Tennessee Comprehensive Assessment Program

TCAP/CRA 2013

8

Task 2 Scoring Guide

Fire Department Task

Task 2. Fire Department Task

Adele asks her local fire chief how many trucks are sent out in response to fire alarms. The fire chief says: “For 1 alarm we send 1 truck; for 2 alarms we send from 2 to 4 trucks; and for 3 alarms we send from 5 to 6 trucks.”

Adele takes the data back to her math class and tells them the number of fire trucks is a function of the number of alarms. Use words and a graph, a table, or a diagram to explain whether you agree or disagree with Adele.

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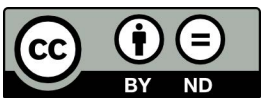


2. Fire Department Task Scoring Guide

The CCSS for Mathematical Content (1 point)

8.F.A.1 States and demonstrates that the number of fire trucks is not a function of the number of alarms. The student may do this by: _____

- creating a graph and drawing a vertical line on the graph, demonstrating that a particular *x*-value has more than one *y*-value.
- creating a mapping to show one *x*-value being mapped to more than one *y*-value.
- creating ordered pairs or using a table to show that at least 2 ordered pairs have the same *x*-values and different *y*-values.
- making a verbal argument that compares the fire-department data against the mathematical definition of a function and observing that a single input or *x*-value maps to more than one output or *y*-value.

(1 Point)

Total Content Points _____

The CCSS for Mathematical Practice (1 point)

MP4 Uses a graph, a mapping, or a table to represent the data in order to evaluate Adele's claim. _____

(1 Point)

(MP4: Model with mathematics.)

Total Practice Points _____

Total Awarded Points _____

The CCSS for Mathematical Content Addressed in This Task

Define, evaluate, and compare functions.

8.F.A.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.

The CCSS for Mathematical Practice*

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 that are 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.

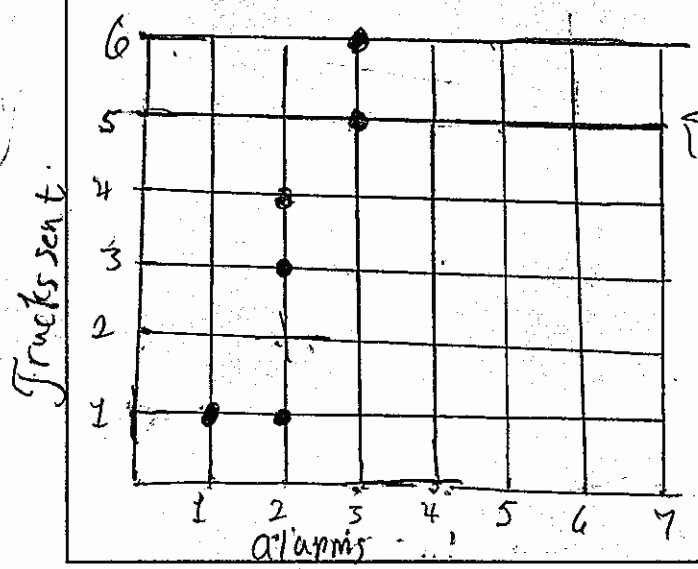
Task 2. Fire Department Task

Adele asks her local fire chief how many trucks are sent out in response to fire alarms. The fire chief says: "For 1 alarm we send 1 truck; for 2 alarms we send from 2 to 4 trucks; and for 3 alarms we send from 5 to 6 trucks."

Adele takes the data back to her math class and tells them the number of fire trucks is a function of the number of alarms. Use words and a graph, a table, or a diagram to explain whether you agree or disagree with Adele.

I disagree with Adele. I created a table where the ~~#~~ of alarms was the input and the trucks sent in response to the alarms was the output. In order to be a function you can only have 1 output for each input. This data does not follow that rule, therefore it is not a function. 2 has more than one output as well as 3.

x	y
1	1
2	2
2	3
2	4
3	5
3	6



The graph I've drawn also proves this isn't a function. Using a vertical line test shows there are 2 points at one spot, proving it is not a function.

Litho#: 854272

Guide 1 Litho 854272

Total Content Points: 1 (8.F.A.1)

Total Practice Points: 1 (MP4)

This response thoroughly explains and demonstrates that the number of fire trucks is not a function of the number of alarms, using a table of values to show that the x value of 2 has y values of 2, 3, and 4, and therefore cannot be a function (8.F.A.1). The student represents the data by creating the table and uses the graph as an appropriate model illustrating the multiple data points for 2 and 3 alarms (MP4).

Total Awarded Points: 2 out of 2

Task 2. Fire Department Task

Adele asks her local fire chief how many trucks are sent out in response to fire alarms. The fire chief says: "For 1 alarm we send 1 truck; for 2 alarms we send from 2 to 4 trucks; and for 3 alarms we send from 5 to 6 trucks."

Adele takes the data back to her math class and tells them the number of fire trucks is a function of the number of alarms. Use words and a graph, a table, or a diagram to explain whether you agree or disagree with Adele.

I disagree since the number of trucks varies. A function can only give you 1 definate amount of trucks for however many alarms are set off. When on a table and you write out all the possibilities, you see that x repeats + the value has more than 1 y value. Thus, it is not a function.

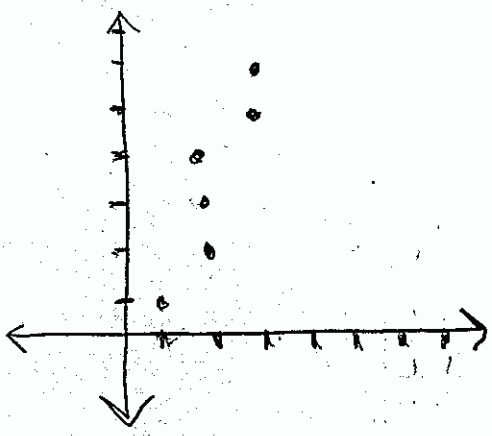
X	Y
1	1
2	2
2	3
2	4
3	5
3	6

x = number of alarms

y = number of trucks

(1,1) (2,2) (2,3) (2,4)

(3,5) (3,6)



Not a function.

Litho#: 856902

Guide 2 Litho 856902

Total Content Points: 1 (8.F.A.1)

Total Practice Points: 1 (MP4)

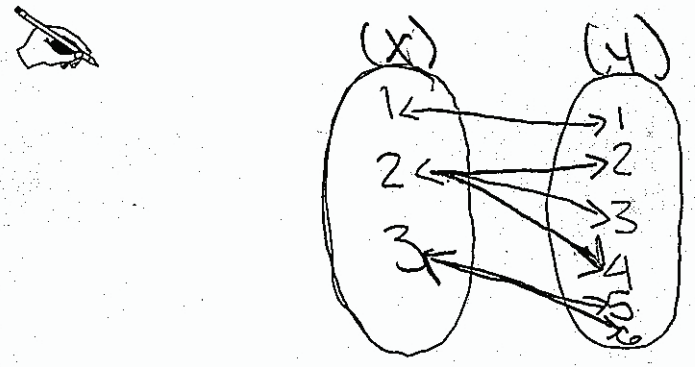
This response thoroughly explains and demonstrates why the number of fire trucks is not a function of the number of alarms by organizing the given data into ordered pairs, plotting these on a graph, and creating a table showing that the x values values of 2 and 3 each have multiple y values (8.F.A.1). The student represents the data through the ordered pairs, the graph, and the table (MP4).

Total Awarded Points: 2 out of 2

Task 2. Fire Department Task

Adele asks her local fire chief how many trucks are sent out in response to fire alarms. The fire chief says: "For 1 alarm we send 1 truck; for 2 alarms we send from 2 to 4 trucks; and for 3 alarms we send from 5 to 6 trucks."

Adele takes the data back to her math class and tells them the number of fire trucks is a function of the number of alarms. Use words and a graph, a table, or a diagram to explain whether you agree or disagree with Adele.



I Disagree, because the number of alarms (x) has more than one of the number of fire trucks (y) for each one.

Litho#: 844680

Guide 3 Litho 844680

Total Content Points: 1 (8.F.A.1)

Total Practice Points: 1 (MP4)

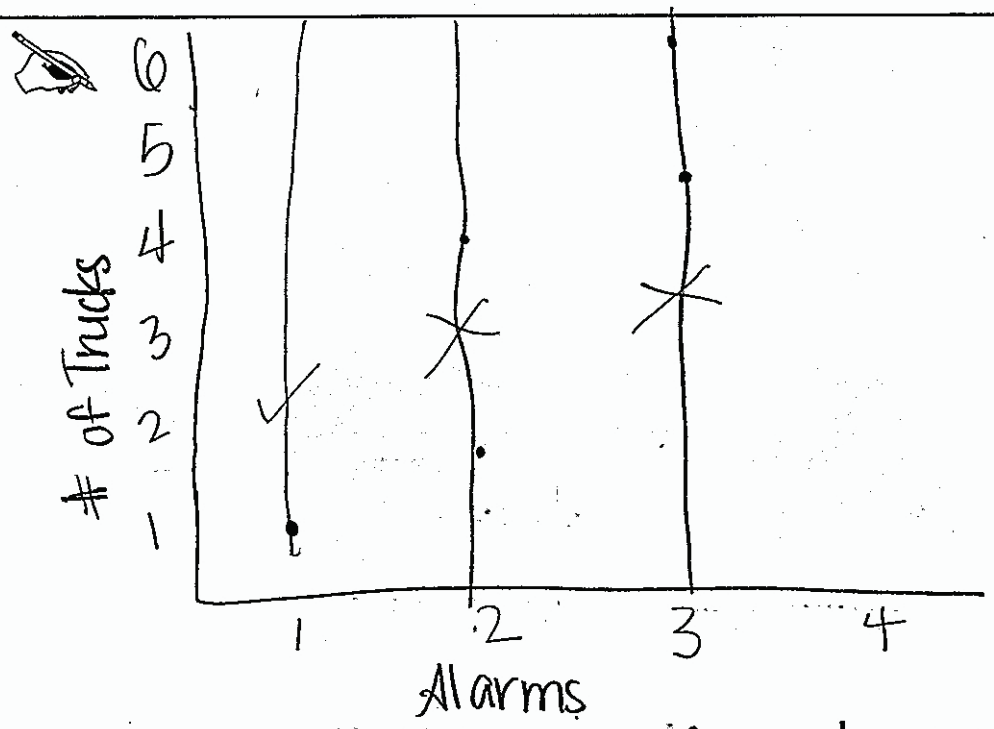
This response adequately demonstrates that the number of fire trucks is not a function of the number of alarms by creating a mapping to show the x values of 2 and 3 each mapped to more than one y value (8.F.A.1). The mapping also appropriately models the data (MP4).

Total Awarded Points: 2 out of 2

Task 2. Fire Department Task

Adele asks her local fire chief how many trucks are sent out in response to fire alarms. The fire chief says: "For 1 alarm we send 1 truck; for 2 alarms we send from 2 to 4 trucks; and for 3 alarms we send from 5 to 6 trucks."

Adele takes the data back to her math class and tells them the number of fire trucks is a function of the number of alarms. Use words and a graph, a table, or a diagram to explain whether you agree or disagree with Adele.



Not a function because if you draw a line over each colum it touches two dots.

Litho#: 865045

Guide 4 Litho 865045

Total Content Points: 1 (8.F.A.1)

Total Practice Points: 1 (MP4)

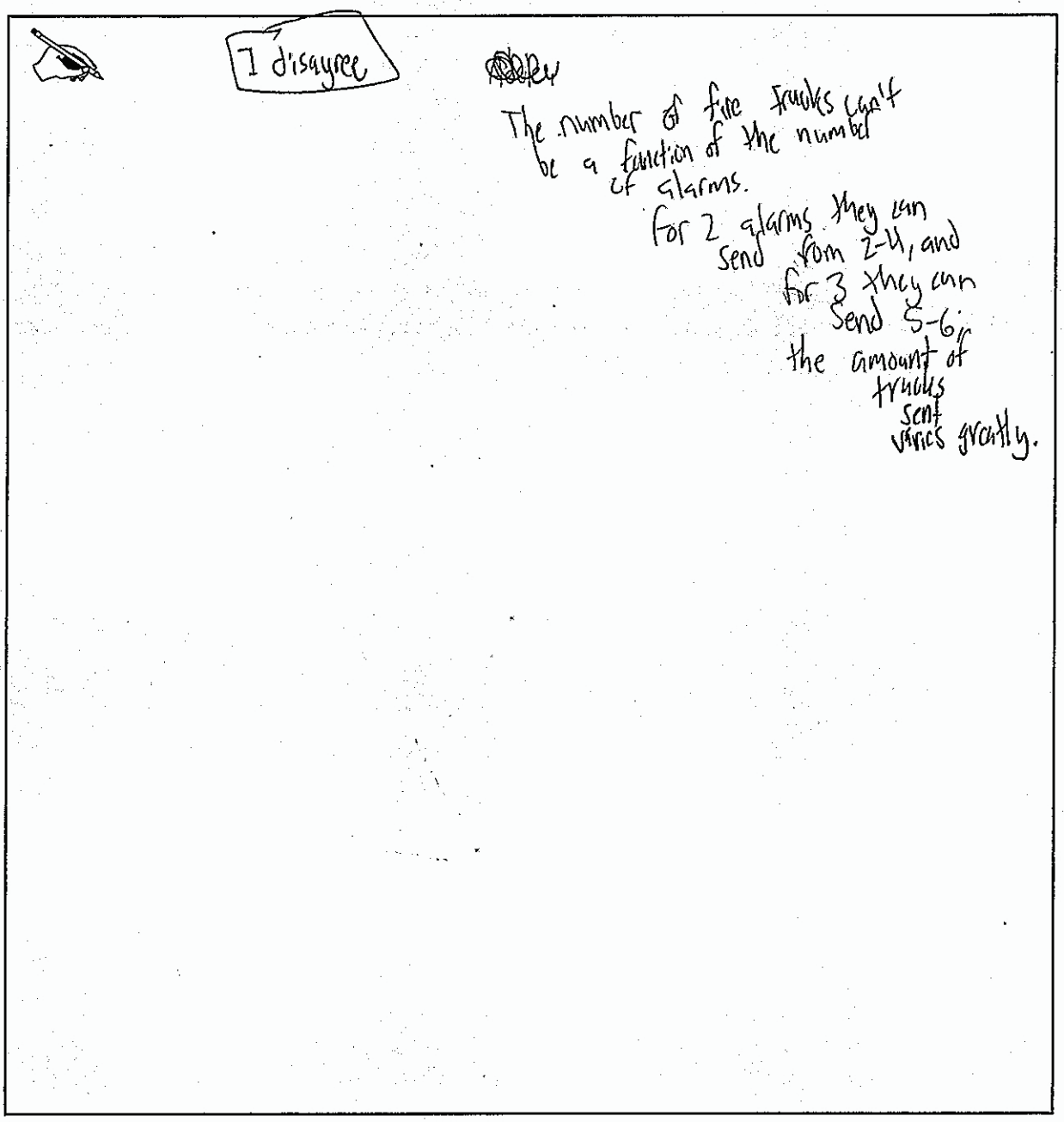
This response correctly illustrates and explains that the number of fire trucks is not a function of the number of alarms by creating a graph showing 2 data points each for 2 and 3 alarms, and by using a vertical line test on all 3 x values to show that this scenario is not a function due to the line passing through multiple points (8.F.A.1). The student uses the graph as an appropriate means of modeling the data (MP4).

Total Awarded Points: 2 out of 2

Task 2. Fire Department Task

Adele asks her local fire chief how many trucks are sent out in response to fire alarms. The fire chief says: "For 1 alarm we send 1 truck; for 2 alarms we send from 2 to 4 trucks; and for 3 alarms we send from 5 to 6 trucks."

Adele takes the data back to her math class and tells them the number of fire trucks is a function of the number of alarms. Use words and a graph, a table, or a diagram to explain whether you agree or disagree with Adele.



Litho#: 880140

Guide 5 Litho 880140

Total Content Points: 1 (8.F.A.1)

Total Practice Points: 0

This response reaches the correct conclusion that the number of fire trucks is not a function of the number of alarms through a verbal argument indicating that the x values for both 2 and 3 alarms map to more than one y value for the number of trucks (8.F.A.1). However, no graph, mapping, or table is utilized to model the data and support the verbal conclusion (no credit for MP4).

Total Awarded Points: 1 out of 2

Task 2. Fire Department Task

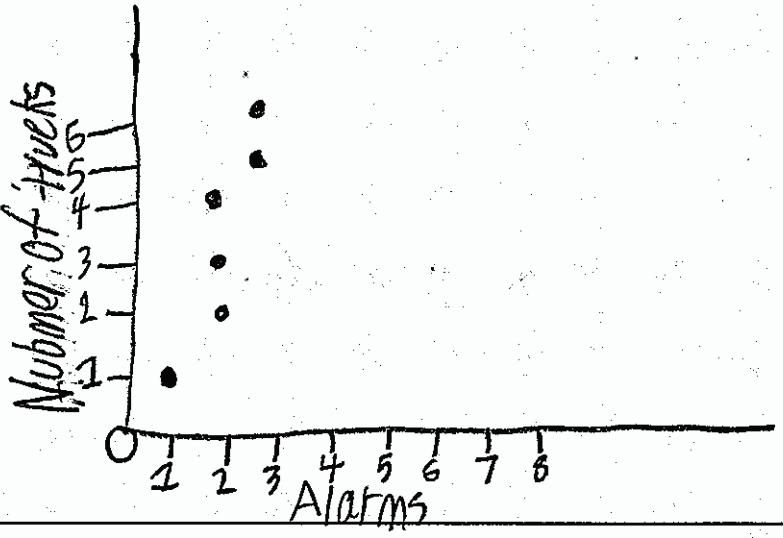
Adele asks her local fire chief how many trucks are sent out in response to fire alarms. The fire chief says: "For 1 alarm we send 1 truck; for 2 alarms we send from 2 to 4 trucks; and for 3 alarms we send from 5 to 6 trucks."

Adele takes the data back to her math class and tells them the number of fire trucks is a function of the number of alarms. Use words and a graph, a table, or a diagram to explain whether you agree or disagree with Adele.

I agree that it is a function because as the number of alarms increases, so does the number of trucks. This means up that the more alarms there are the more trucks there will be. Since they both increase it makes it a function.

Alarms	number of trucks
1	1
2	2-4
3	5-6

up



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Litho#: 872802

Guide 6 Litho 872802

Total Content Points: 0

Total Practice Points: 1 (MP4)

This response incorrectly concludes that the number of fire trucks is a function of the number of alarms, arguing that since both the number of alarms and trucks increase, the number of trucks is a function of the number of alarms (no credit for 8.F.A.1). However, the student uses a graph to correctly plot y values of 2, 3, and 4 for 2 alarms, and y values of 5 and 6 for 3 alarms, which demonstrates understanding of modeling data (MP4).

Total Awarded Points: 1 out of 2

Task 2. Fire Department Task

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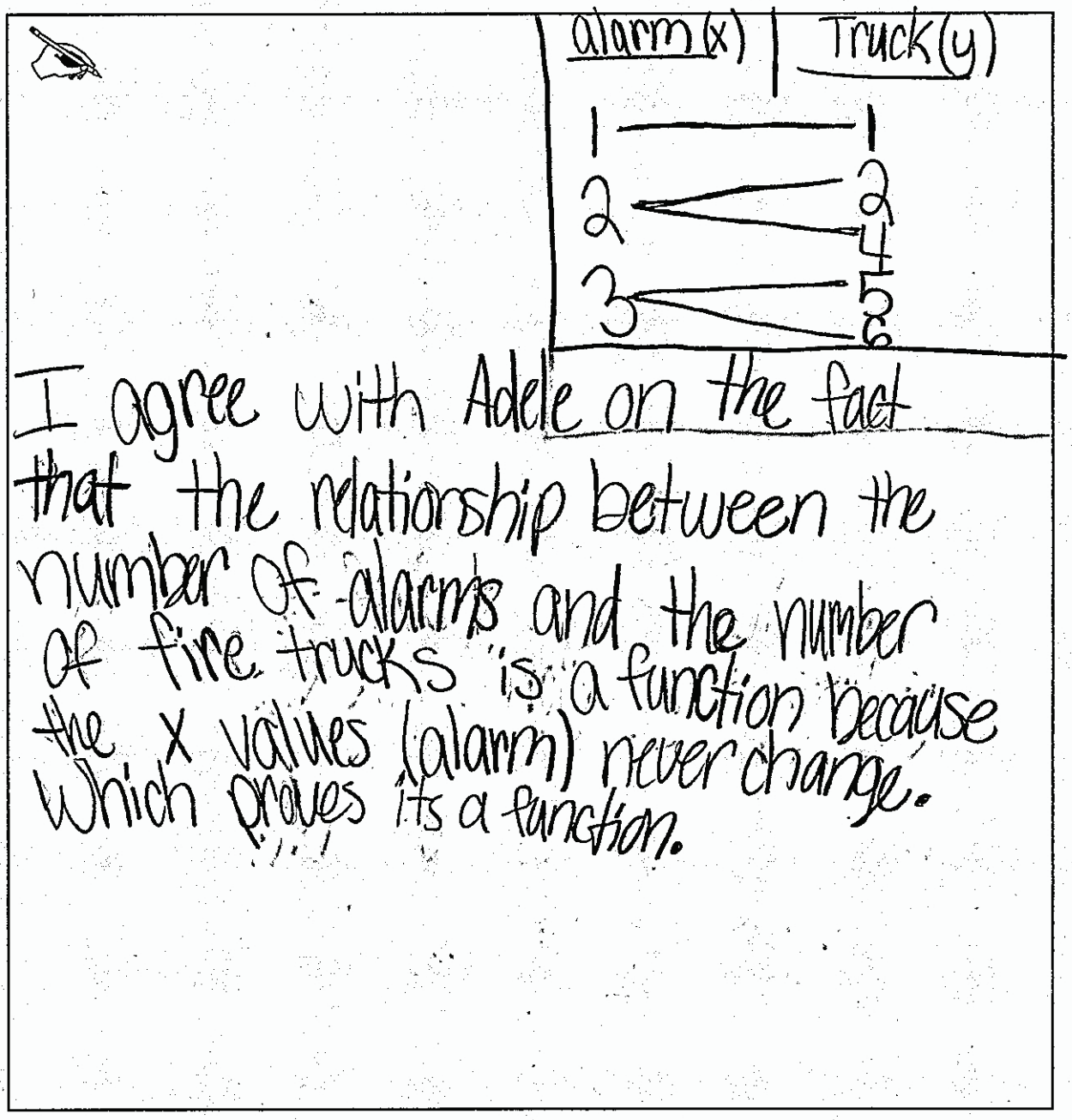
Adele takes the data back to her math class and tells them the number of fire trucks is a function of the number of alarms. Use words and a graph, a table, or a diagram to explain whether you agree or disagree with Adele.



Litho#: 843506

Guide 7 Litho 843506

Total Content Points: 0

Total Practice Points: 1 (MP4)

This response does not successfully prove that the number of fire trucks is not a function of the number of alarms, instead making the incorrect argument that it is a function since the x values never change (no credit for 8.F.A.1). However, the student uses mapping to show that the input value of 2 alarms has truck values of 2 and 4, while 3 alarms has truck values of 5 and 6. Although the input value of 3 trucks is omitted, overall the mapping sufficiently represents the data and shows some understanding of the situation (MP4).

Total Awarded Points: 1 out of 2

Task 2. Fire Department Task

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Adele takes the data back to her math class and tells them the number of fire trucks is a function of the number of alarms. Use words and a graph, a table, or a diagram to explain whether you agree or disagree with Adele.

I agree that it is a function, because every y-value only has one x-value. It is also a function because the y-value goes up at a constent rate of chang.

X	y
1 +1	1
2 +1	3 +2
3 +1	5 +2

Litho#: 854316

Guide 8 Litho 854316

Total Content Points: 0

Total Practice Points: 0

This response reaches the incorrect conclusion that the number of fire trucks is a function of the number of alarms, arguing that it is a function because every y value has only one x value and claiming that the y value has a constant rate of change (no credit for 8.F.A.1). The student attempts to use a table to model the data, but shows the slope rather than a correct representation of the given number of trucks per alarm (no credit for MP4).

Total Awarded Points: 0 out of 2

Task 2. Fire Department Task

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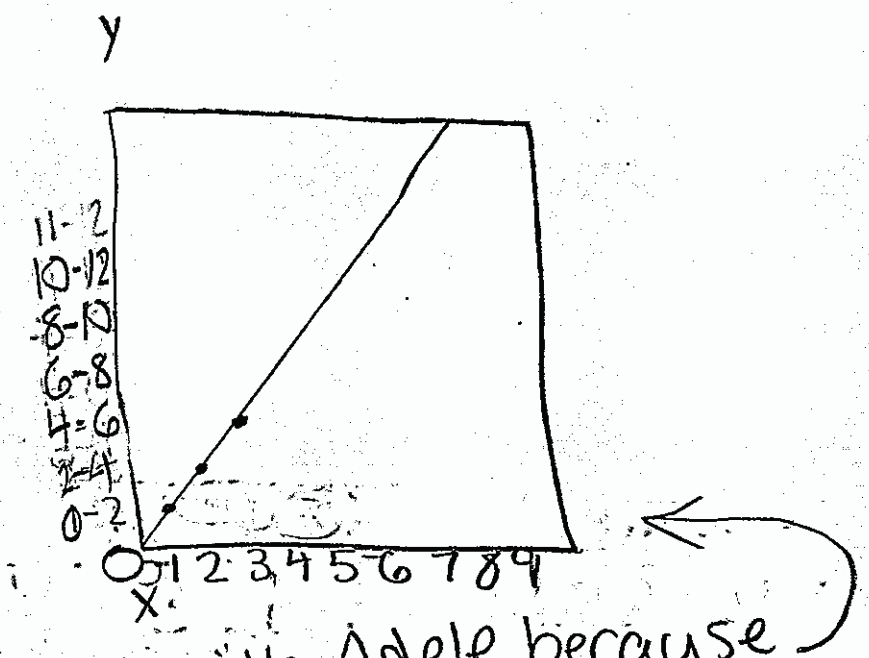
Adele takes the data back to her math class and tells them the number of fire trucks is a function of the number of alarms. Use words and a graph, a table, or a diagram to explain whether you agree or disagree with Adele.

$y = a1 + 1$



I agree with Adele because there is a positive slope, and a pattern in the data. Which makes a function. It is always about double.

alarm-1 trucks 1-2
alarms-2 trucks 2-4
alarms-3 trucks 5-6

GO ON TO THE NEXT PAGE.

Litho#: 856519

Guide 9 Litho 856519

Total Content Points: 0

Total Practice Points: 0

This response fails to prove that the number of fire trucks is not a function of the number of alarms, instead making the incorrect argument that a positive slope and a pattern in the data mean that there is a functional relationship (no credit for 8.F.A.1). The student attempts to use a graph to model the data, but only plots 1 point each for 2 and 3 alarms instead of the multiple trucks that ought to be represented for each value (no credit for MP4).

Total Awarded Points: 0 out of 2

Task 2. Fire Department Task

Adele asks her local fire chief how many trucks are sent out in response to fire alarms. The fire chief says: "For 1 alarm we send 1 truck; for 2 alarms we send from 2 to 4 trucks; and for 3 alarms we send from 5 to 6 trucks."

Adele takes the data back to her math class and tells them the number of fire trucks is a function of the number of alarms. Use words and a graph, a table, or a diagram to explain whether you agree or disagree with Adele.

Alarm	Truck
1	1
2	2-4
3	5-6

I agree, the number of fire trucks is a function of the alarms.

Litho#: 881402

Guide 10 Litho 881402

Total Content Points: 0

Total Practice Points: 0

This response incorrectly concludes that the number of fire trucks is a function of the number of alarms, providing only simple agreement with the argument that the number of fire trucks is a function of the number of alarms (no credit for 8.F.A.1). The student attempts to use a table to model the data, but does not explicitly show that 2 alarms maps to more than one truck value (no credit for MP4).

Total Awarded Points: 0 out of 2