

Square Number and Area Models

Name: _____

Key Terms:

- Rectangle** - Quadrilateral with four right angles. Parallel pairs do not have to be the same length.
- Square** - Quadrilateral with four right angles. All sides are the same length.
- Congruent** - Identical in the sense that one can be superimposed on the other.
- Area** - The amount of space a shape covers. Measured in square units such as cm^2 .

Part A: Making Rectangles

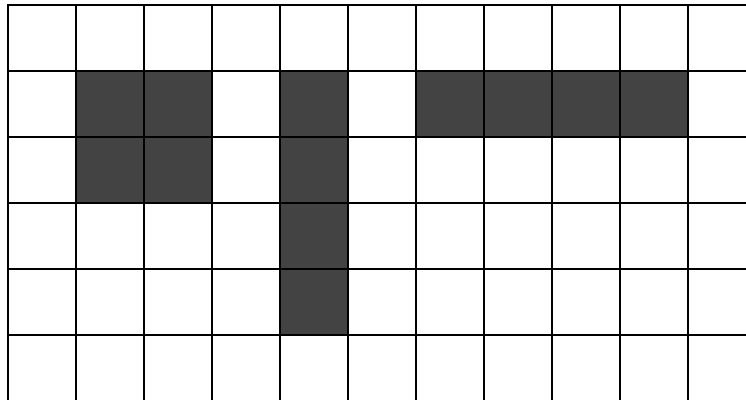
Using the square paper provided, shade in as many different rectangles as you can that have the following number of squares.

Example: 4 squares might look like this. Notice there are three different options, all with an area of 4 squares.

Option 1 - 2 tiles by 2 tiles.

Option 2 - 1 tile by 4 tiles.

Option 3 - 4 tiles by 1 tile.



- 5 squares
- 6 squares
- 9 squares
- 12 squares
- 16 squares
- 20 squares
- 24 squares

Follow Up Questions:

Were there any situations above where you were NOT able to create a rectangle out of the given number of tiles?

No. All situations represented at least one rectangle.

How do the length and width of each rectangle you created relate to its area?

Multiplying by length and width will give you the area.

How many of the above situations had a square as one of its solutions?

Two - 9 and 16.

What did you notice about the length and width of any examples that formed a square?

The length and width were the same.

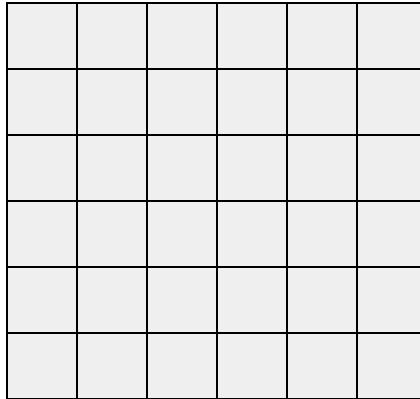
Challenge - Identify the total number of square tiles you would need to make a square with a length of 7.

$$7 \times 7 = 49$$

You would need 49 square tiles

Part B: Square Numbers

When a number is multiplied by itself, we say we are squaring the number. The reason we can say this is illustrated in your previous activity. When we multiply a number by itself, if we were to map it on a grid, we would be mapping out a square.



The square of 6 can be written as $6 \times 6 = 36$.

Sample Problems:

1. Find the area of the square that is 11 units long.
2. A square has an area of 100cm^2 . What is the length of one of its sides?
3. Billy is going to make a square pen for his pet goat. If he wants to enclose an area of 144m^2 how many meters of fencing will he need to buy?

Sample Problems: Answers

1. Find the area of the square that is 11 units long.

If the length of a square is 11 units long, we also know that it is 11 units wide. We know this because a square has sides that are ALL equal in length.

To calculate the area of a square we multiply the length by the width.

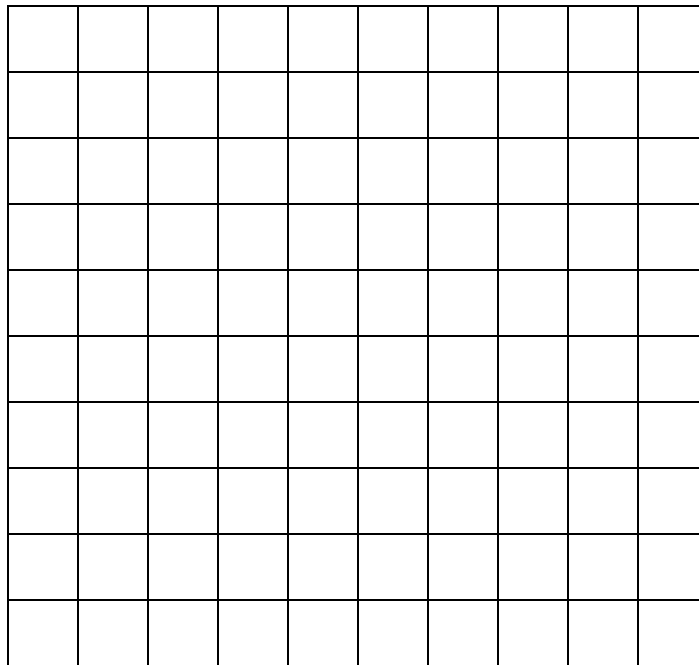
$$A = l \times w$$

$$A = 11 \text{ units} \times 11 \text{ units}$$

$$\mathbf{A = 121 \text{ square units}}$$

2. A square has an area of 100cm^2 . What is the length of one of its sides?

If the square has an area of 100cm^2 , we know that the length and width are equal.



The length of one side is 10m.

3. Billy is going to make a square pen for his pet goat. If he wants to enclose an area of 144m^2 how many meters of fencing will he need to buy?

Again, like the above example, you must figure out which number you can square to make 144m^2 . In this case, the number is 12m.

Enclosing an area means to go around the edge of it. This is called the perimeter. We calculate the perimeter by adding up the length of each side. In the case of a square where all sides are equal, we can simply multiply the length of one side by 4.

$$12\text{m} \times 4 = 48\text{m}.$$

Billy will need 48m of fencing.

Assignment:

1. Square the following numbers.

a. 9

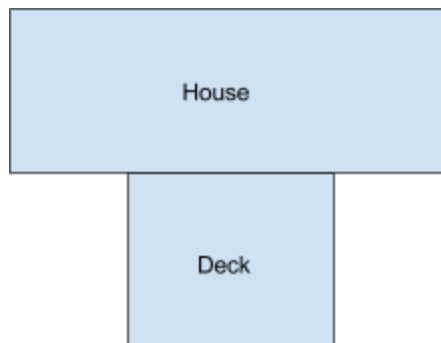
b. 6

c. 13

d. 20

2. If a rectangular room has an area of 20m^2 , what are the possible dimensions of the room?

3. Steven is building a new deck. To prevent anyone from falling off he will put a railing around three sides. The fourth side is protected from the house. If the area of his new deck is 625 square feet, what will the length of his railing be?



Assignment:

1. Square the following numbers.

b. 9

b. 6

c. 13

d. 20

$$9 \times 9 = 81$$

$$6 \times 6 = 36$$

$$13 \times 13 = 169$$

$$20 \times 20 = 400$$

2. If a rectangular room has an area of 20m^2 , what are the possible dimensions of the room?

$$1\text{m} \times 20\text{m}$$

$$2\text{m} \times 10\text{m}$$

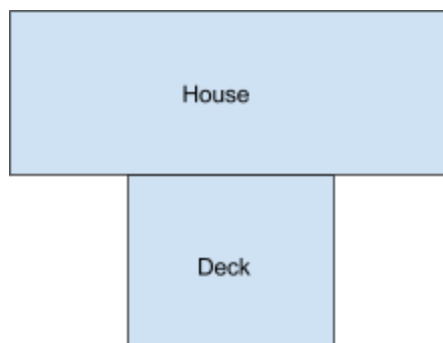
$$4\text{m} \times 5\text{m}$$

$$5\text{m} \times 4\text{m}$$

$$10\text{m} \times 2\text{m}$$

$$20\text{m} \times 1\text{m}$$

3. Steven is building a new deck. To prevent anyone from falling off he will put a railing around three sides. The fourth side is protected from the house. If the area of his new deck is 625 square feet, what will the length of his railing be?



Each side of the deck measures 25m. The railing covers three sides. $25\text{m} \times 3 = 75\text{m}$

