Math
Released Item 2019

Grade 8

Three Boxes of Cereal
M21703
Anchor Set
A1 – A8
With Annotations
Prompt

A 10-ounce box of cereal costs $3. A 20-ounce box of the same cereal costs $5. A third box of the same cereal costs $8.

- Use the given relationships to write a linear equation that expresses the price of a box of cereal as a function of the number of ounces of cereal in the box.
- Calculate the number of ounces in the third box of cereal.
- Show your work or explain your answer.

Enter your equation, your answer, and your work in the space provided.
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<tr>
<th>Score</th>
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</table>
| 3     | Student response includes the following 3 elements.  
  - **Computation component** = 1 point  
    o Correct number of ounces in the third box, 35  
  
  - **Modeling component** = 1 point  
    o Correct equation that represents the price, \( p \), of a box of cereal as a function of the number of ounces, \( x \), in the box;  
      \[ p = \left(\frac{1}{5}\right)x + 1 \text{ or equivalent} \]  
      Note: student may use any two letters provided what they represent is defined.  
  
  - **Modeling component** = 1 point  
    o Valid work shown or explanation given  
  
  Sample Student Response:  
  The equation is  
  \[ p = \left(\frac{1}{5}\right)x + 1 \], where \( x \), represents the number of ounces in a box of this cereal and \( p \), represents the price of a corresponding box of this cereal.  
  The third box contains 35 ounces.  
  I found the equation by using the coordinates (10,3) and (20,5) to find the slope and \( y \)-intercept. To find the slope, I calculated:  
  \[ \frac{5-3}{20-10} = \frac{1}{5} \]  
  To find the \( y \)-intercept, I substituted and solved for \( b \):  
  \[ y = \left(\frac{1}{5}\right)x + b \]  
  \[ 5 = \left(\frac{1}{5}\right) * 20 + b \]  
  \[ b = 1 \]  
  To find the weight of the third box, I solved the equation  
  \[ 8 = \left(\frac{1}{5}\right)x + 1 \]  
  Or other valid response.  |
| 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. |
A 10-ounce box of cereal costs $3. A 20-ounce box of the same cereal costs $5. A third box of the same cereal costs $8.

- Use the given relationships to write a linear equation that expresses the price of a box of cereal as a function of the number of ounces of cereal in the box.
- Calculate the number of ounces in the third box of cereal.
- Show your work or explain your answer.

Enter your equation, your answer, and your work in the space provided.

Ordered pair:
(10, 3), (20, 5), (x, 8)

Slope:
\[
\frac{5-3}{20-10} = \frac{2}{10} = \frac{1}{5}
\]

\[y = \frac{1}{5} x + b\]

Plug an ordered pair into the equation:

\[3 = \left(\frac{1}{5}\right) (10) + b\]
\[3 = 2 + b\]
\[b = 1\]

Equation: \(y = \frac{1}{5} x + 1\)

To find the number of ounces for the third box of cereal, you plug the ordered pair into the equation.

\[8 = \frac{1}{5} x + 1\]
\[7 = \frac{1}{5} x\]
\[7 \times 5 = \frac{1}{5} x \times 5\]
\[x = 35 \text{ ounces}\]
This response receives full credit. It includes each of the three required elements:

- A correct equation that represents the price of a box of cereal as a function of the number of ounces in a box is provided \( y = \frac{1}{5} x + 1 \).

- The correct calculation of the number of ounces in the third box is provided (35 ounces).

- Valid work shown or explanation given is provided [Slope: \( \frac{(5-3)}{(20-10)} = \frac{2}{10} = \frac{1}{5} \), \( y = \frac{1}{5} x + b \); Plug an ordered pair into the equation: \( 3 = \left(\frac{1}{5}\right)(10) + b \), \( 3 = 2 + b \), \( b = 1 \); To find the number of ounces for the third box of cereal, \( x \), you plug the ordered pair into the equation; \( 8 = \frac{1}{5} x + 1 \), \( 7 = \frac{1}{5} x \), \( 7 \times 5 = \frac{1}{5} \times 5 \), \( x = 35 \) ounces].
A 10-ounce box of cereal costs $3. A 20-ounce box of the same cereal costs $5. A third box of the same cereal costs $8.

- Use the given relationships to write a linear equation that expresses the price of a box of cereal as a function of the number of ounces of cereal in the box.
- Calculate the number of ounces in the third box of cereal.
- Show your work or explain your answer.

Enter your equation, your answer, and your work in the space provided.

The linear equation that expresses the price of a box of cereal as a function of the number of ounces of cereal in the box is \( y = \frac{m}{5} + 1 \)

The number of ounces in the third box of cereal is 35 ounces

because \( \frac{10}{5} + 1 = 3 \) and \( \frac{20}{5} + 1 = 5 \) so

\( \frac{35}{5} + 1 = 8 \)
This response receives full credit. It includes each of the three required elements:

- A correct equation that represents the price of a box of cereal as a function of the number of ounces in a box is provided \( y = \frac{x}{5} + 1 \).

- The correct calculation of the number of ounces in the third box is provided (35 ounces).

- Valid work shown or explanation given is provided \( \left( \frac{10}{5} + 1 = 3 \right) \) and \( \left( \frac{20}{5} + 1 = 5 \right) \) so \( \frac{35}{5} + 1 = 8 \).
A 10-ounce box of cereal costs $3. A 20-ounce box of the same cereal costs $5. A third box of the same cereal costs $8.

- Use the given relationships to write a linear equation that expresses the price of a box of cereal as a function of the number of ounces of cereal in the box.
- Calculate the number of ounces in the third box of cereal.
- Show your work or explain your answer.

Enter your equation, your answer, and your work in the space provided.

1. $y = \frac{2}{10}x + 1$
2. For the third box of cereal it would have 35 ounces.
<table>
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| **Anchor Paper 3**  
**Score Point 2** |
| This response receives partial credit. It includes two of the three required elements: |
| • A correct equation that represents the price of a box of cereal as a function of the number of ounces in a box is provided \( y = \frac{2}{10}x + 1 \). |
| • The correct calculation of the number of ounces in the third box is provided (35 ounces). |
| Valid work shown or explanation given is missing. |

- Use the given relationships to write a linear equation that expresses the price of a box of cereal as a function of the number of ounces of cereal in the box.
- Calculate the number of ounces in the third box of cereal.
- Show your work or explain your answer.

Enter your equation, your answer, and your work in the space provided.

<table>
<thead>
<tr>
<th>input</th>
<th>output</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>7</td>
<td>30</td>
</tr>
<tr>
<td>8</td>
<td>35</td>
</tr>
<tr>
<td>9</td>
<td>40</td>
</tr>
<tr>
<td>5 - 3 = 2</td>
<td></td>
</tr>
<tr>
<td>5 + 2 = 7</td>
<td></td>
</tr>
<tr>
<td>7 + 1 = □</td>
<td></td>
</tr>
<tr>
<td>( y = x \cdot 4 + 2 )</td>
<td></td>
</tr>
</tbody>
</table>

Since for every 2 added to the input adds ten to the output, since 3 and five are odd numbers the next number in the input is going to be an odd number. So the next number is 7. And the number after that is 9. Between 7 and 9 is 8, since you only added one to the input you only add 5 to the output. The weight of the $8 box is 35 ounces.
**Annotation**

**Anchor Paper 4**  
**Score Point 2**

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

- The correct calculation of the number of ounces in the third box is provided (35 ounces).

- Valid work shown or explanation given is provided (input, output; 3, 10; 5, 20; 7, 30; 8, 35; 9, 40. Since for every 2 added to the input adds ten to the output. Since 3 and five are odd numbers the next number in the inout is going to be an odd number. So the next number is 7. And the number after that is 9. Between 7 and 9 is 8. Since you only added one to the input you only add 5 to the outout).

An incorrect equation that represents the price of a box of cereal as a function of the number of ounces in a box is provided \( y = x \cdot 4 + 2 \).
A 10-ounce box of cereal costs $3. A 20-ounce box of the same cereal costs $5. A third box of the same cereal costs $8.

- Use the given relationships to write a linear equation that expresses the price of a box of cereal as a function of the number of ounces of cereal in the box.
- Calculate the number of ounces in the third box of cereal.
- Show your work or explain your answer.

Enter your equation, your answer, and your work in the space provided.

\[ y = 10x (3 + 8) = 20x + 5 \]

The number of ounces in the third box is 35 ounces.
This response receives partial credit. It includes one of the three required elements:

- The correct calculation of the number of ounces in the third box is provided (35 ounces).

A correct equation that represents the price of a box of cereal as a function of the number of ounces in a box is missing.

Work shown or explanation given is incorrect \( y = 10x (3 + 8) = 20x + 5 \).
A 10-ounce box of cereal costs $3. A 20-ounce box of the same cereal costs $5. A third box of the same cereal costs $8.

- Use the given relationships to write a linear equation that expresses the price of a box of cereal as a function of the number of ounces of cereal in the box.
- Calculate the number of ounces in the third box of cereal.
- Show your work or explain your answer.

Enter your equation, your answer, and your work in the space provided.

\[
\begin{align*}
10 - ounces &= 2 + 1 \\
20 - ounces &= 4 + 1 \\
35 - ounces &= 7 + 1
\end{align*}
\]

the third box equals 35 ounces
This response receives partial credit. It includes one of the three required elements:

- The correct calculation of the number of ounces in the third box is provided (35 ounces).

A correct equation that represents the price of a box of cereal as a function of the number of ounces in a box is missing.

Valid work shown or explanation given is insufficient (10 - ounces = $2 + $1; 20 - ounces = $4 + $1; 35 - ounces = $7 + $1). More information is required for the element to receive credit.
A 10-ounce box of cereal costs $3. A 20-ounce box of the same cereal costs $5. A third box of the same cereal costs $8.

- Use the given relationships to write a linear equation that expresses the price of a box of cereal as a function of the number of ounces of cereal in the box.
- Calculate the number of ounces in the third box of cereal.
- Show your work or explain your answer.

Enter your equation, your answer, and your work in the space provided.

1. A linear equation that expresses the price if a box of cereal as a function of the number of ounces of cereal in the box is \( y = 3x + 10 \).

2. The number of ounces in the third box of cereal is 30 ounces because the ounces go up by 10 and the amount per box went up $2 every time. Like $3 + $2 = $5 and 10 ounces + 10 ounces = 20 ounces.
This response receives no credit. It includes none of the three required elements:

An incorrect equation that represents the price of a box of cereal as a function of the number of ounces in a box is provided \( y = 3x + 10 \).

An incorrect calculation of the number of ounces in the third box is provided (30 ounces).

Work shown or explanation given is incorrect (the ounces go up by 10 and the amount per box went up $2 every time. Like $3 + $2 = $5 and 10 ouncees +10 ouces = 20 ounces).
A 10-ounce box of cereal costs $3. A 20-ounce box of the same cereal costs $5. A third box of the same cereal costs $8.

- Use the given relationships to write a linear equation that expresses the price of a box of cereal as a function of the number of ounces of cereal in the box.
- Calculate the number of ounces in the third box of cereal.
- Show your work or explain your answer.

Enter your equation, your answer, and your work in the space provided.

\[ y = mx + b \] is the equation. For the 10 ounce box, the equation is \( y = 3x + 20 \). For the 20 ounce box, the equation would be \( y = 5x + 20 \). For the 8 dollar cereal, the equation would be \( y = 8x + b \).
Anchor Paper 8
Score Point 0

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

An incorrect equation that represents the price of a box of cereal as a function of the number of ounces in a box is provided \((y = mx + b)\). Providing the slope-intercept form of an equation will not receive credit.

A correct calculation of the number of ounces in the third box is missing.

Work shown or explanation given is incorrect (For the 10 ounce box, the equation is \(y = 3x + 20\). For the 20 ounce box, the equation would be \(y = 5x + 20\). For the 8 dollar cereal, the equation would be \(y = 8x + b\)).
Practice Set
P1 - P5

No Annotations Included
A 10-ounce box of cereal costs $3. A 20-ounce box of the same cereal costs $5. A third box of the same cereal costs $8.

- Use the given relationships to write a linear equation that expresses the price of a box of cereal as a function of the number of ounces of cereal in the box.
- Calculate the number of ounces in the third box of cereal.
- Show your work or explain your answer.

Enter your equation, your answer, and your work in the space provided.

35 ounce box because a 10 ounce box of cereal cost $3 and a 20 ounce box of cereal cost $5 so there is a pattern for every 5 ounces it goes up $1, so if the cereal was at 20 ounces and cost $5, so if it cost $8 it would have to go up 15 ounces so 20 ounces +15 ounce s = 35 ounces. so the third box os 35 ounces.
A 10-ounce box of cereal costs $3. A 20-ounce box of the same cereal costs $5. A third box of the same cereal costs $8.

- Use the given relationships to write a linear equation that expresses the price of a box of cereal as a function of the number of ounces of cereal in the box.
- Calculate the number of ounces in the third box of cereal.
- Show your work or explain your answer.

Enter your equation, your answer, and your work in the space provided.

First I must write the function.

\[ f(x) = \frac{1}{5} x + 1 \]

\( x \) is the number of ounces.
\( f(x) \) is the cost.

I found this using slope. The slope is \( \frac{y_2-y_1}{x_2-x_1} \). So, I filled in my values, and \( \frac{5-3}{20-10} \). This solves to \( \frac{1}{5} \).

Now I need the y intercept. \( y = \frac{1}{5} x + b \). I changed it to \( 3 = \frac{1}{5} (10) + b \) and solved. I got \( 1 = b \). Now I had \( y = \frac{1}{5} x + 1 \). Now I just changed it to function form.

The third box of cereal costs $8. So I just need to uses that instead of \( f(x) \).

\[ 8 = \frac{1}{5} x + 1 \]
\[ 7 = \frac{1}{5} x \]
\[ 35 = x \]

The third box of cereal has 35 ounces.
A 10 ounce box of cereal costs $3. A 20 ounce box of the same cereal costs $5. A third box of the same cereal costs $8.

- Use the given relationships to write a linear equation that expresses the price of a box of cereal as a function of the number of ounces of cereal in the box.
- Calculate the number of ounces in the third box of cereal.
- Show your work or explain your answer.

Enter your equation, your answer, and your work in the space provided.

In order to write a linear equation, the first thing you need is slope. I found that by creating the ordered pairs (3, 10) and (5, 20) from the prices of boxes and their respective number of ounces. Then I just plugged the numbers into the slope formula, so it looked a little bit like this. \( \frac{20-10}{5-3} = \frac{10}{2} = 5 \). So the slope was 5. The standard form of a linear equation is \( y = mx + b \) and \( m \) represents the slope, so the new equation was \( y = 5x + b \). To find \( b \), I plugged in an \( x \) and \( y \) value, and made the equation \( 10 = 5(3) + b \), which comes out to \( b = -5 \). So the linear equation that represents this problem is \( y = 5x - 5 \). To find the number of ounces in the third box, I simply plugged in 8 for \( x \). \( y = 5(8) - 5 \), so \( y = 35 \). The third box would have 35 ounces.

- Use the given relationships to write a linear equation that expresses the price of a box of cereal as a function of the number of ounces of cereal in the box.
- Calculate the number of ounces in the third box of cereal.
- Show your work or explain your answer.

Enter your equation, your answer, and your work in the space provided.

\[
x = \frac{1}{5}y
\]
A 10-ounce box of cereal costs $3. A 20-ounce box of the same cereal costs $5. A third box of the same cereal costs $8.

- Use the given relationships to write a linear equation that expresses the price of a box of cereal as a function of the number of ounces of cereal in the box.
- Calculate the number of ounces in the third box of cereal.
- Show your work or explain your answer.

Enter your equation, your answer, and your work in the space provided.

The third box of cereal’s ounce is 35 ounces.
# Practice Set

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<td>3</td>
</tr>
<tr>
<td>P3</td>
<td>2</td>
</tr>
<tr>
<td>P4</td>
<td>0</td>
</tr>
<tr>
<td>P5</td>
<td>1</td>
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