

## WALKING HOME II

### Performance Standards (8B/8D).H

Analyze a situation involving distance traveled in a given period of time when rates are provided, represent this situation graphically and algebraically, and discuss the concept of slope as a rate of change represented on the graph.

- *Mathematical knowledge:* Represent linear relationship graphically, use slope of lines to demonstrate the rate of change;
- *Strategic knowledge:* Solve problem using a systematic process;
- *Explanation:* Explain completely what was done and why it was done.

### Procedures

1. Provide students with sufficient learning opportunities to develop the following in order to (8B) interpret and describe numerical relationships using tables, graphs, and symbols, and (8D) use algebraic concepts and procedures to represent and solve problems.
  - Describe the relationships between symbolic expressions and graphs of lines using the appropriate vocabulary for the intercepts and slope of a line.
  - Solve algebraic equations or word problems that involve linear equations or inequalities using algebraic or graphical representations.
2. Provide students with the assessment task worksheet. Have students work individually. Scientific calculators may be used, graphing calculators should not.

Janae walks home from school everyday. School is out at 3:15PM and she is supposed to be home by 3:45 PM. The school is 15 blocks from Janae's home. One day Janae stayed around after classes for 10 minutes before leaving school, Then she starts walking home, while still talking and goofing around with one of her friends. After another 8 minutes, Janae is still 12 blocks from home. She realizes she is going to have to hurry to make it home on time. How fast must she walk (or run) to make it home by 3:45? Use the coordinate axes provided to show her trip home, and use the slopes of the line segments to help discuss the rate she traveled during different parts of her trip.
3. Use the standard scoring rubric. Give each student a score in each of the three categories. A score of 4 should indicate completely correct solutions to all parts of the problem, with complete and correct justifications of their reasoning. A three should represent correct or nearly correct solutions to all parts, with only minor computational errors making their solutions inaccurate, their rationale should be sound, but may not be completely explained. A two would indicate that students have some idea about how to answer the questions, but make major errors in computation and or reasoning that effects their answers. A one may have a correct answer for one part, but generally shows little understanding in their rationale for their procedures and processes. A score of zero generally reflects no correct responses and no logical rationale for their procedures and processes.
4. Minor errors in computation include making errors in the actual addition or multiplication, rounding incorrectly. Major errors include using the wrong operations or formulas to relate terms.
5. Janae will have to travel one block per minute to make it home on time, since she has 12 blocks left to travel in 12 minutes. The graph should show Janae staying at school (distance zero) until 3:25, then traveling 3 blocks in the next 8 minutes, as a straight line segment, then walking (running) to travel the last 12 blocks in 12 minutes as another connected straight line segment. The slope of the first segment is zero, since her rate is zero.... She is still at school. The slope of the second segment is  $\frac{3}{8}$  since she travels 3 blocks in 8 minutes, and the slope of the last segment represents her rate for the remaining 12 blocks, which is much faster, at 1 block per minute, so she makes it home on time.

### Examples of Student Work follow

### Resources

### Time Requirements

- One class period

- Copies of the "Walking Home" assessment task sheet
- Writing utensil
- Scientific calculators may be used
- Mathematics Rubric

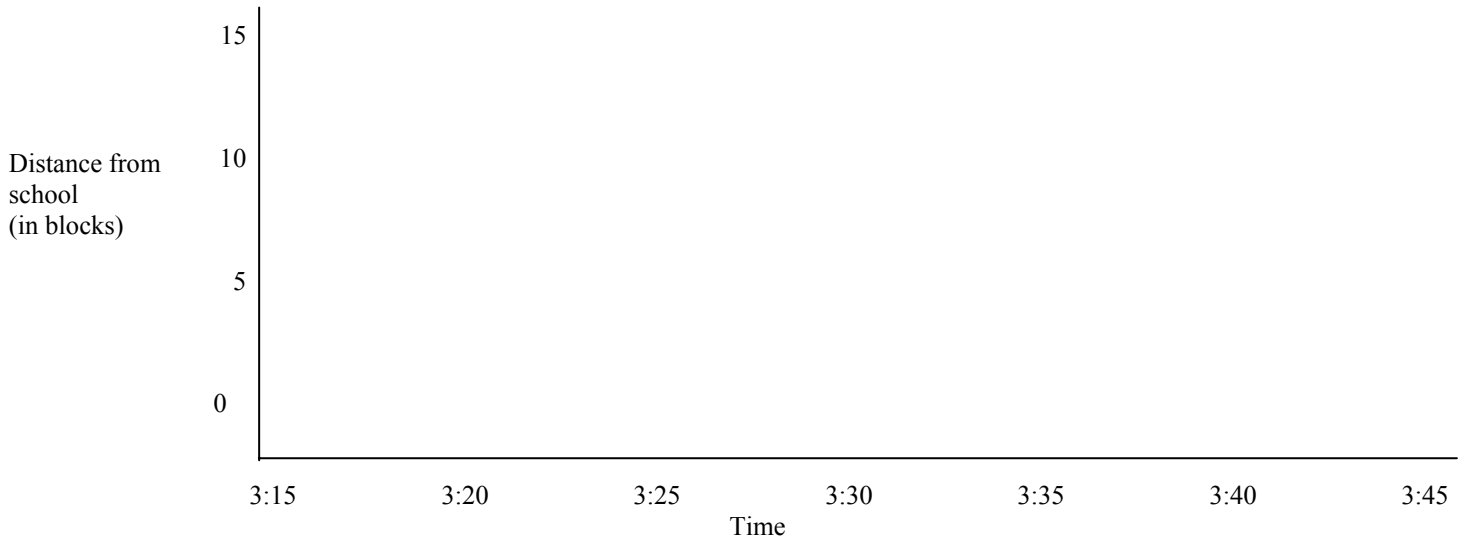
NAME \_\_\_\_\_ DATE \_\_\_\_\_

### WALKING HOME II

#### Student Task Sheet

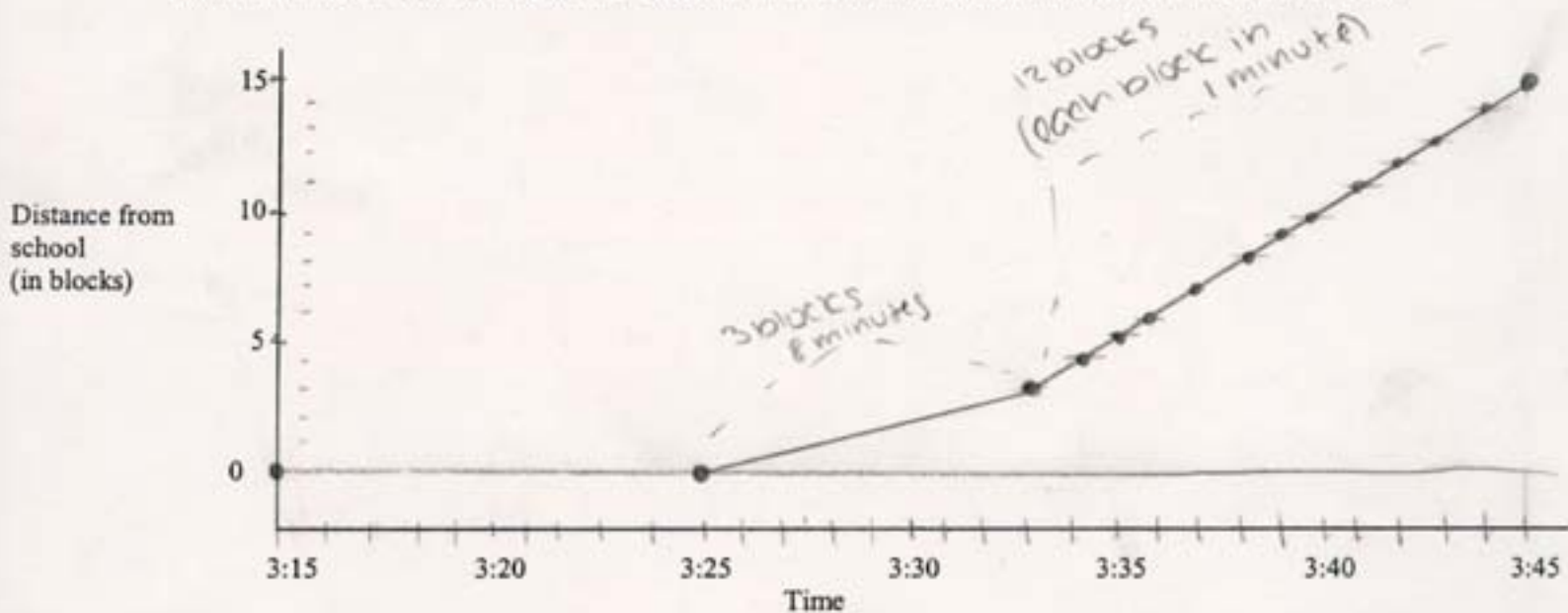
Solve the following problem.

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First 3 blocks took her 8 minutes

Next 12 blocks took her 12 minutes

She got home at 3:45 if she walked/ran the 12 blocks in one minute each.

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{1}{1} = 1$$

$$\text{slope} = \frac{3}{8} = 3 \text{ blocks in } 8 \text{ minutes}$$

$$\text{slope} = \frac{12}{12} = \frac{1}{1} = 1 = 12 \text{ blocks (each in } 1 \text{ minute)}$$

$$\underline{d = r \cdot t}$$

3:15 - 3:45

15 blocks away

$$\begin{array}{r}
 3:45 \\
 - 3:25 \\
 \hline
 0:20
 \end{array}
 \begin{array}{r}
 20 \text{ minutes} \\
 - 8 \text{ minutes} \\
 \hline
 12 \text{ minutes}
 \end{array}$$

3:25 - leaves school

3:33 - 12 blocks away

8 minutes - walked 3 blocks

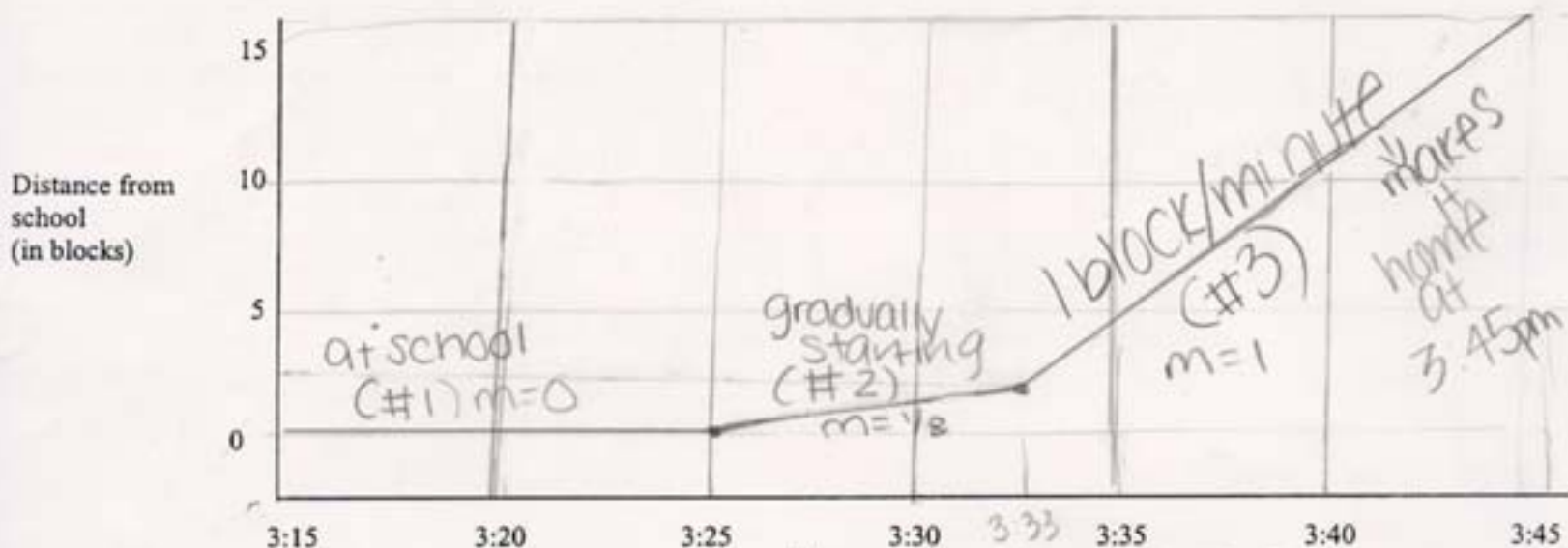
she has 12 minutes to walk/run 12 blocks

1 block per minute

For Janae to make it home by 3:45 she will have to run/walk the rest of the 12 blocks in one minute each. I got to this answer first by subtracting 3:25 from 3:45. I did this because she left the school at 3:25 and she needs to be home by 3:45. I then got 20. I then subtracted 8 from 20 because it has taken her 8 minutes to walk 3 blocks. Here I reached 12. she has 12 minutes to get home and 12 blocks to run/walk. I then divided 12 minutes by 12 blocks and got 1. She would have to run/walk each block in 1 minute in order to get home by 3:45.

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She starts at 3:25<sup>Time</sup>pm, and after 8 minutes (3:33pm), she walks 3 blocks. She must be 15 blocks away from school by 3:45 pm.

The slopes of the lines need to be found, because they rep. rates

Line #1 = 0 because it is horizontal  
 Line #2 =  $\frac{1}{8}$  because its two points are (0, 15) and (23, 3)  $\frac{0-3}{15-23} = \frac{-3}{-8} = \frac{3}{8}$

To solve this problem, I completed the graph given. I made 3 separate lines.

From 3:15PM-3:25PM, Janae's rate was 0 blocks per minute, making the slope of the line 0.

From 3:25PM-3:33PM, Janae walked 3 blocks in 8 min.

Her rate was  $\frac{1}{8}$  block/min. The

slope of line #2 =  $\frac{1}{8}$ . From 3:33PM-

3:45PM, Janae needs to walk 12

blocks/12 min, or 1 block/min. The

slope of line #3, would be 1.

According to the graph, she

started out at 0 blocks per minute, then  $\frac{3}{8}$  blocks per

minute, and then she needs

to go 1 block per minute to be

home on time. The slopes

allowed me to figure out

her needed rate. The

graph allowed me to visually

see the patterns.

1 block/min