Squares & Square Roots

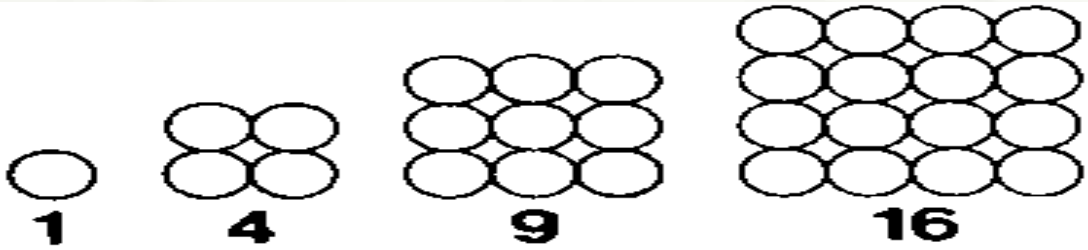
PART I: Perfect Squares

DEFINITION: the square of a whole number

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

- $1 \times 1 = 1$
- $2 \times 2 = 4$
- $3 \times 3 = 9$
- $4 \times 4 = 16$

Activity:

You have 2 minutes! In your notes: 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
- 14 x 14 = 196
- 15 x 15 = 225

SLATE Activity :

You have 5 seconds … take out your white board, marker, & eraser.

Identify the following numbers as perfect squares or not. If it IS a perfect square show the BASE squared (to the 2nd power) EX: 9 IS a perfect square because it equals 3^2

1. 16
2. 15
3. 146
4. 300
5. 324
6. 729

Activity:
Identify the following numbers as perfect squares or not.

1. $16 = 4 \times 4$
2. 15
3. 146
4. 300
5. $324 = 18 \times 18$
6. $729 = 27 \times 27$

Squares & Square Roots

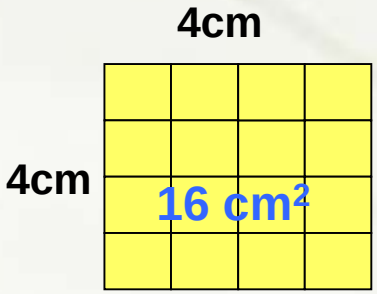
PART II: Square Root

DEFINITION: the length of the side of a square with an area equal to a given number

RADICAL SIGN $\sqrt{}$: used to represent a square root

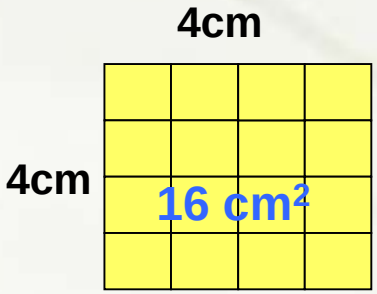
Square Numbers

- 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

- *Quick Steps: Find…* $\sqrt{64}$
- *STEP 1: THINK … What # to the 2nd power EQUALS the # inside of the radical?* $\_^2 = 64$
- *STEP 2: Double check your answer with multiplication. Multiply the BASE X BASE.*

8 X 8 = 64 so the square root of 64 = 8

Finding Square Roots

- *Guided Practice: Find the square root of 100*

$$\sqrt{100}$$

- *We know that $10^2 = 100$*

So the square root of 100 = 10

Finding Square Roots

You have 3 seconds: white board, marker, eraser

- *Activity: Find the square root of 144*

$$\sqrt{144}$$

- *We know that $12^2 = 144$*

So the square root of 100 = 12

Finding Square Roots

- *Activity: Find the square root of 121*

$$\sqrt{121}$$

- *We know that $11^2 = 121$*

So the square root of 121 = 11

Finding Square Roots

- *Activity: Find the square root of 169*

$$\sqrt{169}$$

- *We know that $13^2 = 169$*

So the square root of 169 = 13

Finding Square Roots of Numbers larger than 200

✦ *Activity: Find the square root of 256* $\sqrt{256}$

STEP 1:

BREAK THE LARGER # INTO SMALLER RADICALS $= \sqrt{4} \times \sqrt{64}$

STEP 2:

FIND THE SQUARE ROOT OF EACH RADICAL $= 2 \times 8$

STEP 3:

MULTIPLY THE TWO #S $= 16$

Finding Square Roots of Numbers larger than 200

- *Activity: Find the square root of 10000* $\sqrt{10000}$

STEP 1:

BREAK THE LARGER #

INTO SMALLER RADICALS OF

PERFECT SQUARES

$= \sqrt{100} \times \sqrt{100}$

STEP 2:

FIND THE SQUARE ROOT OF EACH RADICAL

$= 10 \times 10$

STEP 3:

MULTIPLY THE TWO #S

$= 100$

QUICKWRITE: Summary of Learning

A friend has just called you asking,

"What did we learn in math class today?"

(Your response is … YOU HAVE 2 MINUTES TO WRITE … use key vocabulary)

HOMEWORK

5-6 PW (1-28 all)

Squares & Square Roots

Estimating Square Root

NON PERFECT SQUARE - a # that when squared is not a whole #.

EX: 6 is a non perfect square because $\sqrt{6}$ is a DECIMAL

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

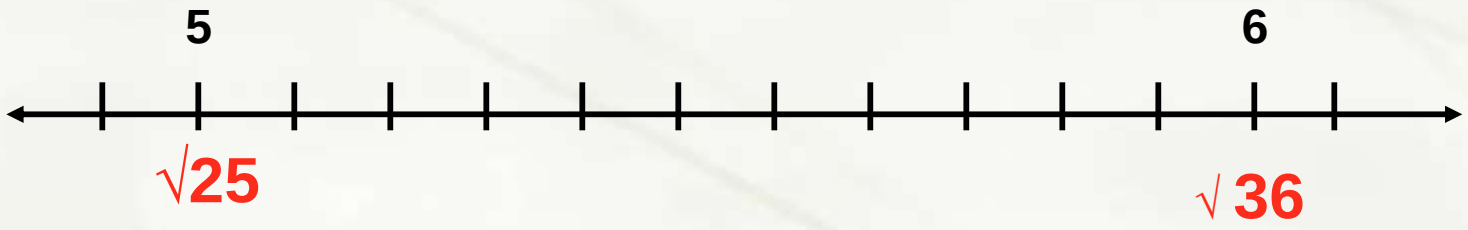
STEP 1: Place the values of the adjacent perfect squares on a number line.

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

Estimating Square Roots

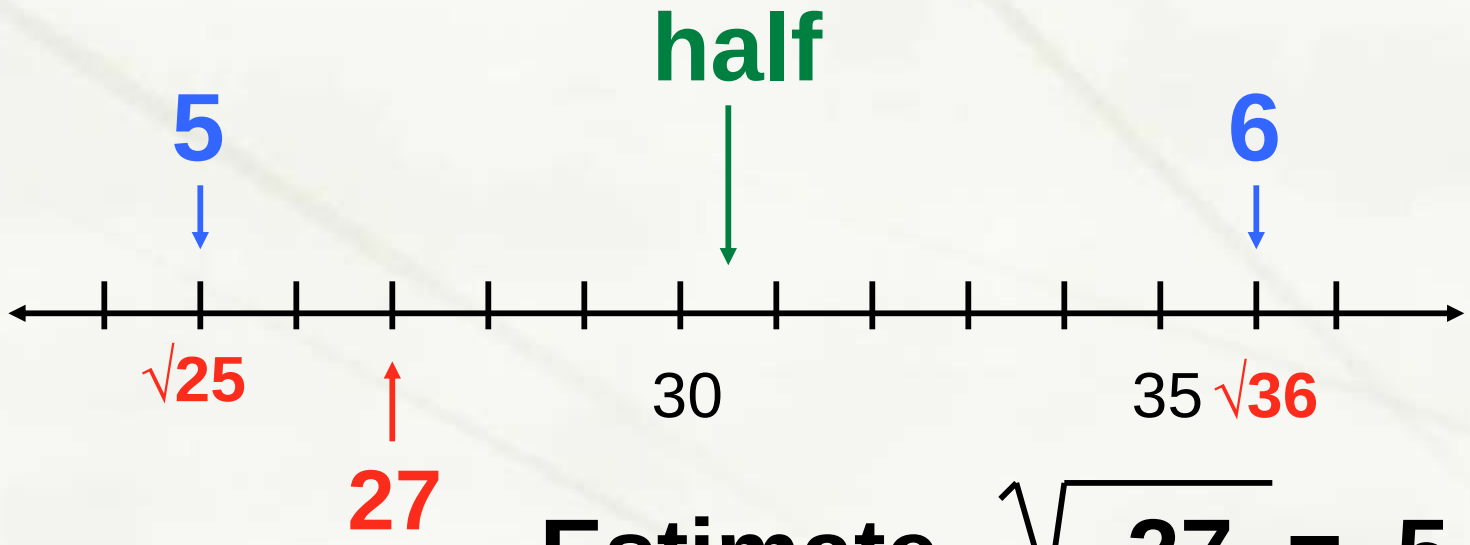
- Example: $\sqrt{27}$

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.

The End

Thanks