Cluster 6.3: Number and Operations

6.3E: Rational Number Operations: Homecoming Mums

Focusing TEKS

6.3E Number and Operations. The student applies mathematical process standards to represent addition, subtraction, multiplication, and division while solving problems and justifying solutions. The student is expected to multiply and divide rational numbers fluently. **Readiness Standard**

Additional TEKS:

6.4H Convert units within a measurement system, including the use of proportions and unit rates. **Readiness Standard**

6.4G Generate equivalent forms of fractions, decimals, and percents using real-world problems, including problems involving money. **Readiness Standard**

6.5C Use equivalent fractions, decimals, and percents to show equal parts of the same whole. **Supporting S**tandard

5.3I Represent and solve multiplication of a whole number and a fraction that refers to the same whole using objects and pictorial models, including area models. **Supporting Standard**

Focusing Mathematical Process

6.1A Apply mathematics to problems arising in everyday life, society, and the workplace.

6.1B Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.

6.1C Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems.

6.1D Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate.

🔺Performance Task

Mrs. Hamilton is selling mums for the homecoming football game to make some extra money. She makes mums for both girls and boys. The girls' mums include 20 ribbon streamers, with 10 each of 2 colors. The girls' mum ribbon streamers are each $3\frac{3}{4}$ - feet long. The boys' garter mums include 10 ribbon streamers that are each 6 inches in length, and each garter mum has 5 ribbons each of 2 colors. The rolls of ribbon Mrs. Hamilton buys contain a total of $7\frac{1}{3}$ yards of ribbon. If Mrs. Hamilton sells 8 girls' mums and 6 boys' garter mums, at a minimum, how many rolls of each color will she need? Justify your reasoning.

Answer: *15 rolls of each color*

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Mathematically Speaking...

In this task, students use the concepts of multiplication and division with fractions and rational numbers to determine the amount of ribbon needed to make homecoming mums of different sizes. As part of the process students still determine how many rolls of ribbon of a given length are needed to make a specific number of mums in the different sizes.

Students may choose to represent the numbers in the problem using the fraction form or the decimal form, and they should use operations in order as determined by order of operations. Students can apply standard algorithms for computations or use strategies such as pictorial or concrete models to represent and solve the problem. Students will need to perform basic customary conversions as part of the problem so all units are common. Students may use any appropriate unit of measure to the problem.

Possible Solution

Mums for girls are made with 2 colors of ribbons and have 10 ribbons of each color. Each of the ribbons are $3\frac{3}{4}$ – feet long. Multiply the ribbon length times the number of ribbon streamers for the total number of feet of ribbon needed for each mum.
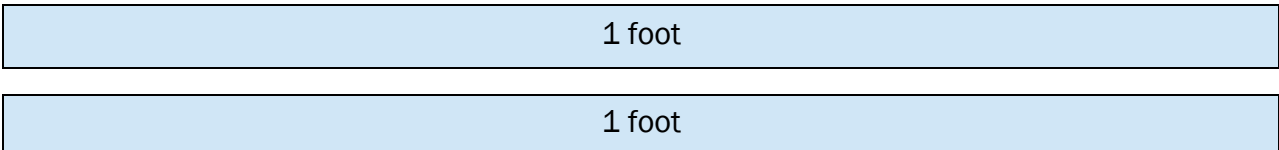
$$3\frac{3}{4} \times 10 = \frac{15}{4} \times \frac{10}{1} = \frac{150}{4} = 37\frac{1}{2}$$

To make one girl mum, Mrs. Hamilton needs $37\frac{1}{2}$ feet of each color ribbon.

The fraction strips below represent the amount of ribbon needed for each streamer.

1 foot

1 foot

1 foot

$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot
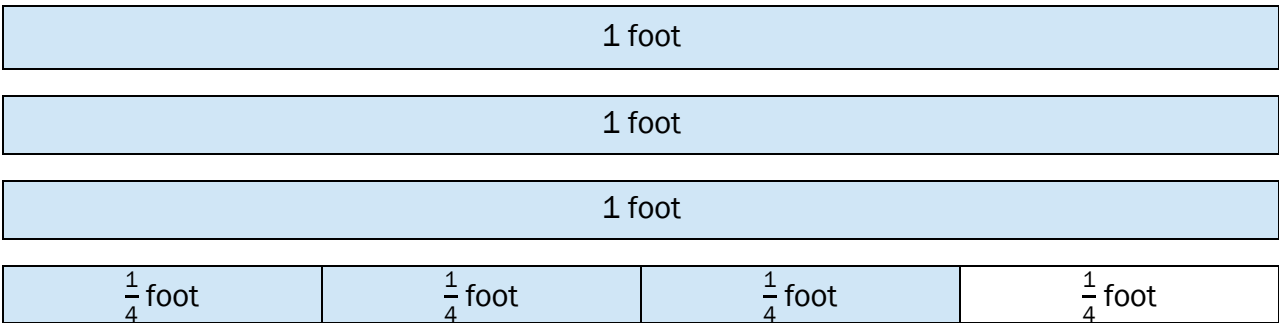
Multiply by 10 and regroup to count the total sections of ribbon.

1 foot

1 foot

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1 foot

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1 foot

1 foot

1 foot

1 foot

1 foot

1 foot

1 foot

1 foot

$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot
$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot
$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot
$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot
$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot
$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot
$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot
$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot
$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot
$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot	$\frac{1}{4}$ foot

10 times 3 feet = 30 feet

Plus 10 times $\frac{3}{4}$ foot each = $\frac{30}{4}$, which is equivalent to 7 whole foot strips and two $\frac{1}{4}$ sections.

The total is 37 whole foot long strips and $\frac{2}{4}$ or $\frac{1}{2}$ - foot more for each girl's mum.

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Mums for boys are made with 2 colors of ribbons with 5 ribbons of each color. The ribbons are all 6 inches or $\frac{1}{2}$ – foot long. Multiply the ribbon length times the number of ribbon streamers for the total amount of ribbon needed for each mum.
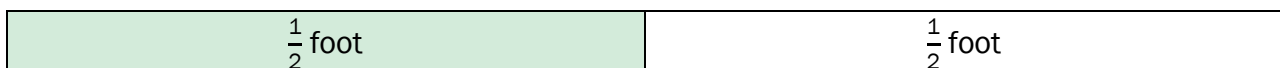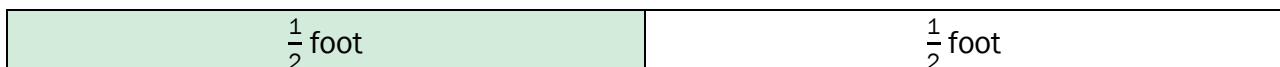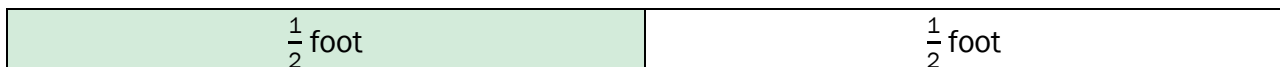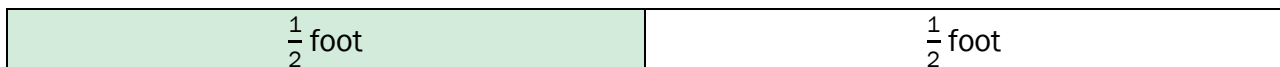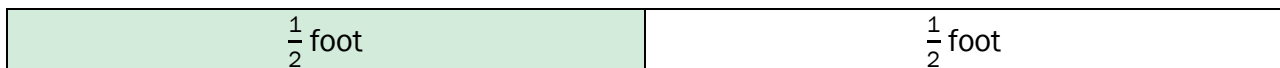
$$\frac{1}{2} \times 5 = \frac{5}{2} = 2\frac{1}{2}$$

To make one boy mum, Mrs. Hamilton needs $2\frac{1}{2}$ feet of each color ribbon.

The fraction strips below represent the amount of ribbon needed for each streamer.
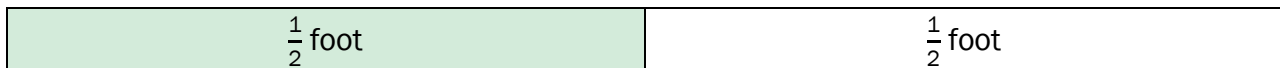
$\frac{1}{2}$ foot	$\frac{1}{2}$ foot

5 ribbons that are $\frac{1}{2}$ - foot long total $2\frac{1}{2}$ feet of ribbon.

$\frac{1}{2}$ foot	$\frac{1}{2}$ foot
$\frac{1}{2}$ foot	$\frac{1}{2}$ foot
$\frac{1}{2}$ foot	$\frac{1}{2}$ foot
$\frac{1}{2}$ foot	$\frac{1}{2}$ foot
$\frac{1}{2}$ foot	$\frac{1}{2}$ foot

5 times $\frac{1}{2}$ - foot = $2\frac{1}{2}$ feet. The amount of each color of ribbon needed for a boy's garter mum is $2\frac{1}{2}$ feet.

Mrs. Hamilton will make 8 girl mums and 6 boy mums. Multiply the amount of ribbon needed times the number of mums she will make.

8 girls' mums times $37\frac{1}{2}$ feet of ribbon per color: $8 \times 37\frac{1}{2} = \frac{8}{1} \times \frac{75}{2} = \frac{600}{2} = 300$ feet per color

Mrs. Hamilton will need 300 feet of each color of ribbon to make the mums for the girls.

6 boys' mums times $2\frac{1}{2}$ feet of ribbon per color: $6 \times 2\frac{1}{2} = 15$ feet per color

Mrs. Hamilton will need 15 feet of each color of ribbon to make the mums for the boys.

Since the ribbons for the girls' and boys' mums are the same, Mrs. Hamilton will need 300 + 15 or 315 feet of each color ribbon. The ribbon comes in rolls $7\frac{1}{3}$ yards long. Because the ribbon lengths

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are in different units of measure from what will be used to make the mums, convert the amount of ribbon on the roll from $7\frac{1}{3}$ yards to feet by multiplying the number of yards on the roll times 3 feet per yard.

$$7\frac{1}{3} \text{ yards per roll} \times 3 \text{ feet per yard} = \frac{22}{3} \times \frac{3}{1} = 22 \text{ feet per roll}$$

Each roll contains 22 feet of ribbon. 315 feet are needed. Divide to find the number of rolls of each color ribbon.

$$315 \text{ feet} \div 22 \text{ feet per roll} = 14\frac{7}{22} \text{ rolls}$$

Mrs. Hamilton needs at least 15 rolls of each color ribbon to have enough ribbon to make the mums she sells.

Look For…

- a solution strategy to determine the total amount of ribbon needed for each mum
- correct computations of the amounts of ribbon
- a solution strategy to determine the number of rolls of ribbon needed per color
- proficiency with forms of rational numbers and operations with rational numbers
- student justification of choices of solution strategy

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🔵 Differentiation: Simplified Task

Mrs. Hamilton is selling mums for the homecoming football game to make some extra money. She makes mums for both girls and boys. The girls' mums include 20 ribbon streamers, with 10 each of 2 colors. The girls' mum ribbon streamers are each $3\frac{3}{4}$ - feet long. The boys' garter mums include 10 ribbon streamers that are each $\frac{1}{2}$ - foot in length. If Mrs. Hamilton sells 8 girls' mums and 6 boys' garter mums, at a minimum, how many whole feet of ribbon will she need? Justify your reasoning.

Answer: 630 feet

🟦 Differentiation: Enriching Task

Mrs. Hamilton is selling mums for the homecoming football game to make some extra money. She makes mums for both girls and boys. The girls' mums include 20 ribbon streamers, with 10 each of 2 colors. The girls' mum ribbon streamers are each $3\frac{3}{4}$ - feet long. The boys' garter mums include 10 ribbon streamers that are each 6 inches in length, and each garter mum has 5 each of 2 colors. The rolls of ribbon Mrs. Hamilton buys contain a total of $7\frac{1}{3}$ yards of ribbon. If Mrs. Hamilton sells 8 girls' mums and 6 boys' garter mums, at a minimum, how many rolls of each color will she need?

Mrs. Hamilton pays $7.99 plus 8.25% tax per roll of ribbon plus another $216 in other supplies. She sells the girls' homecoming mums for $96 each and the boys' garter mums for $45 each. How much money will Mrs. Hamilton earn on her mum sales this season? Justify your reasoning.

Answer: She needs at least 15 rolls of each color. She will potentially earn $562.52 on the mum sales after her costs.

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Scaffolded Task with Answers

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1. How many ribbon streamers of each color will Mrs. Hamilton use to make one girl mum? How long is each ribbon streamer in feet?

    10 per color; each is $3\frac{3}{4}$ feet long

2. How many total feet of each color ribbon will Mrs. Hamilton need to make 1 girl mum?

    $3\frac{3}{4}$ feet × 10 = $37\frac{1}{2}$ feet of each color

3. How many total feet of each color ribbon will Mrs. Hamilton need to make 8 girl mums?

    $37\frac{1}{2}$ feet × 8 = 300 feet per color

4. How many ribbon streamers of each color will Mrs. Hamilton need to make 1 boy garter mum? How long is each ribbon streamer in feet?

    5 per color; each is $\frac{1}{2}$ foot

5. How many total feet of each color ribbon will Mrs. Hamilton need to make 6 boys' garter mums?

    $\frac{1}{2}$ foot × 5 = $2\frac{1}{2}$ feet × 6 = 15 feet per color

6. Each roll of ribbon has how many feet of ribbon?

    22 feet

7. How much total ribbon does Mrs. Hamilton need in each of the two colors?
    315 feet per color

8. At a minimum, how many rolls of each color will Mrs. Hamilton need if she sells 8 girls' mums and 6 boys' mums?

    At least 15 rolls per color

Name _____ Date _____

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Procedural	0	1	2
Conceptual	0	1	2
Communication	0	1	2

Total points:_____

Name _____ Date _____

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Procedural	0	1	2
Conceptual	0	1	2
Communication	0	1	2

Total points:_____

Performance Task: 6.3E
Rational Numbers: Homecoming Mums

Mrs. Hamilton is selling mums for the homecoming football game to make some extra money. She makes mums for both girls and boys. The girls' mums include 20 ribbon streamers, with 10 each of 2 colors. The girls' mum ribbon streamers are each $3\frac{3}{4}$ - feet long. The boys' garter mums include 10 ribbon streamers that are each 6 inches in length, and each garter mum has 5 each of 2 colors. The rolls of ribbon Mrs. Hamilton buys contain a total of $7\frac{1}{3}$ yards of ribbon. If Mrs. Hamilton sells 8 girls' mums and 6 boys' garter mums, at a minimum, how many rolls of each color will she need?

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Justify your reasoning.

Procedural	0	1	2
Conceptual	0	1	2
Communication	0	1	2

Total points:_____

Performance Task: 6.3E
Rational Numbers: Homecoming Mums

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1. How many ribbon streamers of each color will Mrs. Hamilton use to make one girl mum? How long is each ribbon streamer in feet?

2. How many total feet of each color ribbon will Mrs. Hamilton need to make 1 girl mum?

3. How many total feet of each color ribbon will Mrs. Hamilton need to make 8 girl mums?

4. How many ribbon streamers of each color ribbon will Mrs. Hamilton need to make 1 boy garter mum? How long is each ribbon streamer in feet?

5. How many total feet of each color ribbon will Mrs. Hamilton need to make 6 boys' garter mums?

6. Each roll of ribbon has how many feet of ribbon?

7. How much total ribbon does Mrs. Hamilton need in each of the two colors?

8. At a minimum, how many rolls of each color will Mrs. Hamilton need if she sells 8 girls' mums and 6 boys' mums?