Module 5 - Lesson 13:

Solve mathematical problems involving areas of composite figures with mixed-number side lengths.

CCSS Standard – 5.NF.B.4.b

FLUENCY (10-min)

Sprint: Round to the Nearest Tenth

SPRINT: Students round a number to the nearest tenth to build fluency with rounding decimal numbers. (PAGE 103)

Round to the nearest tenth.

1.	$0.38 \approx$ ______	**0.4**
2.	$6.217 \approx$ ______	**6.2**

I don't expect you to finish. Do as many problems as you can. Go for YOUR personal best.
Take your mark. Get set. Think!

FLUENCY (10-min)

Sprint: Round to the Nearest Tenth

Sprint A – Page 104

Sprint A

STOP!!

Underline the last problem that you did.

I am going to read the answers. If you got it right, call out "Yes!" If you made a mistake, circle the answer.

Count the number you got **correct** and write the number at the top of the page.

THIS WILL BE YOUR PERSONAL GOAL FOR SPRINT B

A

Number Correct: ______

Round to the nearest tenth.

1.	0.29 ≈ ______	0.3	23.	1.381 ≈ ______	1.4
2.	0.49 ≈ ______	0.5	24.	41.318 ≈ ______	41.3
3.	0.31 ≈ ______	0.3	25.	3.709 ≈ ______	3.7
4.	0.61 ≈ ______	0.6	26.	53.790 ≈ ______	53.8
5.	0.54 ≈ ______	0.5	27.	7.048 ≈ ______	7.0
6.	0.548 ≈ ______	0.5	28.	67.408 ≈ ______	67.4
7.	0.762 ≈ ______	0.8	29.	9.007 ≈ ______	9.0
8.	0.862 ≈ ______	0.9	30.	79.070 ≈ ______	79.1
9.	0.357 ≈ ______	0.4	31.	5.505 ≈ ______	5.5
10.	0.557 ≈ ______	0.6	32.	50.055 ≈ ______	50.1
11.	0.957 ≈ ______	1.0	33.	60.016 ≈ ______	60.0
12.	1.42 ≈ ______	1.4	34.	0.27 ≈ ______	0.3
13.	1.44 ≈ ______	1.4	35.	0.72 ≈ ______	0.7
14.	2.68 ≈ ______	2.7	36.	70.552 ≈ ______	70.6
15.	2.66 ≈ ______	2.7	37.	170.525 ≈ ______	170.5
16.	6.16 ≈ ______	6.2	38.	80.988 ≈ ______	81.0
17.	6.162 ≈ ______	6.2	39.	280.998 ≈ ______	281.0
18.	3.728 ≈ ______	3.7	40.	95.947 ≈ ______	95.9
19.	3.745 ≈ ______	3.7	41.	395.974 ≈ ______	396.0
20.	4.936 ≈ ______	4.9	42.	449.950 ≈ ______	450.0
21.	4.991 ≈ ______	5.0	43.	599.905 ≈ ______	599.9
22.	4.955 ≈ ______	5.0	44.	999.959 ≈ ______	1,000.0

FLUENCY (10-min)

Sprint A – Page 106

Take your mark. Get set. Improve!

Sprint B

STOP!!

Underline the last problem that you did.

I am going to read the answers. If you got it right, call out "Yes!" If you made a mistake, circle the answer.

Count the number you got **correct** and write the number at the top of the page.

Determine your improved score!

B

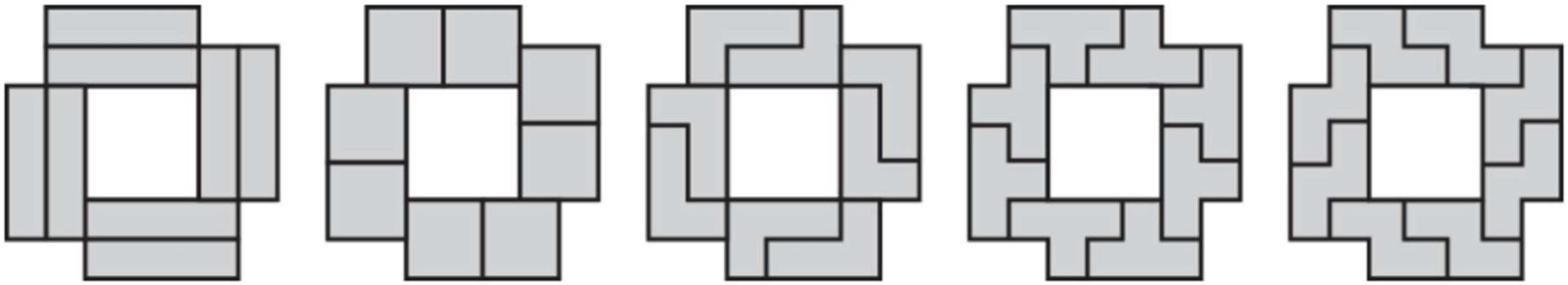
Number Correct: ______

Improvement: ______

Round to the nearest tenth.

1.	0.19 ≈ ______	0.2	23.	1.281 ≈ ______	1.3
2.	0.39 ≈ ______	0.4	24.	31.218 ≈ ______	31.2
3.	0.21 ≈ ______	0.2	25.	2.709 ≈ ______	2.7
4.	0.51 ≈ ______	0.5	26.	42.790 ≈ ______	42.8
5.	0.44 ≈ ______	0.4	27.	6.048 ≈ ______	6.0
6.	0.448 ≈ ______	0.4	28.	56.408 ≈ ______	56.4
7.	0.662 ≈ ______	0.7	29.	8.007 ≈ ______	8.0
8.	0.762 ≈ ______	0.8	30.	68.070 ≈ ______	68.1
9.	0.257 ≈ ______	0.3	31.	4.505 ≈ ______	4.5
10.	0.457 ≈ ______	0.5	32.	40.055 ≈ ______	40.1
11.	0.957 ≈ ______	1.0	33.	50.016 ≈ ______	50.0
12.	1.32 ≈ ______	1.3	34.	0.17 ≈ ______	0.2
13.	1.34 ≈ ______	1.3	35.	0.71 ≈ ______	0.7
14.	2.58 ≈ ______	2.6	36.	60.552 ≈ ______	60.6
15.	2.56 ≈ ______	2.6	37.	160.525 ≈ ______	160.5
16.	5.16 ≈ ______	5.2	38.	70.988 ≈ ______	71.0
17.	5.162 ≈ ______	5.2	39.	270.998 ≈ ______	271.0
18.	2.728 ≈ ______	2.7	40.	95.947 ≈ ______	95.9
19.	2.745 ≈ ______	2.7	41.	295.974 ≈ ______	296.0
20.	3.936 ≈ ______	3.9	42.	349.950 ≈ ______	350.0
21.	3.991 ≈ ______	4.0	43.	499.905 ≈ ______	499.9
22.	3.955 ≈ ______	4.0	44.	999.959 ≈ ______	1,000.0

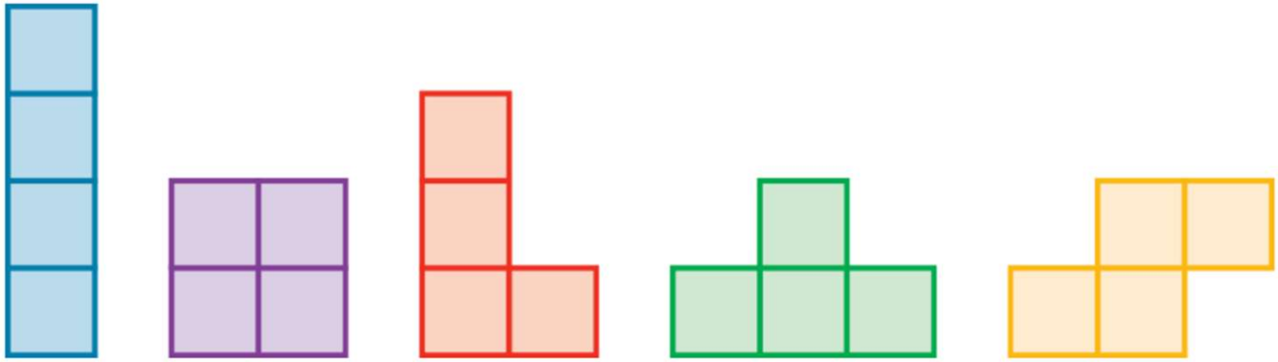
LAUNCH (5-min) **Compare composite figures.**



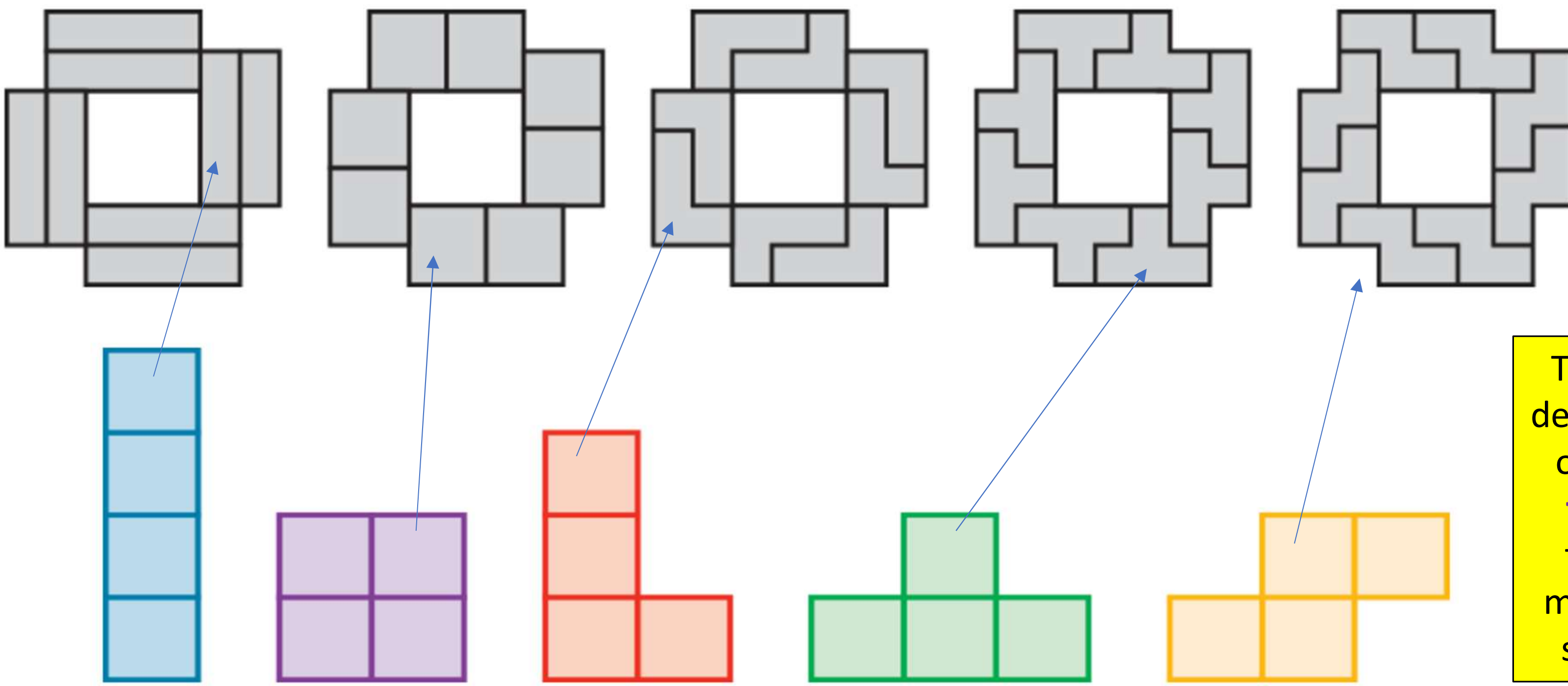
THINK-PAIR-SHARE: What do you notice and wonder about the figures above?

- *The figures have the same shape.*
- *Each figure has a whole in the middle.*
- *The figures are divided into different shapes, but they are the same within each figure.*
- *I wonder if the area is the same for each figure.*

Each of these shaded figures is made from copies of a shape called a tetromino. A tetromino is a geometric figure composed of four squares.



LAUNCH (5-min) **Compare composite figures.**



Today, we will determine areas of **composite figures** with fraction and mixed-number side lengths.

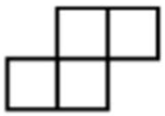
These are the five types of tetrominoes. Each tetromino is a **composite figure** because it is composed, or made, from other shapes. These tetrominoes are composed of squares.

How are the tetrominoes similar? Different?

LEARN (35-min) **Area of a Tetromino**

LEARN book page 107.

1. Each square in the tetromino shown has a side length of $1\frac{1}{2}$ inches. What is the area of the tetromino?



To determine the area of each square, you need to multiply 1 ½ by 1 ½. What method can you use to multiply mixed numbers?

$$1\tfrac{1}{2} \times 1\tfrac{1}{2}$$

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

$$\frac{9}{4} = 2\tfrac{1}{4}$$ the area of **ONE** square

$$2\tfrac{1}{4} \times 4$$

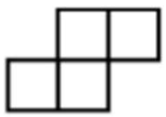
$$\frac{9}{4} \times 4 = \frac{36}{4} = \mathbf{9}$$ square inches

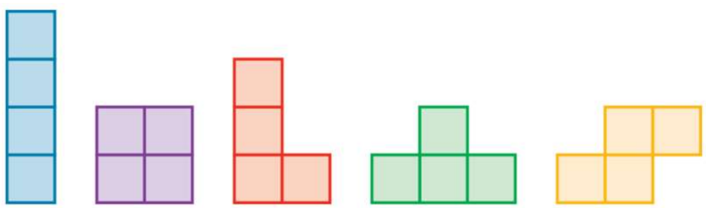
The area of the **entire tetromino** is 9 square inches.

LEARN **(35-min)** **Area of a Tetromino**

LEARN book page 107.

1. Each square in the tetromino shown has a side length of $1\frac{1}{2}$ inches. What is the area of the tetromino?





We just determined that the area of this tetromino with side lengths of 1 ½ inches, has a total area of 9 square inches.

These tetrominoes are all composed of squares that are the same size. If the area of one tetromino is 9 square inches, the area of each tetromino is also 9 square inches.

If we start building composite figures with these tetrominos, the total area would be a MULTIPLE OF 9.

The total AREA of this composite figure would be 9 x 4 = **36 square inches**.

LEARN (35-min) **Composite Figures Made of Tetrominos**

LEARN book page 108.

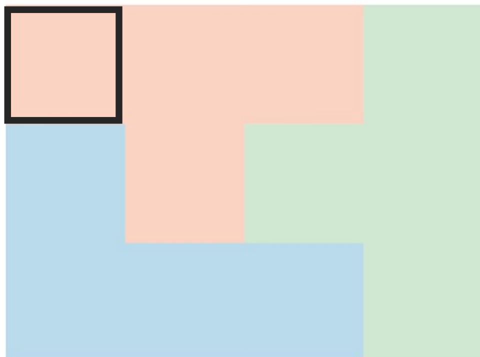
2. The rectangle shown is composed of 3 tetrominoes. Each tetromino is composed of squares with side lengths of $2\frac{1}{4}$ centimeters. What is the area of the rectangle?

This composite figures is made of squares that have different side lengths from the previous problem.

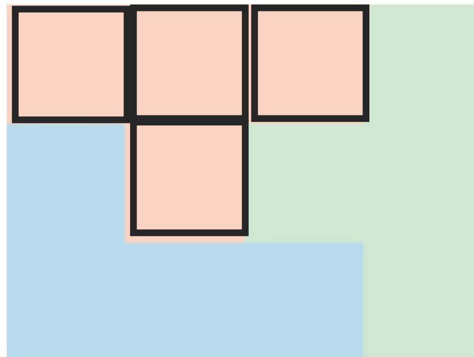
<u>We have several options to solve for the total area</u>:

1. Find the area of 1 square and multiply by the total number of squares in the rectangle.
2. Find the area of 1 square and multiply it by 4 to find the area of one tetromino and then multiply by 3.
3. Determine the length and width of the rectangle and multiply L X W to find AREA.

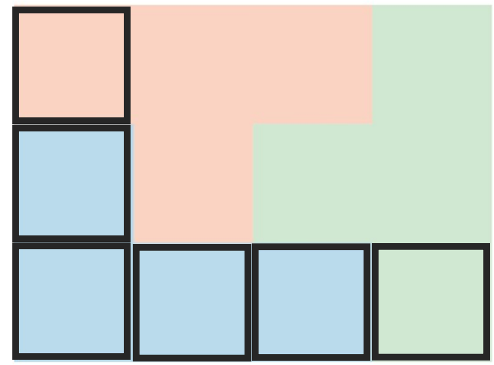
LEARN (35-min) **Composite Figures Made of Tetrominos**



2 ¼ x 2 ¼
9/4 x 9/4 = 81/16
81/16 x 12
12 total squares
972/16
60 ¾ sq. cm



2 ¼ x 2 ¼
9/4 x 9/4 = 81/16
81/16 x 4
324/16
20 ¼
area of one tetromino
20 ¼ x 3
(20 x 3) + (¼ x 3)
60 ¾ sq. cm.



Width:	Length:
2 ¼ x 3	2 ¼ x 4
(2 x 3) + (1/4 x 3)	**(2 x 4) + (1/4 x 4)**
6 ¾	**8 + 1**
	9

Area: L x W
6 ¾ x 9
(6 x 9) + (3/4 x 9)
60 ¾ sq. cm.

LEARN **(35-min)**

Composite Figures Made of Tetrominos

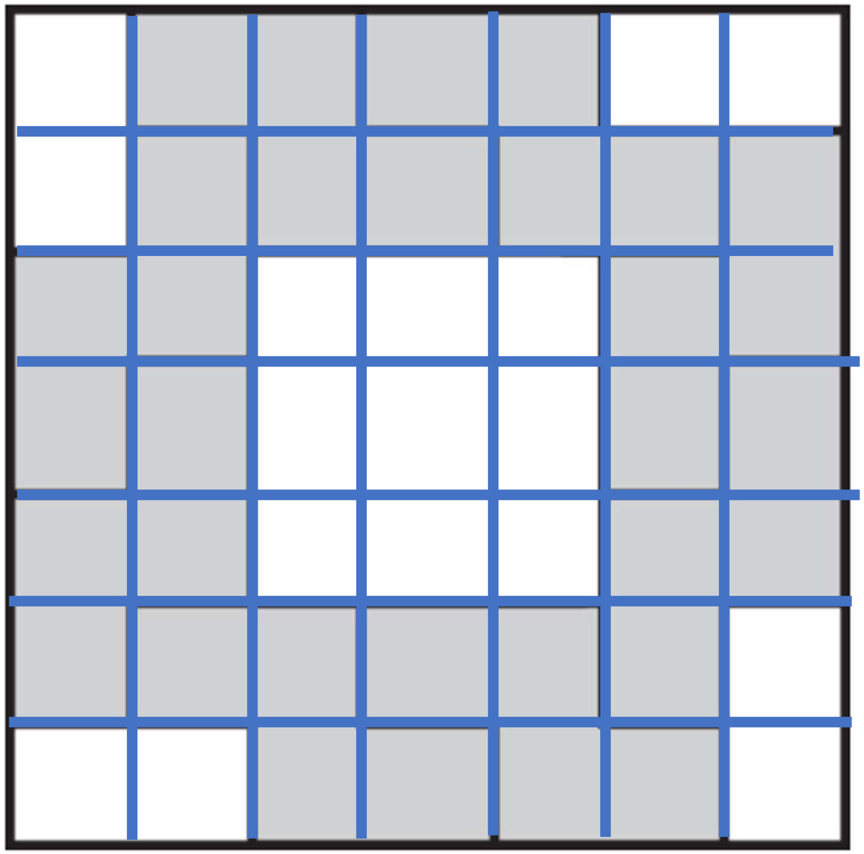
This is a large square with a shaded region and some unshaded regions. The region of the square that is shaded is composed of tetrominoes.

TURN & TALK: What methods can we use to determine the total area of the SHADED region inside the large square? And the total area of the UNSHADED regions inside the large square?

Some guiding questions to consider:

- *How many small squares make up a tetromino?*
- *How can you determine the area of each tetromino?*
- *If you know the area of one tetromino, how do you determine the area of the shaded region?*
- *What do you need to know to determine the area of the unshaded square in the middle of the larger square?*
- *What methods can you use to determine the total area of the unshaded regions inside the larger square?*

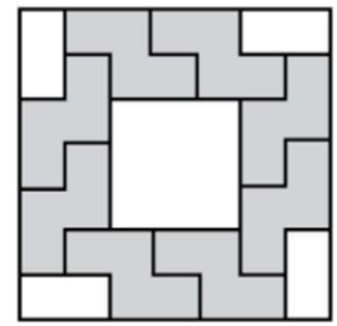
Did you consider drawing in the lines to show all squares? Does it help in any way?



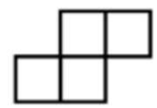
LEARN (35-min) **Composite Figures Made of Tetrominos**

LEARN book page 109.

3. Use the large square shown to complete parts (a)–(d).



a. Every tetromino in the shaded region has the following shape. Each small square in the tetromino has a side length of $1\frac{1}{2}$ inches. The area of this tetromino was determined in problem 1. What is the area of this tetromino?



b. What is the total area of the shaded region inside the large square?

1 ½ x 1 ½

3/2 x 3/2

9/4 = 2 ¼ **area of one square**

2 ¼ x 4

(2 x 4) + (1/4 x 4)

8 + 1 = 9 **area of one tetromino**

SHADED AREA:

9 sq. inches x 8 tetrominoes = 72 sq. in

LEARN **(35-min)**

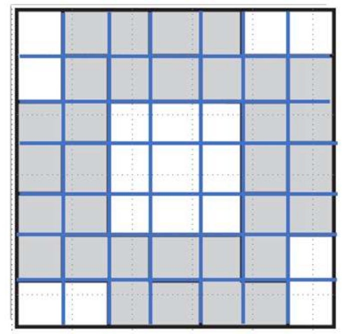
Composite Figures Made of Tetrominos

LEARN book page 109.

It may be easier to use the area of the squares to figure out these questions. We already know that ONE square has the area of 2 ¼ square inches.

c. What is the area of the unshaded square in the middle of the large square?

d. What is the total area of the unshaded regions inside the large square?



UNSHADED MIDDLE SQUARES:
2 ¼ x 9
(2 x 9) + (1/4 x 9)
18 + 9/4
18 + 2 ¼
20 ¼ square inches

UNSHADED SQUARES INSIDE:
2 ¼ x 8
(2 x 8) + (1/4 x 8)
16 + 8/4
16 + 2
18 square inches

TOTAL UNSHADED (MIDDLE SQUARES & CORNERS):
20 ¼ + 18
38 ¼ square inches

LEARN (35-min)

Compare Methods

Notice & Wonder

Lacy and Toby used different methods to determine the area of the unshaded regions of the figure. What do you notice about this work?

Organize

What steps did Lacy and Toby take?

Reveal

Let's focus on adding or subtracting to determine the area of the unshaded regions. Where do you see adding or subtracting in the two methods?

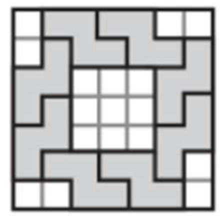
Distill

How do Lucy's work and Toby's work help us see choices we have in how we find the area of part of a figure?

Know

How does making a plan help when you need to determine the area of a composite figure?

Lacy's Way

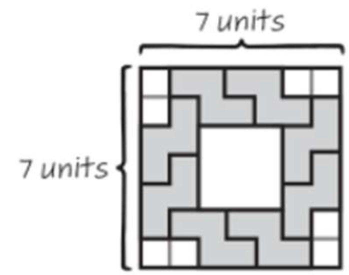


$9 + 8 = 17$ unshaded squares

$$17 \times 2\frac{1}{4} = 17 \times \left(2 + \frac{1}{4}\right)$$
$$= 17 \times 2 + 17 \times \frac{1}{4}$$
$$= 34 + \frac{17}{4}$$
$$= 34 + 4\frac{1}{4}$$
$$= 38\frac{1}{4}$$

The unshaded area is $38\frac{1}{4}$ square inches.

Toby's Way



$$7 \times 1\frac{1}{2} = 7 \times \left(1 + \frac{1}{2}\right)$$
$$= 7 + 3\frac{1}{2}$$
$$= 10\frac{1}{2}$$

$$10\frac{1}{2} \times 10\frac{1}{2} = \left(10 + \frac{1}{2}\right) \times \left(10 + \frac{1}{2}\right)$$
$$= 10 \times 10 + \frac{1}{2} \times 10 + 10 \times \frac{1}{2} + \frac{1}{2} \times \frac{1}{2}$$
$$= 100 + 5 + 5 + \frac{1}{4}$$

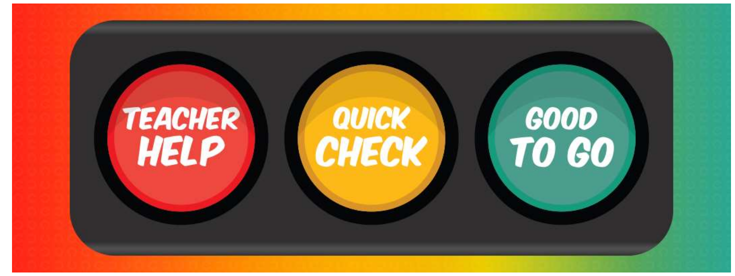
Total area of figure $\longrightarrow = 110\frac{1}{4}$

$$110\frac{1}{4} - 72 = 38\frac{1}{4}$$

The unshaded area is $38\frac{1}{4}$ square inches.

LAND (10-min)

Exit Ticket



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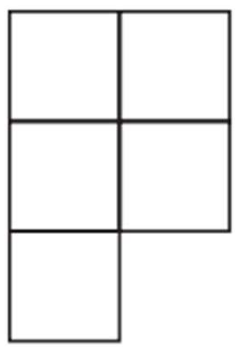
Name ______________________ Date __________

The figure shown is composed of 5 squares with side lengths of $2\frac{1}{2}$ inches. What is the area of the figure?



Exit Ticket – PAGE 113

Small Group Time:
Problem Set Pages 111 - 112

Homework:
Page 83 APPLY BOOK