the pitch (slope) is $\frac{6}{12}$.

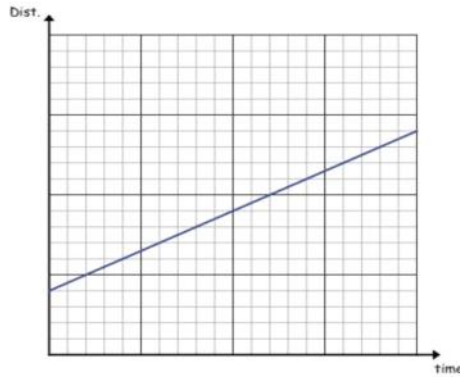


57. Mr. J is building a hide-away cabin with a roof that has a pitch of $\frac{9}{12}$. T-spray is also building a hut but his roof is one-third as steep. If both roofs have the same total height, how many times wider is T-spray's roof?

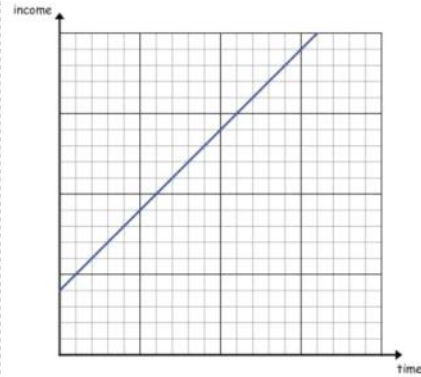
Since slope compares two quantities, it is a *measure of rate of change*.

For each of the following scenarios, what rate does the slope represent?

58. Rate: _____
 What are the units of the slope? _____



59. Rate: _____
 What are the units of the slope? _____



60. Rate: _____
 What are the units of the slope? _____

