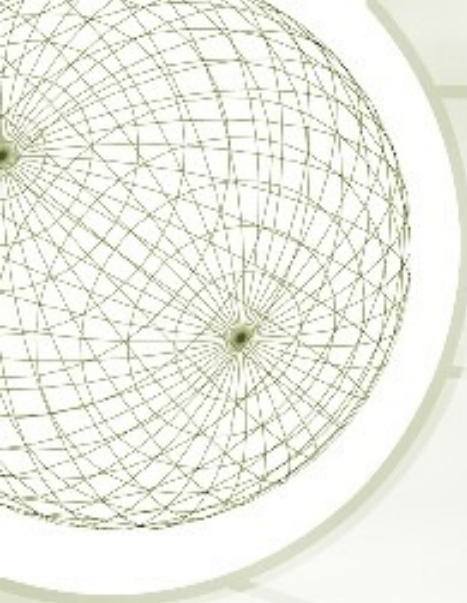


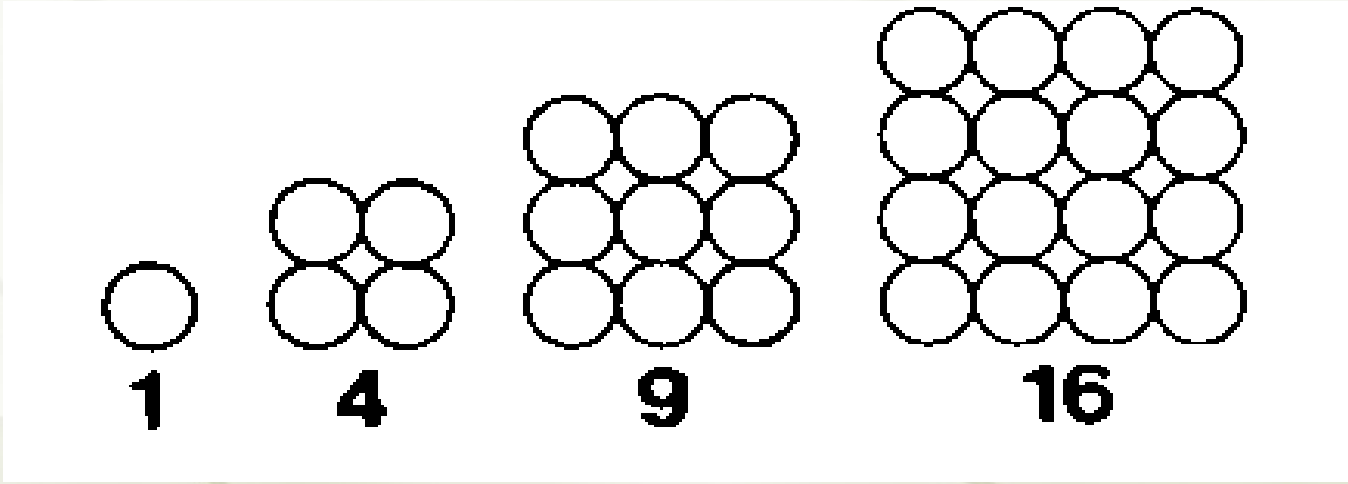
Squares & Square Roots

Perfect Squares

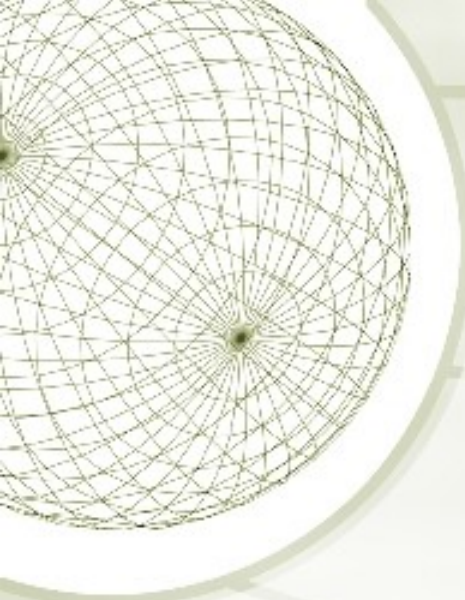
Lesson 12

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



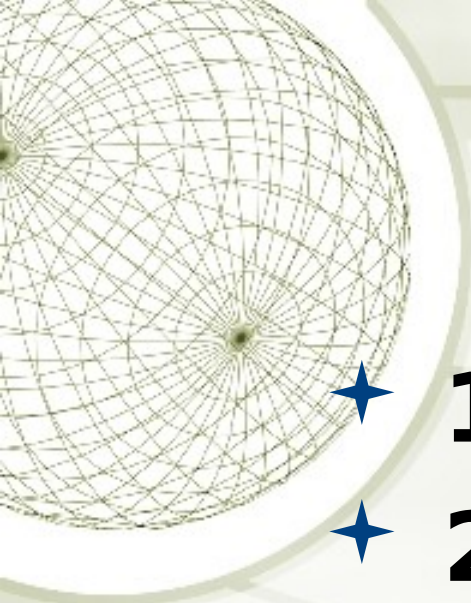
MULTIPLICATION TABLE

	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

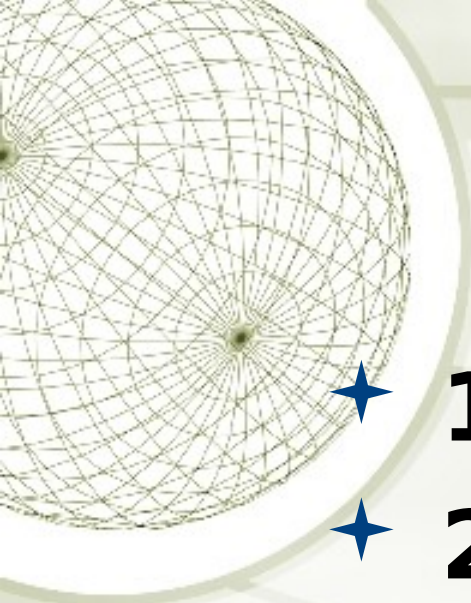


Square Numbers

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

Activity:

Calculate the perfect squares up to 15^2…



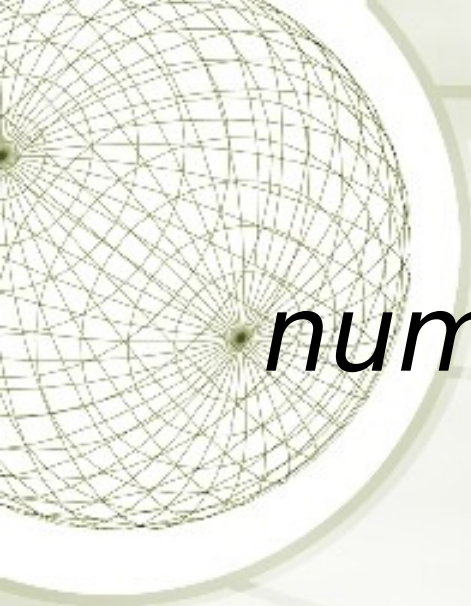
Square Numbers

- 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

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**

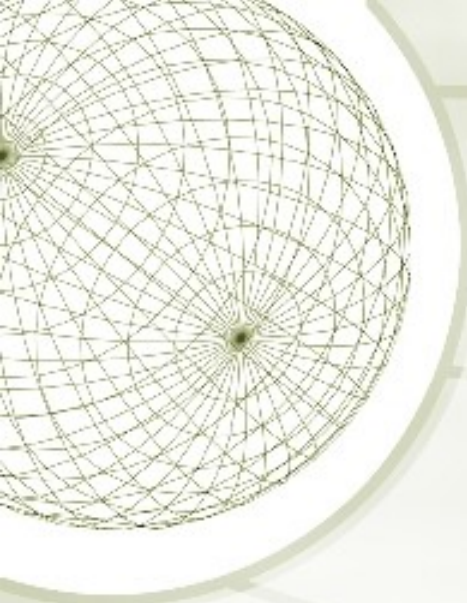
ii. **15**

iii. **146**

iv. **300**

v. **324 = 18 x 18**

vi. **729 = 27 x 27**

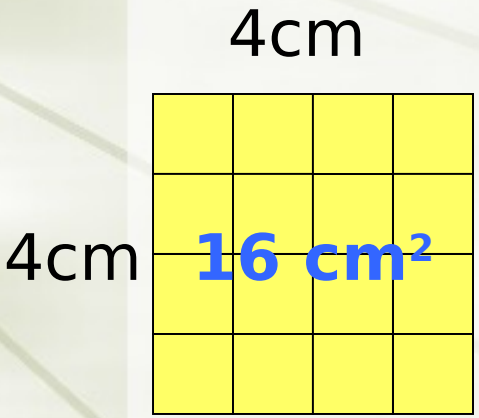


Squares & Square Roots

Square Root

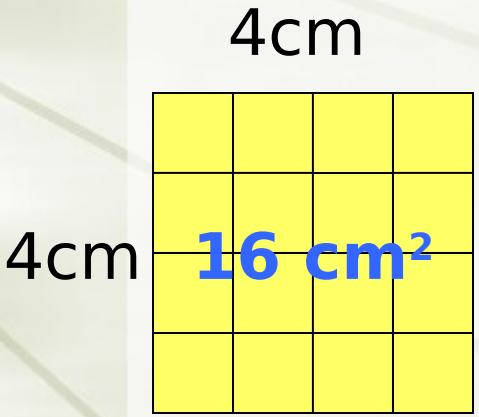
Square Numbers

- One property of a perfect square is that it can be represented by a square array.
- Each small square in the array shown has a side length of 1cm.
- The large square has a side length of 4 cm.



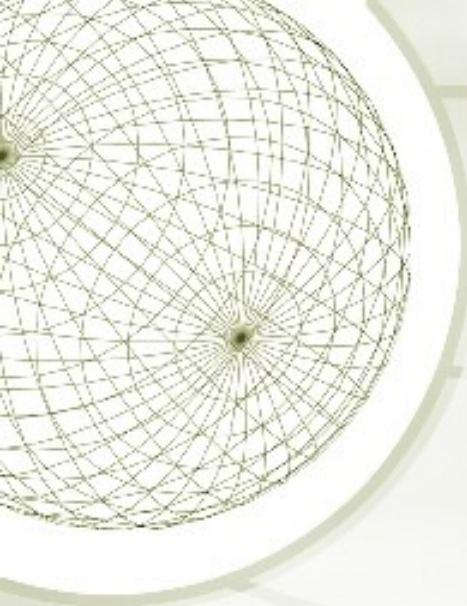
Square Numbers

- The large square has an area of 4cm x 4cm = 16 cm^2.



- The number 4 is called the square root of 16.

- We write: $4 = \sqrt{16}$



Square Root

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

- Ex: 5 is the square root of 25.

$$5 = \sqrt{25}$$

Finding Square Roots

- We can use the following strategy to find a square root of a large number.

$$\sqrt{4 \times 9} = \sqrt{4} \times \sqrt{9}$$

$$\sqrt{36} = 2 \times 3$$

$$6 = 6$$

Finding Square Roots

$\sqrt{4 \times 9} = \sqrt{4} \sqrt{9}$

$\sqrt{36} = 2 \times 3$

$6 = 6$

- We can factor large perfect squares into smaller perfect squares to simplify.

Finding Square Roots

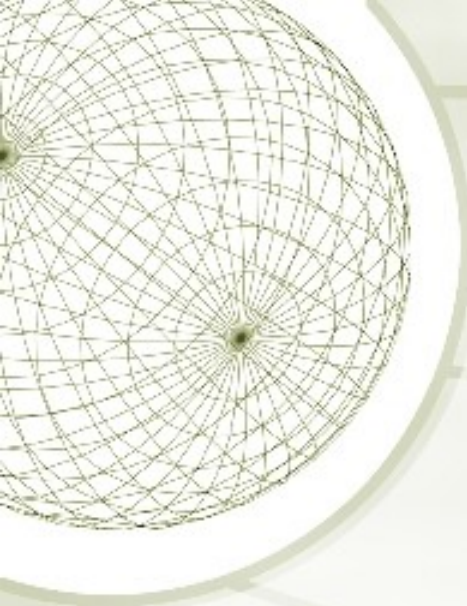
- Activity: Find the square root of 256

$$\sqrt{256}$$

$$= \sqrt{4} \times \sqrt{64}$$

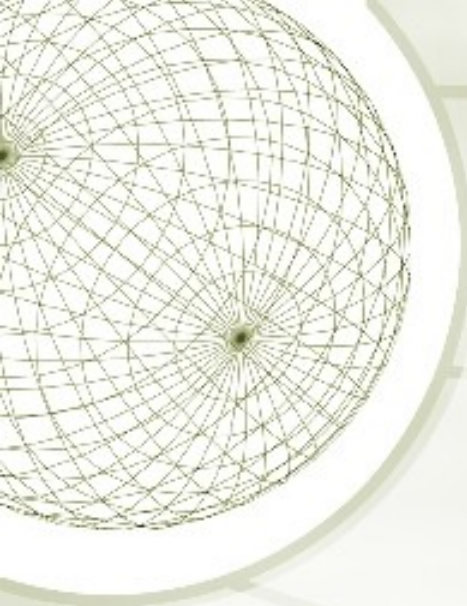
$$= 2 \times 8$$

$$= 16$$



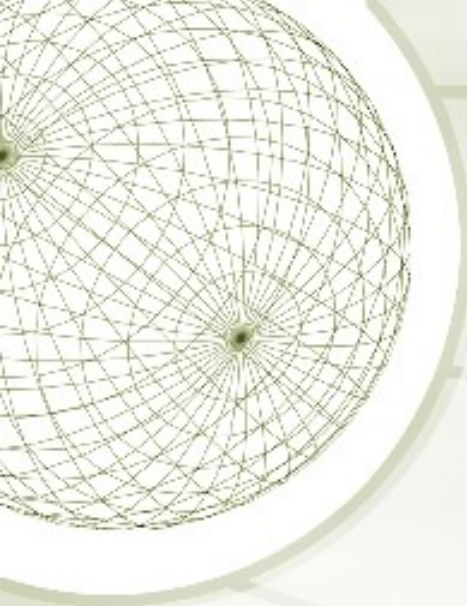
Squares & Square Roots

Estimating Square Root



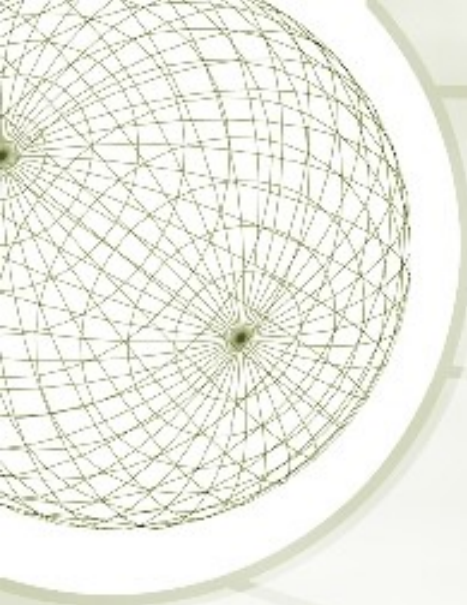
Estimating Square Roots

$$\sqrt{25} = ?$$



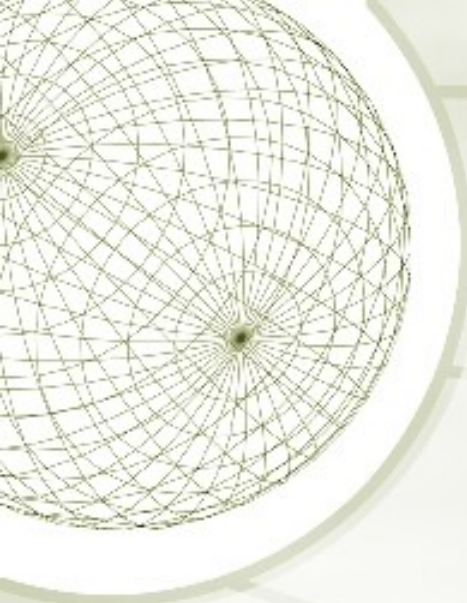
Estimating Square Roots

$$\sqrt{25} = 5$$



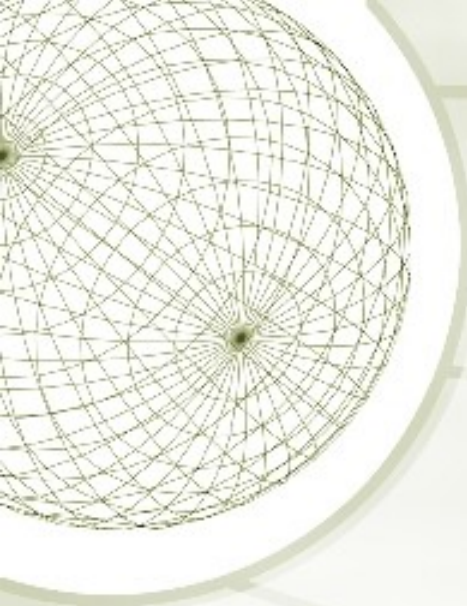
Estimating Square Roots

$$\sqrt{49} = ?$$



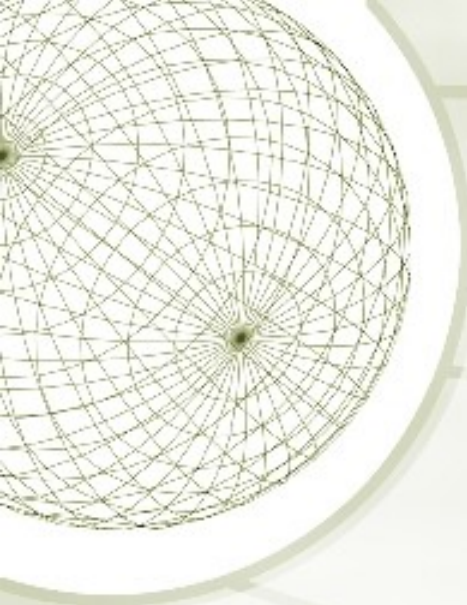
Estimating Square Roots

$$\sqrt{49} = 7$$



Estimating Square Roots

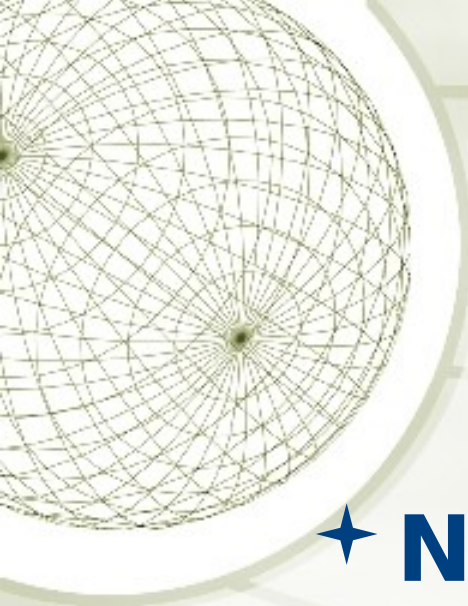
$$\sqrt{27} = ?$$



Estimating Square Roots

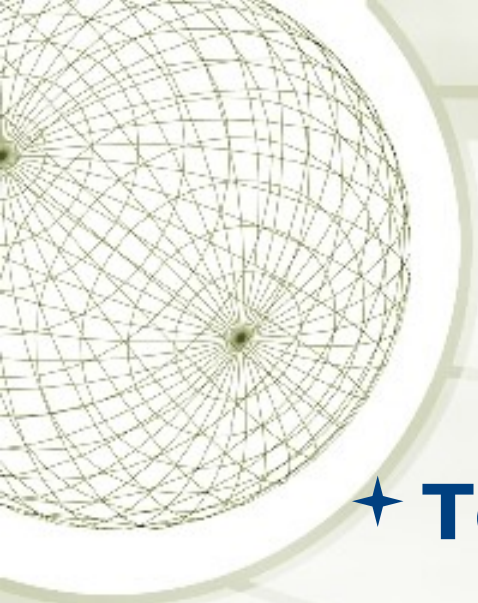
$$\sqrt{27} = ?$$

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

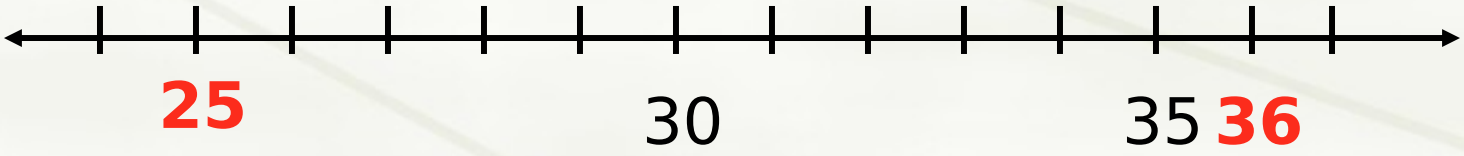
1. Place the values of the adjacent perfect squares on a number line.

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

Estimating Square Roots

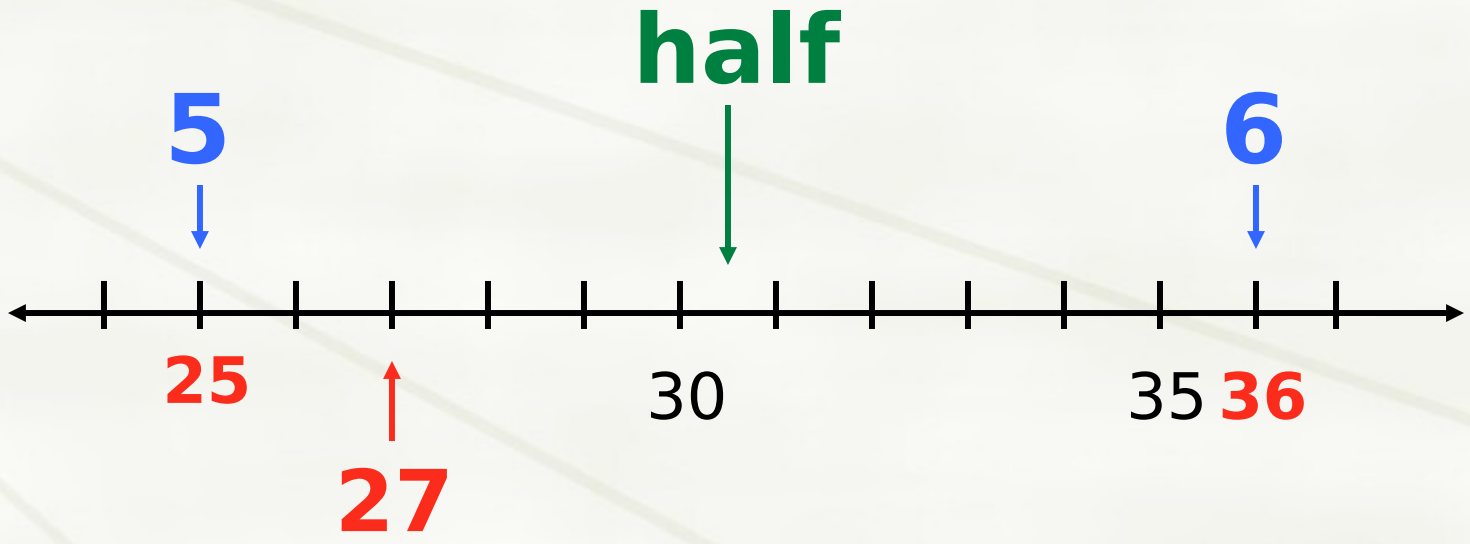
- **Example:** $\sqrt{27}$

What are the perfect squares on each side of 27?

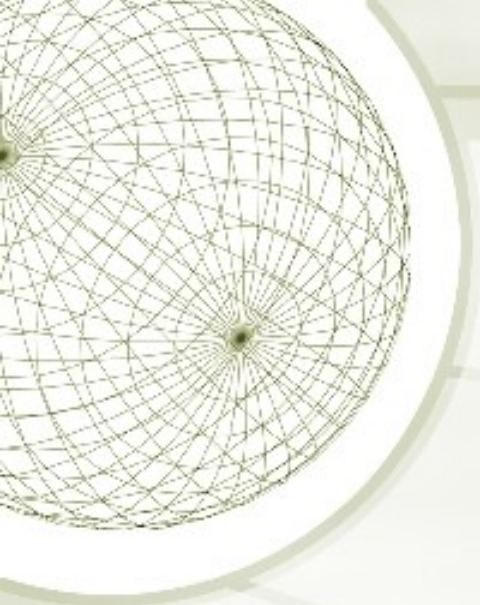


Estimating Square Roots

- 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

CLASSWORK

PAGE 302 – 1,3,6,8,9,11,13

PAGE 303 – 16,17,20,22,23,24,26

If finished: Complete page 50 to get ready for your test.