

TEACHER'S GUIDE

MATH SERIES

LINEAR EQUATIONS
and Their Graphs: Let's Get It Straight
Part 2
17 Minutes

Distributed by BENCHMARK MEDIA

FOR USE IN: Mathematics

LEVEL: Grades 7-9, Advanced Grade 6

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EDUCATIONAL OBJECTIVES:

To further apply the basic concepts learned in Linear Equations Part 1 to derive:

- **Linear equations and their graphs**
- **The domain of an equation**

BACKGROUND INFORMATION:

Linear functions and linear equations are often used for modeling processes in real life. That is why it is important to learn how to derive these equations. In fact, when the coordinates of just two points on a straight line are known, the equation for the line can be easily derived. This in turn allows us to find the y-coordinate of any point on the line.

BEFORE SHOWING THE VIDEO:

The video contains several optional pauses where the students are presented with calculations to complete, while the VCR may be placed on pause. After the pause, correct answers are given. If the teacher plans to use these pauses, the students may be requested to have paper and pens available before starting the video. For a more intensive interaction between students and parts of the video, the teacher may wish to pause the tape after the presentation of a particular concept to inquire if the students have understood it; and/or ask the students before starting the video to signal the teacher to

stop at any point for clarification. The video may also be shown in its entirety without pause either as an introduction or a review of the subject. It is always helpful if teachers are able to view the video before showing it to the class.

Several questions can be posed in order to review the content of the Linear Equations and Their Graphs Part 1:

1. Draw a straight line through points with coordinates $(0, 0)$ and $(-1, 2)$. Explain whether the slope of this line is positive or negative. Find the slope of this line. Can the equation $y = -2x + 4$ be the equation of this line? Explain your answer. Find the equation of this line. Plug $x = 1$ and $x = 2$ into the obtained equation and graph these points.
2. A straight line goes through point $(0, 2)$. Its slope is equal to -3 . What is the y -intercept? Write the equation of this line.
3. Write the equation for a straight line that passes through point $(0, -2)$ and is parallel to another line whose equation is $y = -4x$.

CONTENT OF THE VIDEO:

The key concepts explained are how to derive the equation of a straight line:

1. when its slope and one of its points are given
2. when two points on it are given
3. that passes through a given point and is parallel to another line whose equation is known.

These problems are tackled by using the formula for slope and by solving linear equations for an unknown coefficient. The visuals use an eye catching style, combining live action with computer simulation to find equations for events such as, a plane's takeoff, leveling off, and landing:

AFTER SHOWING THE VIDEO:

It may be a good idea to review the various cases in which the equation for a straight line was derived in the video. We learned how to find the equation of a straight line in the following cases: when the slope is given and the line passes through the origin; when the slope and the y -intercept are given; when the slope and the coordinates of a point are given; when the straight line is parallel to a line with a known slope and passes through a point with known coordinates; when two points on the straight line are given. In particular, students may be reminded that they first learned to derive the equation of a straight line when its slope and its y -intercept are given. Then, the problem was generalized and they learned how to derive this equation when the slope and any point on the line are known. It may be emphasized that this is the usual way of reasoning in mathematics -- to start with some particular case and then to generalize from it.

Some questions may be offered:

1. A straight line whose equation is $y=-4x+b$ passes through the point $(4, -3)$. Find its y-intercept.
2. Find the equation of the straight line with the given slope m that passes through the given point A for each of the following cases:
 - a) $m= 4, A(-1, 2)$
 - b) $m= -3, A(-3, 1)$
 - c) $m=2, A(-1, -4)$.
3. A straight line is parallel to another line whose equation is $y=-0.5x+2$, and passes through the point $(1, -2)$. Find the equation of this line.
4. Draw straight lines through points with coordinates:
 - a) $(0, 0)$ and $(-1,1)$
 - b) $(-2, 3)$ and $(1, 1)$;
 - c) $(1, -3)$ and $(2, 2)$.Find their slopes. Find their equations.

EXPLORING AND INVESTIGATING:

The following questions may be used to draw students into a deeper discussion:

1. Two students had to derive the equation of a straight line. One student selected two points on the line, and the other selected two other points on the line. Using the appropriate strategy, each of them obtained an answer. Do you think their answers were identical? Explain your answer.

2. A car moved from a starting point at a constant speed. After 1 hour it covered 70 miles. Is it correct to say that after 30 minutes it covered 35 miles? Is it correct to say that the equation for its distance from its starting point is $y=70x$ (where x is the number of hours the car was in motion)? Is it correct to say that after 2 days (48 hours) the car covered 3,300 miles? What can you say about the domain of the obtained equation?

The Math Series consists of 10 videos:

ALGEBRA: A Piece of Cake Part 1

ALGEBRA: A Piece of Cake Part 2

SLOPES: That's a Bit Steep!

PERCENTAGES That Make Sense

LINEAR EQUATIONS and Their Graphs: Let's Get It Straight Part 1

LINEAR EQUATIONS and Their Graphs: Let's Get It Straight Part 2

INTEGER OPERATIONS: Into the Negative Zone Part 1 Adding and Subtracting

INTEGER OPERATIONS: Into the Negative Zone Part 2 Multiplying and Dividing

FACTORING IS FANTASTIC Part 1: Common Factors

FACTORING IS FANTASTIC Part 2: Quadratic Trinomials

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