IS IT LINEAR?

Performance Standard 8D.H

Write a real-world word problem with two variables in the answer accordingly:
- *Mathematical knowledge*: Create word problems that meet given conditions and represent linear relationships.
- *Strategic knowledge*: Use appropriate strategies to create the word problem.
- *Explanation*: Explain completely and clearly what was done and why it was done.

Procedures

1. ***In order to use algebraic concepts and procedures to represent and solve problems (8D)*** students should experience sufficient learning opportunities to develop the following:
   - Create word problems that meet given conditions and represent linear relationships.

   Note: Students should have experience with linear relationships and writing their own problems prior to this assessment.
2. Provide each student a copy of the "Is It Linear?" task sheet and the rubric. Have students review and discuss the task and how the rubric will be used to evaluate it. Students should also have a straight edge or ruler available for use.
3. Have the students work individually to solve the following problem. Do not help them with their thinking.

   - Write a word problem that meets the following criteria: It represents a real-world situation; the answer to the word problem is an equation in terms of two variables represented in the situation; the two variables are related in a linear relationship; and when one variable has a value of zero, the other does not; so, the two variables are not just directly proportional.
   - Draw the graph of the linear relationship present in the problem.
   - Provide a solution to the problem that you wrote.

4. Evaluate each student's work using the rubric and its guide to determine the performance level. Give each student a score in each of the three categories, scoring each part of the problem separately. Minor errors in computation include making errors in the actual addition or multiplication, rounding incorrectly. Major errors include using the wrong operation or formulas.

   The key idea here is for students to understand linear relationships well enough to identify situations where linear relationships occur in the real-world, and write a coherent word problem that reflects that understanding. Make sure that the scenario the students write produces a word problem that is solvable, and that the relationship represented meets the criteria of being linear and not just a situation where you have direct proportionality (i.e. the line would not pass through the origin when graphed).

   If students produce a word problem that is solvable, but the situation is one where the variables are directly proportional, they should receive a score of 2 for mathematical knowledge, since they did not meet all the requirements of the task. Asking the students to graph the relationship and to solve their problem should aid the student in identifying errors in their word problem, and aid the teacher in determining if the student understood the task and could complete it with a problem that met all the conditions.

   The explanations should include how they found these answers, as well as why these answers are correct.

Examples of Student Work follow

Resources
- Copies of the "Is It Linear?" task sheet
- Straightedge or ruler
- Mathematics Rubric

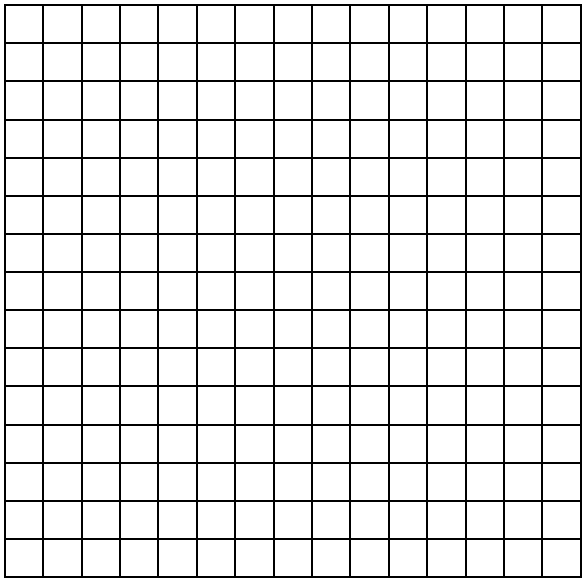
Time Requirements
- One class period

NAME _____ DATE _____

IS IT LINEAR?

A. Write a word problem that meets the following criteria:
   - It represents a real-world situation.
   - The answer to the word problem is an equation in terms of two variables represented in the situation.
   - The two variables are related in a linear relationship.
   - When one variable has a value of zero, the other does not, so the two variables are not just directly proportional.

B. Draw the graph of the linear relationship present in the problem. Describe how this graph represents the relationship in your problem.



C. Provide a solution to the problem that you wrote. Explain your reasoning.

"Meets"

Name _____

Date 04/05/01

Is It Linear?

A. Write a word problem that meets the following criteria:

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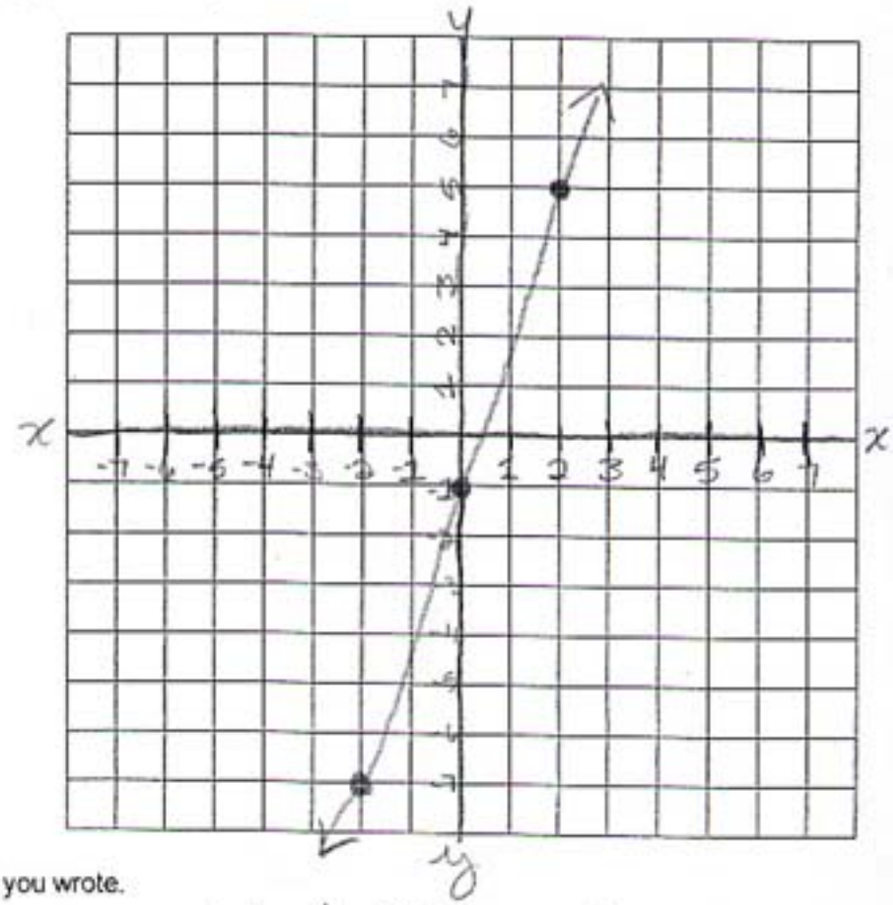
- The two variables are related in a linear relationship.
- When one variable has a value of zero the other does not, so the two variables are not just directly proportional.

Bobby has a set of building blocks. He builds an average of 3 buildings per hour. Each hour his big sister, Sally, knocks over one building. How many buildings are left standing.

B. Draw the graph of the linear relationship present in the problem.

$y = 3x - 1$

x	y
-2	-7
0	-1
2	5



C. Provide a solution to the problem that you wrote.

If Bobby worked on his buildings for two hours, he would have 5 buildings left standing.

3, 3, 3 pts

8D-HM

"Exceeds"

A-9

Name _____

Date 3-23

Is It Linear?

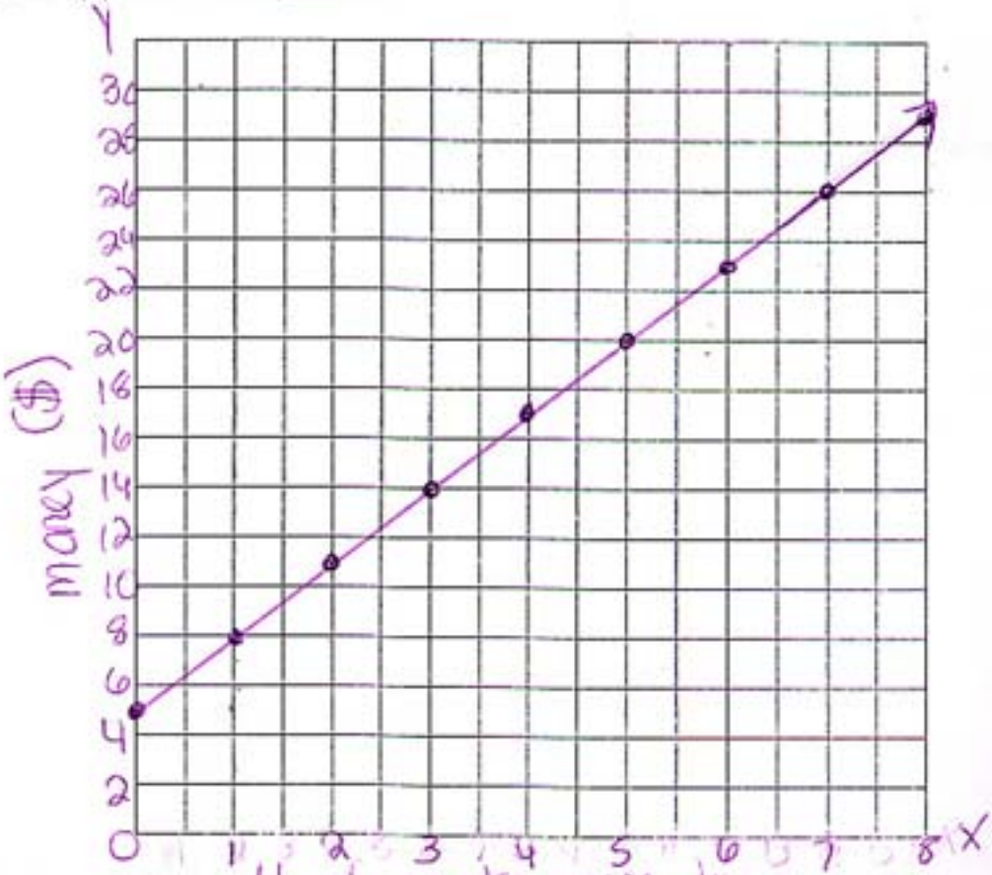
A. Write a word problem that meets the following criteria:

- It represents a real-world situation.
- The answer to the word problem is an equation in terms of two variables represented in the situation.
- The two variables are related in a linear relationship.
- When one variable has a value of zero the other does not, so the two variables are not just directly proportional.

Billy got a piggy bank with $5 in it for his birthday. He dicides to save all of his allowance it it. He gets $3 every week for allowance. If he saves his allowance every week, how much will he have after five weeks?

B. Draw the graph of the linear relationship present in the problem.

$y = 3x + 5$



C. Provide a solution to the problem that you wrote.

After 5 weeks he will have $20.

80-HE