

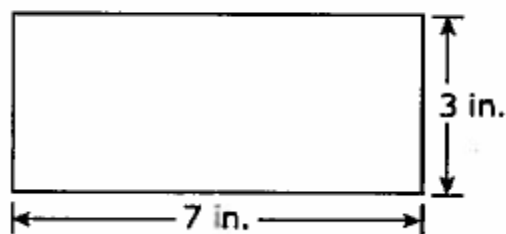


Math
Spring Operational 2015

Grade 4
PBA Item #14
Identify Errors
0493-M02313Y

Prompt

A rectangle is shown.



Part A

A student uses square tiles measuring 1 inch on each side to find the area of the rectangle. Her reasoning is shown.

I covered the top and bottom edges of the rectangle with 7 tiles each.



I then covered the left and right edges with 3 tiles each. I added up all the tiles I used to get a total area of 20 square inches. $7 + 7 + 3 + 3 = 20$



Identify the two errors in the student's reasoning and describe how to correctly use square tiles to find the area of the rectangle. Give the correct area of the rectangle.

Part B

Write a multiplication sentence that models how to find the area of the rectangle shown.

Rubric

Task is worth a total of 4 points.

0493-M02313 Rubric Part A	
Score	Description
3	<p>Student response includes the following 3 elements.</p> <ul style="list-style-type: none">• Reasoning component = 3 points<ul style="list-style-type: none">○ Identifies error of overlapping tiles on corners○ Identifies error of not completely covering the rectangle with tiles○ Explains a way to correctly cover the rectangle and determines the area of the rectangle is 21 square inches <p>Sample Student Response:</p> <p>One error the student made was she covered each corner of the rectangle twice. Another error she made was she didn't completely cover the entire rectangle.</p> <p>To correctly determine the area, you should cover the entire rectangle with squares without overlapping. If I do this, I would cover the top and bottom edges with 7 tiles each, then I could add another 7 tiles to cover the middle section of the rectangle. In all, I used 21 tiles to cover the entire rectangle with no overlaps. This means that the area of the rectangle is 21 square inches.</p> $7 + 7 + 7 = 21$ <p>(or other valid explanation)</p> <p>Notes:</p> <ul style="list-style-type: none">• If the error made is shown or stated as the perimeter is being found, not area, a point can be given for either the first or second element, but not a point for each.• Work that correctly shows the area of the rectangle addresses the requirement to explain the way to cover the rectangle.
2	Student response includes 2 of the 3 elements.
1	Student response includes 1 of the 3 elements.
0	Student response is incorrect or irrelevant.

0493-M02313 Rubric Part B

Score	Description
1	<p>Student response includes the following element.</p> <ul style="list-style-type: none"><li>• Computation component = 1 point<ul style="list-style-type: none"><li>○ Valid multiplication sentence that shows how to find the area of the rectangle shown. <p>Sample Student Response: $7 \times 3 = 21$</p>
0	Student response is incorrect or irrelevant.

Anchor Set
A1 – A10

Part A

One of the errors the student has was she/he counted 4 of the squares twice she also didn't add the tiles in the middle. The correct answer should be 21 square inches

Part B

$$3 \times 7 = 21$$

Annotations

Anchor Paper 1

Part A: Score Point 3

This response receives full credit. The response includes each of the three required elements:

- The response correctly identifies the error of overlapping tiles on corners (*counted 4 of the squares twice*).
- The response correctly identifies the error of not completely covering the rectangle with tiles (*didn't add the tiles in the middle*).
- The response provides the correct area of the rectangle (*21*).

Part B: Score Point 1

This response receives full credit. The response includes the required element:

- The response provides $7 \times 3 = 21$ or its equivalent ($3 \times 7 = 21$).

Part A

The error the student made was you need to fill up the whole inside to know the area, and she used the same tiles twice which is not how you do it. The correct area is 21 square inches.

Part B

$$7 \times 3 = 21$$

Annotations

Anchor Paper 2

Part A: Score Point 3

This response receives full credit. The response includes each of the three required elements:

- The response correctly identifies the error of overlapping tiles on corners (*used the same tiles twice*). A student does not need to specify that it is the four corner tiles that are being used twice.
- The response correctly identifies the error of not completely covering the rectangle with tiles (*you need to fill up the whole inside*).
- The response provides the correct area of the rectangle (*21*).

Part B: Score Point 1

This response receives full credit. The response includes the required element:

- The response provides $7 \times 3 = 21$ or its equivalent ($7 \times 3 = 21$).

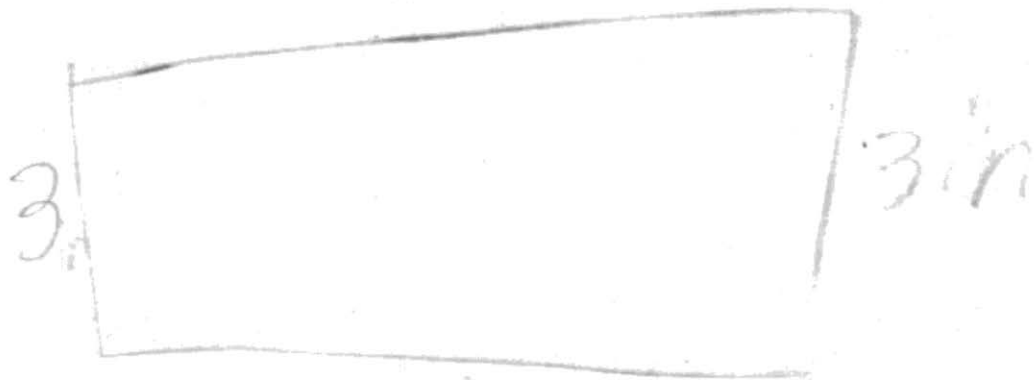
Part A The two mistakes are she didn't put the middle row in. And she counted wrong the answer would be 21 blocks



perimeter = 20 inches
Area = 21 inches

Part B

$$7 \times 3 = 21$$



$$\text{Area} = 21 \text{ inches}^2$$

Annotations

Anchor Paper 3

Part A: Score Point 2

This response receives partial credit. The response includes two of the three required elements:

- The response correctly identifies the error of not completely covering the rectangle with tiles (*didn't put the middle row in*).
- The response provides the correct area of the rectangle (*21*).

The response does not correctly identify the error of overlapping tiles on corners (*she counted wrong*).

Part B: Score Point 1

This response receives full credit. The response includes the required element:

- The response provides $7 \times 3 = 21$ or its equivalent ($7 \times 3 = 21$).

Part A

She covered 4 tiles 2 times.
She didn't cover the inside.

Part B

$$7 \times 3 = 21$$

Annotations

Anchor Paper 4

Part A: Score Point 2

This response receives partial credit. The response includes two of the three required elements:

- The response correctly identifies the error of overlapping tiles on corners (*covered 4 tiles 2 times*).
- The response correctly identifies the error of not completely covering the rectangle with tiles (*didn't cover the inside*).

The response does not provide the correct area of the rectangle.

Part B: Score Point 1

This response receives full credit. The response includes the required element:

- The response provides $7 \times 3 = 21$ or its equivalent ($7 \times 3 = 21$).

Part A

1. She forgot to
count the five squares in the
middle



2. She counted wrong
it is 21 not 20

Part B

$$14 \times 6 = 21$$

Annotations

Anchor Paper 5

Part A: Score Point 2

This response receives partial credit. The response includes two of the three required elements:

- The response correctly identifies the error of not completely covering the rectangle with tiles (*forgot to count the five squares in the middle*).
- The response provides the correct area of the rectangle (*21*).

The response does not correctly identify the error of overlapping tiles on corners.

Part B: Score Point 0

This response receives no credit. The response does not include the required element:

The response does not provide $7 \times 3 = 21$ or its equivalent ($14 \times 6 = 21$).

Part A

She was wrong she found
the perimeter not area. Also she
didn't label what.

Part B

21 inches because the length is
7 in and the width is 3 inches
and $7 \times 3 = 21$ inches.

$$7 \times 3 = 21 \text{ in}$$

Annotations

Anchor Paper 6

Part A: Score Point 1

This response receives partial credit. The response includes one of the three required elements:

- The response correctly identifies the error of not completely covering the rectangle with tiles (*found the perimeter not area*).

The response does not correctly identify the error of overlapping tiles.

The response does not provide the correct area of the rectangle.

Part B: Score Point 1

This response receives full credit. The response includes the required element:

- The response provides $7 \times 3 = 21$ or its equivalent (*$7 \times 3 = 21$ in*).

Part A: Score Point 1

Part B: Score Point 0

Part A
Their wrong because $7+7+3+3$ is 20 but they would
have one space blank it has to be $7+7+7=21$

Part B

$$7 \times 2 = 14 + 3 \times 2 = 20$$

Annotations

Anchor Paper 7

Part A: Score Point 1

This response receives partial credit. The response includes one of the three required elements:

- The response provides the correct area of the rectangle (21).

The response does not correctly identify the error of overlapping tiles.

The response does not correctly identify the error of not completely covering the rectangle with tiles ($7+7+3+3$ is 20 but the student would have one space blank).

Part B: Score Point 0

This response receives no credit. The response does not include the required element:

The response does not provide $7 \times 3 = 21$ or its equivalent ($7 \times 2 = 14 + 3 \times 2 = 20$).

Part A

you can't put more
tiles on the corners

Part B

$$\begin{array}{r} 7 \quad 3 \\ \times 2 \quad \times 2 \\ \hline 14 \quad 6 = 20 \end{array}$$

Annotations

Anchor Paper 8

Part A: Score Point 1

This response receives partial credit. The response includes one of the three required elements:

- The response correctly identifies the error of overlapping tiles on corners (*you can't put more tiles on the corners*).

The response does not correctly identify the error of not completely covering the rectangle with tiles.

The response does not provide the correct area of the rectangle.

Part B: Score Point 0

This response receives no credit. The response does not include the required element:

The response does not provide $7 \times 3 = 21$ or its equivalent ($7 \times 2 = 14$, $3 \times 2 = 6$, $14 + 6 = 20$).

Part A

She/he made two errors by not filling in the sides completely and not showing where the three inches are in the first picture.

Part B

$$7 \times 2 = 14 \quad 3 \times 2 = 6$$

$$6 + 14 = 20$$

Annotations

Anchor Paper 9

Part A: Score Point 0

This response receives no credit. The response includes none of the three required elements:

The response does not correctly identify the error of overlapping tiles on corners (*not filling in the sides completely*).

The response does not correctly identify the error of not completely covering the rectangle with tiles (*not showing where the three inches are*).

The response does not provide the correct area of the rectangle.

Part B: Score Point 0

This response receives no credit. The response does not include the required element:

The response does not provide $7 \times 3 = 21$ or its equivalent ($7 \times 2 = 14$, $3 \times 2 = 6$, $6 + 14 = 20$).

Part A One of her errors was when she covered the left and right edges. She said she put 3 but on the picture she only put 2. Another one of her errors was the area of the rectangle is (16) not 20.
↓
area of rectangle

Part B

$$7 \times 2 = 14$$

$$1 \times 2 = 2$$

$$14 + 2 = 16$$

Annotations

Anchor Paper 10

Part A: Score Point 0

This response receives no credit. The response includes none of the three required elements:

The response does not correctly identify the error of overlapping tiles on corners (*she covered the left and right edges . . . she only put 2*).

The response does not correctly identify the error of not completely covering the rectangle with tiles.

The response does not provide the correct area of the rectangle.

Part B: Score Point 0

This response receives no credit. The response does not include the required element:

The response does not provide $7 \times 3 = 21$ or its equivalent ($7 \times 2 = 14$, $1 \times 2 = 2$, $14 \times 2 = 16$).

Practice Set
P101 - P105

Part A

$7 + 7 + 3 + 3 = 20$ perimeter she
 but that is perimeter she
 needs to find area
 he added wrong it is 16 no 20
 $7 \times 3 = 21 \text{ in}^2$

Part B

$$7 \text{ in} \times 3 \text{ in} = 21 \text{ in}^2$$

Part A

The student's reasoning is incorrect. The error he made was that he added instead of multiplying. So when he counted up his answers he didn't count the middle row and he counted some tiles twice because they were going both across & down. The correct area of the rectangle would be 21.

Part B

A multiplication sentence that shows what the area of the rectangle would be:

$$3 \times 7 = 21 \text{ (in total)}$$

(going across)
(going down)

There are 21 squares in all in the rectangle

Part A cover the top and bottom
3 tiles on each sides and 7 tiles
on the top and bottom

Part B
 $7 \times 3 = 21$

Part A

The student did not count all of the squares and she counted the corner squares twice. The correct answer is 21 square inches.

Part B

$$7 \times 3 = 21$$

Part A

She forgot to shade
5 of the blocks and counted
the corners twice

16

Part B

 7×2 3×2 

$$6 + 14 = 20$$

Practice Set

Paper	Score
P101	2,1
P102	3,1
P103	0,1
P104	3,1
P105	2,0