Squares & Square Roots

Square Root

Square Root

- A number which, when multiplied by itself, results in another number.

- Ex: 5 is the square root of 25.

$$5 = \sqrt{25}$$

Vocabulary

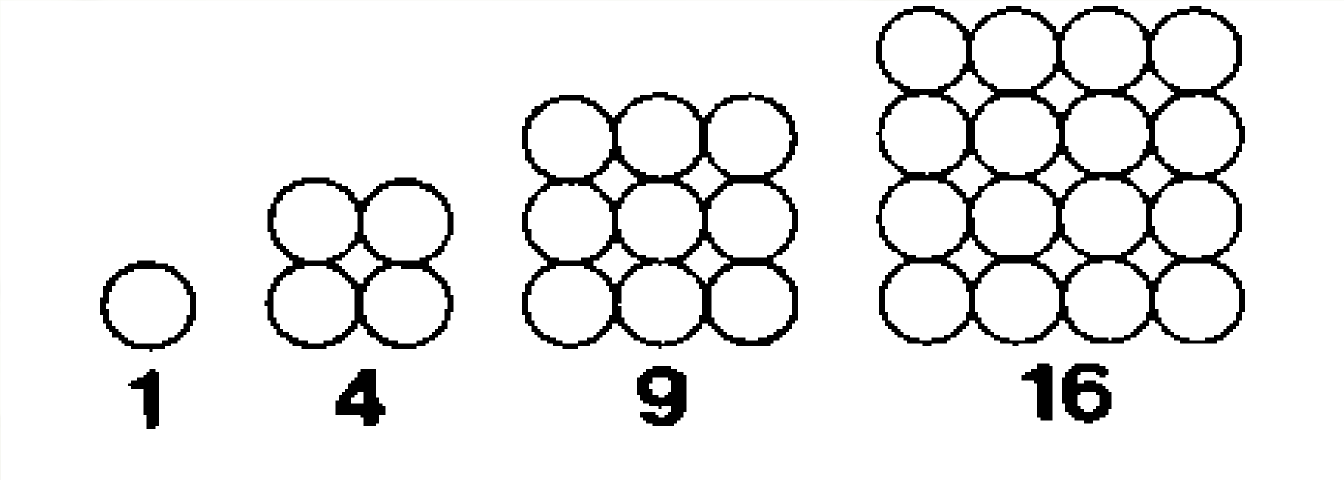
- **Radical:** The expression $\sqrt{s}$ is called a radical. The symbol $\sqrt{\ }$ is a radical sign.
- **Radicand:** The number s beneath the radical sign.

Squares & Square Roots

Perfect Squares

Square Number

- Also called a "*perfect square*"
- A number that is the square of a whole number
- Can be represented by arranging objects in a square.



Square Numbers

MULTIPLICATION TABLE

	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9
2	2	4	6	8	10	12	14	16	18
3	3	6	9	12	15	18	21	24	27
4	4	8	12	16	20	24	28	32	36
5	5	10	15	20	25	30	35	40	45
6	6	12	18	24	30	36	42	48	54
7	7	14	21	28	35	42	49	56	63
8	8	16	24	32	40	48	56	64	72
9	9	18	27	36	45	54	63	72	81

Square Numbers

- 1 x 1 = 1
- 2 x 2 = 4
- 3 x 3 = 9
- 4 x 4 = 16

Square Numbers

- 1 x 1 = 1
- 2 x 2 = 4
- 3 x 3 = 9
- 4 x 4 = 16
- 5 x 5 = 25
- 6 x 6 = 36
- 7 x 7 = 49
- 8 x 8 = 64
- 9 x 9 = 81
- 10 x 10 = 100
- 11 x 11 = 121
- 12 x 12 = 144
- 13 x 13 = 169
- 14 x 14 = 196
- 15 x 15 = 225

Activity:

Identify the following numbers as perfect squares or not.

i. 16
ii. 15
iii. 146
iv. 300
v. 324
vi. 729

Activity:

Identify the following numbers as perfect squares or not.

i. 16 = 4 x 4

ii. 15

iii. 146

iv. 300

v. 324 = 18 x 18

vi. 729 = 27 x 27

Squares & Square Roots

Estimating Square Root

Estimating Square Roots

Square roots of numbers that are not perfect squares, such as 15, are not whole numbers. A calculator can approximate the value of $\sqrt{15}$ as 3.872983346... Without a calculator, you can use square roots of perfect squares to help estimate the square roots of other numbers.

REMEMBER…

If a whole number is not a perfect square, then its square root is irrational. For example, 2 is not a perfect square and $\sqrt{2}$ is irrational.

Estimating Square Roots

$$\sqrt{25} = ?$$

Estimating Square Roots

$$\sqrt{25} = 5$$

Estimating Square Roots

$$\sqrt{36} = ?$$

Estimating Square Roots

$$\sqrt{36} = 6$$

Estimating Square Roots

$$\sqrt{27} = ?$$

Estimating Square Roots

$$\sqrt{27} = ?$$

Since 27 is not a perfect square, we have to use another method to calculate it's square root.

Estimating Square Roots

- Not all numbers are perfect squares.
- Not every number has an Integer for a square root.
- We have to estimate square roots for numbers between perfect squares.

Estimating Square Roots

- To calculate the square root of a non-perfect square

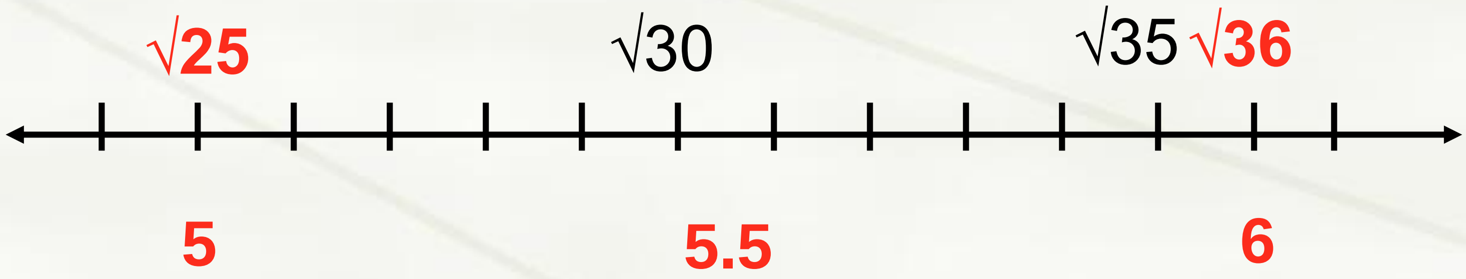
1. Place the values of the adjacent perfect squares on a number line.

2. Interpolate between the points to estimate to the nearest tenth.

Estimating Square Roots

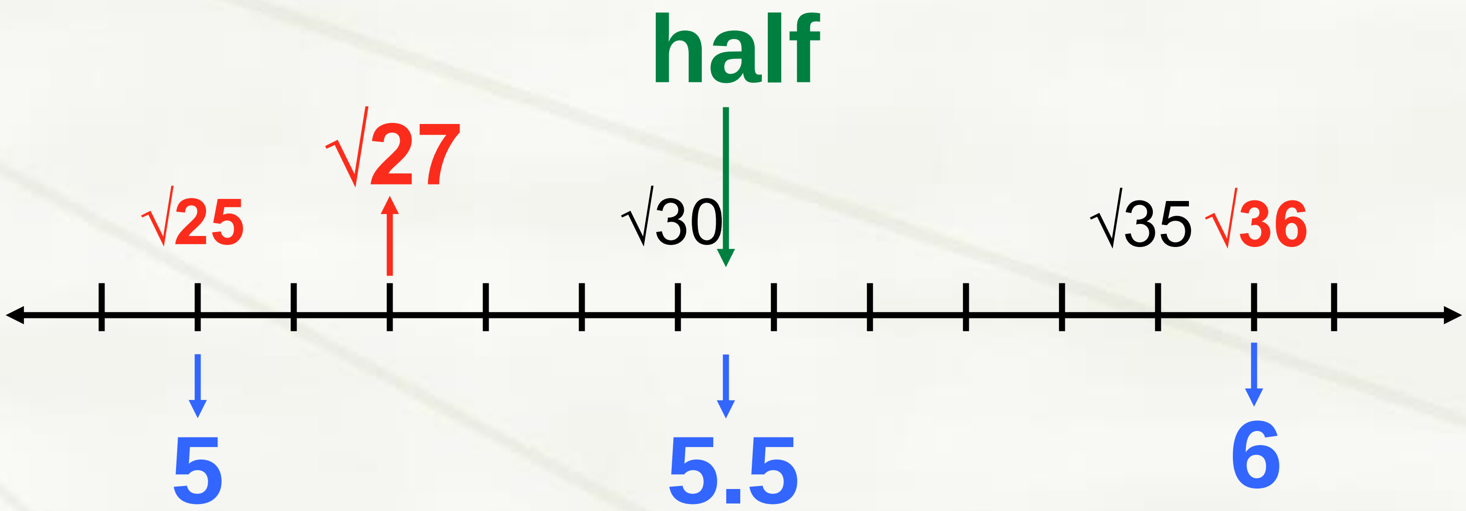
- Example: $\sqrt{27}$

What are the perfect squares on each side of 27?



Estimating Square Roots

- **Example:** $\sqrt{27}$



Estimate $\sqrt{27} = 5.2$

Estimating Square Roots

- Example: $\sqrt{27}$

- Estimate: $\sqrt{27} = 5.2$

- Check: (5.2) (5.2) = 27.04