8

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 1 – Module 11: "Describing the Graph of a Linear Equation"

ALTERNATIVE DELIVERY MODE
ADM

Mathematics – Grade 8
Alternative Delivery Mode
Quarter 1 – Module 11: Describing the Graph of Linear Equation in Terms of its Intercepts and Slope
First Edition, 2020

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writer:	Fritch A. Paronda
Language Editor:	Merjorie G. Dalagan
Content Evaluator:	Melody C. Gapa
Layout Evaluator:	Jake D. Fraga
Reviewers:	Rhea J. Yparraguirre**,** Lewellyn V. Mejias, Severiano D. Casil, Villaflor D. Edillor, Florangel S. Arcadio, Alma R. Velasco, Crisante D. Cresino, Juliet P. Utlang
Illustrator:	Fritch A. Paronda
Layout Artist:	Fritch A. Paronda
Management Team:	Francis Cesar B. Bringas, Isidro M. Biol, Jr., Maripaz F. Magno, Josephine Chonie M. Obseñares, Josita B. Carmen, Celsa A. Casa, Regina Euann A. Puerto, Bryan L. Arreo, Leopardo P. Cortes, Claire Ann P. Gonzaga, Lieu Gee Keeshia C. Guillen

Printed in the Philippines by _____

Department of Education – Caraga Region

Office Address: Learning Resource Management Section (LRMS)
J.P. Rosales Avenue, Butuan City, Philippines 8600
Tel. No./Telefax No.: (085) 342-8207 / (085) 342-5969
E-mail Address: caraga@deped.gov.ph

8

Mathematics

Quarter 1 – Module 11: "Describing the Graph of a Linear Equation"

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

This module was designed and written with you in mind. It is here to help you master the skills of illustrating triangle congruence. You are provided with varied activities to process the knowledge and skills learned and to deepen and transfer your understanding of the lesson. The scope of this module enables you to use it in many different learning situations. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

This module contains:

Lesson 1 – Describing the Graph of a Linear Equation

After going through this module, you are expected to:

1. determine the different trends of the graph of a linear equation;
2. describe the trends of the graph of a linear equation in terms of its intercepts and slope; and
3. relate the graph of linear equations in real-life situations.

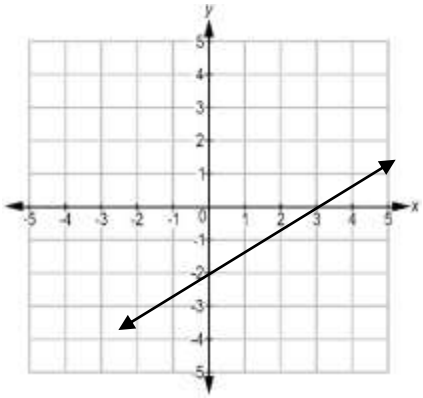
What I Know

Choose the letter of the best answer. Write your answer on a separate sheet of paper.

1. What is the trend of the graph of a linear equation that has a slope of 5?
   A. The graph is a vertical line.
   B. The graph is a horizontal line.
   C. The graph is increasing from left to right.
   D. The graph is decreasing from left to right.

2. What is the trend of the graph of a linear equation having a slope of $-\frac{3}{2}$.
   A. The graph is a vertical line.
   B. The graph is a horizontal line.
   C. The graph is increasing from left to right.
   D. The graph is decreasing from left to right.

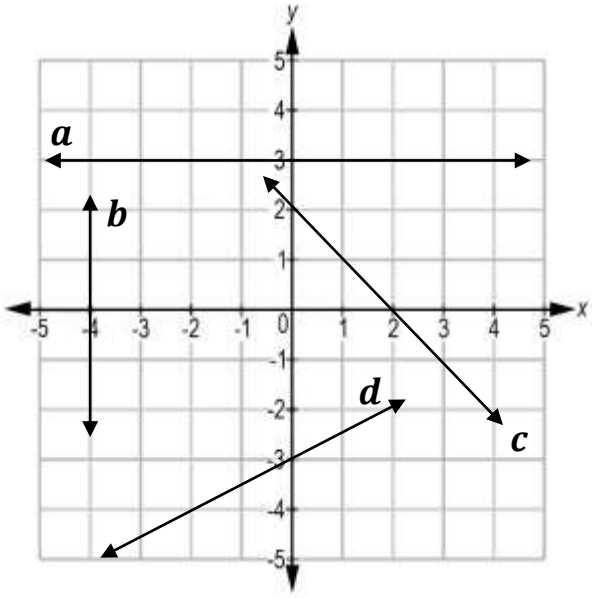
Use the graph below to answer items 3 and 4.



3. What is the slope of the line?
   A. $\frac{3}{2}$
   B. $\frac{2}{3}$
   C. $-\frac{2}{3}$
   D. $-\frac{3}{2}$

4. What is the trend of the graph?
   A. The graph is a vertical line.
   B. The graph is a horizontal line.
   C. The graph is increasing from left to right.
   D. The graph is decreasing from left to right.

Use the graph below to answer questions 5 – 9.



5. Which line has a positive slope?
   A. line a
   B. line b
   C. line c
   D. line d

6. Which line has a negative slope?
   A. line a
   B. line b
   C. line c
   D. line d

7. Which line has a zero slope?
   A. line a
   B. line b
   C. line c
   D. line d

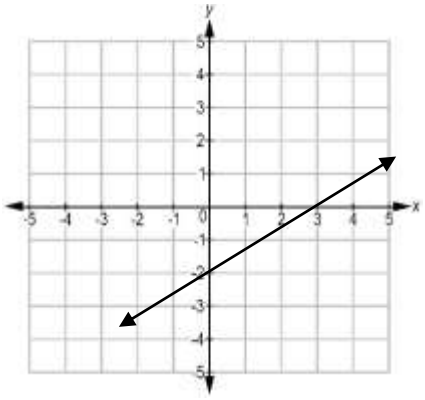
8. Which line has an undefined slope?
   A. line a
   B. line b
   C. line c
   D. line d

9. What is the slope of the equation $y = -6$.
   A. -6
   B. -1
   C. 0
   D. undefined

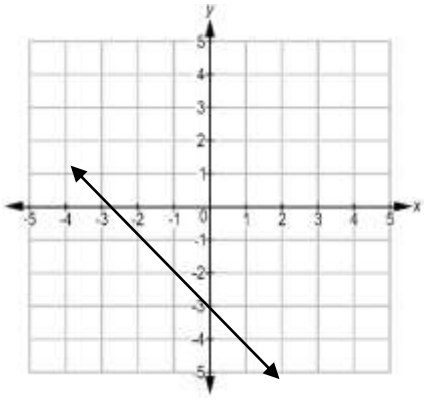
10. Describe the graph of the linear equation $y = -6$.
   A. It is a vertical line.
   B. It is a horizontal line.
   C. It is increasing from left to right.
   D. It is decreasing from left to right.

11. Which graph shows the equation $y = x - 3$.

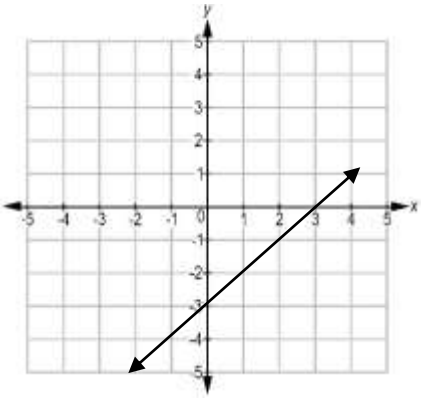
A.



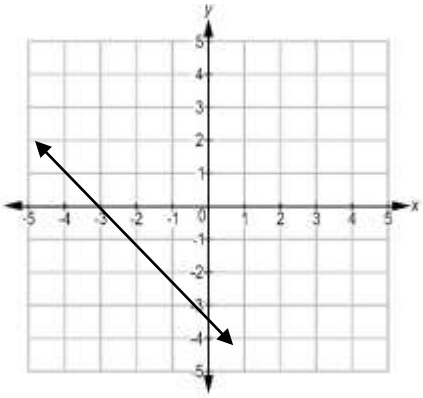
C.



B.



D.

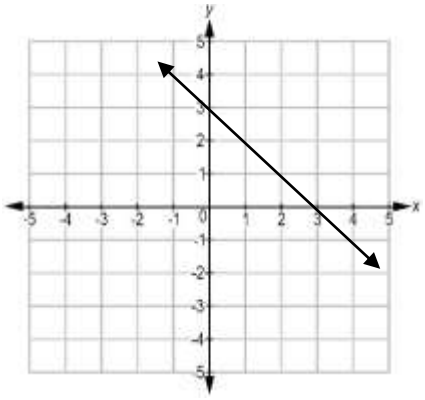


12. Nel was asked to describe the trend of the graph of an equation whose slope is 2. He answered, "it is increasing from left to right". Is Nel's answer correct?

A. No, because the graph should be horizontal.
B. No, because the graph should be a vertical line.
C. Yes, because the graph is a slanting line.
D. Yes, because the equation whose slope is positive should be increasing from left to right.

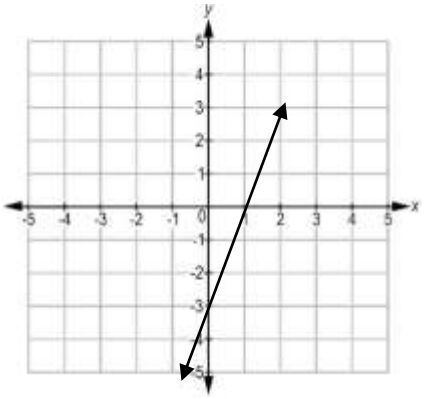
13. Describe the slope of the graph given below.

A. Negative
B. Positive
C. Undefined
D. Zero



14. Find the slope of this line.

A. 3
B. $\frac{1}{3}$
C. $-\frac{1}{3}$
D. -3



15. What is the trend of the graph presented in number 14?
A. It is a horizontal line.
B. It is a vertical line.
C. It is increasing from right to left.
D. It is decreasing from left to right.

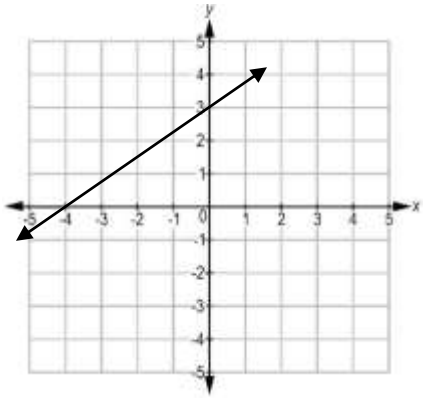
Lesson 1 Describing the Graph of a Linear Equation in Terms of its Intercepts and Slope

A line can be described by its slope. The slope of a line is a number that measures its "steepness", usually denoted by the letter m. It is the change in y for a unit change in x along the line.

What's In

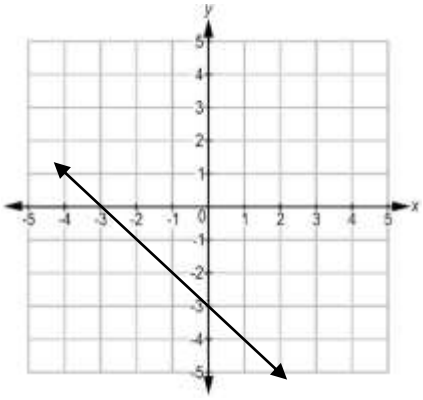
Directions: Determine the slope of each line below. Use a separate sheet of paper.

Figure 1



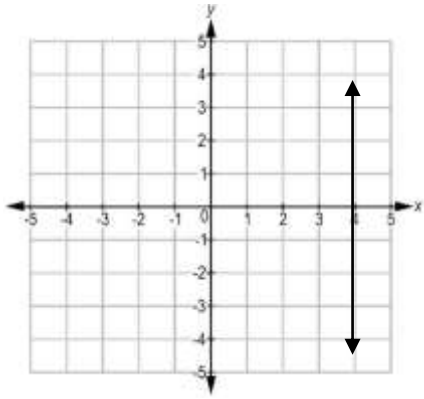
$Slope =$

Figure 3



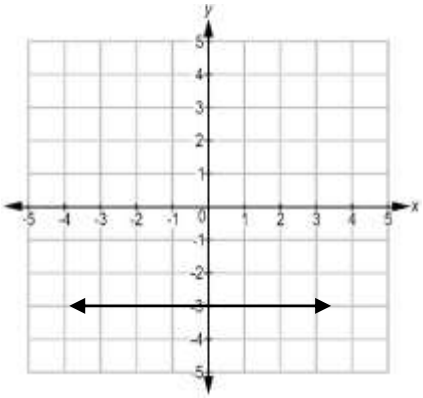
$Slope =$

Figure 2



$Slope =$

Figure 4



$Slope =$

Questions

1. Which of the figures has a positive slope?
2. Which of the figures has a negative slope?
3. Which of the figures has a slope of zero?
4. Which of the figures has an undefined slope?

What's New

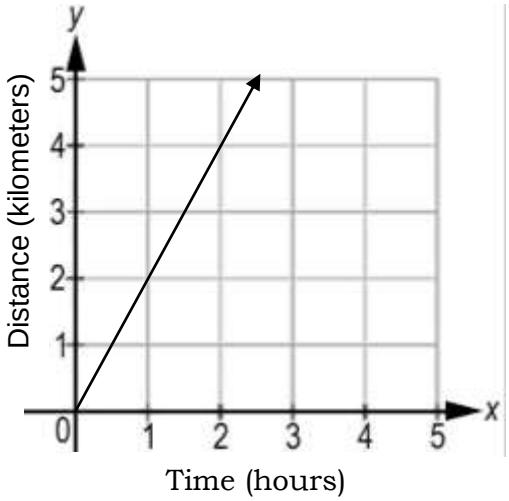
Activity: Let's Have a Walk

Read and analyze the situation, then answer the questions that follow. Use a separate sheet of paper.

Situation

Ben goes for a walk every morning. The distance he walks can be modeled by the equation $y = 2x$, where (y) is the distance walked in kilometers and (x) is the number of hours he has walked.

The graph shows the data collected about the walk of Ben where x is the time (hours) and y is the distance (kilometers).



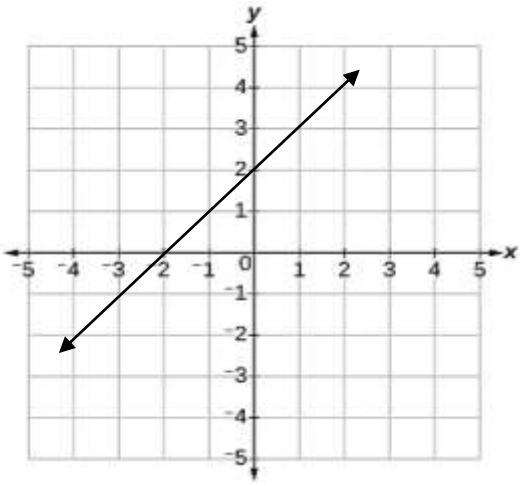
Questions:

a. What is the constant speed of Ben in walking?
b. What happens to the value of distance for every one-hour increase?
c. Slope is defined as "the value of y for every unit of x", in this line representing the data about the distance walked by Ben, what is the slope of the line?

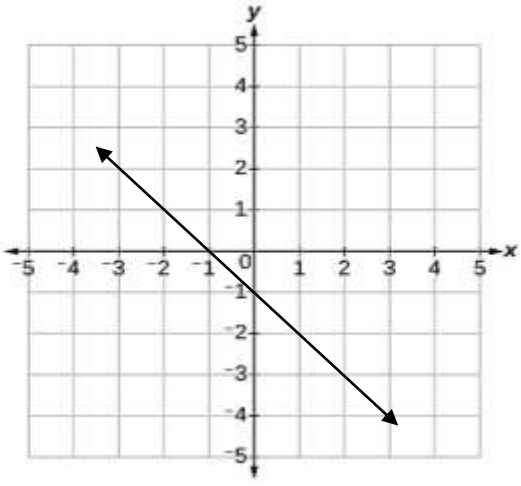
What is It

Trend of the Graph

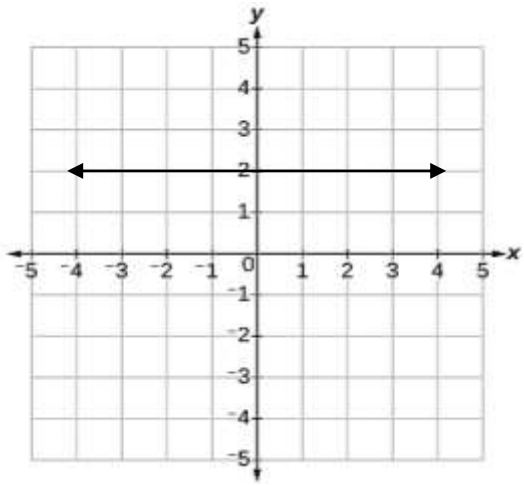
The value of the slope m tells the trend of the graph of a linear equation.



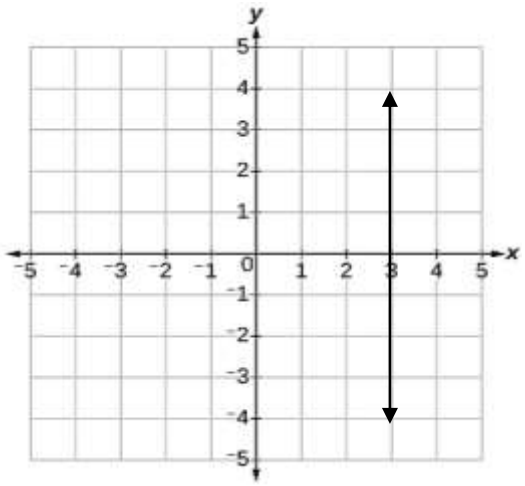
If ***m* is positive**, then **the graph is increasing from left to right**.



If ***m* is negative**, then **the graph is decreasing from left to right**.



If m **is zero**, then **the graph is a horizontal line**.



If m **is undefined**, then **the graph is a vertical line**.

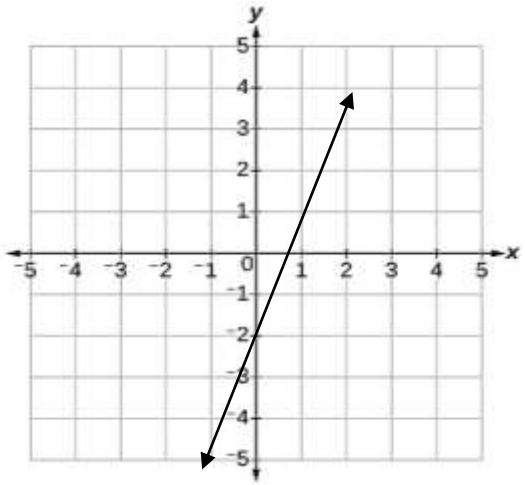
Example 1

Describe the graph of the linear equation $y = 3x - 2$.

Solution

In the graph, y increases as x increases, so the line slopes upwards to the right.

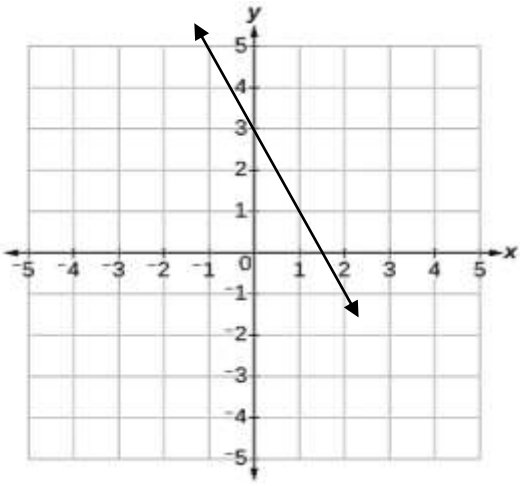
Also, notice that the equation has a positive slope 3. Thus, it can be deduced that the graph of the given equation increases from left to right.



Example 2

Describe the graph of the linear equation $y = -2x + 3$.

Solution



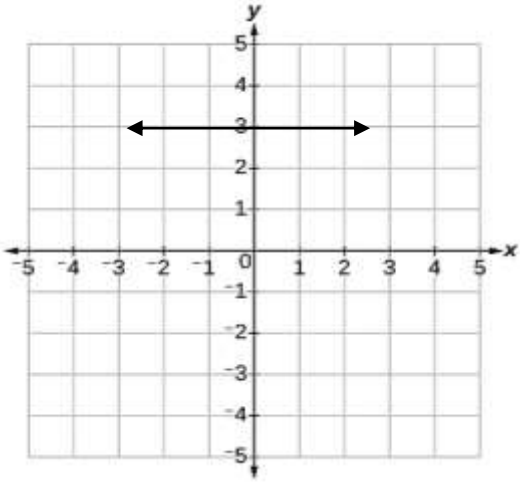
In the graph, y decreases as x increases, so the line slopes downwards to the right.

Also, notice that the equation has a negative slope -2. Thus, it can be deduced that the graph of the given equation decreases from left to right.

Example 3

Describe the graph of the linear equation $y = 3$.

Solution



In the graph, y does not change as x increases, so the line is exactly horizontal. The slope of any horizontal line is always zero. The line on the right goes neither up nor down as x increases, so its slope is zero.

The horizontal line has an equation of the form $y = 3$, where 3 is the y-intercept.

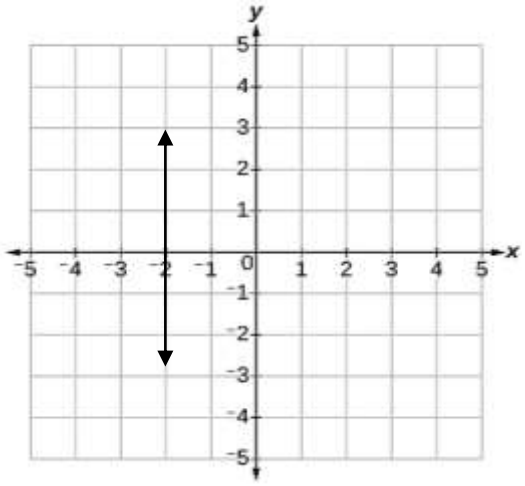
Example 4

Describe the graph of the linear equation $x = -2$.

Solution

When the line is exactly vertical, it does not have a defined slope.

The vertical line where -2 is the x-intercept has an equation of the form $x = -2$.

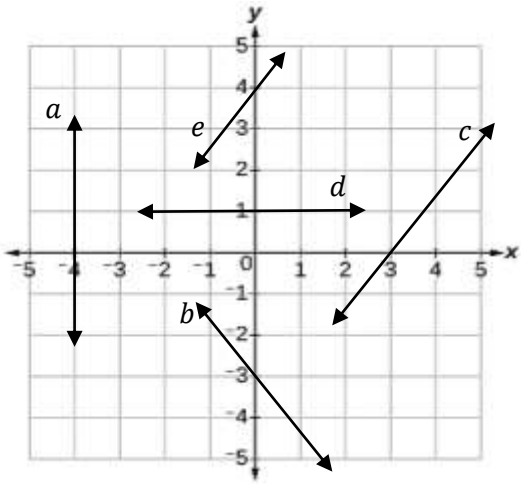


What's More

A. Describe the trend of the graph given the following equations. Use a separate sheet of paper.

1. $y = -\frac{3}{5}x + 4$ Trend of the Graph: _____
2. $y = -9$ Trend of the Graph: _____
3. $y = 4x - \frac{3}{2}$ Trend of the Graph: _____
4. $x = -2$ Trend of the Graph: _____
5. $4x + y = 7$ Trend of the Graph: _____

B. Describe the trend of the graph.



Line a _____

Line b _____

Line c _____

Line d _____

Line e _____

What I Have Learned

This activity will enable you to master how to describe the trend of the graph of a linear equation.

Directions: Given the sign of the slope, complete the sentences below by supplying an appropriate information which tells the trend of the graph.

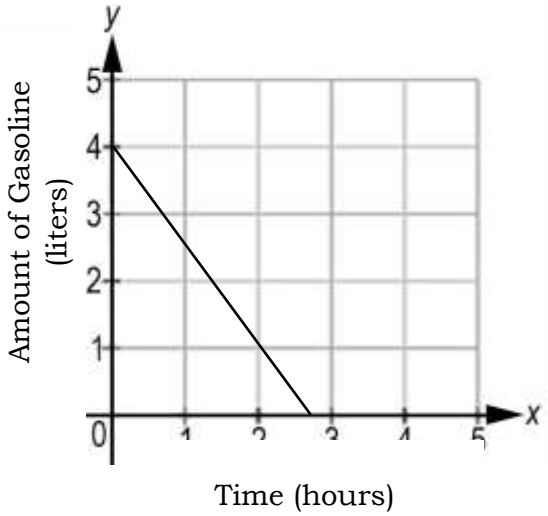
1. If the slope m is positive, then_____.
2. If the slope m is negative, then_____.
3. If the slope m is zero, then _____.
4. If the slope m is undefined, then _____.
5. If the slope m is -7, then _____.
6. If the slope m is 4/3, then_____.

What I Can Do

Read and analyze the situation, then answer the questions that follow. Use a separate sheet of paper.

Situation

Jayson fills his motorcycle with 4 liters of unleaded gasoline. Every hour he travels, the motorcycle consumes 1.5 liters at constant speed. The graph represents the gasoline left in his motorcycle (y) after traveling for (x) hours.



Time (hours)

Questions:

a. What is the amount of gasoline left after travelling for 2 hours?
b. What is the constant decrease of gasoline per hour?
c. After how many hours will he need to fill or to buy gasoline again?

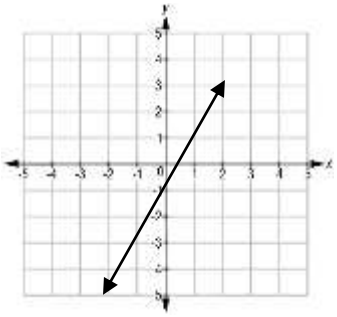
Assessment

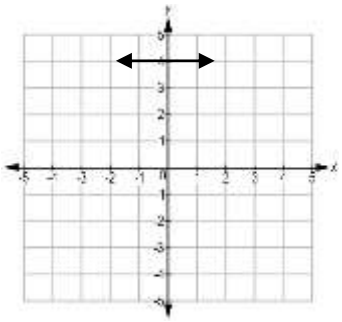
Multiple Choice: Choose the letter of the best answer. Write the letter on the space before the number.

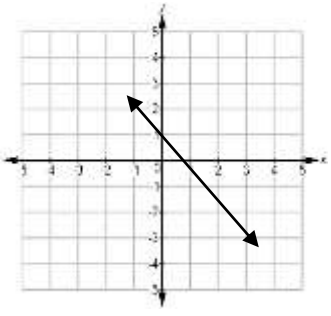
1. What is the trend of the graph of the linear equation that has a slope of $\frac{1}{2}$?
   A. The graph is a vertical line.
   B. The graph is a horizontal line.
   C. The graph is increasing from left to right.
   D. The graph is decreasing from left to right.

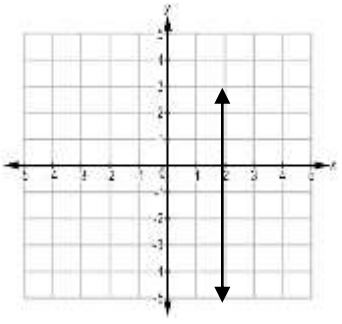
2. Describe the graph of the linear equation $y = 8$.
   A. The graph is a vertical line.
   B. The graph is a horizontal line.
   C. The graph is increasing from left to right.
   D. The graph is decreasing from left to right.

3. Which of the graph below has a negative slope?

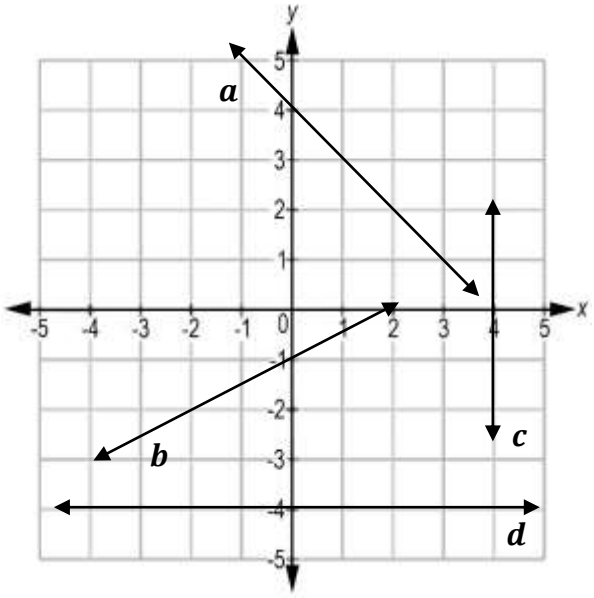
A. 

C. 

B. 

D. 

Use the graph below to answer questions 4 – 7.



4. Which line has a positive slope?
   A. line a
   B. line b
   C. line c
   D. line d

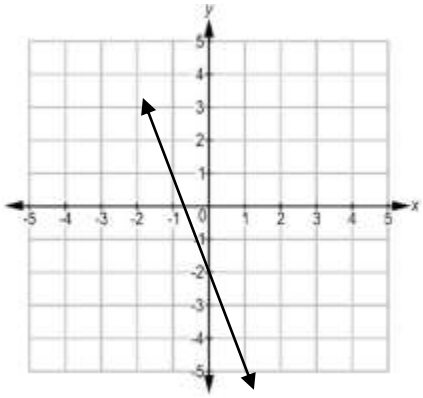
5. Which line has a negative slope?
   A. line a
   B. line b
   C. line c
   D. line d

6. Which line has a zero slope?
   A. line a
   B. line b
   C. line c
   D. line d

7. Which line has an undefined slope?
   A. line a
   B. line b
   C. line c
   D. line d

8. What is the trend of the graph of a linear equation $y = -\frac{9}{8}x + 2$?
   A. The graph is a vertical line.
   B. The graph is a horizontal line.
   C. The graph is increasing from left to right.
   D. The graph is decreasing from left to right.

Use the graph below to answer items 9 and 10.

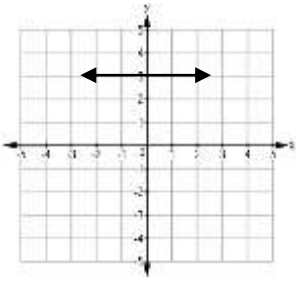


9. What is the slope of the line?
   A. -3
   B. -2
   C. 2
   D. 3

10. What is the trend of the graph?
   A. The graph is a vertical line.
   B. The graph is a horizontal line.
   C. The graph is increasing from left to right.
   D. The graph is decreasing from left to right.

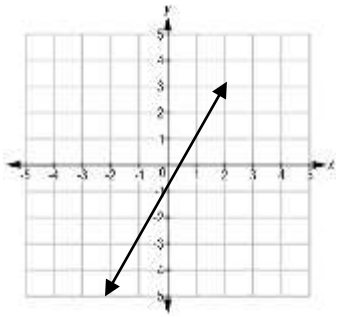
11. Describe the slope of the line given the graph below.

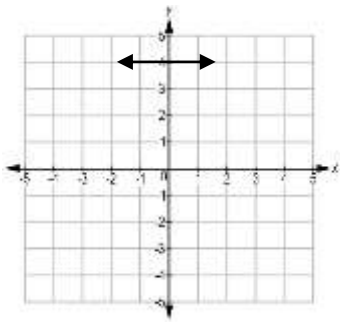
   A. The slope is zero.
   B. The slope is positive.
   C. The slope is negative.
   D. The slope is undefined.

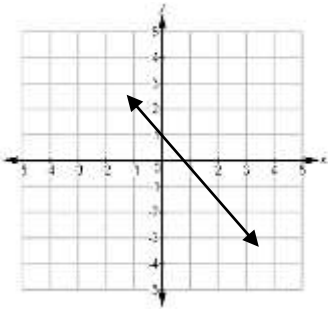


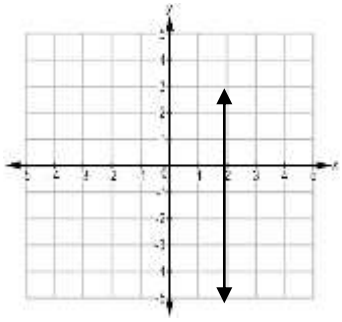
12. Your classmate insisted that the graph of the linear equation $y = \frac{3}{4}$ is increasing from right to left. Is your classmate correct?
   A. Yes, because the equation has a zero slope.
   B. Yes, because the equation has an undefined slope.
   C. No, because the graph of the equation is a vertical line.
   D. No, because the graph of the equation is a horizontal line.

13. Which of the graph below has a zero slope?

A. 

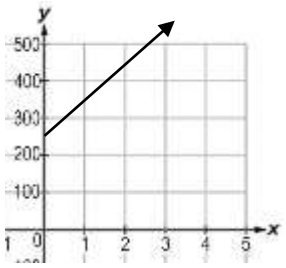
C. 

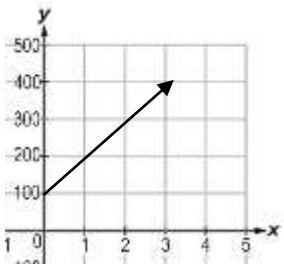
B. 

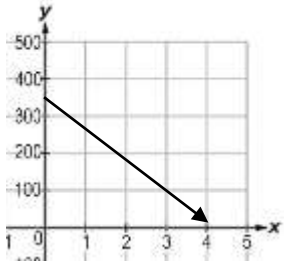
D. 

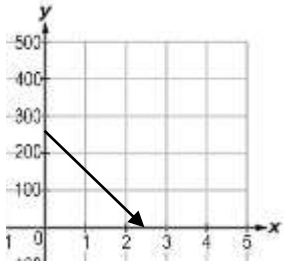
14. Describe the trend of the graph of the equation $x = 10$.
    A. The graph is a vertical line.
    B. The graph is a horizontal line.
    C. The graph is increasing from left to right.
    D. The graph is decreasing from left to right.

15. To become a fitness club member, one must pay a ₱ 250 start-up charge and a ₱ 100 monthly fee. Which of the graphs below is the total payment (y) for (x) months of using the gym?

A. 

C. 

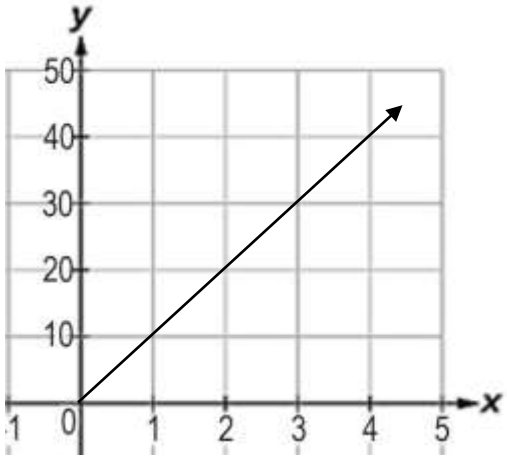
B. 

D. 

Additional Activities

Activity: Share your Story

Directions: Label the x – and y – axis and create a story out of the graph of the linear equation below. Use a separate sheet of paper.



Your output will be assessed using the rubric below.

RUBRIC

Criteria	Highly Proficient (5)	Proficient (4)	Approaching (3)	Beginning (2)
Connections	Strong mathematical connections are used to extend the concept learned to other mathematics or to a deeper understanding of mathematics.	Mathematical connections or observations are recognized.	Some attempt to relate the concept learned to other subjects or to own interests and experiences is made.	No connections are made.
Communication	A sense of audience and purpose is communicated and/ or precise math language and symbolic notation is used to consolidate math thinking and to communicate ideas.	A sense of audience or purpose is communicated and/or formal math language is used throughout the story or situation to share and clarify ideas.	Some awareness of audience or purpose is communicated, or some formal math language is used, and specific example is provided to communicate ideas.	No awareness of audience or purpose is communicated.

Answer Key

What's More	What's New	What's In	What I Know
A. 1. Decreasing from left to right 2.Horizontal line 3.Increasing from left to right 4.Vertical line 5. Decreasing from left to right B. *line a* –Vertical line *line b* –Decreasing from left to right *line c* –Increasing from left to right *line d* –Horizontal line *line e* –Increasing from left to right	a. 2 b. Increasing from left to right c. As the value of y increases the value of x increases	Fig.1 $m = \frac{3}{4}$ Fig.2 $m = undefined$ Fig.3 $m = -1$ Fig.4 $m = 0$ Questions 1. Fig. 1 2. Fig. 3 3. Fig. 4 4. Fig. 2	1. C 2. D 3. B 4. C 5. D 6. C 7. A 8. B 9. C 10. B 11. B 12. D 13. A 14. A 15. C

Additional Activities	What I have Learned	Assessment	What Can I Do
Answer may vary.	Slope 1. 5 2. -1 3. 0 4. 3 5. -4 Trend 1. Increasing from left to right 2. Decreasing from left to right 3. Horizontal line 4. Increasing from left to right 5. Decreasing from left to right	1. C 2. B 3. B 4. B 5. A 6. D 7. C 8. D 9. A 10. D 11. A 12. D 13. C 14. A 15. A	a. 1 b. 1.5 liters/hour c. After $2\frac{2}{3}$ hours or 2 hours and 40 minutes

References

Abuzo, Emmanuel P., Bryant, Merden L., Cabrella, Jem Boy B. Caldez, Belen P., Callanta, Melvin M., Castro, Anastacia Preserfina I., Halabaso, Alicia R., Javier, Sonia P., Nocom, Roger T., and Ternida, Conception S. (2013). Grade 8 Mathematics Learners Module. pp. 181-183. Philippines. Book Media Press, Inc. and Printwell, Inc.

Orines, Fernando B., et.al. (2017). Second Edition Next Century Mathematics, pp. 101-105, Manila, Philippines.

For inquiries or feedback, please write or call:

Department of Education – Bureau of Learning Resource
Ground Floor, Bonifacio Building, DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax. Nos.: (632) 8634-1072; 8634-1054; 8631-4985

Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph