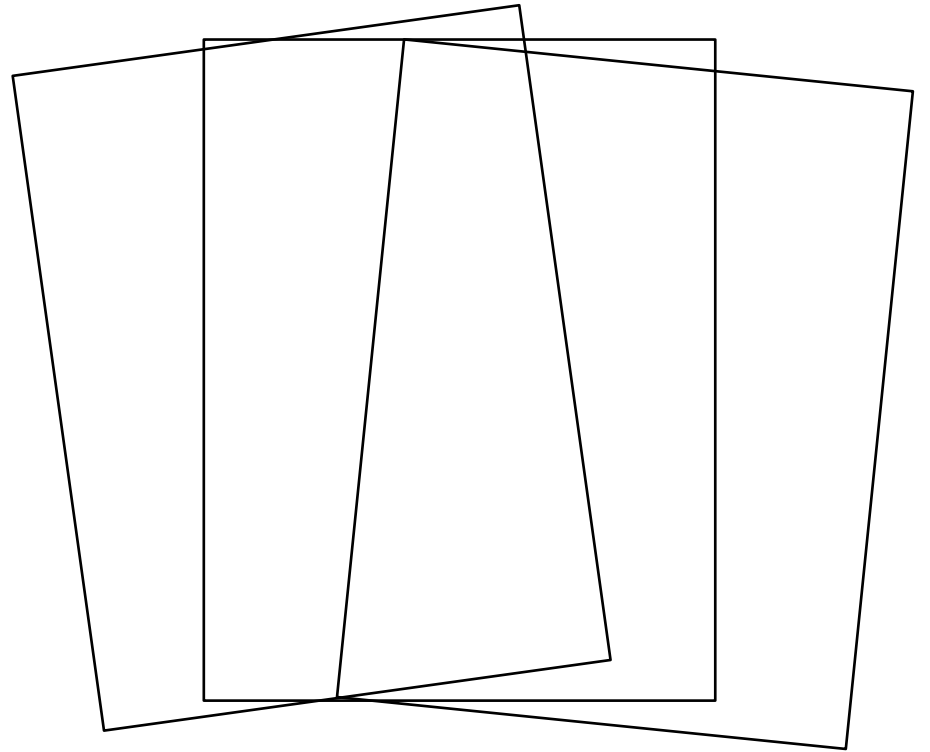
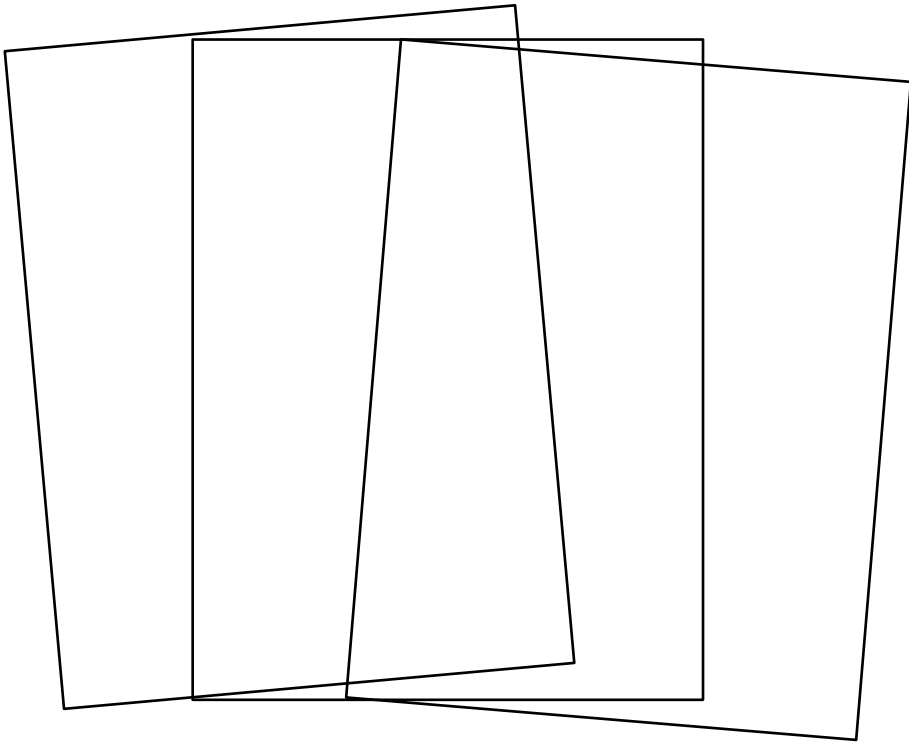


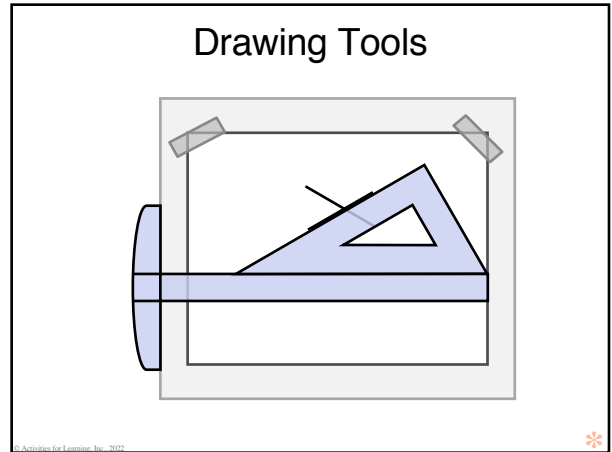
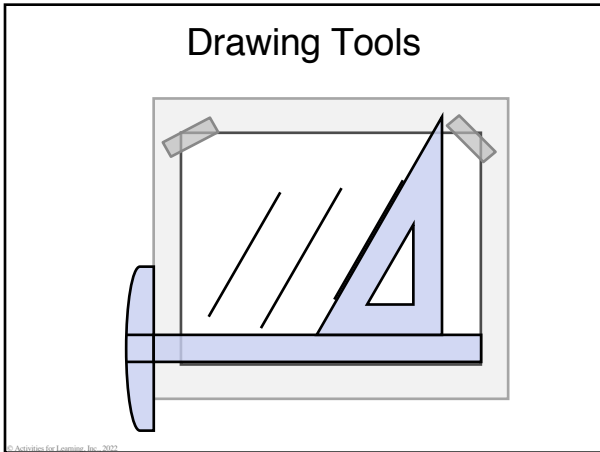
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**info@RightStartMath.com**







### Lesson 2

**LESSON 2: DRAWING DIAGONALS**

**OBJECTIVES:**

- To use the horizontal and vertical lines of a square.
- To use the mathematical meaning of "diagonal."
- To draw the two diagonals.
- To draw the vertical and horizontal lines of a square.

**ACTIVITIES:**

**Horizontal and vertical lines:** Horizontal lines are the lines that run from left to right. Vertical lines are the lines that run from top to bottom. A horizontal line is a line that runs from left to right. A vertical line is a line that runs from top to bottom.

**Diagonals:** In a square, the two diagonals are the lines that connect opposite corners. The two diagonals of a square are the lines that connect opposite corners. The two diagonals of a square are the lines that connect opposite corners.

**EXTRAS:**

A square is a four-sided polygon with four equal sides and four right angles. A square is a four-sided polygon with four equal sides and four right angles. A square is a four-sided polygon with four equal sides and four right angles.

1. Make two 7-square and 11-11 squares.

2. Trace, then draw the diagonals in the squares using your drawing tools. There are 2 diagonals in each square.

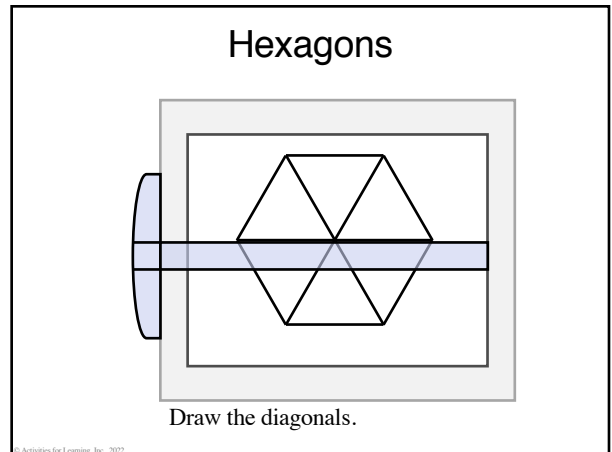
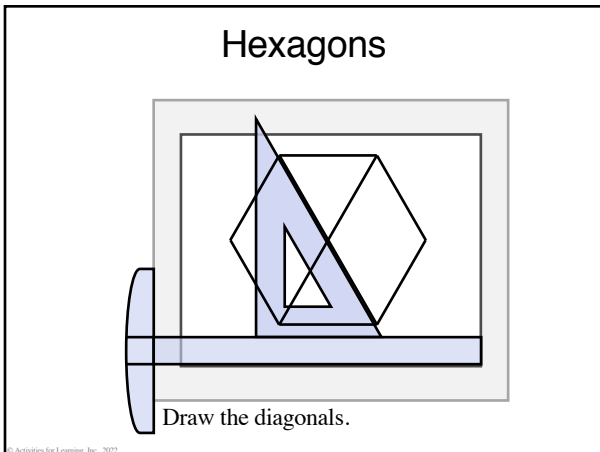
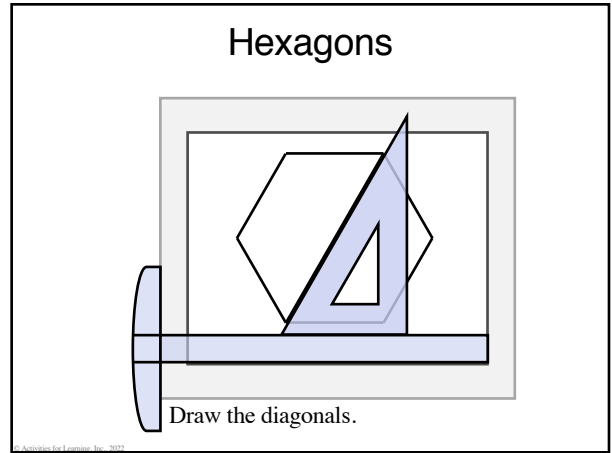
3. How many diagonals are horizontal? \_\_\_\_\_

4. How many diagonals are vertical? \_\_\_\_\_

5. How many diagonals in each square are either horizontal or vertical? \_\_\_\_\_

6. How many diagonals in each square are not horizontal or vertical? \_\_\_\_\_

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## Hexagons

Diagonal – line from vertex to vertex.

## Hexagons

Draw all the diagonals.

## Hexagons

## Lesson 2

1. How many diagonals can be drawn from one vertex?  
 2. How many diagonals can be drawn from two vertices?  
 3. How many diagonals can be drawn from three vertices?  
 4. How many diagonals can be drawn from four vertices?  
 5. How many diagonals can be drawn from five vertices?

**NOTES:** Make sure that the worksheet is positioned on the drawing board correctly. If it is misaligned, the work will be inaccurate. Also remember to keep the T-square below the line being drawn with the triangle.

Some students struggle to remember the triangle can be rotated and flipped a variety of ways when drawing diagonals.

Regarding Questions 5 and 6, each point, or vertex, has 3 diagonals. Each diagonal must be horizontal, vertical, or neither of the two. Therefore, if a vertex has one diagonal that is either horizontal or vertical, the other two diagonals must not be horizontal or vertical. The answers for Questions 5 and 6 will add up to the total number of diagonals in a vertex, 3.

The lessons are written for the student to read themselves. They will frequently need to refer back to the lesson while doing the worksheet. If the lesson still doesn't answer their question, they need to learn how to ask additional questions to find the answers. This is an important skill to acquire towards becoming an independent learner. "I don't get it" is not a question. If needed, help them form a question. Then help them look for an answer. Frustration will occur. It is part of life. They can do this!

**DICTIONARY TERMS:** horizontal, vertical, diagonal, hexagon

## Lesson 2

**NOTES:** Make sure that the worksheet is positioned on the drawing board correctly. If it is misaligned, the work will be inaccurate. Also remember to keep the T-square below the line being drawn with the triangle.

Some students struggle to remember the triangle can be rotated and flipped a variety of ways when drawing diagonals.

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**DICTIONARY TERMS:** horizontal, vertical, diagonal, hexagon

## Equilateral Triangles

Move the T-square down.

### Equilateral Triangles

Draw a side.

### Equilateral Triangles

Flip the triangle and repeat.

### Equilateral Triangle in Half

The two halves are *congruent*.

### Equilateral Triangle in Half

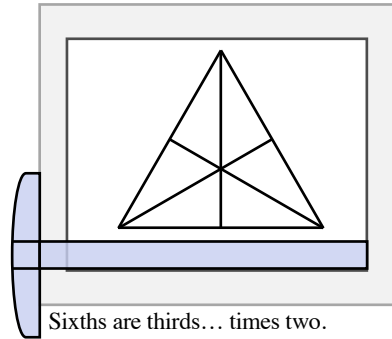
Dividing in half yet another way.

### Equilateral Triangle in Thirds

### Equilateral Triangle in Thirds

Another way to do thirds.

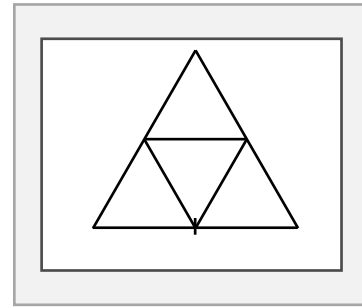
## Equilateral Triangle in Sixths



Sixths are thirds... times two.

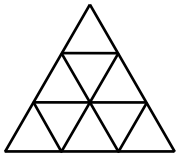
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## Equilateral Triangle in Fourths



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## Equilateral Triangle in Ninths



Row Number	Row Number $\times 2$	Triangles in the Row
1	2	1
2	4	3
3	6	5
4	8	7
5	10	9
6	12	11
10	20	19
$n$	$2n$	$2n - 1$

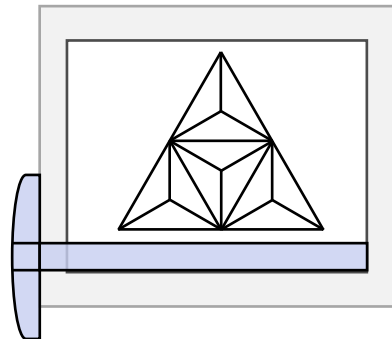
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## Equilateral Triangle in Ninths

Row	Number of Triangles	Total Number of Triangles
1	1	1
2	3	4
3	5	9
4	7	16
5	9	25
6	11	36
7	13	49
8	15	64
9	17	81

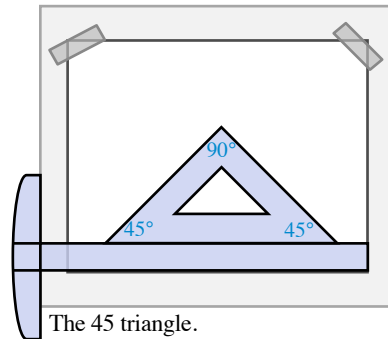
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## Equilateral Triangle in Twelfths



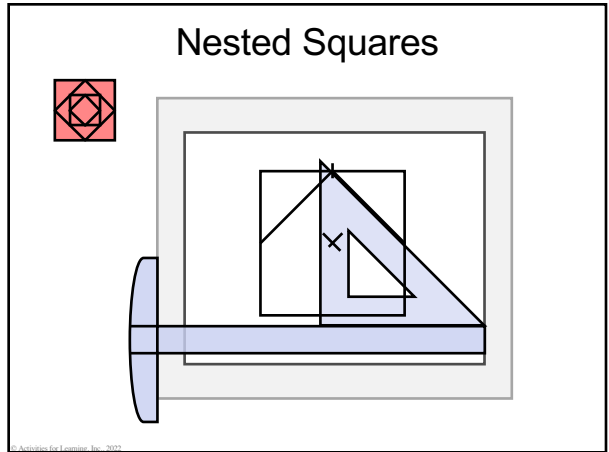
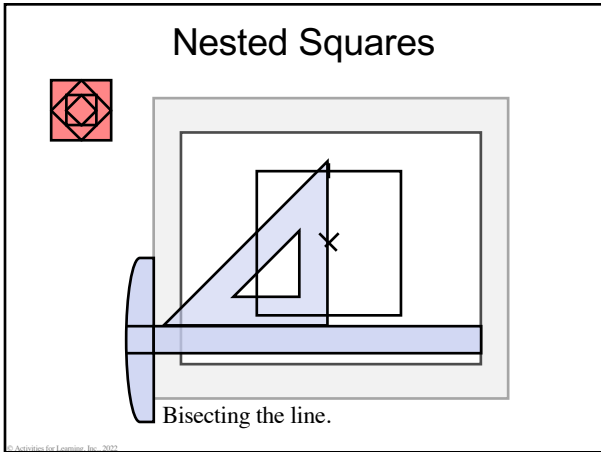
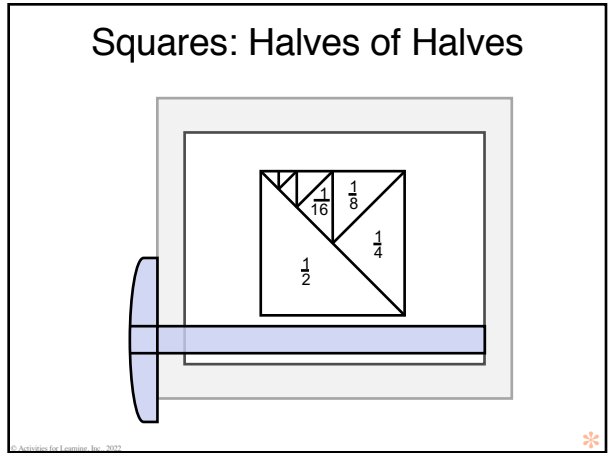
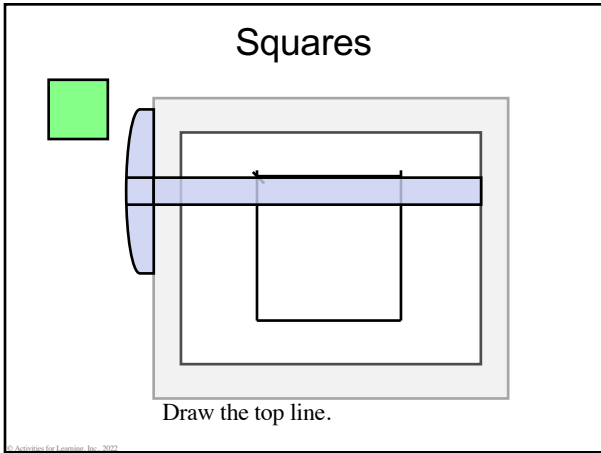
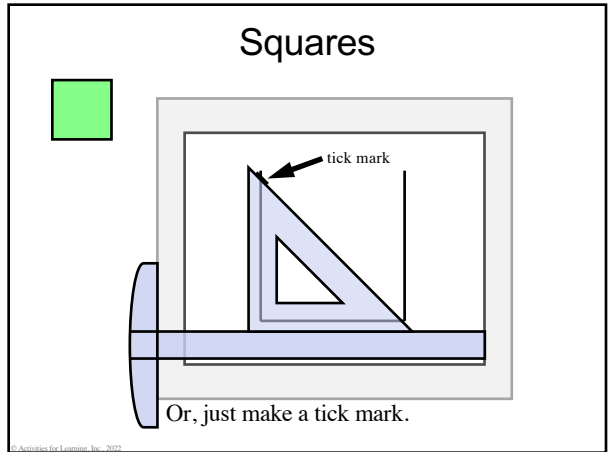
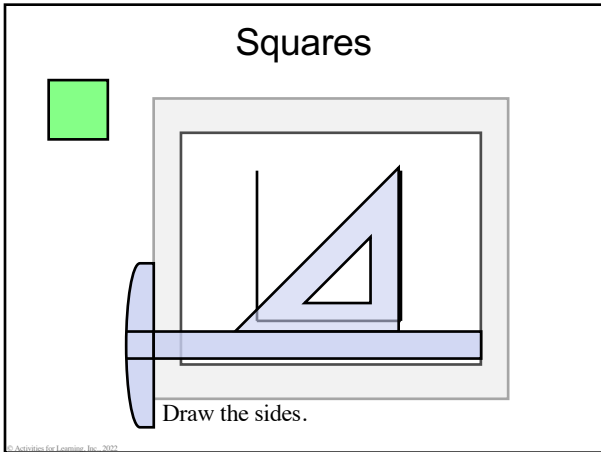
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## Squares



The 45 triangle.

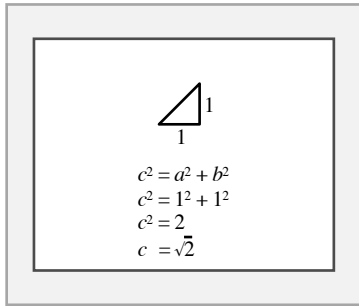
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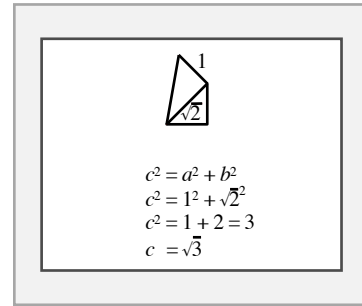
### Square Root Spiral



Sides are 1.

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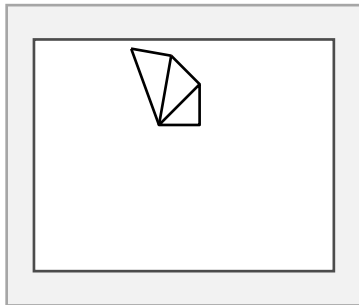
### Square Root Spiral



Draw new hypotenuse.

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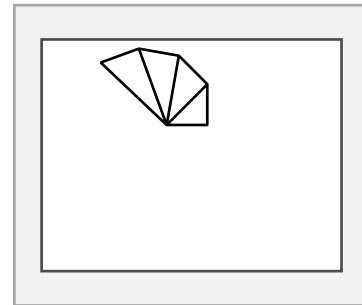
### Square Root Spiral



Draw new hypotenuse, which is  $\sqrt{4}$ .

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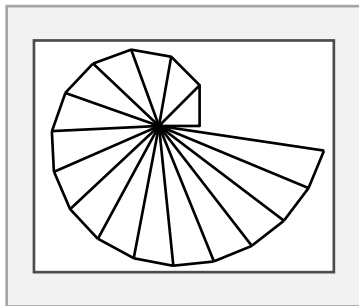
### Square Root Spiral



Draw new hypotenuse, which is  $\sqrt{5}$ .

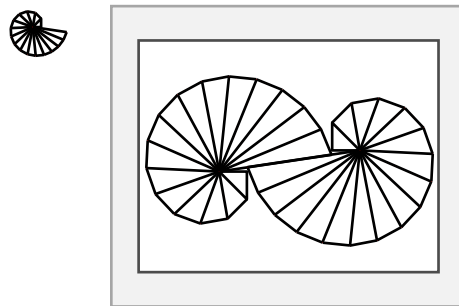
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### Square Root Spiral



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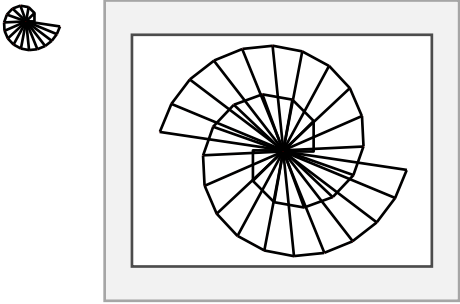
### Square Root Spiral



Combine two spirals.

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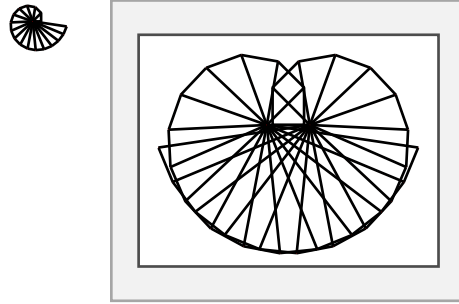
## Square Root Spiral



Combine two spirals.

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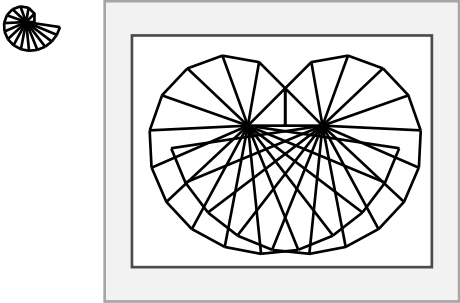
## Square Root Spiral



Combine two spirals.

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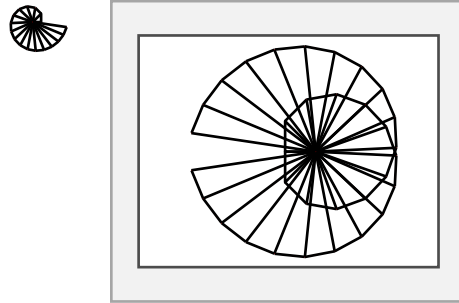
## Square Root Spiral



Combine two spirals.

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## Square Root Spiral



Combine two spirals.

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## Area of a Circle

100

**LESSON 97: AREA OF A CIRCLE**

**OBJECTIVES:**  
1. To understand the formula for the area of a circle.  
2. To understand the formula for the area of a sector.

**WATERMARKS:**  
1. Worksheets 97-1 and 97-2, Area of a Circle  
2. Drawing Board, Triangles and Squares  
3. 4 by 4 Grid  
4. Scissors  
5. Math Card Game Book, Inc.

**ACTIVITIES:**  
**Investigation 97-1:** Complete the worksheet before reading further. Working about the area of a circle, you find that the central square and half of the rectangle have the same area. The circle is divided into sectors. A little more than 3 times the area of the square is the area of a circle in a circle of radius  $r$  and length  $2\pi r$ .  
**Investigation 97-2:** You will use the same method to find the area of a circle.  
**Investigation 97-3:** This worksheet is another way to think about finding the formula for the area of a circle. It is based on the circumference of a circle. The worksheet before reading further.  
**Now thinking about the area of a circle:** The second worksheet has a drawing of a circle with a radius  $r$  and circumference  $2\pi r$ . The worksheet showed another way to think about the width of the parallelogram for the square below. The width is half the circumference of the circle because it is formed with half the sectors.

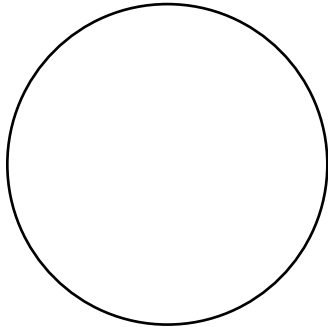
You have the illustration of a circle that has height the circumference of  $2\pi r$  and the height of each sector is  $r$ . Since the area of a parallelogram is  $wh$ , the area of a circle is  $r \times 2\pi r$ . In the figure below, the same circle is divided into 16 sectors. Notice how much longer the outer edge.

**Thinking game:** Play the Memory game. Read to the Math Card Game Book, Inc.

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## Area of a Circle



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