

SECURE MATERIAL - Reader Name: _____
Tennessee Comprehensive Assessment Program

TCAP/CRA

2014



5

Phase III

Box of Crayons Task

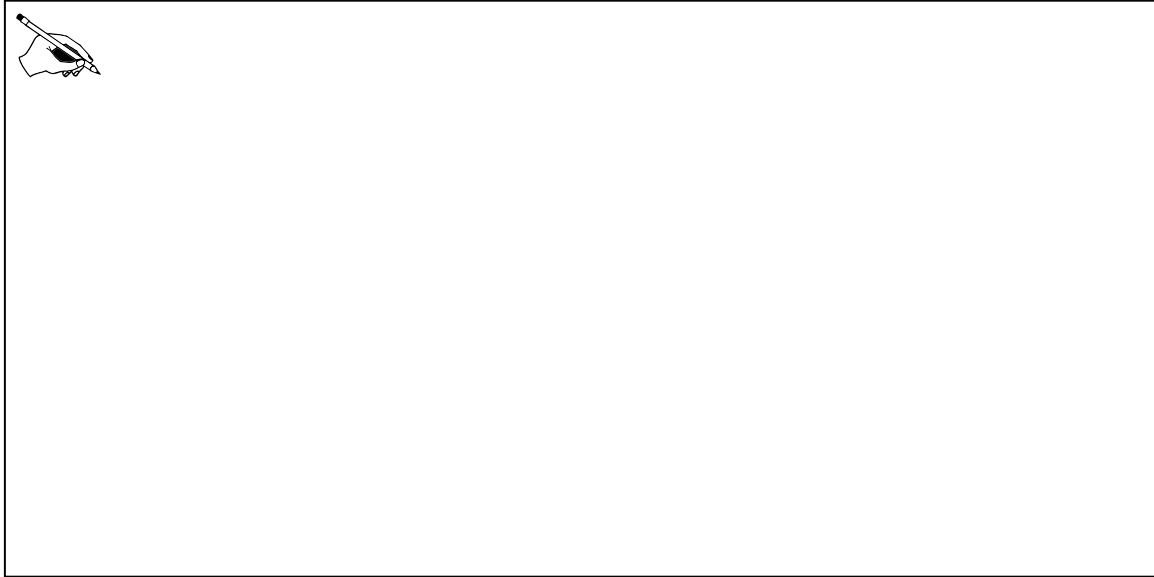
Anchor Set

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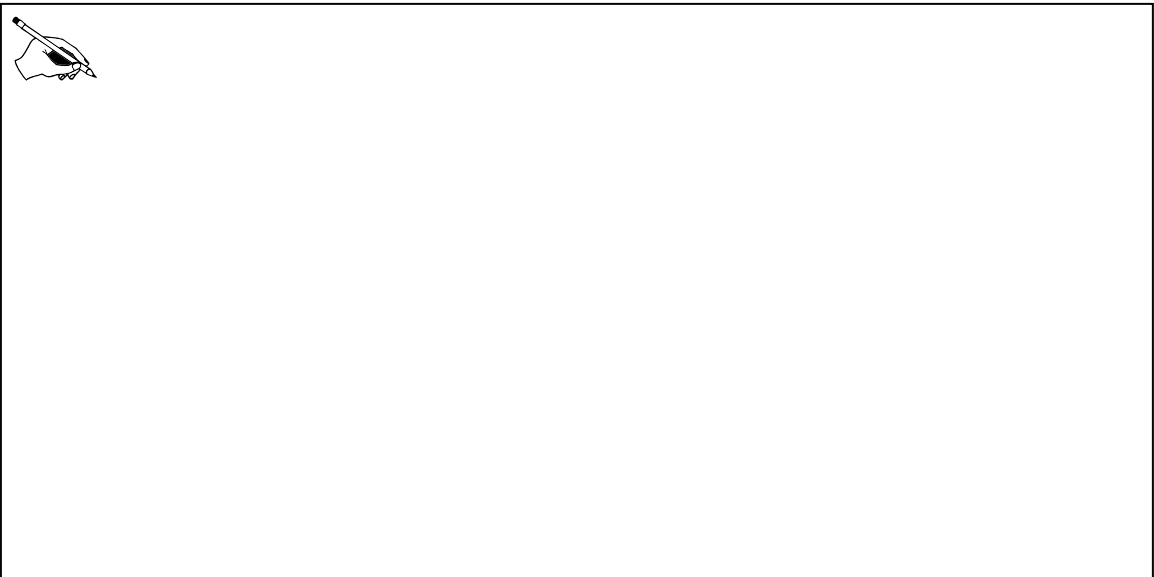
Grade 5 — 2013–14, Phase III
Part 2: Constructed Response Task Section

Box of Crayons Task

- a. Mrs. Campbell has $\frac{2}{3}$ of a box of crayons. She gives $\frac{1}{4}$ of the $\frac{2}{3}$ of a box to Colin. What fraction of a whole box of crayons did Mrs. Campbell give to Colin? Use a diagram and an equation to support your answer.



- b. A full whole box of crayons has 24 crayons in it. How many crayons did Mrs. Campbell give to Colin?



Scoring Guide

The CCSS for Mathematical Content (2 points)

5.NF.B.4(x) Multiplies $\frac{1}{4} \times \frac{2}{3}$ to get $\frac{2}{12}$. _____

(1 Point)

5.NF.B.4(z) Multiplies accurately $\frac{2}{12}$ or the fraction found in part a by 24. _____

(1 Point)

The CCSS for Mathematical Practice (2 points)

MP4 Writes a precise expression to represent $\frac{1}{4}$ of $\frac{2}{3}$. _____

(1 Point)

(MP4: Model with mathematics.)

MP7 Represents with a visual model the denominator of 12 when multiplying fourths times thirds or the denominator of 6 when multiplying halves times thirds (through the process of cross simplification). _____

(1 Point)

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

TOTAL POINTS: 4

The CCSS for Mathematical Content Addressed In This Task

Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

5.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

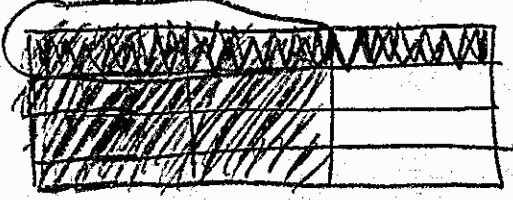
The CCSS for Mathematical Practice*

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 type indicates Mathematical Practices not addressed in this assessment.

Box of Crayons Task


- a. Mrs. Campbell has $\frac{2}{3}$ of a box of crayons. She gives $\frac{1}{4}$ of the $\frac{2}{3}$ of a box to Colin. What fraction of a whole box of crayons did Mrs. Campbell give to Colin? Use a diagram and an equation to support your answer.



$\frac{2}{3} \times \frac{1}{4} = \frac{2}{12} = \left(\frac{1}{6}\right)$

She gave him $\frac{2}{12}$ or $\frac{1}{6}$ of the crayons.

- b. A full whole box of crayons has 24 crayons in it. How many crayons did Mrs. Campbell give to Colin?



$\frac{24}{1} \times \frac{1}{6} = \frac{24}{6} = (4)$

She gave him 4 crayons.

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Total Content Points: 2 (5.NF.B.4(x), 5.NF.B.4(z))

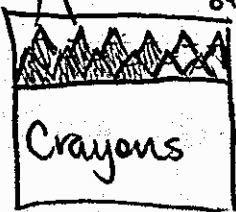
Total Practice Points: 2 (MP4, MP7)

In Part A, the student correctly solves the word problem and finds an answer of “ $\frac{2}{12}$ or $\frac{1}{6}$ of the crayons.” (5.NF.B.4(x)). In Part B, the student correctly determines that Mrs. Campbell gives Colin 4 crayons (5.NF.B.4(z)). In Part A, the student writes the expression $\frac{2}{3} \times \frac{1}{4}$ to represent $\frac{1}{4}$ of $\frac{2}{3}$ (MP4). The student’s diagram in Part B reflects the answer $\frac{2}{12}$ by partitioning the whole into 12 boxes, which accurately represents the denominator of 12 (MP7).

Total Awarded Points: 4 out of 4

Box of Crayons Task



- a. Mrs. Campbell has $\frac{2}{3}$ of a box of crayons. She gives $\frac{1}{4}$ of the $\frac{2}{3}$ of a box to Colin. What fraction of a whole box of crayons did Mrs. Campbell give to Colin? Use a diagram and an equation to support your answer.



$\frac{1}{4} \cdot \frac{2}{3} = \frac{2}{12}$ went to Colin.

every 2 crayons of $\frac{2}{3}$ is $\frac{1}{4}$

Mrs. Campbell gave 2 crayons to Colin.

 - what she has
 - what she doesn't

- b. A full whole box of crayons has 24 crayons in it. How many crayons did Mrs. Campbell give to Colin?

$\frac{2}{12} \cdot \frac{2}{2} = \frac{4}{24}$

Mrs. Campbell gave Colin 4 crayons.

Anchor 2

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Total Content Points: 2 (5.NF.B.4(x), 5.NF.B.4(z))

Total Practice Points: 2 (MP4, MP7)

In Part A, the student correctly solves the word problem and finds that “ $\frac{2}{12}$ went to Colin.”

(5.NF.B.4(x)). In Part B, the student correctly determines that Mrs. Campbell gave Colin

4 crayons (5.NF.B.4(z)). In Part A, the student writes the expression $\frac{1}{4} \times \frac{2}{3}$ to represent $\frac{1}{4}$ of $\frac{2}{3}$

(MP4). The student’s diagram in Part A reflects the situation by showing 12 crayons in the box, accurately representing the denominator of 12 (MP7).

Total Awarded Points: 4 out of 4

Box of Crayons Task

- a. Mrs. Campbell has $\frac{2}{3}$ of a box of crayons. She gives $\frac{1}{4}$ of the $\frac{2}{3}$ of a box to Colin. What fraction of a whole box of crayons did Mrs. Campbell give to Colin? Use a diagram and an equation to support your answer.

The $\frac{2}{3}$ box of crayons

$\frac{2}{3} \cdot \frac{1}{4} = \frac{2}{12} = \frac{1}{6}$

The fraction of crayons given out is two-thirds

The part of the box she had

The number of groups of 2 in a box whole

Mrs. Campbell gave Colin $\frac{1}{6}$ of the crayons

Crayons given to Colin

- b. A full whole box of crayons has 24 crayons in it. How many crayons did Mrs. Campbell give to Colin?

$24 \div 3 = 8$

Total Crayons

The number of groups

$8 \div 2 = 4$

The number of crayons in a group

The number of crayons Colin was give

Mrs. Campbell gave Colin 4 crayons

Anchor 3

Litho 00015200178

Total Content Points: 2 (5.NF.B.4(x), 5.NF.B.4(z))

Total Practice Points: 2 (MP4, MP7)

In Part A, the student correctly solves the word problem and gets the answer $\frac{1}{6}$ (5.NF.B.4(x)). In

Part B, the student correctly determines that “Mrs. Campbell gave Colin 4 crayons”

(5.NF.B.4(z)). The student writes a precise expression $\left(\frac{2}{3} \times \frac{1}{4}\right)$ to represent $\frac{1}{4}$ of $\frac{2}{3}$ $\left(\frac{2}{3} \times \frac{1}{4}\right)$


(MP4). The student’s visual model accurately represents the denominator of 6, found when

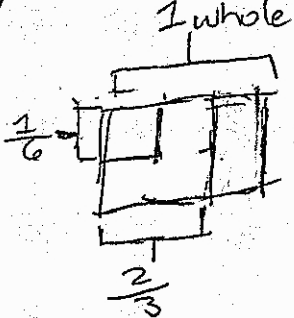
finding $\frac{1}{4}$ of $\frac{2}{3}$ (MP7).

Total Awarded Points: 4 out of 4


Box of Crayons Task

- a. Mrs. Campbell has $\frac{2}{3}$ of a box of crayons. She gives $\frac{1}{4}$ of the $\frac{2}{3}$ of a box to Colin. What fraction of a whole box of crayons did Mrs. Campbell give to Colin? Use a diagram and an equation to support your answer.

 She gives Colin $\frac{1}{6}$ of the box of crayons.

$$\frac{1}{4} \cdot \frac{2}{3} = \frac{2}{12} \div 2 = \left(\frac{1}{6}\right)$$


- b. A full whole box of crayons has 24 crayons in it. How many crayons did Mrs. Campbell give to Colin?

 $\begin{array}{r} 6 \overline{)24} \\ \underline{-24} \\ \hline \end{array}$ She gives Colin 4 crayons.

Anchor 4 Litho 00245200178

Total Content Points: 2 (5.NF.B.4(x), 5.NF.B.4(z))

Total Practice Points: 1 (MP4)

In Part A, the student correctly solves the word problem and finds the answer $\frac{1}{6}$ (5.NF.B.4(x)).

In Part B, the student correctly determines that Mrs. Campbell gives Colin 4 crayons

(5.NF.B.4(z)). The student writes the precise expression $\frac{1}{4} \times \frac{2}{3}$ to represent $\frac{1}{4}$ of $\frac{2}{3}$ (MP4). As

the student's diagram is not clearly divided into six equal parts, it does not show sufficient evidence of a denominator of 6 (no credit for MP7).

Total Awarded Points: 3 out of 4

Box of Crayons Task

- a. Mrs. Campbell has $\frac{2}{3}$ of a box of crayons. She gives $\frac{1}{4}$ of the $\frac{2}{3}$ of a box to Colin. What fraction of a whole box of crayons did Mrs. Campbell give to Colin? Use a diagram and an equation to support your answer.

$\frac{1}{4}$ of $\frac{2}{3} = \frac{2}{12}$ equation

$\frac{1}{4}$ of $\frac{2}{3} = \frac{2}{12}$

- b. A full whole box of crayons has 24 crayons in it. How many crayons did Mrs. Campbell give to Colin?

I got 4 because Mrs. Campbell has 24 crayons and she is giving Colin $\frac{1}{4}$ of $\frac{2}{3}$ box of crayons. So I found out what $\frac{2}{3}$ of 24 is then I got 16 and then I had to find out $\frac{1}{4}$ of 16 which is 4

$\frac{2}{3}$ of 24

$8 \cdot 2 = 16$

$\frac{1}{4}$ of 16

$16 \div 4 = 4$

4 crayons

Anchor 5

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Total Content Points: 2 (5.NF.B.4(x), 5.NF.B.4(z))

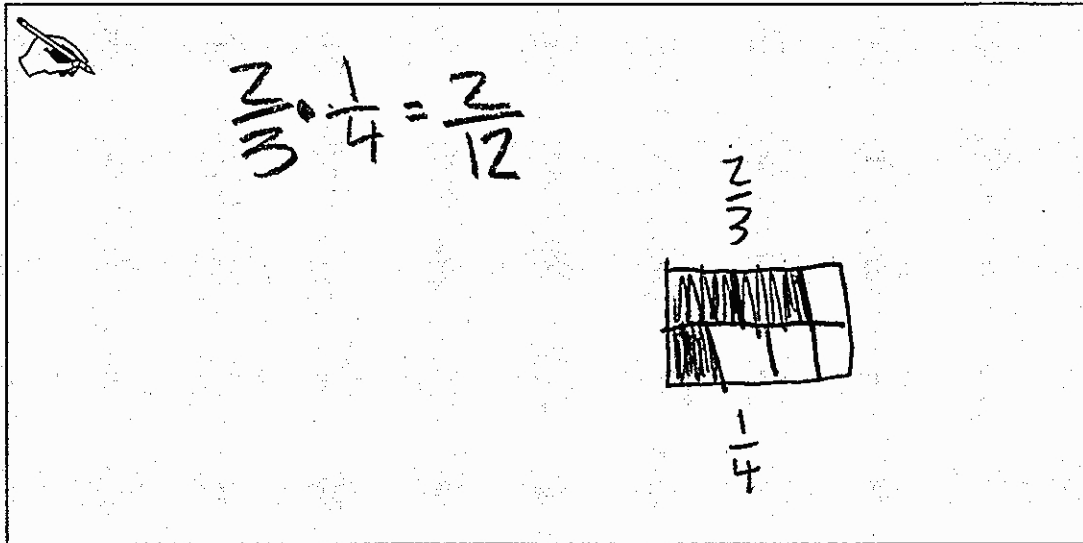
Total Practice Points: 1 (MP7)

In Part A, the student finds the answer $\frac{2}{12}$ for the fraction of the crayons Mrs. Campbell gave Colin (5.NF.B.4(x)). In Part B, the student correctly determines that Mrs. Campbell gives Colin 4 crayons (5.NF.B.4(z)). The student does not write a precise mathematical expression to represent $\frac{1}{4}$ of $\frac{2}{3}$ (no credit for MP4). The student's final diagram indicates an understanding of structure by dividing the whole into 12 parts, which accurately represents the denominator of 12 (MP7).

Total Awarded Points: 3 out of 4

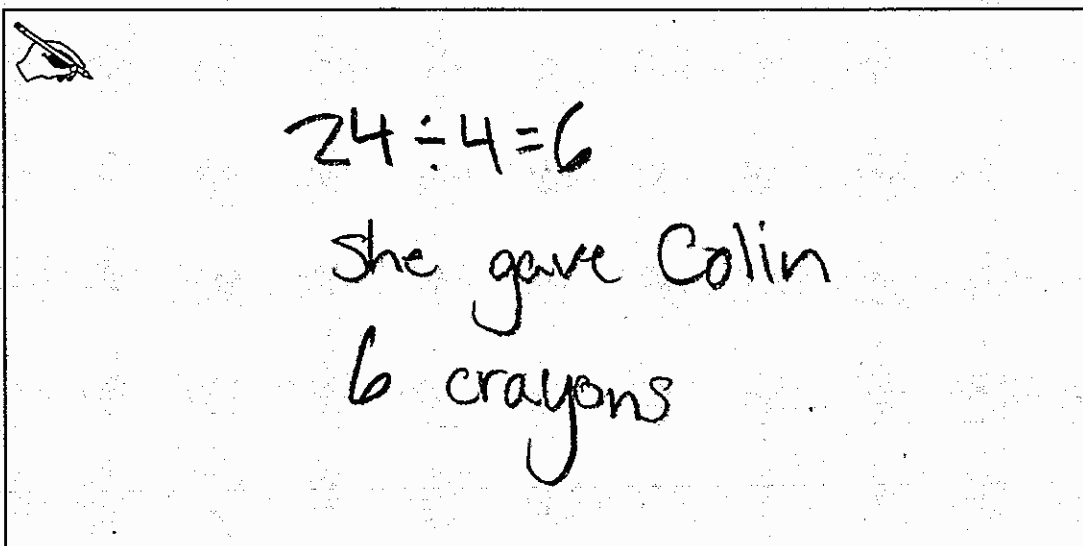
Box of Crayons Task

- a. Mrs. Campbell has $\frac{2}{3}$ of a box of crayons. She gives $\frac{1}{4}$ of the $\frac{2}{3}$ of a box to Colin. What fraction of a whole box of crayons did Mrs. Campbell give to Colin? Use a diagram and an equation to support your answer.



The diagram shows a rectangular box representing a box of crayons. The box is divided into three equal horizontal sections. The top two sections are shaded with vertical lines, representing $\frac{2}{3}$ of the box. The bottom section is divided into four equal vertical columns, representing $\frac{1}{4}$ of the $\frac{2}{3}$ section. The fraction $\frac{2}{3}$ is written vertically above the box, and $\frac{1}{4}$ is written vertically below the box. To the left of the box, the equation $\frac{2}{3} \cdot \frac{1}{4} = \frac{2}{12}$ is written.

- b. A full whole box of crayons has 24 crayons in it. How many crayons did Mrs. Campbell give to Colin?



The diagram shows a rectangular box representing a box of crayons. The box is divided into four equal horizontal sections. The top section is shaded with vertical lines, representing $\frac{1}{4}$ of the box. The fraction $\frac{1}{4}$ is written vertically above the box. To the left of the box, the equation $24 \div 4 = 6$ is written. Below the equation, the text "she gave Colin 6 crayons" is written.

Anchor 6

Litho 00175200178

Total Content Points: 1 (5.NF.B.4(x))

Total Practice Points: 1 (MP4)

In Part A, the student correctly solves the word problem, finding the correct answer of $\frac{2}{12}$ (5.NF.B.4(x)). In Part B, the student incorrectly determines that Mrs. Campbell gives Colin 6 crayons, instead of $\frac{1}{6}$ of the total number of crayons (no credit for 5.NF.B.4(z)). In Part A, the student writes a correct expression to represent $\frac{1}{4}$ of $\frac{2}{3}$ $\left(\frac{2}{3} \times \frac{1}{4}\right)$ (MP4). The diagram in Part A divides half of the whole into fourths and the other half into thirds. The diagram does not demonstrate an understanding of the structure of fractions, as the whole is not divided into either six or twelve equal parts (no credit for MP7).

Total Awarded Points: 2 out of 4

Box of Crayons Task

- a. Mrs. Campbell has $\frac{2}{3}$ of a box of crayons. She gives $\frac{1}{4}$ of the $\frac{2}{3}$ of a box to Colin. What fraction of a whole box of crayons did Mrs. Campbell give to Colin? Use a diagram and an equation to support your answer.

Handwritten student work for part a:

$$\begin{array}{r} \frac{2}{3} \quad \frac{8}{12} \\ - \frac{1}{4} \quad \frac{3}{12} \\ \hline \frac{5}{12} \end{array}$$

$$\begin{array}{r} \text{Mrs. Campbell } \frac{8}{12} \\ - \frac{3}{12} \\ \hline \end{array}$$

She gave Colin $\frac{3}{12}$ of the crayon box.

The diagram shows a circle divided into 12 equal sectors. 8 sectors are shaded and labeled "Mrs. Campbell". 3 of these shaded sectors are circled and labeled "Colin". A separate circle contains the fraction $\frac{3}{12}$.

- b. A full whole box of crayons has 24 crayons in it. How many crayons did Mrs. Campbell give to Colin?

Handwritten student work for part b:

Mrs. Campbell $\frac{8}{12}$ of box

Colin $\frac{3}{12}$ of box

$$\frac{3 \times 2}{12 \times 2} = \frac{6}{24}$$

Mrs. Campbell gave Colin 6 out of the 24 crayons in the box.

full box = 24 crayons

Anchor 7

Litho 00335200183

Total Content Points: 1 (5.NF.B.4(z))

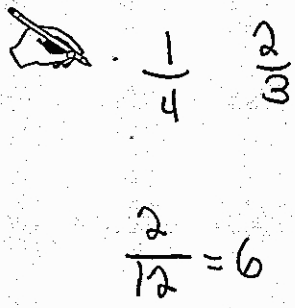
Total Practice Points: 1 (MP7)

In Part A, the student gets an incorrect answer of $\frac{3}{12}$ (no credit for 5.NF.B.4(x)). In Part B, the student uses the incorrect fraction $\left(\frac{3}{12}\right)$ from Part A to determine the number of crayons that Mrs. Campbell gives to Colin (6), which is correct based on the incorrect fraction (5.NF.B.4(z)). The student writes an incorrect expression to represent $\frac{1}{4}$ of $\frac{2}{3} \left(\frac{2}{3} - \frac{1}{4}\right)$ in Part A (no credit for MP4). However, the student's diagram in Part A accurately represents the denominator of 12, demonstrating some understanding of the structure of fractions (MP7).

Total Awarded Points: 2 out of 4

Box of Crayons Task

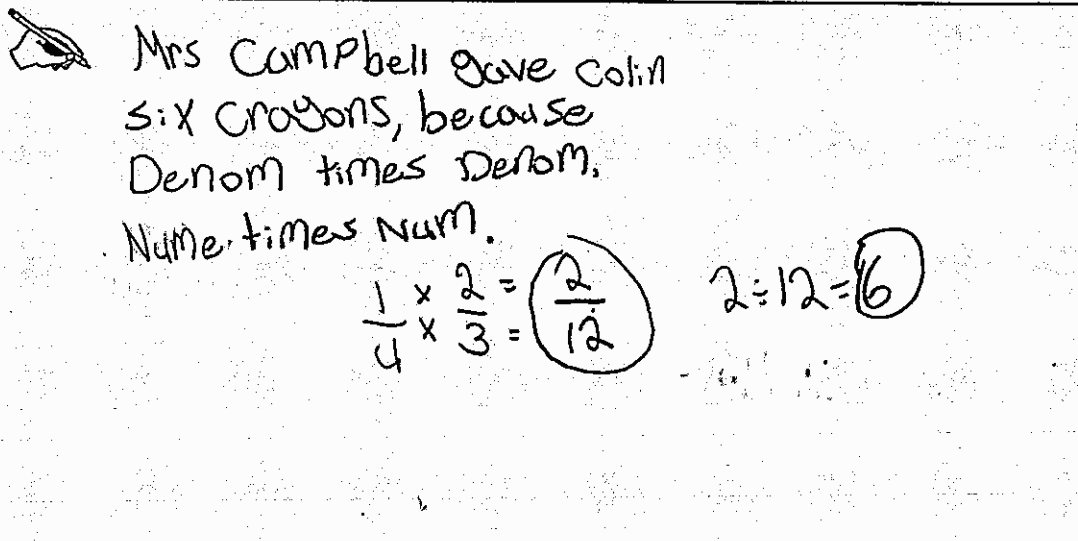
- a. Mrs. Campbell has $\frac{2}{3}$ of a box of crayons. She gives $\frac{1}{4}$ of the $\frac{2}{3}$ of a box to Colin. What fraction of a whole box of crayons did Mrs. Campbell give to Colin? Use a diagram and an equation to support your answer.



Mrs Campbell gave Colin $\frac{2}{12}$ of the Box of Crayons.

$\frac{2}{12} = 6$

- b. A full whole box of crayons has 24 crayons in it. How many crayons did Mrs. Campbell give to Colin?



Mrs Campbell gave Colin six crayons, because Denom times Denom, Num times Num.

$\frac{1}{4} \times \frac{2}{3} = \frac{2}{12}$ $2 \times 12 = 6$

Anchor 8

Litho 01805200183

Total Content Points: 1 (5.NF.B.4(x))

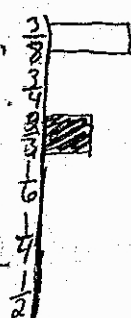
Total Practice Points: 0

In Part A, the student finds the correct answer to the word problem $\left(\frac{2}{12}\right)$ (5.NF.B.4(x)). In Part B, the student incorrectly determines that Mrs. Campbell gives Colin 6 crayons (no credit for 5.NF.B.4(z)). The student does not write an expression to represent $\frac{1}{4}$ of $\frac{2}{3}$ (no credit for MP4). The response does not contain a visual model representing the problem, and thus does not demonstrate an understanding of the structure of fractions (no credit for MP7).

Total Awarded Points: 1 out of 4

Box of Crayons Task



- a. Mrs. Campbell has $\frac{2}{3}$ of a box of crayons. She gives $\frac{1}{4}$ of the $\frac{2}{3}$ of a box to Colin. What fraction of a whole box of crayons did Mrs. Campbell give to Colin? Use a diagram and an equation to support your answer.




$\frac{1}{4} \div \frac{2}{3} = \frac{3}{8}$

$\frac{1}{4} \times \frac{3}{2} = \frac{3}{8}$

$\frac{1}{4} \div \frac{2}{3} = \frac{3}{8}$

Key:
 = Mrs. Campbell has
 = Colin has

- b. A full whole box of crayons has 24 crayons in it. How many crayons did Mrs. Campbell give to Colin?



$\frac{3}{8} \times \frac{24}{1} = \frac{9}{1} = 9 \text{ crayons}$

She gave collin 9 crayons.

Anchor 9

Litho 02595200183

Total Content Points: 1 (5.NF.B.4(z))

Total Practice Points: 0


In Part A, the student incorrectly solves the word problem, finding an incorrect answer $\left(\frac{3}{8}\right)$

(no credit for 5.NF.B.4(x)). In Part B, the student uses the incorrect fraction from Part A and multiplies it by 24 to determine that Mrs. Campbell gives Colin 9 crayons, which is correct based on that incorrect fraction (5.NF.B.4(z)). The student writes an incorrect expression to represent $\frac{1}{4}$ of $\frac{2}{3}$ $\left(\frac{1}{4} \div \frac{2}{3}\right)$ (no credit for MP4) For several reasons, including not showing a denominator of 12 or 6, the diagram in Part A does not accurately represent the problem situation (no credit for MP7).

Total Awarded Points: 1 out of 4

Box of Crayons Task

- a. Mrs. Campbell has $\frac{2}{3}$ of a box of crayons. She gives $\frac{1}{4}$ of the $\frac{2}{3}$ of a box to Colin. What fraction of a whole box of crayons did Mrs. Campbell give to Colin? Use a diagram and an equation to support your answer.




Mrs. Campbell gave Colin $\frac{2}{3}$ of the box.

$$\frac{2}{3} \div \frac{1}{4}$$

$$\frac{2}{3} \cdot \frac{4}{1} = \frac{8}{3} = 2\frac{2}{3}$$

- b. A full whole box of crayons has 24 crayons in it. How many crayons did Mrs. Campbell give to Colin?



$$\frac{24}{1} \cdot \frac{2}{3} = \frac{48}{3} = 16$$

$$\frac{16}{1} \cdot \frac{1}{4} = \frac{16}{4} = 4$$

Mrs. Campbell gave Colin 4 crayons.

Anchor 10

Litho 01105200183

Total Content Points: 1 (5.NF.B.4(z))


Total Practice Points: 0

In Part A, the student finds an incorrect answer of $2\frac{2}{3}$ (no credit for 5.NF.B.4(x)). In Part B, the student correctly determines that Mrs. Campbell gives Colin 4 crayons. The student does not use the incorrect answer from Part A to determine this, instead using a new series of equations to correctly determine the number of crayons. (5.NF.B.4(z)). In Part A, the student writes an incorrect expression to represent $\frac{1}{4}$ of $\frac{2}{3}$ $\left(\frac{2}{3} \div \frac{1}{4}\right)$ (no credit for MP4). The student does not provide a visual model representing a denominator of 12 or 6 (no credit for MP7).

Total Awarded Points: 1 out of 4

Box of Crayons Task

- a. Mrs. Campbell has $\frac{2}{3}$ of a box of crayons. She gives $\frac{1}{4}$ of the $\frac{2}{3}$ of a box to Colin. What fraction of a whole box of crayons did Mrs. Campbell give to Colin? Use a diagram and an equation to support your answer.




$$\frac{2}{3} - \frac{1}{4} = \frac{8}{12} - \frac{3}{12} = \frac{5}{12}$$

$$\frac{2 \times 4}{3 \times 4} = \frac{8}{12}$$

$$\frac{1 \times 3}{4 \times 3} = \frac{3}{12}$$

Mrs. Campbell gave Colin $\frac{5}{12}$ of the crayons.

- b. A full whole box of crayons has 24 crayons in it. How many crayons did Mrs. Campbell give to Colin?



$$\frac{24}{1} \div \frac{5}{12} = \frac{24}{1} \times \frac{12}{5} = \frac{288}{5}$$

Around 10 - 15 crayons

$$\begin{array}{r} 0576 \\ 5 \overline{) 2880} \\ \underline{25} \\ 38 \\ \underline{-35} \\ 30 \\ \underline{-30} \\ 0 \end{array}$$

Anchor 11

Litho 02275200183

Total Content Points: 0

Total Practice Points: 0

In Part A, the student finds an incorrect answer of $\frac{5}{12}$ (no credit for 5.NF.B.4(x)). In Part B, the student incorrectly determines that Mrs. Campbell gives Colin 10–15 crayons (no credit for 5.NF.B.4(z)). The student subtracts $\frac{1}{4}$ from $\frac{2}{3}$ instead of multiplying to find $\frac{1}{4}$ of $\frac{2}{3}$ (no credit for MP4). There is no visual model representing the problem (no credit for MP7).

Total Awarded Points: 0 out of 4