Mathematics Toolkit: Grade 4 Objective 3.C.1.c

Standard 3.0 Knowledge of Measurement

Topic C. Applications in Measurement

Indicator 1. Apply measurement concepts

Objective c. Determine start time, elapsed time, and end time

Assessment Limits:

Use hour and half hour intervals

Table of Contents

Objective 3.C.1.c Tools

- Sample Item #1 - Brief Constructed Response (BCR)
    - Annotated Student Responses

Scoring Rubric

- Rubric - Brief Constructed Response

Sample Item #1 Brief Constructed Response (BCR) Item with Annotated Student Responses

Question

Sarah is walking to her friend's house. She leaves her house at 3:45 and arrives at her friend's house at 5:15.

Step A

How long did it take Sarah to walk from her house to her friend's house?

Step B

Explain why your answer is correct. Use what you know about elapsed time in your explanation. Use words and/or numbers in your explanation.

Step A is scored 0 (Incorrect) or 1 (Correct) and assesses 3.C.1.c.
Step B is scored with a 3 point (0, 1, 2) rubric and assesses Processes of Mathematics.

Note: Thirteen “Sample Student Responses” follow below. Each response appears on its own separate page and includes scoring information. The “Sample Student Responses” represent a range of score points.

Correct Answer

Step A
1 hour and 30 minutes

Annotated Student Responses

Step A

How long did it take Sarah to walk from her house to her friend's house?

2 hours

Step B

Use what you know about elapsed time to explain why your answer is correct. Use words, numbers, and/or pictures in your explanation.

Elapsed time is when time goes by. For example, if it was 12:00  and one hour later it would be 1:00  . Time can help abt.

Score for Sample Student Response #1:

Step A - Content (Knowledge of Measurement): 0

Step B - Processes of Mathematics: 0

Annotation for Step B, Using the Rubric: This response is irrelevant to the problem. It merely gives a definition of elapsed time using an example that does not apply to this problem.

Step A

How long did it take Sarah to walk from her house to her friend's house?

It took 1:30 mins

Step B

Use what you know about elapsed time to explain why your answer is correct. Use words, numbers, and/or pictures in your explanation.

I know this answer is corect because I advanced 1 hour, but it was only 4:45. It was still not there, so I had to add by 5s until I got to 5:15.

Score for Sample Student Response #2:

Step A - Content (Knowledge of Measurement): 1

Step B - Processes of Mathematics: 1

Annotation for Step B, Using the Rubric: This response demonstrates a minimal understanding and analysis of the problem. The student uses a partial application of a strategy, adding on one hour, "I advanced 1 hour." The explanation for the mathematical process is partially developed when the student states, "I had to add by 5's until I got to 5:15." However, the supportive information about the number of times 5 was added is not provided.

Step A

How long did it take Sarah to walk from her house to her friend's house?

1hour 30 minites

Step B

Use what you know about elapsed time to explain why your answer is correct. Use words, numbers, and/or pictures in your explanation.

How I got my answer was I got my answer. I started at 3:45 PM. Then, I added an hour. After that, I added 30 minutes,

Score for Sample Student Response #3:

Step A - Content (Knowledge of Measurement): 1

Step B - Processes of Mathematics: 1

Annotation for Step B, Using the Rubric: This response demonstrates a minimal understanding and analysis of the problem. The student provides a partially developed explanation of a strategy used to solve the problem, "I added an hour. After that, I added 30 minutes." Supportive information about why this was done is not provided.

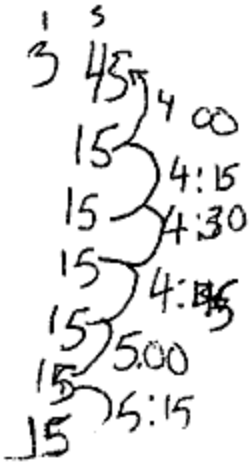
Step A

How long did it take Sarah to walk from her house to her friend's house?

1 h. 30min.

Step B

Use what you know about elapsed time to explain why your answer is correct. Use words, numbers, and/or pictures in your explanation.



Score for Sample Student Response #4:

Step A - Content (Knowledge of Measurement): 1

Step B - Processes of Mathematics: 1

Annotation for Step B, Using the Rubric: This response demonstrates a minimal understanding and analysis of the problem. The student provides a partial application of a numeric strategy used to solve this problem. The supportive information explaining how the groups of 15 added up to 1 hour and 30 minutes is not provided.

Step A

How long did it take Sarah to walk from her house to her friend's house?

1:30

Step B

Use what you know about elapsed time to explain why your answer is correct. Use words, numbers, and/or pictures in your explanation.

3:45
+1:00
4:45 not enough

3:45
+2:00
5:45 to much

-10 5:45
-10 5:35 2
-10 5:25
-10 5:15 3
1:30
116
30

Score for Sample Student Response #5:

Step A - Content (Knowledge of Measurement): 1

Step B - Processes of Mathematics: 2

Annotation for Step B, Using the Rubric: This response demonstrates a complete understanding and analysis of the problem. The student applies a reasonable strategy to solve the problem numerically. The supportive numeric information is provided and appropriate to the solution of the problem.

Step A

How long did it take Sarah to walk from her house to her friend's house?

An hour and 30 mins.

Step B

Use what you know about elapsed time to explain why your answer is correct. Use words, numbers, and/or pictures in your explanation.

My answer is correct because if you add 15 minutes too 3:45 it will get you too 4:00 so then until 5:00 it would be another hour, but there is still 15 minutes until she is there. So if you an hour and two 15's together it will equal an hour and 30 minutes.

Score for Sample Student Response #6:

Step A - Content (Knowledge of Measurement): 1

Step B - Processes of Mathematics: 2

Annotation for Step B, Using the Rubric: This response demonstrates a complete understanding and analysis of the problem. The student applies a reasonable strategy to the solution of the problem by adding 15 minutes, then 1 hour, and then another 15 minutes. The explanation provided is clear and developed, "So if you add an hour and two 15's together you will equal an hour and 30 minutes."

Sarah is walking to her friend's house. She leaves her house at 3:45 P.M. and arrives at her friend's house at 5:15 P.M.

Step A

How long did it take Sarah to walk from her house to her friend's house?

1 hour and 30 min.

Step B

Use what you know about elapsed time to explain why your answer is correct. Use words, numbers, and/or pictures in your explanation.

My answer is correct because I counted by 5's starting at 3:45 P.M. After I counted the hour from 3:45PM to 4:45PM) until I got to 5:15 P.M.

Score for Sample Student Response #7:

Step A - Content (Knowledge of Measurement): 1

Step B - Processes of Mathematics: 1

Annotation for Step B, Using the Rubric: This response demonstrates a minimal understanding and analysis of the problem. The student uses a partial application of a strategy, "...I counted by 5's... until I got to 5:15 P.M." The explanation for the mathematical process is partially developed. The supportive information identifying the number of times the student counted by 5's is not provided. Compare to Sample Student Response #2.

Sarah is walking to her friend's house. She leaves her house at 3:45 P.M. and arrives at her friend's house at 5:15 P.M.

Step A

How long did it take Sarah to walk from her house to her friend's house?

1 hour and a half

Step B

Use what you know about elapsed time to explain why your answer is correct. Use words, numbers, and/or pictures in your explanation.

I Knew that my answer is correct because 3:45 to 4:15 is a half an hour and that 4:15 to 4:45 is an half an hour and from 4:45 to 5:15 is an half an hour. So I know that 2 half an hours make a hour. So now I have 1 hour and one half an hour left. So it would be 1 hour and a half

Score for Sample Student Response #8:

Step A - Content (Knowledge of Measurement): 1

Step B - Processes of Mathematics: 2

Annotation for Step B, Using the Rubric: This response demonstrates a complete understanding and analysis of the problem. The student applies a reasonable strategy to solve the problem by counting by half-hours from the starting time to the finish time. The explanation for the mathematical process is clear and developed, "I know that 2 half an hours make a hour. So now I have 1 hour and one half an hour." Compare to Sample Student Response #6.

Sarah is walking to her friend's house. She leaves her house at 3:45 P.M. and arrives at her friend's house at 5:15 P.M.

Step A

How long did it take Sarah to walk from her house to her friend's house?

1:30

Step B

Use what you know about elapsed time to explain why your answer is correct. Use words, numbers, and/or pictures in your explanation.

I first lined up 5:15 and putted 3:45 under 5:15. The I started to subtract. But I can't subtract 45 from 15. So I brorrowed 60 minutes from 5 hours. and subtract 45 from 60. Then I added 15 from the answer I got for the minutes. I'm done with the minutes and going on to the hour. Since the minutes borrowed 60 minute=an hour. It turned into 4:15. I subtract 4-3 and got 1:30.

Score for Sample Student Response #9:

Step A - Content (Knowledge of Measurement): 1

Step B - Processes of Mathematics: 2

Annotation for Step B, Using the Rubric: This response demonstrates a complete understanding and analysis of the problem. The student applies a reasonable strategy to solve the problem by subtracting starting time from the finishing time. The explanation for the mathematical process is clear and developed, "I borrowed 60 minutes from 5 hours an subtract 45 from 60. Then I added 15 from [to] the answer I got for the minutes." The supportive numeric information provided is accurate and appropriate.

Sarah is walking to her friend's house. She leaves her house at 3:45 P.M. and arrives at her friend's house at 5:15 P.M.

Step A

How long did it take Sarah to walk from her house to her friend's house?

1 hour and 30 min.

Step B

Use what you know about elapsed time to explain why your answer is correct. Use words, numbers, and/or pictures in your explanation.

My answer is correct because I know elapsed time. I took 3:45 and added 1 hour and got 4:45 and added on until I got 5:15. Thats how I know my answer is correct.

Score for Sample Student Response #10:

Step A - Content (Knowledge of Measurement): 1

Step B - Processes of Mathematics: 1

Annotation for Step B, Using the Rubric: This response demonstrates a minimal understanding and analysis of the problem. The student uses a partial application of a strategy, adding time, to solve this problem. The supportive information explaining what is added to 4:45 and how many times it is added is not provided, "...4:45 and added on until I got to 5:15." Compare to Sample Student Response #3.

Sarah is walking to her friend's house. She leaves her house at 3:45 P.M. and arrives at her friend's house at 5:15 P.M.

Step A

How long did it take Sarah to walk from her house to her friend's house?

1 hr. 30 min.

15
+15
30

3:45 +15min. 4:00
4:00 +1 hr. 5:00
5:00 +15 min. 5:15

Step B

Use what you know about elapsed time to explain why your answer is correct. Use words, numbers, and/or pictures in your explanation.

I know my answer is correct because from 3:45 it takes 15 min. to get to 4:00. From 4:00 it takes an hour to get to 5:00, then from 5:00 to 5:15 it takes 15 min. Add 15 and 15, and you get 30 min. plus an hour.

Score for Sample Student Response #11:

Step A - Content (Knowledge of Measurement): 1

Step B - Processes of Mathematics: 2

Annotation for Step B, Using the Rubric: This response demonstrates a complete understanding and analysis of the problem. The student applies a reasonable strategy to solve the problem by adding a group of 15 minutes to get to 4:00 and then adding groups of 15 minutes to get to the final time. The explanation for the mathematical process is clear and developed, "From 4:00 it takes an hour to get to 5:00, then from 5:00 to 5:15 it takes 15 minutes." The supportive information provided is appropriate to the solution of the problem, "Add 15 and 15, and you get 30 minutes, plus an hour." Compare to Sample Student Response #6.

Sarah is walking to her friend's house. She leaves her house at 3:45 P.M. and arrives at her friend's house at 5:15 P.M.

Step A

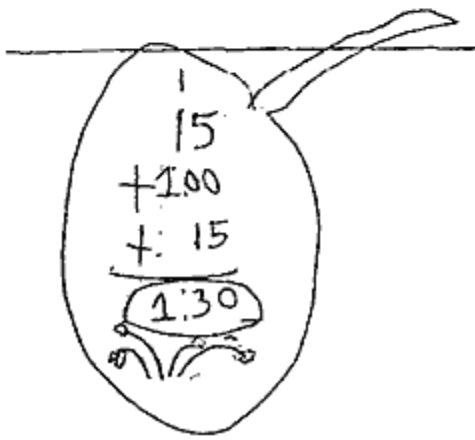
How long did it take Sarah to walk from her house to her friend's house?

1 hours a 30 minets to get to her firends house

Step B

Use what you know about elapsed time to explain why your answer is correct. Use words, numbers, and/or pictures in your explanation.

Well 3:45 and 5:15. And 3:45+ 15 minets is 4:00 + 1hour is 5:00 + 15 more mints it would be 5:15 and if you add it together.



Score for Sample Student Response #12:

Step A - Content (Knowledge of Measurement): 1

Step B - Processes of Mathematics: 2

Annotation for Step B, Using the Rubric: This response demonstrates a complete understanding and analysis of the problem. The student applies a reasonable strategy to the solution of the problem by adding groups of 15 minutes. The explanation provided is clear and developed. The supportive numerical information provided shows how the final answer was reached. Compare to Sample Student Response #6.

Sarah is walking to her friend's house. She leaves her house at 3:45 P.M. and arrives at her friend's house at 5:15 P.M.

Step A

How long did it take Sarah to walk from her house to her friend's house?

2 hours and 35 minuits

Step B

Use what you know about elapsed time to explain why your answer is correct. Use words, numbers, and/or pictures in your explanation.

The way I know adout elapsed time is you start at one time and they give you another time and they they ask how long it takes them to get there or when they get there.

Score for Sample Student Response #13:

Step A - Content (Knowledge of Measurement): 0

Step B - Processes of Mathematics: 0

Annotation for Step B, Using the Rubric: This response is irrelevant to the problem. The student merely gives a definition of elapsed time including a restatement of the question. Compare to Sample Student Response #1.

Rubric - Brief Constructed Response (BCR)

Score 2
The response demonstrates a complete understanding and analysis of a problem.

- Application of a reasonable strategy in the context of the problem is indicated.
- Explanation[1] of and/or justification[2] for the mathematical process(es) used to solve a problem is clear, developed, and logical.
- Connections and/or extensions made within mathematics or outside of mathematics are clear.
- Supportive information and/or numbers are provided as appropriate. [3]

Score 1
The response demonstrates a minimal understanding and analysis of a problem.

- Partial application of a strategy in the context of the problem is indicated.
- Explanation[1] of and/or justification[2] for the mathematical process(es) used to solve a problem is partially developed, logically flawed, or missing.
- Connections and/or extensions made within mathematics or outside of mathematics are partial or overly general, or flawed.
- Supportive information and/or numbers may or may not be provided as appropriate.[3]

Score 0
The response is completely incorrect, irrelevant to the problem, or missing.[4]

Notes:

[1] Explanation refers to students' ability to communicate how they arrived at the solution for an item using the language of mathematics.

[2] Justification refers to students' ability to support the reasoning used to solve a problem, or to demonstrate why the solution is correct using mathematical concepts and principles.

[3] Students need to complete rubric criteria for *explanation, justification, connections* and/or *extensions* as cued for in a given problem.

[4] Merely an exact copy or paraphrase of the problem will receive a score of "0".

Rubric Document Date: August 2003