Tennessee Comprehensive Assessment Program / Mathematics

TCAP/CRA 2012-2013

Task 3: Used Video Games Task Scoring Guide

Task 3. Used Video Games Task

Video Mart sells used games for handheld consoles. All games sell in packages of 4, and each package costs $20.

a. Explain why the relationship between the number of games and the cost of the games is proportional.

Emily represents this relationship with the equations $y = 5x$ and $x = 0.2y$.

b. Explain what the 5, 0.2, x, and y in each of Emily's equations mean in the context of the problem.

c. Are Emily's equations equivalent? Why or why not? Use mathematical reasoning to justify your response.

3. Used Video Games Task Scoring Guide

The CCSS for Mathematical Content (3 points)

7.RP.2 The student recognizes and represents the relationship as proportional. The student may do this in one of the following ways: _____

- by partitioning a diagram to determine rate.
- by using division to determine rate.
- by forming ratios to determine either or both of the unit rates for a single video game, e.g., \$20:4 games $\rightarrow$ \$5 per video game and 4 games:\$20 $\rightarrow$ 0.2 video games per dollar without any calculations evident.
- by sketching a graph by identifying possible combinations of games and costs, interpreting these values as ordered pairs, plotting the points and determining that the points lie on a straight line passing through the origin.
- by acknowledging that buying items at a given cost per item is a proportional situation.
- by scaling the cost of one or four video games up or down to indicate that the rate is constant.
- by using any of the previously listed methods to find the unit rate for one package (four games).

7.RP.2b The student explains the meaning of 5 and 0.2 in the context of the task or as the unit rate or constant of proportionality in the equations. _____

7.EE.4 The student defines the variables to indicate that *x* represents the number of games and *y* represents the cost of buying *x* games or that *x* is the input in the first equation and the output of the second equation while *y* is the output of the first equation and the input of the second equation, without making reference to the context of the problem. _____

Total Content Points _____

The CCSS for Mathematical Practice (4 points)

MP1 The student explains that the relationship between number of video games and dollars is proportional in Part A; explains the meaning of all coefficients and variables in the context of the problem in Part B; verifies the two equations are equivalent in Part C. _____

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

MP3 The student provides an explanation proving that the relationship between number of video games and dollars is proportional, or provides a reasonable explanation for the meaning of the variables and constants in Emily's equations, or provides work or explanation to justify that Emily's equations are equivalent. _____

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

MP6 The student provides labels as needed, explains the meaning of all coefficients and variables, and includes carefully formulated explanations. _____

(MP6: Attend to precision.)

MP7 The student provides work showing understanding of rate, the structure of proportional relationships, and the role of unit rate in Emily's equations. _____

(MP7: Look for and make use of structure.)

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.

7.RP.2 Recognize and represent proportional relationships between quantities.

7.RP.2b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

7.EE.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

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 3. Used Video Games Task

Video Mart sells used games for handheld consoles. All games sell in packages of 4, and each package costs $20.

a. Explain why the relationship between the number of games and the cost of the games is proportional.

1 package costs $20
2 " " $40
3 " " $60

I can divide the cost by the number of packages and I always get 20 so it is proportional

Litho 4963

Emily represents this relationship with the equations $y = 5x$ and $x = 0.2y$.

b. Explain what the 5, 0.2, x, and y in each of Emily's equations mean in the context of the problem.

y is the total cost of the games
x is the number of games
The 5 is the cost of 1 game
Since x is number of games and y is total cost the 0.2 is the number you multiply by the total cost to find out how many games

c. Are Emily's equations equivalent? Why or why not? Use mathematical reasoning to justify your response.

Yes
If I start with $y=5x$ and divide both sides $\frac{y}{5} = \frac{5x}{5}$ I get
$\frac{1}{5}y = x$ $\frac{1}{5} = 0.2$
so $y=5x$ now looks like
$0.2y = x$ which is $x=0.2y$
They r the same

GO ON TO THE NEXT PAGE.

Guide 1 Litho 4963

Total Content Points: 3 (7.RP.2, 7.RP.2b, 7.EE.4)

Total Practice Points: 4 (MP1, MP3, MP6, MP7)

The student recognizes and represents the proportional relationship between the number of games and total cost of games by describing a ratio ("1 package costs $20; 2 . . . $40; 3 . . . $60") to determine that dividing the cost by the number of packages will always result in 20 (7.RP.2). The student recognizes that this means "I always get 20 so it is proportional" (MP3). The student correctly explains the meaning of 5 and 0.2 in the context of the task ("5 is the cost of 1 game; 0.2 is the number you multiply by the total cost") (7.RP.2b), and correctly defines the variables ("y is the total cost of the games; x is the number of games") (7.EE.4). The student completes all parts of the task correctly, including verifying the two equations are equivalent in Part C ("$0.2y = x$ which is $x = 0.2y$; They r the same") (MP1). The student provides labels, gives the meaning of all coefficients and variables, and includes carefully formulated explanations (MP6). The student shows understanding of the structure of proportional relationships by determining a rate, demonstrating the structure of proportional relationships, and explaining the role of unit rate in Emily's equations (MP7).

Total Awarded Points: 7 out of 7

Task 3. Used Video Games Task

Video Mart sells used games for handheld consoles. All games sell in packages of 4, and each package costs $20.

a. Explain why the relationship between the number of games and the cost of the games is proportional.

the relationship is proportional because if you pay $20 for 4, that would be $5 for 1; then all you would have to do is multiply 5 times the number of games (g) to get the price

$5g = price$

Emily represents this relationship with the equations $y = 5x$ and $x = 0.2y$.

b. Explain what the 5, 0.2, x, and y in each of Emily's equations mean in the context of the problem.

5 = unit rate

x = number of games

y = price of games

0.2 = 0.2

c. Are Emily's equations equivalent? Why or why not? Use mathematical reasoning to justify your response.

no, because $y = 5x$ works better because it uses unit rate so it will always be correct.

Guide 2 Litho 11852

Total Content Points: 2 (7.RP.2, 7.EE.4)

Total Practice Points: 2 (MP3, MP7)

The student recognizes and represents the proportional relationship between the number of games and total cost of games by describing a ratio ($20 for four games) to determine a rate of $5 for one game (7.RP.2). The student illustrates this proportional relationship with the formula "5*g* = price," noting that multiplying 5 times the number of games (*g*) gives the total price (MP3). The student shows understanding of the structure of proportional relationships by determining a rate in Part A and describing how to make use of the rate to determine a price (MP7). The student correctly explains the meaning of the coefficient 5 in Part B as the unit rate; however, the explanation for the coefficient 0.2, "0.2 = 0.2", lacks meaning relative to the context of the task (no credit for 7.RP.2b).The student correctly defines the variables by indicating in Part B that *x* = number of games and *y* = price of games (7.EE.4). The explanation for the coefficient .02 is vague and incorrect, as well as the justification given in Part C, indicating a lack of precision (no credit for MP6). These errors show that the student has not adequately interpreted the problem in order to solve all parts correctly (no credit for MP1).

Total Awarded Points: 4 out of 7

Task 3. Used Video Games Task

Video Mart sells used games for handheld consoles. All games sell in packages of 4, and each package costs $20.

a. Explain why the relationship between the number of games and the cost of the games is proportional.

The number of games and the cost are proportional because if it cost $20 and they come in packages of 4 that means that each game in the package cost $5. Because if you do $20 = 4x$ you would think of what times 4 equals 20. When you solve it is 5 so that means that for 4 games at the games being $5 each you would pay a total of $20.

Litho#: 7299

Emily represents this relationship with the equations $y = 5x$ and $x = 0.2y$.

b. Explain what the 5, 0.2, x, and y in each of Emily's equations mean in the context of the problem.

y = the total cost of the games.
5 = how much each game is.
x = how many games was in the package.

x = total number of games in the package.

0.2 = the amount of weight of things in the basket.

y = how much the package costed.

c. Are Emily's equations equivalent? Why or why not? Use mathematical reasoning to justify your response.

Yes Emily's equations are equivalent. Because when you work them out you are going to get the answer that you need.

$20 = 5(4)$ } they both equivalent.
$4 = 0.2(20)$

$\frac{80}{4}$ $\frac{80}{20}$ } so yes they are equivalent.

Guide 3 Litho 7299

Total Content Points: 2 (7.RP.2, 7.EE.4)

Total Practice Points: 2 (MP3, MP7)

The student recognizes and represents the proportional relationship between the number of games and total cost of games by using an equation ($20 = 4x$) to determine a unit rate of $5 (7.RP.2). The student correctly defines the variables as related to the task in Part B ("y = the total cost of the games"; "x = how many games was in the package") (7.EE.4). The student explains the meaning of the coefficient 5 ("5 = how much each game is") in Part B, but does not correctly explain the meaning of the 0.2 relative to the context of the task (no credit for 7.RP.2b). The student provides work showing understanding of rate in Part A, and correctly defines x, y, and 5 in Part B, showing understanding of the structure of proportional relationships. (MP7). In Part C, a detailed justification is given to prove that Emily's equations are equivalent. (MP3). The incorrect definition of the coefficient 0.2 in Part B indicates a lack of precision (no credit for MP6) and incomplete understanding of the problem (no credit for MP1).

Total Awarded Points: 4 out of 7

Task 3. Used Video Games Task

Video Mart sells used games for handheld consoles. All games sell in packages of 4, and each package costs $20.

a. Explain why the relationship between the number of games and the cost of the games is proportional.

The relationship between the number of games and the cost of the games is proportional because:

It is $20 for 4 games in a pack. If you divide: 20 ÷ 4, you will get 5. You would be paying 5 dollars for every game in the pakage.

Emily represents this relationship with the equations $y = 5x$ and $x = 0.2y$.

b. Explain what the 5, 0.2, x, and y in each of Emily's equations mean in the context of the problem.

The five would be the price you're paying. The x would be how many games you're paying for. 0.2 would be tax and y would be the amount of money spent.

c. Are Emily's equations equivalent? Why or why not? Use mathematical reasoning to justify your response.

Yes, her equations are equivilent because she uses 5, and the tax of the games in the package.

Guide 4 Litho 11841

Total Content Points: 2 (7.RP.2, 7.EE.4)

Total Practice Points: 2 (MP3, MP7)

The student recognizes and represents the proportional relationship between the number of games and total cost of games by using division (20 ÷ 4) to determine a rate of $5 (7.RP.2). The student correctly defines the variables *x* and *y* as related to the context of the task in Part B (7.EE.4). Although the meaning of the coefficient 5 is explained relative to the task in Part B, the coefficient 0.2 is incorrectly explained as a tax (no credit for 7.RP.2b, no credit for MP6). Understanding of rate and the structure of proportional relationships is shown by the correct determination of the rate in Part A and correction definitions for the coefficient 5 as the price, the variable *x* as number of games, and *y* as total money spent (MP7). The student determines and justifies a rate of $5 in Part A (MP3) Misinterpretation in Part B and incorrect explanation in Part C indicate the student has not made sense of all parts of the problem to synthesize a coherent whole (no credit for MP1).

Total Awarded Points: 4 out of 7

Task 3. Used Video Games Task

Video Mart sells used games for handheld consoles. All games sell in packages of 4, and each package costs $20.

a. Explain why the relationship between the number of games and the cost of the games is proportional.

It is proportional because if they sold it in packages of 1, the cost would be $5 per package.

$4 \div 4 = 1$ $\quad \frac{1}{5} = \frac{4}{20}$

$20 \div 4 = 5$

Also if it sold in packages of 8, the cost would be $40 per package.

Litho#: 7289

Emily represents this relationship with the equations $y = 5x$ and $x = 0.2y$.

b. Explain what the 5, 0.2, x, and y in each of Emily's equations mean in the context of the problem.

y is the product and the multiple.
x is the product and the multiple.
5 is the multiple.
0.2 is the multiple.

c. Are Emily's equations equivalent? Why or why not? Use mathematical reasoning to justify your response.

Yes because 5 times a number is 5x, and 0.2 times a number is 0.2y or y÷5.
30=5x6 20=5x4
6=0.2x30 4=0.2x20

Guide 5 Litho 7289

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

Total Practice Points: 2 (MP3, MP7)

The student recognizes and represents the proportional relationship as proportional between the number of games and total cost of games by using division (20 ÷ 4) to determine a rate of $5 (7.RP.2). The work in Part A shows understanding of rate ($5 per game), and understanding of the structure of proportional relationships through reasoning that scaling the pack of 4 games up to 8 would scale the total cost up to $40 (MP7). The student does not correctly define the variables or the coefficients in Part B as related to the context of the task (no credit for 7.RP.2b, no credit for 7.EE.4). The student justifies that Emily's equations are equivalent by checking each equation with the ordered pairs (6, 30) and (4, 20) in Part C (MP3). Missing explanations for all the coefficients and variables in Part B, indicate a lack of precision (no credit for MP6), and understanding of all parts of the problem (no credit for MP1).

Total Awarded Points: 3 out of 7

Task 3. Used Video Games Task

Video Mart sells used games for handheld consoles. All games sell in packages of 4, and each package costs $20.

a. Explain why the relationship between the number of games and the cost of the games is proportional.

Cost ($)	5	10	15	20
games in package	1	2	3	4
Ratios	5	5	5	5

$\div \frac{5}{1} = \$5$

$\div \frac{10}{2} = \$5$

$\div \frac{15}{3} = \$5$

$\div \frac{20}{4} = \$5$

Each game in the package cost $5 & there are 4 games in each package.

Litho#: 11934

Emily represents this relationship with the equations $y = 5x$ and $x = 0.2y$.

b. Explain what the 5, 0.2, x, and y in each of Emily's equations mean in the context of the problem.

The 5, 0.2, x, y are like if you have both of the problem it helps you solve each other like for Ex.

$y = 5x$ $x = 0.2y$

$5(0.2) = 0.2(5)$

c. Are Emily's equations equivalent? Why or why not? Use mathematical reasoning to justify your response.

yes. cause $y = 5$ $x = 0.2$. each Problem it needs that other # like....

$5 \times 0.2 = 1$ $0.2 \times 5 = 1$

each # =s the same thing it's just writen different.

Guide 6 Litho 11934

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

Total Practice Points: 2 (MP3, MP7)

The student recognizes and represents the proportional relationship between the number of games and the total cost of games by using a table and division to determine a rate of $5 in Part A (7.RP.2). The work in Part A shows understanding of rate and the structure of proportional relationships by scaling from 1 to 2 to 3 to 4 games, while costs scaled up from $5 to $10 to $15 to $20 (MP7), thereby explaining the proportional relationship between the number of video games and dollars (MP3). The student neither correctly defines the variables in Part B as related to the context of the task (no credit for 7.EE.4) nor explains the meaning of the coefficients (no credit for 7.RP.2b). Incorrect explanations for the coefficients and variables in Part B and incorrect justifications for Emily's equations in Part C indicate a lack of precision (no credit for MP6) and lack of comprehension of all parts of the problem necessary to solve them (no credit for MP1).

Total Awarded Points: 3 out of 7

Task 3. Used Video Games Task

Video Mart sells used games for handheld consoles. All games sell in packages of 4, and each package costs $20.

a. Explain why the relationship between the number of games and the cost of the games is proportional.

4/$20 x/$40

4 · $40 = $160 $160 ÷ $20 = 8

Because the amount of games will always go up by 4 and the cost will always go up by $20.

Emily represents this relationship with the equations $y = 5x$ and $x = 0.2y$.

b. Explain what the 5, 0.2, x, and y in each of Emily's equations mean in the context of the problem.

x = x axis
y = y axis
0.2 = the number you divid every thing by
5 = the number you times by x

c. Are Emily's equations equivalent? Why or why not? Use mathematical reasoning to justify your response.

No Because there can't be any numbers on the side with y.

Guide 7 Litho 7293

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

Total Practice Points: 1 (MP7)

The student recognizes and represents the proportional relationship between the number of games and total cost of games by observing that there are 4 games per pack and “the amount of games will always go up by 4 and the cost will always go up by $20” (7.RP.2). Although a rate is not directly stated, understanding of rate is indirectly demonstrated by the explanation that games and costs will always go up in proportion, thereby using scaling as an indication of knowledge of the structure of proportionality (MP7). The student neither correctly defines the variables in Part B as related to the context of the task (no credit for 7.EE.4) nor correctly explains the meaning of the coefficients (no credit for 7.RP.2b). The student’s explanation of the proportional relationship between number of video games and dollars does not clearly enough define proportionality to be a viable argument in Part A; or correctly explain the meaning of the variables and constants in Emily’s equation in Part B; or provide work justifying that Emily’s equations are equivalent in Part C (no credit for MP3). Incorrect work in parts B and C evidence a lack of precision (no credit for MP6) and understanding needed to make sense of all parts of the problem and persevere in solving them (no credit for MP1).

Total Awarded Points: 2 out of 7

Task 3. Used Video Games Task

Video Mart sells used games for handheld consoles. All games sell in packages of 4, and each package costs $20.

a. Explain why the relationship between the number of games and the cost of the games is proportional.

Game packages	Cost ($)
4	$20
8 (+4)	$40 (+20)
12 (+4)	$60 (+20)
16 (+4)	$80 (+20)

The relationship between the Number of games & the cost of the games is proportional because if we were to graph this it would go through the (x) axis

Emily represents this relationship with the equations $y = 5x$ and $x = 0.2y$.

b. Explain what the 5, 0.2, x, and y in each of Emily's equations mean in the context of the problem.

(5, .2) (x, y)

y = 5x x = .2y

c. Are Emily's equations equivalent? Why or why not? Use mathematical reasoning to justify your response.

GO ON TO THE NEXT PAGE.

Guide 8 Litho 7343

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

Total Practice Points: 0

The student recognizes and represents the proportional relationship between the number of games and total cost of games with a table that shows the scaling up of video games by 4 as the total cost goes up by $20 increments in Part A (7.RP.2), but the explanation in Part A does not indicate how the numbers would be graphed or use a rate to define the relationship as proportional (no credit for MP7). The student does not correctly define the variables in Part B as related to the context of the task (no credit for 7.EE.4) and does not attempt to define the coefficients (no credit for 7.RP.2b). The student recognizes the cost of various numbers of games, but does not use the values to define the relationship as proportional in Part A; or explain the meaning of the variables and constants in Emily's equation in Part B; or provide any work justifying that Emily's equations are equivalent in Part C (no credit for MP3). Missing and incorrect work indicate lack of precision (no credit for MP6) and understanding needed to make sense of all parts of the problem and persevere in solving them (no credit for MP1).

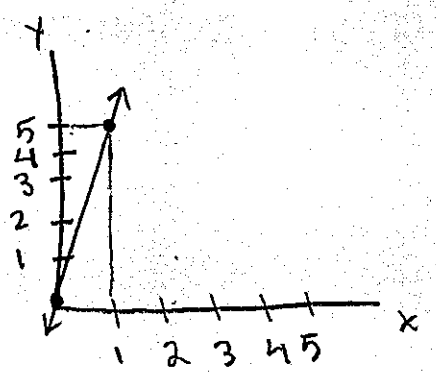
Total Awarded Points: 1 out of 7

Task 3. Used Video Games Task

Video Mart sells used games for handheld consoles. All games sell in packages of 4, and each package costs $20.

a. Explain why the relationship between the number of games and the cost of the games is proportional.

$\frac{4}{20} = \frac{1}{5}$ $\frac{x}{y}$



If you were to graph this, it would go through the orgin. Therefore, it is proportional.

Emily represents this relationship with the equations $y = 5x$ and $x = 0.2y$.

b. Explain what the 5, 0.2, x, and y in each of Emily's equations mean in the context of the problem.

$y = 5x$ ← $x = 0.2y$

$y = 5(0.2)$ $\quad$ $x = 0.2$

$y = 1$ $\quad$ $y = 1$

$5(0.2)1 = (1)$

c. Are Emily's equations equivalent? Why or why not? Use mathematical reasoning to justify your response.

No; $5x = 1$ and $0.2y = 0.2$. This is because when I multiply $5x$ which is $5(0.2)$, I get 1. That is the first equation. Then I multiply $0.2y$ which is $0.2(1)$, I get 0.2. 1 and 0.2 are not equivalent.

Guide 9 Litho 7319

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

Total Practice Points: 0

Even though the graph shows only one point (1, 5) and the explanation is only partially correct (does not indicate that a proportional relationship would graph as a straight line through the origin), the student recognizes and represents the proportional relationship between the number of games and total cost of games with the ratio $\frac{4}{20}=\frac{1}{5}$ (7.RP.2). Since the graph is incomplete and the explanation of how a proportional relationship would be graphed is only partially correct, the student does not make a viable argument for proportionality; there is no reasonable explanation for the variables and constants in Emily's equation in Part B and no correct work justifying that Emily's equations are equivalent in Part C (no credit for MP3). The student does not clearly identify a rate from the ratio $\frac{4}{20}=\frac{1}{5}$ or in Emily's equations, thereby not making use of the structure of proportional relationships (no credit for MP7). The student incorrectly defines the variables in Part B as related to the context of the task (no credit for 7.EE.4) and does not attempt to explain the meaning of the coefficients (no credit for 7.RP.2b). Incorrect definitions of variables and coefficients and missing work in Part C indicate a lack of precision (no credit for MP6) and insufficient understanding needed to make sense of all parts of the problem and persevere in solving them (no credit for MP1).

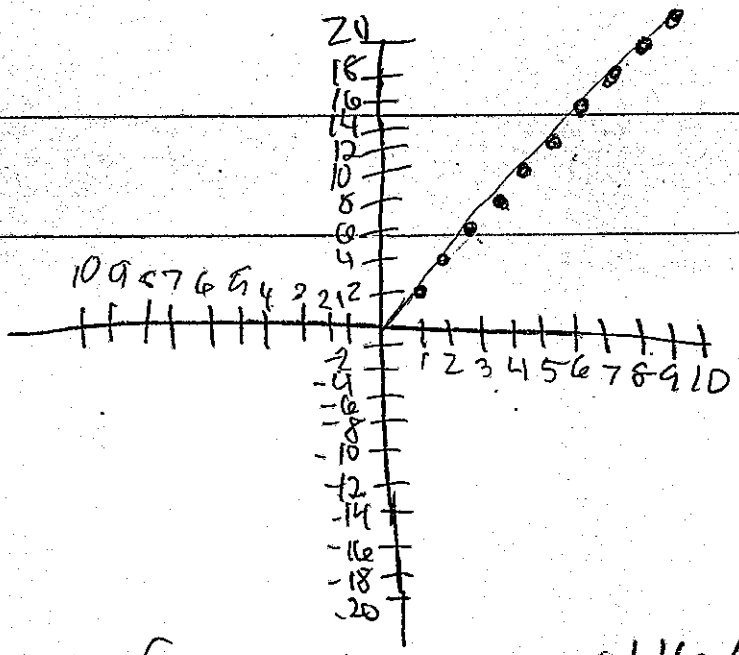
Total Awarded Points: 1 out of 7

Task 3. Used Video Games Task

Video Mart sells used games for handheld consoles. All games sell in packages of 4, and each package costs $20.

a. Explain why the relationship between the number of games and the cost of the games is proportional.

It is proportional because 4.5=20 or 20÷5 = 4. Also if you put these points on a grid with the Coordinates of (1,2),(2,4)(3,6)(4,8), etc 4 and 20 would be in the same line of proportion.



Goes through middle!

Emily represents this relationship with the equations $y = 5x$ and $x = 0.2y$.

b. Explain what the 5, 0.2, x, and y in each of Emily's equations mean in the context of the problem.

y=is the ~~#~~ of apples in a tree.
X=is the number of trees.
5= is just a number multipling to see how many Apples are in the # of trees
0.2=is a number multiplying the number of apples in a tree to see how many trees are there.

c. Are Emily's equations equivalent? Why or why not? Use mathematical reasoning to justify your response.

X	equation	Y	X	equation	X
1	5·X	5	10	0.2·10	2
2	5·2	10	20	0.2·20	4
3	5·3	15	30	0.2·30	6
4	5·4	20	40	0.2·80	8

Guide 10 Litho 7267

Total Content Points: 0

Total Practice Points: 0

The student does not recognize and represent the proportional relationship between the number of games and total cost of games. Even though the equation ($4 \times 5 = 20$) and ratio ($20 \div 5 = 4$) are accurate, the student's graph and ordered pairs are incorrect for the context of the problem and do not represent the proportional relationship of video games to cost (no credit for 7.RP.2). The student does not define the variables or coefficients accurately in Part B, even in the context the student provides, where *y* is the total number of apples in all trees and 5 is the number of apples in one tree (no credit for 7.EE.4). The student does not determine a correct unit rate or show contextually accurate scaling in Part A (no credit for MP7). The student does not explain the proportionality relationship in Part A; or reasonably explain the variables and constants in Emily's equation in Part B; or conclude whether Emily's equations are equivalent or not, although the work is accurate in Part C (no credit for MP3). The student does not explain the meaning of all variables and coefficients as related to the context of the task in Part B, or prove whether Emily's equations are equivalent or not, indicating a lack of precision (no credit for MP6) and lack of understanding needed to make sense of all parts of the problem and persevere in solving them (no credit for MP1).

Total Awarded Points: 0 out of 7