Module 5 - Lesson 12:

Multiply mixed numbers.

CCSS Standard – 5.NF.B.4 / 5.NF.B.4.b

FLUENCY (10-min)

Whiteboard Exchange: Round Decimals

Round 0.738 to the nearest tenth. $0.738 \approx$ _____

Round 0.738 to the nearest hundredth. $0.738 \approx$ _____

Round 8.056 to the nearest tenth. $8.056 \approx$ _____

Round 8.056 to the nearest hundredth. $8.056 \approx$ _____

FLUENCY (10-min) **Whiteboard Exchange: Round Decimals**

Round 31.572 to the nearest tenth. $31.572 \approx$ _____

Round 31.572 to the nearest hundredth. $31.572 \approx$ _____

Round 80.504 to the nearest tenth. $80.504 \approx$ _____

Round 80.504 to the nearest hundredth. $80.504 \approx$ _____

FLUENCY (10-min) **Whiteboard Exchange: Add or Subtract Decimals**

Write and complete the equation. Show YOUR method.

$0.54 + 0.39 =$ _____

$3.6 + 8.82 =$ _____

$$\begin{array}{r} {\scriptstyle 1} \\ 0.54 \\ +\ 0.39 \\ \hline 0.93 \end{array}$$

FLUENCY (10-min) **Whiteboard Exchange: Add or Subtract Decimals**

Write and complete the equation. Show YOUR method.

$0.8 - 0.26 =$ _____

$5 - 1.47 =$ _____

$$\begin{array}{r} {\scriptstyle 7\,10} \\ 0.\not{8}\not{0} \\ -\ 0.26 \\ \hline 0.54 \end{array}$$

$$\begin{array}{r} {\scriptstyle 9\,10} \\ 4\not{5}.\not{0}\not{0} \\ -\ 1.47 \\ \hline 3.53 \end{array}$$

FLUENCY (10-min) **Whiteboard Exchange: Add or Subtract Decimals**

Write and complete the equation. Show YOUR method.

$9.04 - 3.86 =$ _____

$$\begin{array}{r} {\scriptstyle 8\ \ 9\ 14} \\ 9.\not{0}\not{4} \\ -\ 3.86 \\ \hline 5.18 \end{array}$$

LAUNCH (5-min) **Relate the break apart and distribute strategy and the area model.**

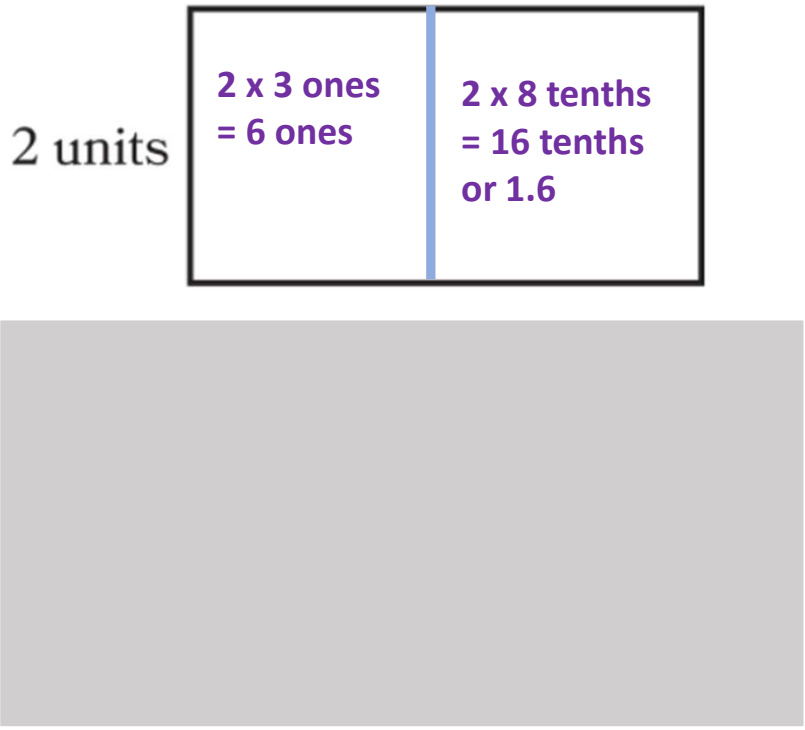
We know that we can find the AREA of rectangles with fraction side lengths by multiplying the side lengths. (A = L x W)

How can we find the AREA of this rectangle?

$$\begin{array}{r} {\scriptstyle 1} \\ 3.8 \\ \times \quad 2 \\ \hline 7.6 \end{array}$$

This shows the **break apart and distribute method**.
Notice the partial products; 6 and 1.6

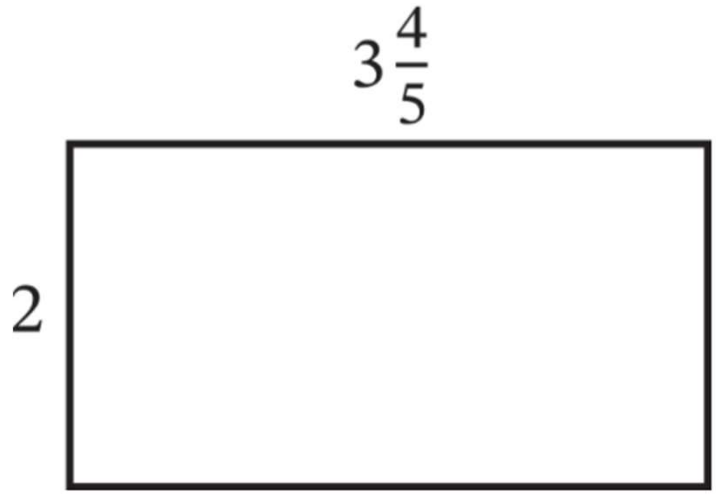
We might also use the **AREA MODEL** method:



LEARN (35-min) **Explore Area Models**

What multiplication expression does this area model represent?

TASK: With a partner, find the AREA of this rectangle using any method. Show your thinking.

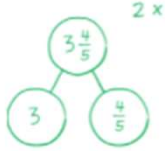


Did anyone use any of these methods?

Addition:

$$2 \times 3\frac{4}{5} = 3\frac{4}{5} + 3\frac{4}{5}$$
$$= 3 + 3 + \frac{4}{5} + \frac{4}{5}$$
$$= 6 + \frac{8}{5}$$
$$= 6 + 1\frac{3}{5}$$
$$= 7\frac{3}{5}$$

Number bond:



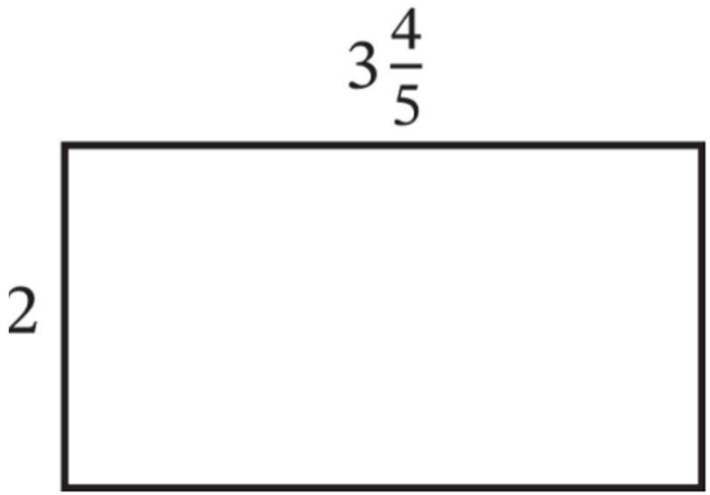
$$2 \times 3\tfrac{4}{5} = 2 \times \left(3 + \tfrac{4}{5}\right)$$
$$= (2 \times 3) + \left(2 \times \tfrac{4}{5}\right)$$
$$= 6 + \tfrac{8}{5}$$
$$= 6 + 1\tfrac{3}{5}$$
$$= 7\tfrac{3}{5}$$

Break apart and distribute:

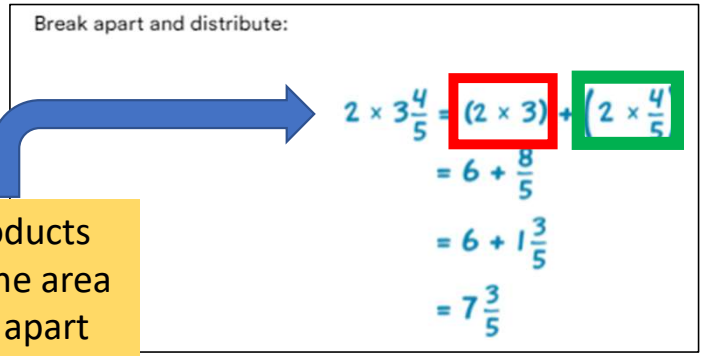
$$2 \times 3\frac{4}{5} = (2 \times 3) + \left(2 \times \frac{4}{5}\right)$$
$$= 6 + \frac{8}{5}$$
$$= 6 + 1\frac{3}{5}$$
$$= 7\frac{3}{5}$$

LEARN (35-min) **Explore Area Models**

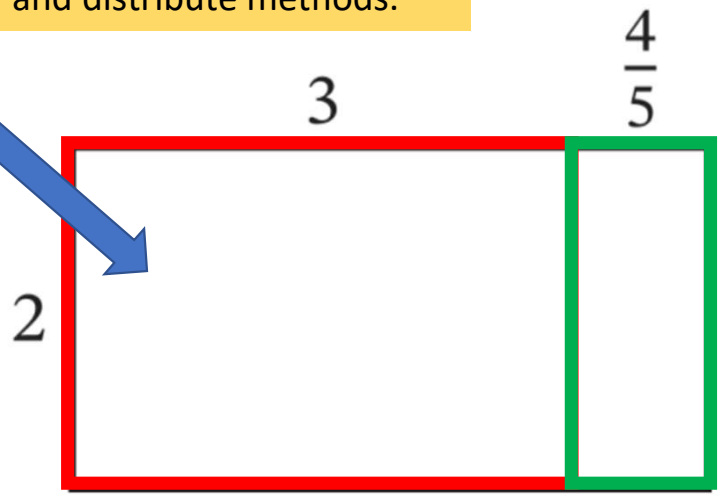
Another way is to use an area model.



- The length of the rectangle is the area model is decomposed into 2 parts.
- 2 is multiplied by the lengths of both rectangles to determine the area.
- The areas of the partial products are added to determine the total area.



Notice the partial products connection between the area model and the break apart and distribute methods.

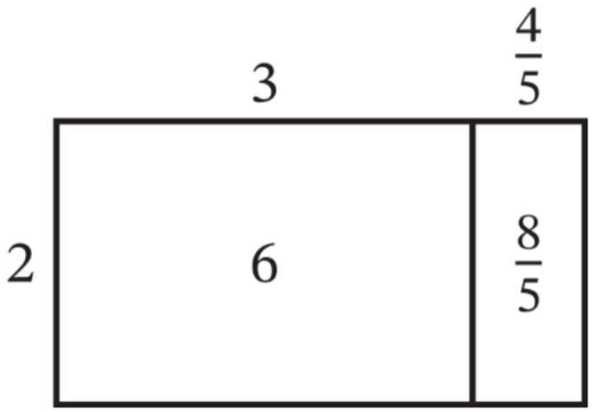


6 + 1 3/5

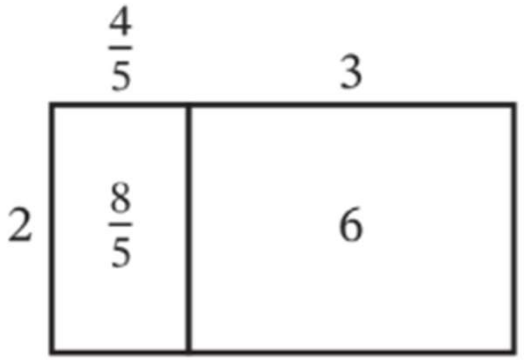
7 3/5

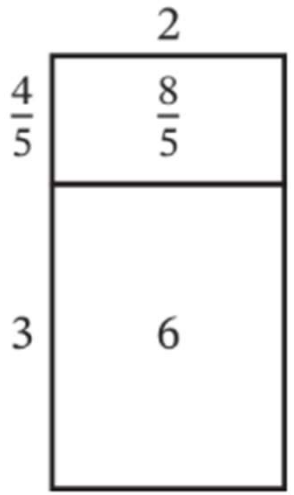
LEARN (35-min) **Explore Area Models**

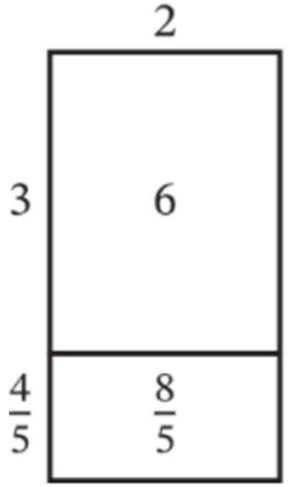
$2 \times 3\ ^{4/5} = 7\ ^{3/5}$



Can any of these other area models be used to represent $2 \times 3\ ^{4/5}$?







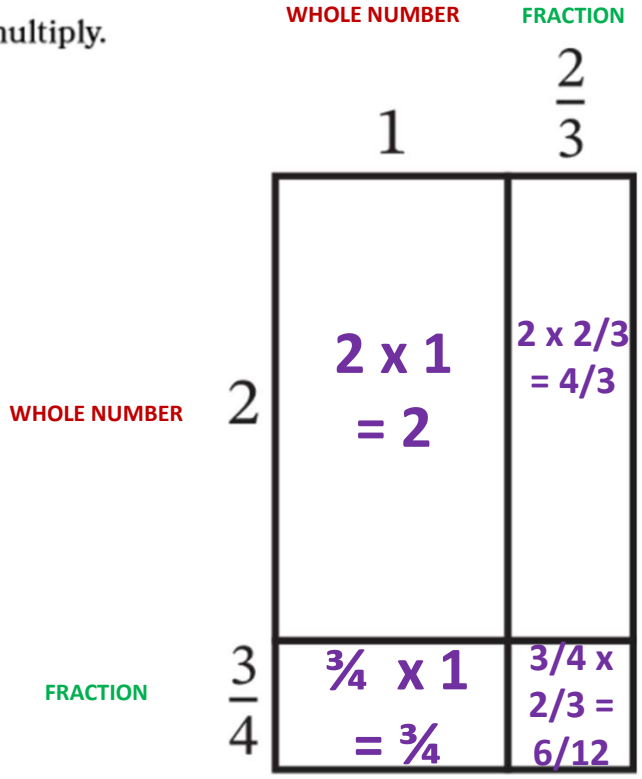
- YES! Each area model show $2 \times 3\ ^{4/5}$.

LEARN (35-min) **Explore Area Models**

LEARN book page 95.

1. Use an area model to multiply.

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



2 + 4/3 + 3/4 + 6/12

Are the denominators the same?

2 + 16/12 + 9/12 + 6/12

2 + 31/12

2 + 2 7/12

4 7/12

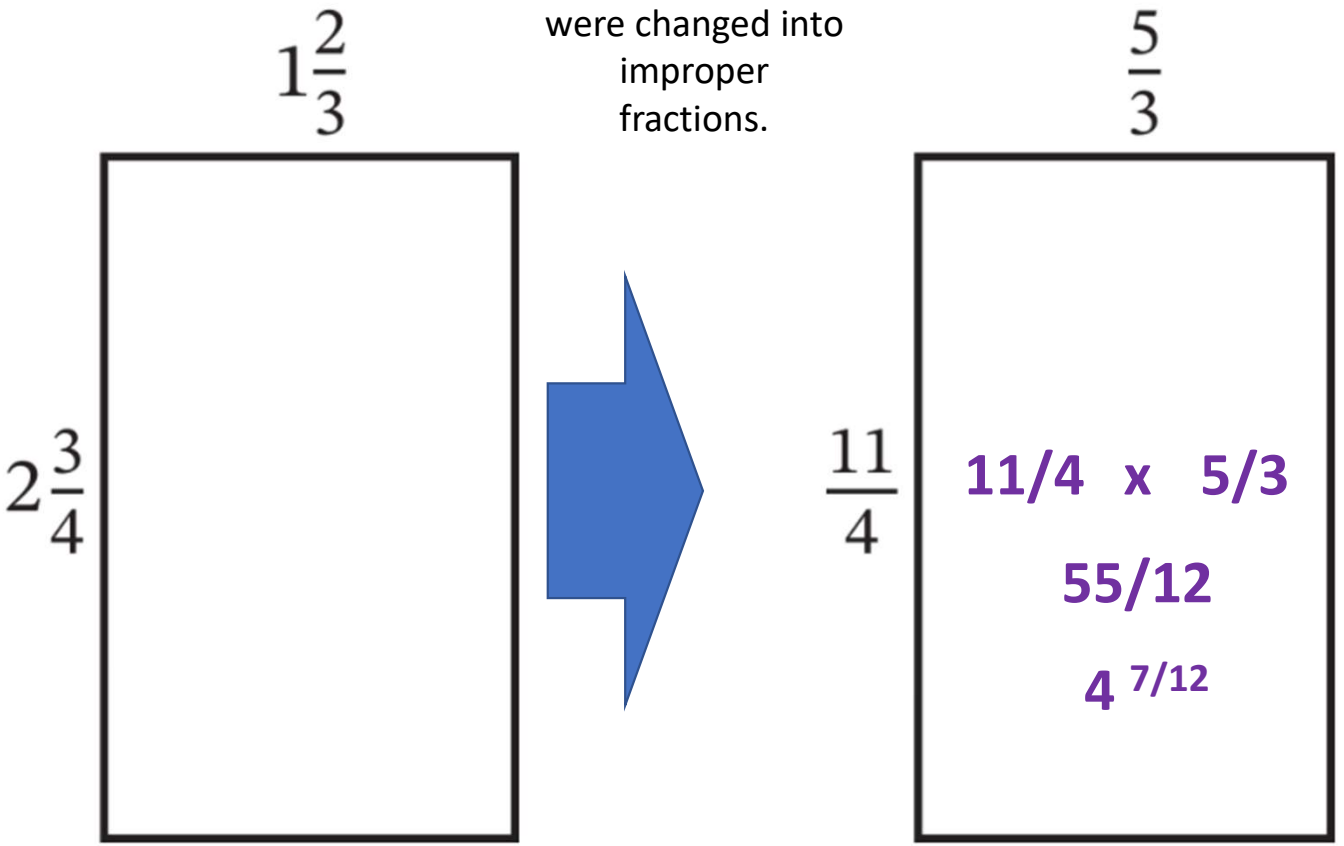
LEARN (35-min) **Explore Area Models**

What are some advantages of multiplying mixed numbers by writing them as improper fractions greater than 1?

You don't need to use the break apart and distribute method!!!

You only need to find the product of one multiplication expression.

Notice how the mixed numbers were changed into improper fractions.



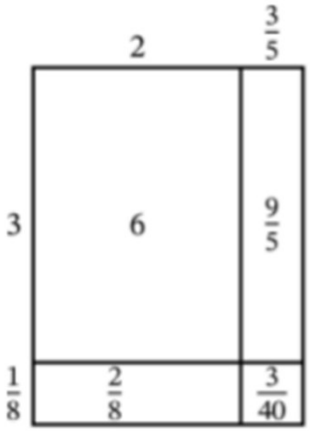
LEARN (35-min) Explore Area Models

LEARN book page 95.

2. Use two different methods to evaluate $2\frac{3}{5} \times 3\frac{1}{8}$.

Sometimes, writing mixed numbers as fractions greater than 1 and multiplying those fractions is more efficient than using an area model, and sometimes it is not. In this problem, why might writing numbers as fractions greater than 1 and multiplying the fractions be less effective than using an area model or the break apart and distribute method?

AREA MODEL with BREAK PART AND DISTRIBUTE METHOD



$$2\tfrac{3}{5} \times 3\tfrac{1}{8} = \left(2 + \tfrac{3}{5}\right) \times \left(3 + \tfrac{1}{8}\right)$$
$$= (2 \times 3) + \left(\tfrac{3}{5} \times 3\right) + \left(2 \times \tfrac{1}{8}\right) + \left(\tfrac{3}{5} \times \tfrac{1}{8}\right)$$
$$= 6 + \tfrac{9}{5} + \tfrac{2}{8} + \tfrac{3}{40}$$
$$= 6 + \tfrac{72}{40} + \tfrac{10}{40} + \tfrac{3}{40}$$
$$= 6 + \tfrac{85}{40}$$
$$= 6 + 2\tfrac{5}{40}$$
$$= 8\tfrac{5}{40}$$

TURN MIXED NUMBERS INTO IMPROPER FRACTIONS

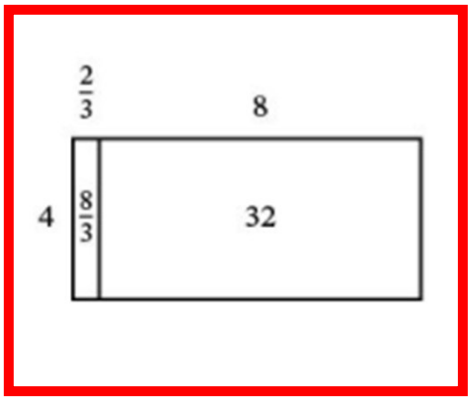
$$2\tfrac{3}{5} + 3\tfrac{1}{8} = \tfrac{13}{5} \times \tfrac{25}{8}$$
$$= \tfrac{325}{40}$$
$$= 8\tfrac{5}{40}$$

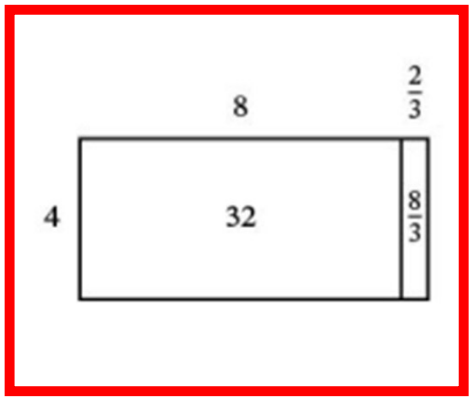
LEARN (35-min)

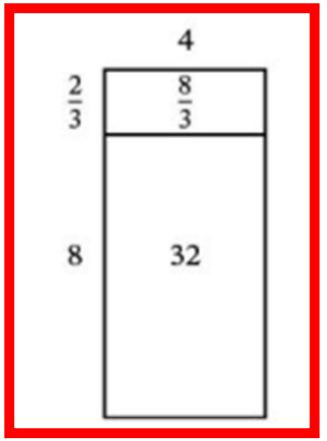
Problem Set

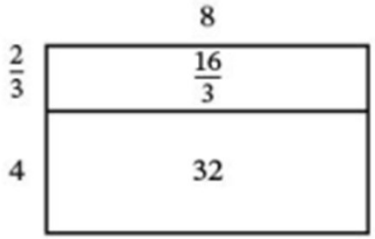
LEARN book page 97.

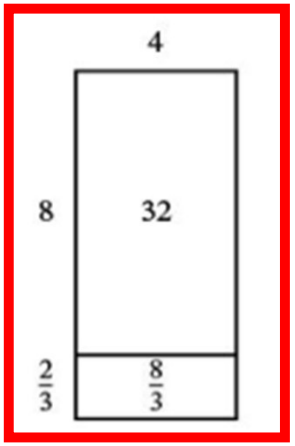
1. Circle the area models that can be used to find $4 \times 8\frac{2}{3}$.

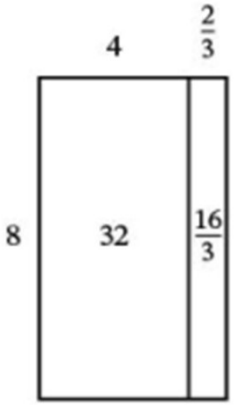












LAND (10-min) **Exit Ticket**

Name _____ Date _____

12

Draw an area model to find $2\frac{3}{5} \times 3\frac{1}{2}$.

Exit Ticket – PAGE 101

Small Group Time:
Problem Set Pages 98 - 100

Homework:
Page 77 APPLY BOOK