

Tennessee Comprehensive Assessment Program / Mathematics

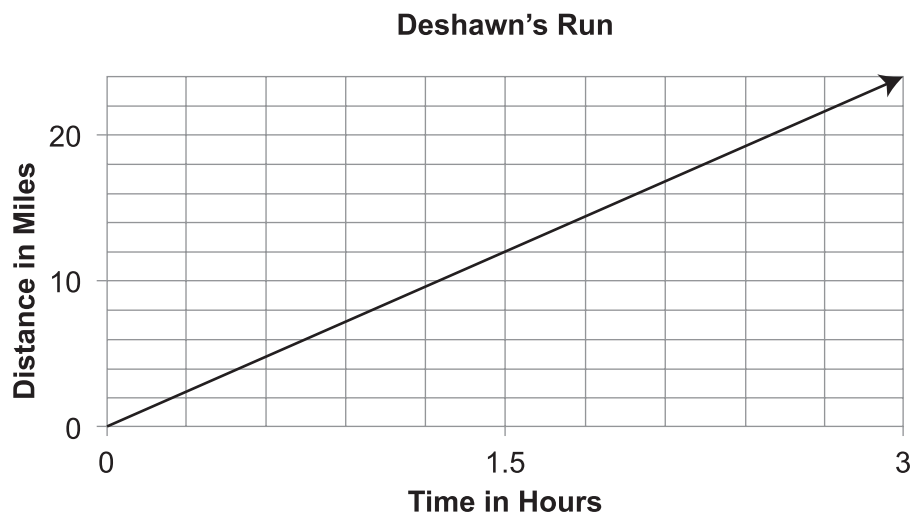
# TCAP/CRA PILOT 2012



## Task 3 : Deshawn's Run Scoring Guide

### Task 3. Deshawn's Run Task

The graph below shows data from Deshawn's trial run of 3 hours.



- a. Explain to Deshawn how he can use the information in the graph to determine the rate at which he travels. Include a unit rate in your response.

Handwriting area for the student's response.



- b. Kevin claims that the graph shows a proportional relationship, and that the constant of proportionality is  $\frac{6}{5}$ , since he can count 6 spaces up and 5 spaces over from (0, 0) to reach another point on the graph. Some of what Kevin said is correct, and some is incorrect. Explain to Kevin in what ways he is right, and in what ways he is wrong about the graph.



### 3. Deshawn's Run Task Scoring Guide

#### The CCSS for Mathematical Content (2 points)

7.RP.2a Explains that the graph indicates a proportional relationship, since it is a line passing through (0, 0). \_\_\_\_\_

7.RP.2b Explains that the scale of the graph must be accounted for when determining unit rate or constant of proportionality; possibly notes, for example, that the graph actually rises 12 miles for each 1.5 hours, or that the constant of proportionality is actually  $\frac{6 \times 2}{5 \times 0.3}$  because the vertical axis shows a 2-mile scale and the horizontal axis shows a 0.3 mile scale. \_\_\_\_\_

**Total Content Points** \_\_\_\_\_

#### The CCSS for Mathematical Practices (4 points)

MP1 Reads the graph appropriately, taking the scale into account when determining the unit rate. \_\_\_\_\_

(MP1: Make sense of problems and persevere in solving them.)

MP2 Abstracts the data from the graph; forms diagrams, ratios, or equations to determine unit rate. Correctly notes the meaning of the results in the context of the problem. \_\_\_\_\_

(MP2: Reason abstractly and quantitatively.)

MP3 Provides a logical argument that while Kevin is correct about the proportional relationship because the graph is a line passing through (0, 0), he is incorrect about the constant of proportionality, because he has failed to note the scale on each axis. \_\_\_\_\_

(MP3: Construct viable arguments and critique the reasoning of others.)

MP6 Accurately reads points on the graph, multiplies correctly, writes correct equations, and labels quantities correctly. \_\_\_\_\_

(MP6: Attend to precision.)

**Total Practice Points** \_\_\_\_\_

**Total Awarded Points** \_\_\_\_\_

## The CCSS for Mathematical Content Addressed in This Task

**Analyze proportional relationships and use them to solve real-world and mathematical problems.**

**Recognize and represent proportional relationships between quantities.**

- 7.RP.2a Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table, or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
- 7.RP.2b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

## The CCSS for Mathematical Practices\*

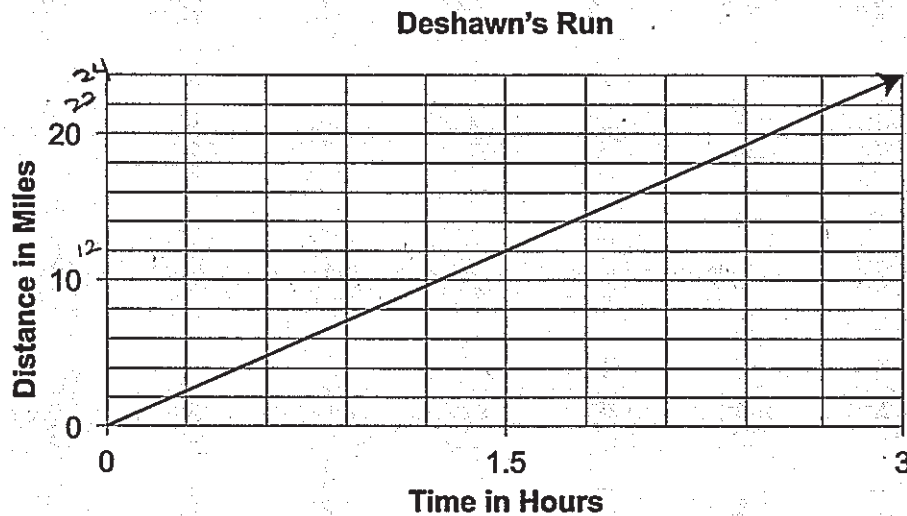
1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

\*Gray text indicates Mathematical Practices not addressed in this task.


Students' responses to a mathematical task provide evidence of what they understand and are able to do in relation to the standards and practices. Across tasks, this cumulative evidence shows students' understanding and abilities within a domain. When students do not respond completely to all parts of a task, they provide insufficient evidence of their mathematical understanding and abilities and therefore do not fully demonstrate the expectations of the standards and practices aligned with that task.

## Task 3. Deshawn's Run Task


The graph below shows data from Deshawn's trial run of 3 hours.



- a. Explain to Deshawn how he can use the information in the graph to determine the rate at which he travels.

 You take two points off of the line,  $(1.5, 12)$  and  $(3, 24)$ . You subtract the y-coordinates,  $24 - 12 = 12$ , and the x-coordinates,  $3 - 1.5$ . Make sure you use the coordinates from the same plot first.  $\frac{24-12}{3-1.5} = \frac{12}{1.5}$ . Then you divide by 1.5, the denominator,  $\frac{12}{1.5} = \frac{8}{1}$ . So, for every hour Deshawn runs 8 miles.

- b. Kevin claims that the graph shows a proportional relationship, and that the constant of proportionality is  $\frac{6}{5}$ , since he can count 6 spaces up and 5 spaces over from (0, 0) to reach another point on the graph. Some of what Kevin said is correct, and some is incorrect. Explain to Kevin in what ways he is right, and in what ways he is wrong about the graph.

 He is right about for every 5 spaces over and 6 spaces up, they reach another point. He is wrong because the horizontal line is 0.3 of an hour, not one hour, and the vertical line goes up in increments of two. so the praportionality is  $\frac{12}{1.5}$ . bc

Guide 1

Litho 70173

Total Content Points: 1 (7.RP.2b)

Total Practice Points: 3 (MP1, MP2, MP6)

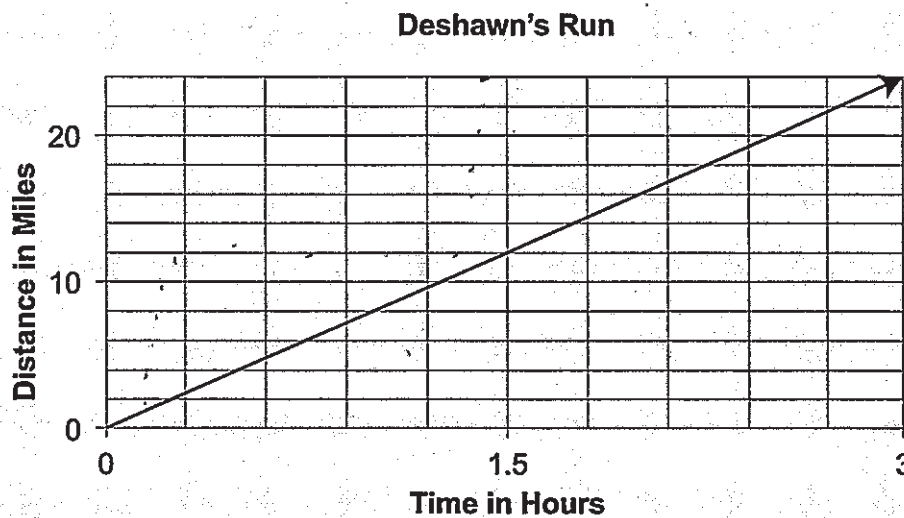
The student never explains that the relationship is proportional because the graph is a line where the  $y$ -intercept is zero (no credit for 7.RP.2a). In response to task b, the student explains that the scale of the graph must be accounted for when determining the constant of proportionality (7.RP.2b). The student appropriately selects two points from the line and incorporates the correct scale into an equation that solves for the unit rate (MP1 and MP2). However, the student never explains that the relationship is proportional because the  $y$ -intercept is zero (no credit for MP3). The student uses a correct equation to solve for the unit rate while using appropriate labels and noting the correct scales (MP6).

Total Awarded Points: 4 out of 6




## Task 3. Deshawn's Run Task


The graph below shows data from Deshawn's trial run of 3 hours.



- a. Explain to Deshawn how he can use the information in the graph to determine the rate at which he travels.

 The first thing you must do is find how he traveled in 1.5 hrs and multiply that by two to get the distance he traveled in the time period which is 24 miles. Next you must divide 24 by 3 which = 8. This means the rate is 8 miles/hr

- b. Kevin claims that the graph shows a proportional relationship, and that the constant of proportionality is  $\frac{6}{5}$ , since he can count 6 spaces up and 5 spaces over from (0, 0) to reach another point on the graph. Some of what Kevin said is correct, and some is incorrect. Explain to Kevin in what ways he is right, and in what ways he is wrong about the graph.

 He is right in perspective of the proportionality of the hours but he is incorrect in the perspective that he is talking about the miles because when he went up 6 spaces and over 5 spaces both went 15 hours but when he did this with the miles it did not come out the same rate.

Guide 2

Litho 70338

Total Content Points: 1 (7.RP.2b)

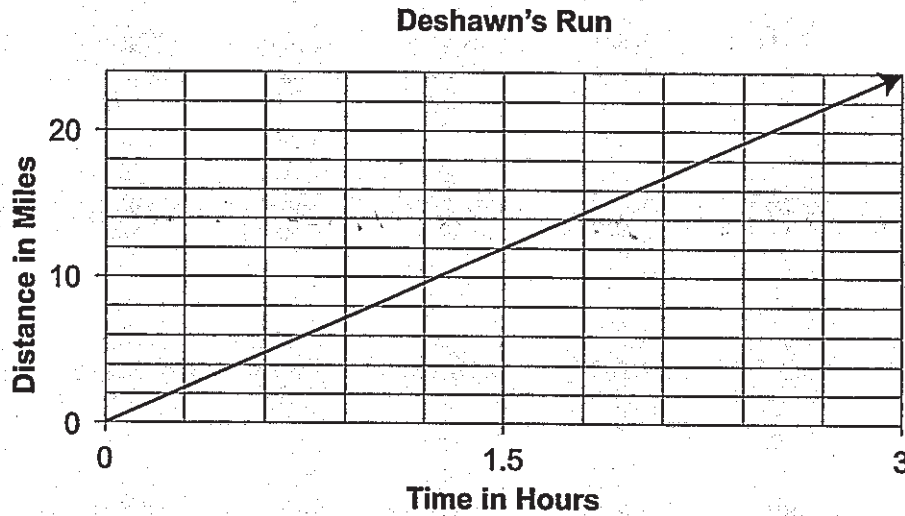
Total Practice Points: 2 (MP1, MP2)

The student never explains that the relationship is proportional because the graph is a line with the  $y$ -intercept of zero (no credit for 7.RP.2a). In response to task b, the student attempts to explain the relevance of scale but the meaning is unclear. However, the student demonstrates understanding of the actual scale while calculating for the correct unit rate (7.RP.2b). The student reads the graph correctly, recognizing that 3 hours corresponds with 24 miles, and solves for the correct unit rate (MP1). The student correctly abstracts data from the graph to determine the unit rate and labels it appropriately (MP2). The student never explains that the relationship is proportional because the  $y$ -intercept is zero (no credit for MP3). Although the student reads the graph correctly and labels the unit rate appropriately, the graph's scales are not noted (no credit for MP6).


Total Awarded Points: 3 out of 6

**Task 3. Deshawn's Run Task**


The graph below shows data from Deshawn's trial run of 3 hours.



- a. Explain to Deshawn how he can use the information in the graph to determine the rate at which he travels.

 At 1.5 hrs. Deshawn run 12 miles.  
 He runs every mile at an average time of  $90 \div 12 = 7.5$  minutes to run a mile

- b. Kevin claims that the graph shows a proportional relationship, and that the constant of proportionality is  $\frac{6}{5}$ , since he can count 6 spaces up and 5 spaces over from  $(0, 0)$  to reach another point on the graph. Some of what Kevin said is correct, and some is incorrect. Explain to Kevin in what ways he is right, and in what ways he is wrong about the graph.

 Kevin is correct because the graph is proportional, but he is incorrect in some ways.  $(6, 5)$  is the only coordinate pair that touches an axis point on the graph, so you can not be sure if its proportional or not.

Guide 3

Litho 70267

Total Content Points: 1 (7.RP.2b)

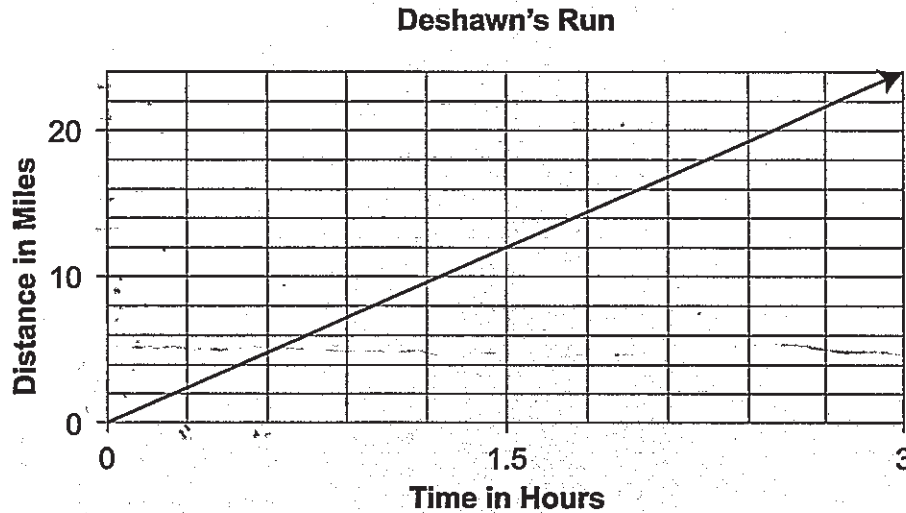
Total Practice Points: 2 (MP1, MP2)

The student does not explain that the relationship is clearly proportional because the  $y$ -intercept is zero and the graph is a line (no credit for 7.RP.2a). Although the student never explicitly explains that the scale must be accounted for, the student demonstrates understanding of the actual scale while calculating for the correct unit rate (7.RP.2b). The student reads the graph correctly, recognizing that 1.5 hours corresponds with 12 miles, and solves for the correct unit rate (MP1). The student correctly abstracts data from the graph to determine the unit rate and labels it appropriately (MP2). The student never explains that the relationship is proportional because the graphed line passes through the origin (no credit for MP3). Although the student reads the graph correctly, the graph's scales are not noted (no credit for MP6).


Total Awarded Points: 3 out of 6

**Task 3. Deshawn's Run Task**


The graph below shows data from Deshawn's trial run of 3 hours.



- a. Explain to Deshawn how he can use the information in the graph to determine the rate at which he travels.

 Deshawn can determine the rate at which he travels by finding a readable point on the chart for example 24 miles in 3 hours and divide  $24 \div 3 = 8$  so 8 miles per hour

- b. Kevin claims that the graph shows a proportional relationship, and that the constant of proportionality is  $\frac{6}{5}$ , since he can count 6 spaces up and 5 spaces over from (0, 0) to reach another point on the graph. Some of what Kevin said is correct, and some is incorrect. Explain to Kevin in what ways he is right, and in what ways he is wrong about the graph.

 Kevin is right in the fact that he said that the data is proportional but wrong in the sense that the constant of proportionality is  $\frac{5}{6}$ .



Guide 4

Litho 70380

Total Content Points: 1 (7.RP.2b)

Total Practice Points: 2 (MP1, MP2)

The student fails to explain that the relationship is proportional because the graph is a line passing through the origin (no credit for 7.RP.2a). Although the student never explicitly explains that the scale must be accounted for, the student demonstrates understanding that the scale must be adjusted from the given rate of  $\frac{6}{5}$  while solving for the unit rate

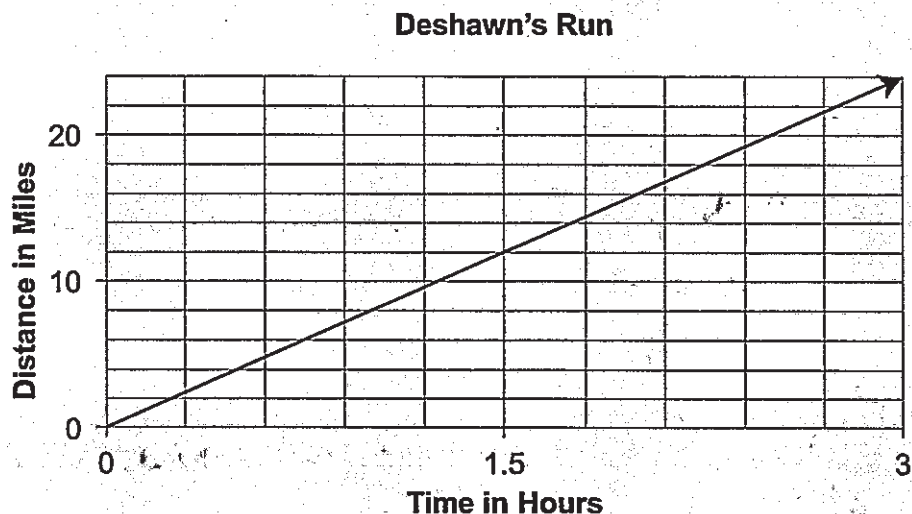
(7.RP.2b). The student reads the graph correctly and determines the unit rate (MP1). The student abstracts data from the graph correctly, using the point (3, 24) to determine the unit rate. Although the final answer of 8 is not labeled “per hour,” that label is provided in the previous step (MP2). The student never explains the significance of the fact that the  $y$ -intercept is zero (no credit for MP3). The student does not mention the graph’s actual scale (no credit for MP6).

Total Awarded Points: 3 out of 6


### Task 3. Deshawn's Run Task

Guide 5a


The graph below shows data from Deshawn's trial run of 3 hours.



- a. Explain to Deshawn how he can use the information in the graph to determine the rate at which he travels.

 Since the graph is constant, Deshawn can find the slope of the graph, 8, by comparing two different points on the line. The slope of the graph is his rate, or speed, in miles per hour.

- b. Kevin claims that the graph shows a proportional relationship, and that the constant of proportionality is  $\frac{6}{5}$ , since he can count 6 spaces up and 5 spaces over from (0, 0) to reach another point on the graph. Some of what Kevin said is correct, and some is incorrect. Explain to Kevin in what ways he is right, and in what ways he is wrong about the graph.

 The graph does show a proportional relationship, and there is a point 6 spaces up and 5 spaces over from the origin. However, the proportionality is not  $\frac{6}{5}$ , because units on the y-axis move up by 2, and units on the x-axis move up by 0.3, so the slope is 8.

Guide 5

Litho 70387

Total Content Points: 1 (7.RP.2b)

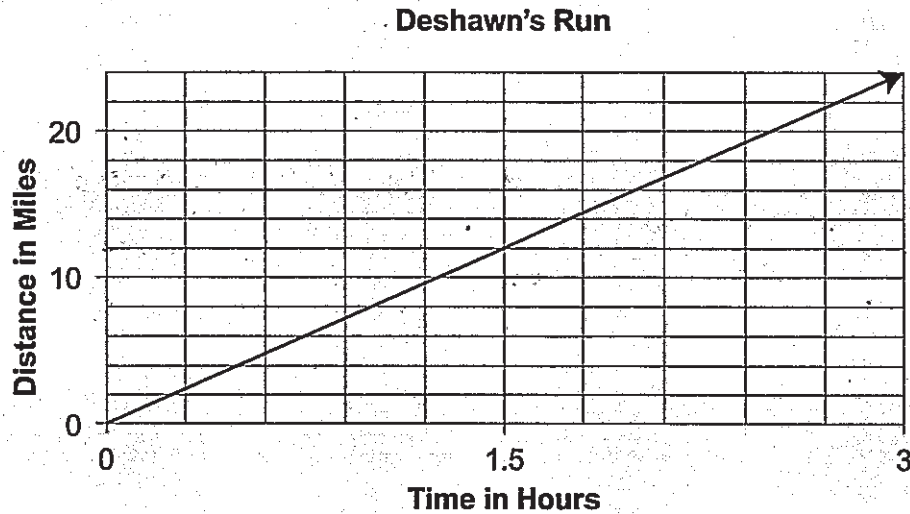
Total Practice Points: 1 (MP1)

The student does not explain that the relationship is proportional because the graph is a line and the  $y$ -intercept is zero (no credit for 7.RP.2a). In response to task b, the student explains that the scale of the graph must be accounted for when determining the constant of proportionality (7.RP.2b). The student notes the correct scale and supplies the actual unit rate (MP1). Although the student supplies the correct unit rate and context, no work is shown to demonstrate how the unit rate was determined (no credit for MP2). The student never explains that the relationship is proportional because the line has a  $y$ -intercept of zero (no credit for MP3). The student solves for the correct unit rate and labels the scales appropriately, but never indicates which points were used from the graph (no credit for MP6).


Total Awarded Points: 2 out of 6

**Task 3. Deshawn's Run Task**

The graph below shows data from Deshawn's trial run of 3 hours.



- a. Explain to Deshawn how he can use the information in the graph to determine the rate at which he travels.

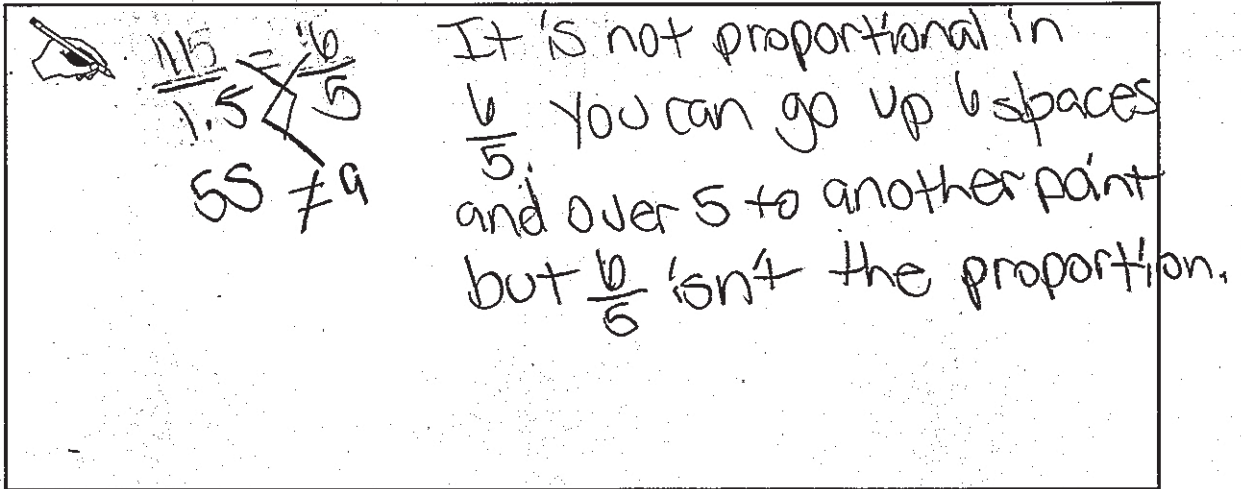
 He picks a number where he is certain on what the x & y is. Like 1.5 hrs. is 11 miles. So, he does  $11 \div 1.5$  and it is 7.33

$$\begin{array}{r} 11 \\ 1.5 \overline{) 22.5} \\ \underline{30} \phantom{0} \\ 33 \phantom{0} \\ \underline{33} \phantom{0} \\ 0 \end{array}$$

$$\begin{array}{r} 11 = x \\ 1.5 \overline{) 11} \\ \underline{15} \phantom{0} \\ 15 \phantom{0} \\ \underline{15} \phantom{0} \\ 0 \end{array} \quad x = 7.33$$

7.33 miles per hour.

- b. Kevin claims that the graph shows a proportional relationship, and that the constant of proportionality is  $\frac{6}{5}$ , since he can count 6 spaces up and 5 spaces over from (0, 0) to reach another point on the graph. Some of what Kevin said is correct, and some is incorrect. Explain to Kevin in what ways he is right, and in what ways he is wrong about the graph.



$\frac{11.5}{1.5} = \frac{6}{5}$   
 $55 \neq 9$

It is not proportional in  $\frac{6}{5}$ . You can go up 6 spaces and over 5 to another point but  $\frac{6}{5}$  isn't the proportion.

Guide 6

Litho 70187

Total Content Points: 1 (7.RP.2b)

Total Practice points: 1 (MP2)

The student does not explain that the graph shows a proportional relationship by showing a line with a  $y$ -intercept of zero (no credit for 7.RP.2a). Although the student misreads the graph, the response to task b demonstrates some understanding that scale must be

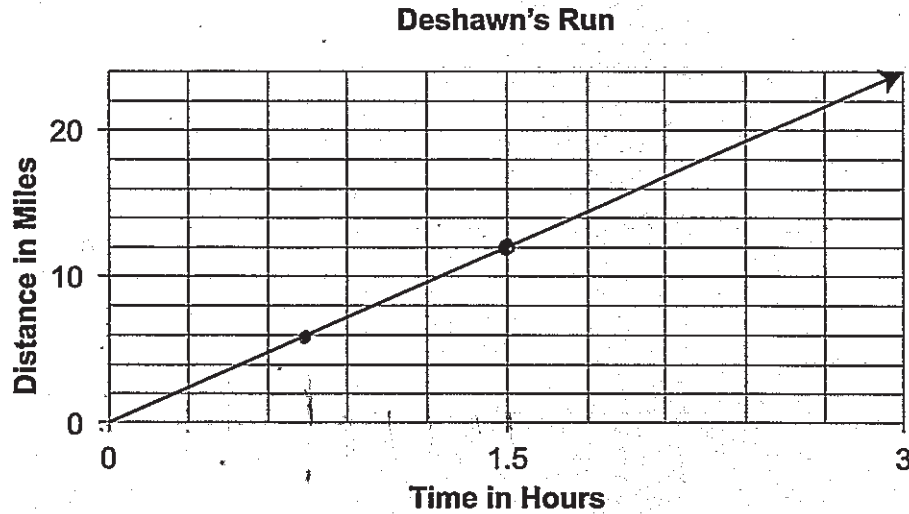
accounted for when determining the constant of proportionality. The student states that  $\frac{6}{5}$

is not the correct proportion and cross-multiplies to prove it (7.RP.2b). The student misreads the graph when calculating the unit rate (no credit for MP1, no credit for MP6). The student abstracts data from the graph to determine the unit rate and notes the appropriate context (MP2). The student never explains the significance of the fact that the  $y$ -intercept is zero (no credit for MP3).


Total Awarded Points: 2 out of 6

Task 3. Deshawn's Run Task

The graph below shows data from Deshawn's trial run of 3 hours.




- a. Explain to Deshawn how he can use the information in the graph to determine the rate at which he travels.

 If Deshawn takes the difference of 2 points of the distance and puts it over the differences of the time, he will get the rate of change.

$$\frac{Y_2 - Y_1}{X_2 - X_1} = \frac{12 - 6}{1.5 - 1} = \frac{6}{0.5} = \frac{12}{1}$$



- b. Kevin claims that the graph shows a proportional relationship, and that the constant of proportionality is  $\frac{6}{5}$ , since he can count 6 spaces up and 5 spaces over from (0, 0) to reach another point on the graph. Some of what Kevin said is correct, and some is incorrect. Explain to Kevin in what ways he is right, and in what ways he is wrong about the graph.

 He may be correct, but that is only from the origin. If the graph was proportional, he would be able to do that from any point in the graph, not just the origin.

Guide 7

Litho 70248

Total Content Points: 1 (7.RP.2b)

Total Practice Points: 0

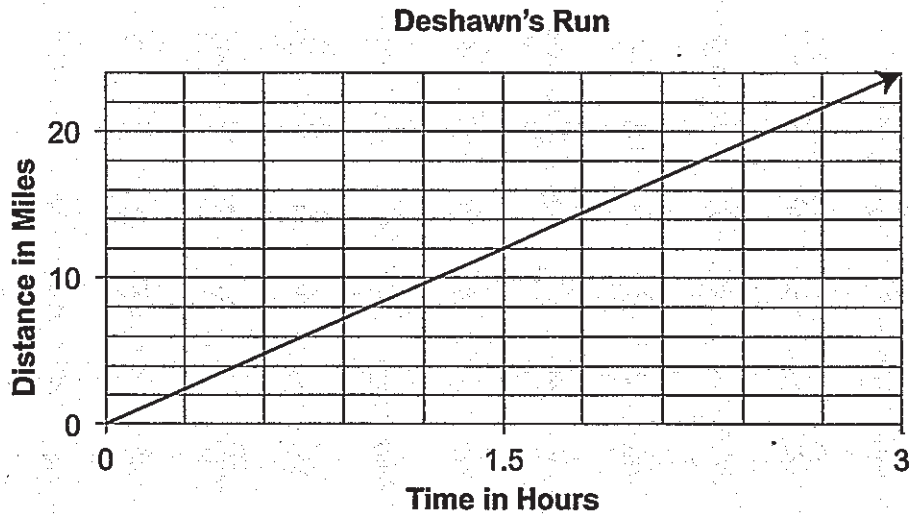
The student never explains that the relationship is proportional because the line passes through the origin (no credit for 7.RP.2a). Although the student never explicitly explains that the scale must be accounted for, the student demonstrates understanding that the scale must be adjusted from the given rate of  $\frac{6}{5}$  while solving for the unit rate (7.RP.2b).

The student misreads the graph when attempting to solve for the unit rate (no credit for MP1). The student attempts to abstract data from the graph but never states the context for the unit rate (no credit for MP2). The student does not explain that the relationship is proportional because the line has a  $y$ -intercept of zero (no credit for MP3). The student misreads the graph and fails to label quantities appropriately (no credit for MP6).


Total Awarded Points: 1 out of 6

**Task 3. Deshawn's Run Task**


The graph below shows data from Deshawn's trial run of 3 hours.



- a. Explain to Deshawn how he can use the information in the graph to determine the rate at which he travels.

 Deshawn can take two points on a graph, find the difference of the "y"s over the difference of the "x"s. Then divide y over x and see the note he travels at.

- b. Kevin claims that the graph shows a proportional relationship, and that the constant of proportionality is  $\frac{6}{5}$ , since he can count 6 spaces up and 5 spaces over from (0, 0) to reach another point on the graph. Some of what Kevin said is correct, and some is incorrect. Explain to Kevin in what ways he is right, and in what ways he is wrong about the graph.

 He is correct in the fact that that is the right amount of grid spaces, but the measure of units per block was not considered.

Guide 8

Litho 70326

Total Content Points: 1 (7.RP.2b)

Total Practice Points: 0

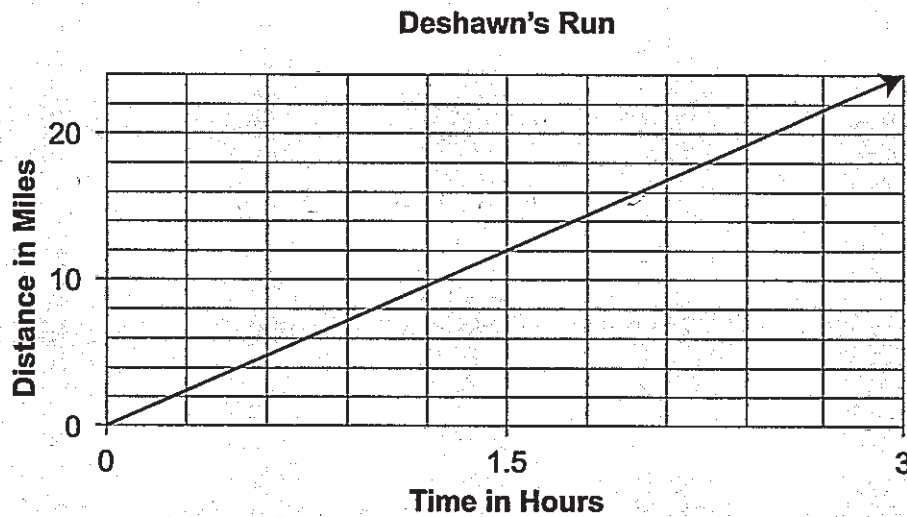
The student never explains that the relationship is proportional because the  $y$ -intercept is zero (no credit for 7.RP.2a). In response to task b, the student explains that the units of measure must be considered when calculating the unit rate (7.RP.2b). The student never determines the unit rate, or explains that the rate would be in miles per hour (no credit for MP1, no credit for MP2). The student does not explain that the relationship is proportional because the line has a  $y$ -intercept of zero (no credit for MP3). The student also fails to demonstrate the ability to select or label points from the graph (no credit for MP6).

Total Awarded Points: 1 out of 6


### Task 3. Deshawn's Run Task

Guide 9a


The graph below shows data from Deshawn's trial run of 3 hours.



- a. Explain to Deshawn how he can use the information in the graph to determine the rate at which he travels.

 Divide the distance in miles by the time in hours.

- b. Kevin claims that the graph shows a proportional relationship, and that the constant of proportionality is  $\frac{6}{5}$ , since he can count 6 spaces up and 5 spaces over from (0, 0) to reach another point on the graph. Some of what Kevin said is correct, and some is incorrect. Explain to Kevin in what ways he is right, and in what ways he is wrong about the graph.

 Kevin is right because the proportionality is  $\frac{6}{5}$ . I don't find what is wrong.

$$\frac{12}{15} = 8 \quad \frac{24}{3} = 8$$

Total Content Points: 0

Total Practice Points: 1 (MP1)

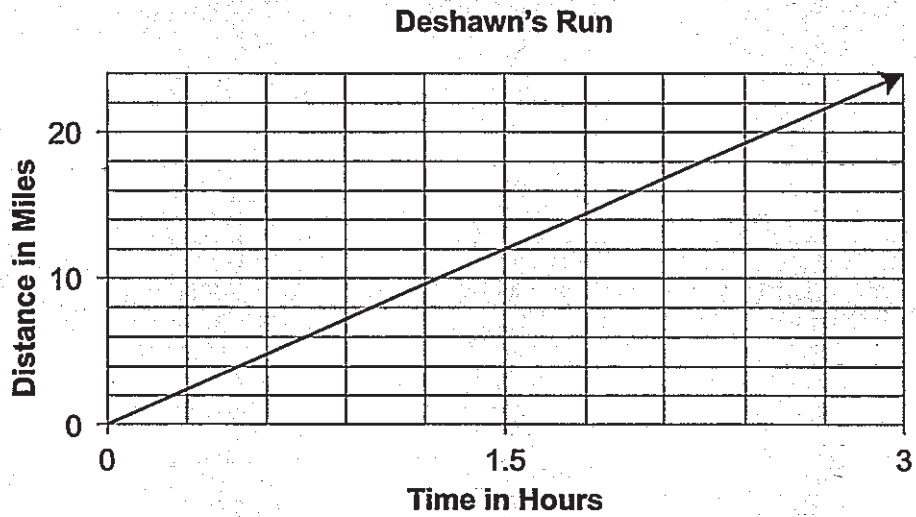
The student does not explain that the relationship is clearly proportional because the  $y$ -intercept of the line is zero (no credit for 7.RP.2a). Although the student seems to adjust for scale in determining the unit rate, the student's assertion that  $\frac{6}{5}$  is the correct proportionality demonstrates a lack of understanding of the relationship between the rate and the constant of proportionality (no credit for 7.RP.2b). The student reads a point on the graph correctly and solves for the unit rate (MP1). Although the student correctly solves for eight, the student never states the context for the number found (no credit for MP2). The student does not explain that the relationship is proportional because the  $y$ -intercept is zero (no credit for MP3). The student does not label quantities appropriately or specify the graph's correct scale (no credit for MP6).

Total Awarded Points: 1 out of 6




**Task 3. Deshawn's Run Task**


The graph below shows data from Deshawn's trial run of 3 hours.



- a. Explain to Deshawn how he can use the information in the graph to determine the rate at which he travels.

 Deshawn can run two miles in 15 minutes. So he can run 12 miles in an hour and a half.

- b. Kevin claims that the graph shows a proportional relationship, and that the constant of proportionality is  $\frac{6}{5}$ , since he can count 6 spaces up and 5 spaces over from (0, 0) to reach another point on the graph. Some of what Kevin said is correct, and some is incorrect. Explain to Kevin in what ways he is right, and in what ways he is wrong about the graph.

 he is right about moving up 6 and 5 spaces over, but the proportionality is not  $\frac{6}{5}$  it is  $\frac{7}{2}$

Total Content Points: 0

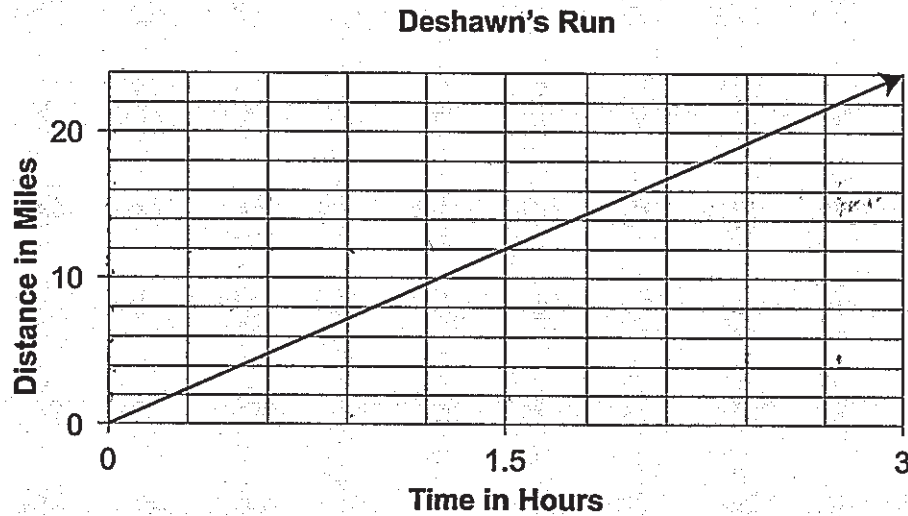
Total Practice Points: 0

The student never explains that he can tell that the relationship is proportional because the  $y$ -intercept is zero (no credit for 7.RP.2a). The student does not solve for a unit rate or explain that the scale must be accounted for when determining it (no credit for 7.RP.2b). Although the student reads the graph correctly, the unit rate is never calculated (no credit for MP1, no credit for MP2). The student does not explain the significance of the fact that the  $y$ -intercept is zero (no credit for MP3). The student reads the graph correctly but never makes any further calculations or notes the graph's actual scale (no credit for MP6).


Total Awarded Points: 0 out of 6

Task 3. Deshawn's Run Task


The graph below shows data from Deshawn's trial run of 3 hours.



- a. Explain to Deshawn how he can use the information in the graph to determine the rate at which he travels.

 Deshawn runs 10 miles in 1.5 hours.

- b. Kevin claims that the graph shows a proportional relationship, and that the constant of proportionality is  $\frac{6}{5}$ , since he can count 6 spaces up and 5 spaces over from (0, 0) to reach another point on the graph. Some of what Kevin said is correct, and some is incorrect. Explain to Kevin in what ways he is right, and in what ways he is wrong about the graph.

 The correct part is that it does take him 6 spaces up and 5 spaces over to reach his point. The incorrect part is that  $\frac{6}{5}$  is not a constant of proportionality.

Total Content Points: 0

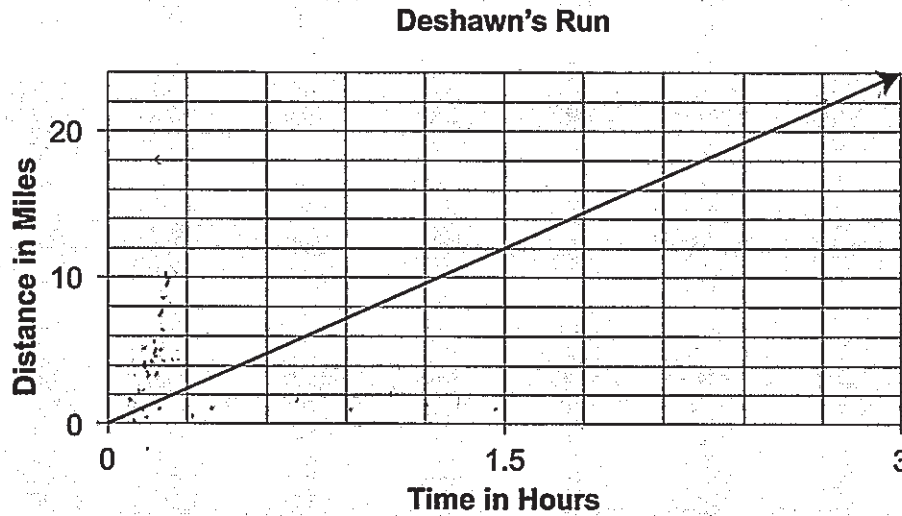
Total Practice Points: 0

The student does not explain that the relationship is proportional because the graphed line has a  $y$ -intercept of zero (no credit for 7.RP.2a). In response to task a, the student merely attempts to pull a point from the graph without solving for a unit rate or explaining that the scale must be accounted for when determining it. Similarly, in response to task b, the student simply states that “ $\frac{6}{5}$  is not a constant of proportionality” without explaining the scale’s relevance (no credit for 7.RP.2b). The student does not calculate the unit rate, and incorrectly reads the graph (no credit for MP1). The student unsuccessfully attempts to abstract data from the graph, and a unit rate is never calculated (no credit for MP2). The student does not mention that she knows that the relationship is proportional because the  $y$ -intercept is zero (no credit for MP3). The student attempts to label a data point but incorrectly cites the  $y$ -coordinate while also failing to note the graph’s scale (no credit for MP6).


Total Awarded Points: 0 out of 6

**Task 3. Deshawn's Run Task**

The graph below shows data from Deshawn's trial run of 3 hours.



- a. Explain to Deshawn how he can use the information in the graph to determine the rate at which he travels.

 He can use this graph by showing how much distance he can cover in a period of time.

- b. Kevin claims that the graph shows a proportional relationship, and that the constant of proportionality is  $\frac{6}{5}$ , since he can count 6 spaces up and 5 spaces over from (0, 0) to reach another point on the graph. Some of what Kevin said is correct, and some is incorrect. Explain to Kevin in what ways he is right, and in what ways he is wrong about the graph.



Kevin is correct when he says that he can count 6 up and 5 over, but the graph is not proportional.



Total Content Points: 0

Total Practice Points: 0

The student never explains that the relationship is proportional because the graph is a line with the  $y$ -intercept of zero (no credit for 7.RP.2a). The student merely describes the relationship between time and distance in a general way without solving for a unit rate or explaining that the scale must be accounted for when determining it (no credit for 7.RP.2b). The student never calculates the unit rate (no credit for MP1) or abstracts data from the graph (no credit for MP2). The student never explains that the relationship is proportional because the  $y$ -intercept is zero (no credit for MP3). The student does not pull and then label data from the graph or note the graph's actual scale (no credit for MP6).

Total Awarded Points: 0 out of 6