#9552

LET'S GET IT STRAIGHT: LINEAR EQUATIONS AND THEIR GRAPHS: PART ONE

BENCHMARK MEDIA, 2002
Grade Levels: 7-12
16 minutes
1 Instructional Graphic Enclosed

DESCRIPTION

After reviewing some facts about the slope of a straight line, presents ways to find linear equations on a straight-line graph. Introduces related vocabulary and includes a review.

ACADEMIC STANDARDS

Subject Area: Mathematics

★ Standard: Understands and applies basic and advanced properties of functions and algebra

- Benchmark: Understands various representations (e.g., tables, graphs, verbal descriptions, algebraic expressions, Venn diagram) of patterns and functions and the relationships among them (See Instructional Goal #1.)

- Benchmark: Solves linear equations using concrete, informal, and formal methods (e.g., using properties, graphing ordered pairs, using slope-intercept form) (See Instructional Goal #2.)

- Benchmark: Understands special values (e.g., minimum and maximum vales, x- and y-intercepts, slope, constant ratio or difference) of patterns, relationships, and functions (See Instructional Goal #3.)

INSTRUCTIONAL GOALS

1. To review facts about the slope of a straight line.
2. To demonstrate how to find an equation of a straight line.
3. To explain what is meant by the domain of an equation.

BACKGROUND INFORMATION

   Linear functions are probably the simplest of all functions and are the most convenient and simple instruments for modeling real-world processes. The ability to derive equations of given straight lines is an essential skill in many situations. This skill comes into play whenever one must find the coordinates of the points on a line, or the intersection points of different straight lines, or to determine whether or not a given line goes through a given point.

1. steep
2. slope
3. rise
4. run
5. coordinates
6. x –axis

7. y-axis
8. origin
9. formula
10. gradient
11. domain

BEFORE SHOWING

1. Pass out index cards that have the following terms on them and review their meanings: slope, horizontal, vertical, zero slope, positive slope, negative slope, rise, run, and slope formula.
2. Review equations that have two variables.
   a. If the equation is y = 2x, find y when x = 2, 3, 4, 5, 6.
   b. If the equation is y = 3x –3, find y when x = -1, 2, 0, 3, 4.
   c. Suppose the equation is not known. If x = 2, 3, 4, 5, 6 and y = 6, 9, 12, 15, 18, what is the equation? Explain that this is what the video is about.
3. Review plotting solutions to a linear equation on a graph. Set up a table to find the values for y. If the coordinates do not form a straight line, find the reason.
4. Pass out white boards and calculators for completing calculations that will be shown in the video.

DURING SHOWING

1. View the video more than once, with one showing uninterrupted.
2. Pause at each section that has calculations for the viewers to complete. Use white boards and calculators to find the answers.
3. Pause at the section showing 2/3 being changed to a decimal. Explain that the video was produced in Australia and students there show a repeating decimal by writing a dot above the repeating number.
4. Pause at the section showing "x" as representing multiplication. Point out other less confusing ways that multiplication can be written in algebra.
5. Pause at the section showing the equation y = 2/3x written in brackets with the domain included. Write the full title of the equation. Compare the length of the worded statement with that of the equation.
6. Pause at the section explaining about the top line of the pole. Clarify how the domain was determined to be between –1.4 and 8.1.
7. Pause at the section explaining about the y-intercept. Point out that the equation y =mx + b is used as an equation with lines that have y-intercepts.

AFTER SHOWING

► Discussion Items and Questions

1. What is the slope of a horizontal line? What kind of slope does a line rising to the right have? What kind of slope does a line rising to the left have?
2. What is the slope formula?
3. What is the horizontal axis on a grid called? What is the vertical axis on a grid called?

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4. What is the point where the x-axis and y-axis meet called?
5. Slope can be written as a fraction or a decimal. Which is probably the more exact number?
6. What is the importance of including the domain when writing an equation for a straight line?
7. When y equals the slope of a straight line times x, what does this indicate about the line?
8. If the y-intercept is negative, what does this indicate about the line?

► Applications and Activities

1. Draw straight lines through points with the following coordinates and find the slopes of each:
   a. (0,0) and (1,2)
   b. (1,3) and (2,1)
   c. (1,3) and (2,3)
2. Set up a spreadsheet to calculate the slopes of lines.
3. Set up an x, y table for the equation $y = 3x - 5$ with the domain being $0 \leq x \leq 8$. Graph the equation.
4. Complete a worksheet to find the equation of a straight line when two points are given. (See Instructional Graphic.)
5. Write the following equations using words:
   a. $\{(x,y): y = -3x, -4 \leq x \leq 3\}$
   b. $\{(x,y): y = 2x - 4, 0 \leq x \leq 5\}$
6. Use linear equations and graphs to solve these practical applications:
   a. A company had $100,000 in its bank account. The amount of money increased uniformly and six months later the account grew to $160,000. How much money was in the account after two months?
   b. Andrew went out of his house and walked at a constant speed. After 90 minutes of walking, he covered three miles. How many miles did he walk after 50 minutes?

RELATED RESOURCES

CAPTIONED
MEDIA PROGRAM

- Slopes: That's a Bit Steep #9549
- Algebra: Linear Equations #9746

www.cfv.org

World Wide Web
The following Web sites complement the contents of this guide; they were selected by professionals who have experience in teaching deaf and hard of hearing students. Every effort was made to select accurate, educationally relevant, and "kid safe" sites. However, teachers should preview them before use. The U.S. Department of Education, the National Association of the Deaf, and the Captioned Media Program do not endorse the sites and are not responsible for their content.

- **SLOPE AND Y- INTERCEPT**

Contains an interactive solver that helps find the equation of a line.

http://school.discovery.com/homeworkhelp/webmath/equline3.html

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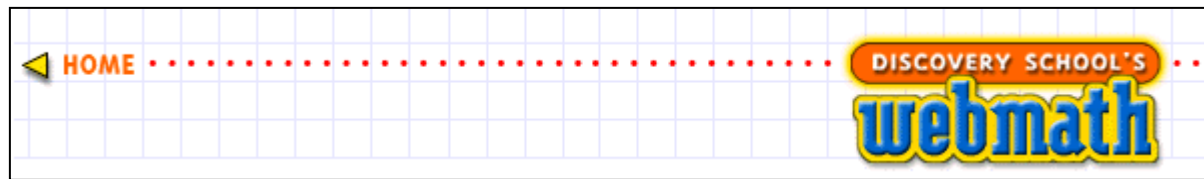
Uses graphics to explain rise, run, slope, and y-intercepts.

- **FINDING THE EQUATION OF A LINE**

http://library.thinkquest.org/20991/alg/grapheq.html?tqskip1=1&tqtime=0609

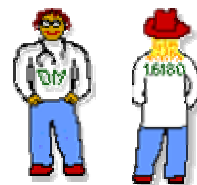
- **TUTORIALS**

Contains a link to a site that has interactive drills for finding linear equations from graphs.

http://www.bonita.k12.ca.us/schools/ramona/teachers/carlton/tutorials.html
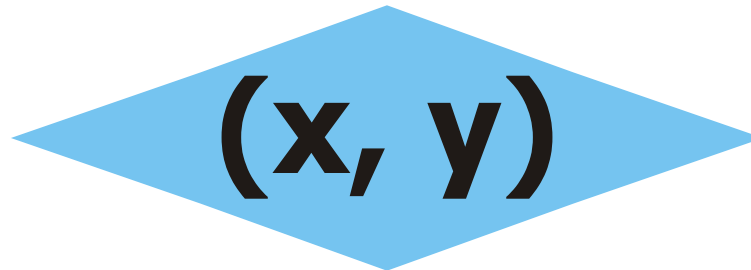

- **Ask Dr. Math**

http://mathforum.org/library/drmath/sets/high_lineareq.html

Contains links that have information about linear equations including how to find the equation of a line.

INSTRUCTIONAL GRAPHICS

- FINDING THE EQUATION OF A STRAIGHT LINE

Finding the Equation of a Straight Line
(when given two points)

$$(x, y)$$

1.   Draw a straight line through points with coordinates (0,0) and (2,4).

2.   Find the slope of this line.

3.   The slope shows the change in the y-coordinate of a point on this line when its x-coordinate changes by 1. Use this table to find the values for y.

x	1	2	3	4	5
y					

4.   Find the equation of this straight line.

5.   Find the y-coordinate of the point on this line whose x-coordinate is equal to 2.3.

6.   Draw another straight line through the point (0,1) that is parallel to the first straight line.

7.   Find the slope of this line.

8.   Find the y-intercept.

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