



Math
Released Item 2015

Grade 6
PBA Item #12
Sheets of Cardboard
M21482

Prompt

One size of cardboard can be purchased in sheets that are $\frac{3}{16}$ inch thick. The sheets of cardboard are stacked on top of each other in packages. The height of each stack is $2\frac{1}{4}$ inches.



- Use the model of a ruler to determine the number of sheets of cardboard in a stack.
- Explain how you used the model to find your answer.
- Write an expression that can be used to determine the number of sheets of cardboard in a stack.
- Explain how your expression relates to the model.



- ▶ Numbers
- ▶ Arithmetic and Units
- ▶ Exponents and Roots
- ▶ Relations
- ▶ Geometry
- ▶ Groups

Task is worth a total of 4 points.

M21482 Rubric	
Score	Description
4	<p>Student response includes each of the following 4 elements.</p> <ul style="list-style-type: none">• Reasoning component = 3 points<ul style="list-style-type: none">○ Correct explanation of how to find the number of sheets in a stack using the ruler○ Correct expression or equation that can be used to find the number of sheets, $2\frac{1}{4} \div \frac{3}{16}$ or equivalent○ Correct explanation of how expression relates to use of the ruler• Computation component = 1 point<ul style="list-style-type: none">○ Correct number of sheets of cardboard in a stack, 12 <p>Sample Student Response:</p> <p>To find the number of sheets in a stack using the ruler, you start at $2\frac{1}{4}$ inches on the ruler. Then you can mark off groups of $\frac{3}{16}$. This is 3 of the 16ths marks on the ruler. Then you can count the number of groups. There were 12 groups, so there are 12 sheets in a stack.</p> <p>An expression that represents this is $2\frac{1}{4} \div \frac{3}{16}$. This relates to using the ruler because you are starting with $2\frac{1}{4}$ and dividing by $\frac{3}{16}$, which is really finding how many groups of $\frac{3}{16}$ there are in $2\frac{1}{4}$. When you divide, you will get 12, which means there are 12 groups of $\frac{3}{16}$ in $2\frac{1}{4}$.</p>
3	Student response includes 3 of the 4 elements.
2	Student response includes 2 of the 3 elements.
1	Student response includes 1 of the 2 elements.
0	Student response is incorrect or irrelevant.

Anchor Set

A1 – A10

- Sheets of cardboard in a stack = 12
- I figured out how long $\frac{3}{16}$ of the ruler will be then I kept on counting up $\frac{3}{16}$ until I got to $2\frac{1}{4}$, and I got 12 times.

- $2\frac{1}{4} \div \frac{3}{16} = \frac{9}{4} \times \frac{16}{3}$

- $\frac{9}{4} \times \frac{16}{3}$ is the same thing as

$2\frac{1}{4} \div \frac{3}{16}$. This equation means how many

$\frac{3}{16}$ are in $2\frac{1}{4}$, and that relates

to the model and the number of sheets of cardboard.

Annotations

Anchor Paper 1 Score Point 4

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

- The response provides the correct number of sheets of cardboard in a stack (*Sheets of cardboard in a stack = 12*).
- The response provides an explanation of how to find the number of sheets in a stack using the ruler (*I figured out how long $\frac{3}{16}$ of the ruler will be then I kept on counting up $\frac{3}{16}$ until I got $2\frac{1}{4}$, and I got 12 times.*).
- The response provides an expression that can be used to find the number of sheets ($2\frac{1}{4} \div \frac{3}{16}$).
- The response provides an explanation of how the expression relates to use of the ruler (*The equation means how many $\frac{3}{16}$ are in $2\frac{1}{4}$, and that relates to the model and the number of sheets of cardboard.*).

#1 The model ruler helped me because if you mark at every $\frac{3}{16}$ until you get to $2\frac{1}{4}$ you can go back and count the marks for your answer.

#2 $2\frac{1}{4} \div \frac{3}{16} = 12$

#3 The expressio above relates to the model 'cause you are seeing how many $\frac{3}{16}$ " will fit in $2\frac{1}{4}$ " same as dividing.

Annotations

Anchor Paper 2

Score Point 4

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

- The response provides the correct number of sheets of cardboard in a stack (12).
- The response provides an explanation of how to find the number of sheets in a stack using the ruler (*The model ruler helped me because if you mark at every $\frac{3}{16}$ until you get $2\frac{1}{4}$ you can go back and count the marks for your answer.*).
- The response provides an expression or equation that can be used to find the number of sheets ($2\frac{1}{4} \div \frac{3}{16}$).
- The response provides an explanation of how the expression relates to use of the ruler (*The expressio above relates to the model 'cause you are seeing how many $\frac{3}{16}$ will fit in $2\frac{1}{4}$ same as dividing.*).

One size of cardboard can be purchased in sheets that are $\frac{3}{16}$ inch thick. The sheets of cardboard are stacked on top of each other in packages. The height of each stack is $2\frac{1}{4}$ inches.



- Use the model of a ruler to determine the number of sheets of cardboard in a stack.
- Explain how you used the model to find your answer.
- Write an expression that can be used to determine the number of sheets of cardboard in a stack.
- Explain how your expression relates to the model.

In a stack of cardboard that is $2\frac{1}{4}$ inches thick, there are 12 sheets of cardboard. I used the model to count every $\frac{3}{16}$ mark. $\left(2\frac{1}{4}\right) \div \left(\frac{3}{16}\right)$ My expression relates to the model because it shows another way to solve the problem.

Annotations

Anchor Paper 3

Score Point 3

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

- The response provides the correct number of sheets of cardboard in a stack (*12 sheets of cardboard*).
- The response provides an explanation of how to find the number of sheets in a stack using the ruler (*In a stack of cardboard that is $2\frac{1}{4}$ inches thick, there are 12 sheets of cardboard. I used the model to count every $\frac{3}{16}$ mark.*).
- The response provides an expression that can be used to find the number of sheets ($(2\frac{1}{4}) \div (\frac{3}{16})$).

The response does not provide a correct explanation of how the expression relates to use of the ruler (*My expression relates to the model because it shows another way to solve the problem.*).

1. I used the model to find my answer by crossing out every $\frac{3}{16}$ until I got to $2\frac{1}{4}$.

2. $2\frac{1}{4} = \frac{4}{16}$. $(2\frac{4}{16} \div \frac{3}{16})$

3. my expression relates to the model because division is separating into groups. I separated my ruler into groups of $\frac{3}{16}$.

Annotations

Anchor Paper 4 Score Point 3

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

- The response provides an explanation of how to find the number of sheets in a stack using the ruler (*I used the model to find my answer by crossing out every $\frac{3}{16}$ until I got to $2\frac{1}{4}$.*)
- The response provides an expression that can be used to find the number of sheets ($2\frac{1}{4} \div \frac{3}{16}$).
- The response provides an explanation of how the expression relates to use of the ruler (*My expression relates to the model because division is separating into groups. I separated my ruler into group of $\frac{3}{16}$.*)

The response does not provide the correct number of sheets of cardboard in a stack.

One size of cardboard can be purchased in sheets that are $\frac{3}{16}$ inch thick. The sheets of cardboard are stacked on top of each other in packages. The height of each stack is $2\frac{1}{4}$ inches.



- Use the model of a ruler to determine the number of sheets of cardboard in a stack.
- Explain how you used the model to find your answer.
- Write an expression that can be used to determine the number of sheets of cardboard in a stack.
- Explain how your expression relates to the model.



$$\frac{3}{16} \times \frac{9}{4}$$

$$4 \times 4 = 16$$

$$4\left(\frac{9}{4}\right) = \frac{36}{16}$$

$$\frac{36}{16} \div \left(\frac{3}{16}\right) = 12$$

- ▶ Numbers
- ▶ Arithmetic and Units
- ▶ Exponents and Roots
- ▶ Relations
- ▶ Geometry
- ▶ Groups

Annotations

Anchor Paper 5

Score Point 2

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

- The response provides the correct number of sheets of cardboard in a stack (12).
- The response provides an expression or equation that can be used to find the number of sheets ($\frac{36}{16} \div \frac{3}{16}$).

The response does not provide an explanation of how to find the number of sheets in a stack using the ruler. The response does not provide an explanation of how the expression relates to use of the ruler.

My expression was

$$2\frac{1}{4} \div \frac{3}{16} \text{ or } \frac{9}{4} \times \frac{16}{3}$$

I used the model by counting how many sets of 3 tick marks there were in $2\frac{1}{4}$.

Annotations

Anchor Paper 6

Score Point 2

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

- The response provides an explanation of how to find the number of sheets in a stack using the ruler (*I used my model by counting how many sets of 3 tick marks there were in $2\frac{1}{4}$*).
- The response provides an expression that can be used to find the number of sheets ($2\frac{1}{4} \div \frac{3}{16}$).

The response does not provide the correct number of sheets of cardboard in a stack. The response does not provide an explanation of how the expression relates to use of the ruler.

One size of cardboard can be purchased in sheets that are $\frac{3}{16}$ inch thick. The sheets of cardboard are stacked on top of each other in packages. The height of each stack is $2\frac{1}{4}$ inches.



- Use the model of a ruler to determine the number of sheets of cardboard in a stack.
- Explain how you used the model to find your answer.
- Write an expression that can be used to determine the number of sheets of cardboard in a stack.
- Explain how your expression relates to the model.

There are 11 sheets of cardboard in a stack. I used the model to find my answer by looking for $2\frac{1}{4}$ and $\frac{3}{16}$. An expression that could determine the number of sheets in a cardboard stack is $2\frac{1}{4}$ divided by $\frac{3}{16}$. My expression relates to the model because it's the same problem.

Annotations

Anchor Paper 7

Score Point 1

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

- The response provides an expression that can be used to find the number of sheets ($2\frac{1}{4}$ divided by $\frac{3}{16}$).

The response does not provide the correct number of sheets of cardboard in a stack (11).

The response does not provide the correct explanation of how to find the number of sheets in a stack using the ruler (*I used the mode to find my answer by looking for $2\frac{1}{4}$ and $\frac{3}{16}$*).

The response does not provide the correct explanation of how the expression relates to use of the ruler (*My expression relates to the model because it's the same problem*).

One size of cardboard can be purchased in sheets that are $\frac{3}{16}$ inch thick. The sheets of cardboard are stacked on top of each other in packages. The height of each stack is $2\frac{1}{4}$ inches.



- Use the model of a ruler to determine the number of sheets of cardboard in a stack.
- Explain how you used the model to find your answer.
- Write an expression that can be used to determine the number of sheets of cardboard in a stack.
- Explain how your expression relates to the model.

Calculator interface showing a row of buttons: undo, redo, clear, delete, plus, minus, multiply, divide, fraction, square, power, square root, and equals. Below the buttons is an approximation symbol (\approx).

$$\frac{3}{16} \left(2\frac{1}{4} = 12 \right)$$

- ▶ Numbers
- ▶ Arithmetic and Units
- ▶ Exponents and Roots
- ▶ Relations
- ▶ Geometry
- ▶ Groups

Annotations

Anchor Paper 8

Score Point 1

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

- The response provides the correct number of sheets of cardboard in a stack (12).

The response does not provide an explanation of how to find the number of sheets in a stack using the ruler.

The response does not provide an expression or equation that can be used to find the number of sheets.

The response does not provide an explanation of how the expression relates to use of the ruler.

4 inches

I went to the $2\frac{1}{4}$ and then went to $\frac{3}{16}$
and got 4 when I counted

$$2\frac{1}{4} + \frac{3}{16}$$

The 2 represents 2 inches then you count
4 little lines and get $2\frac{1}{4}$ then you add
 $\frac{3}{16}$.

Annotations

Anchor Paper 9

Score Point 0

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

The response does not provide the correct number of sheets of cardboard in a stack (4 inches).

The response provides an incorrect explanation of how to find the number of sheets in a stack using the ruler (*I went to the $2\frac{1}{4}$ and then went to $\frac{3}{16}$ and got 4 when I counted.*).

The response provides an incorrect expression to find the number of sheets in a stack ($2\frac{1}{4} \cdot \frac{3}{16}$).

The response does not provide an explanation of how the expression relates to use of the ruler (*The 2 represents 2 inches then you count 4 lines and get $2\frac{1}{4}$ then you add $\frac{3}{16}$.*).

One size of cardboard can be purchased in sheets that are $\frac{3}{16}$ inch thick. The sheets of cardboard are stacked on top of each other in packages. The height of each stack is $2\frac{1}{4}$ inches.



- Use the model of a ruler to determine the number of sheets of cardboard in a stack.
- Explain how you used the model to find your answer.
- Write an expression that can be used to determine the number of sheets of cardboard in a stack.
- Explain how your expression relates to the model.



to find the answer i subtracted $\frac{3}{16}$
 $-2\frac{1}{4}$. then i found the answer
which was $\frac{5}{8}$

- ▶ Numbers
- ▶ Arithmetic and Units
- ▶ Exponents and Roots
- ▶ Relations
- ▶ Geometry
- ▶ Groups

Annotations

Anchor Paper 10

Score Point 0

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

The response does not provide the correct number of sheets of cardboard in a stack ($\frac{5}{8}$).

The response does not provide an explanation of how to find the number of sheets in a stack using the ruler.

The response provides an incorrect expression to find the number of sheets in a stack (*to find the answer i subtracted $\frac{3}{16} - 2\frac{1}{4}$*).

The response does not provide an explanation of how the expression relates to use of the ruler.

Practice Set
P101 - P105

One size of cardboard can be purchased in sheets that are $\frac{3}{16}$ inch thick. The sheets of cardboard are stacked on top of each other in packages. The height of each stack is $2\frac{1}{4}$ inches.



- Use the model of a ruler to determine the number of sheets of cardboard in a stack.
- Explain how you used the model to find your answer.
- Write an expression that can be used to determine the number of sheets of cardboard in a stack.
- Explain how your expression relates to the model.

There are 13 sheets of cardboard in one stack

12 sheets are in one stack.

I used the model by counting how many $\frac{3}{16}$ can fit in one $2\frac{1}{4}$.

$$2\frac{1}{4} \div \frac{3}{16} = 12$$

My expression is related

to the model, because

$2\frac{1}{4} \div \frac{3}{16}$ is the same as dividing $2\frac{1}{4}$ into parts that are $\frac{3}{16}$.

One size of cardboard can be purchased in sheets that are $\frac{3}{16}$ inch thick. The sheets of cardboard are stacked on top of each other in packages. The height of each stack is $2\frac{1}{4}$ inches.



- Use the model of a ruler to determine the number of sheets of cardboard in a stack.
- Explain how you used the model to find your answer.
- Write an expression that can be used to determine the number of sheets of cardboard in a stack.
- Explain how your expression relates to the model.



For every $\frac{3}{16}$ I tallied a line on my paper until I got to $\left(2\frac{1}{4}\right)$.

- ▶ Numbers
- ▶ Arithmetic and Units
- ▶ Exponents and Roots
- ▶ Relations
- ▶ Geometry
- ▶ Groups

P104

One size of cardboard can be purchased in sheets that are $\frac{3}{16}$ inch thick. The sheets of cardboard are stacked on top of each other in packages. The height of each stack is $2\frac{1}{4}$ inches.



- Use the model of a ruler to determine the number of sheets of cardboard in a stack.
- Explain how you used the model to find your answer.
- Write an expression that can be used to determine the number of sheets of cardboard in a stack.
- Explain how your expression relates to the model.

12 sheets of cardboard are in each stack. The model helped me because each inch is divided into 16 sections. Every 3 sections would be another sheet of cardboard.

$\left(2\frac{1}{4}\right) \div \left(\frac{3}{16}\right) = \text{the number of sheets of cardboard in each stack.}$

One size of cardboard can be purchased in sheets that are $\frac{3}{16}$ inch thick. The sheets of cardboard are stacked on top of each other in packages. The height of each stack is $2\frac{1}{4}$ inches.



- Use the model of a ruler to determine the number of sheets of cardboard in a stack.
- Explain how you used the model to find your answer.
- Write an expression that can be used to determine the number of sheets of cardboard in a stack.
- Explain how your expression relates to the model.

i counted out $\frac{3}{16}$ in one inch then kept counting until i got to $2\frac{1}{4}$ inches and i got 12 sheets of cardboard are in one stack i did not use an expression and it relates cause you will be able to use the ruler

Practice Set

Paper	Score
P101	0
P102	4
P103	1
P104	3
P105	2