Warm Up September 26, 2018

1.) Madden 19 costs $59.99. Best Buy has a coupon for 25% off all video games.

A. What is the discount? ≈$15.00

B. What is the sale price? $44.99

59.99 × .25 = 14.9975 ≈ 15

2.) Find the distance an airplane travels if it goes 400 miles per hour for 3 hours.

$400 \frac{mi}{h} \cdot 3 h = 1200 \text{ miles}$

3.) Aileen worked 35.5 hours last week. If she gets paid $7.75 per hour, what was her income before taxes?

$35.5 \times 7.75 = \$275.13$

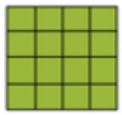
Perfect Squares

When a number is multiplied it is multiplied by itself.

When the product of a number and itself is an integer, the result is called a perfect squares.

Perfect Squares = ( )^2

$9 = 3^2$ 

$16 = 4^2$ 

Example

$5^2 = 5 \cdot 5$

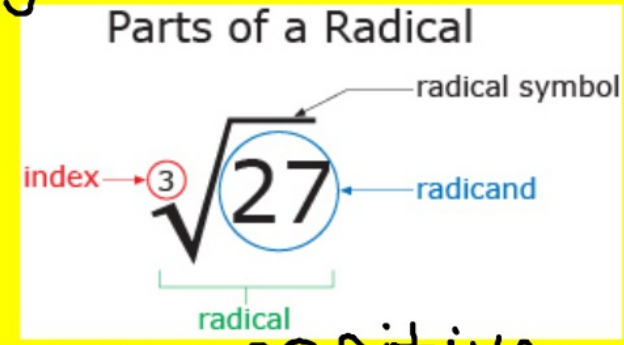
$(-7)^2 = -7 \cdot -7$

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

If $a^2 = b$, then a is the square root of b. A radical is used to represent the positive square root.

There is no square root of a negative number.

A radical symbol only indicates the positive square root.



Any positive number has two square roots - a positive and a negative.

Meaning	Positive square root	Negative square root	The positive and negative square roots
Symbol	$\sqrt{}$	$-\sqrt{}$	$\pm\sqrt{}$
Example	$\sqrt{9} = 3$	$-\sqrt{9} = -3$	$\pm\sqrt{9} = \pm 3$

+
−

On a TI-83/84:

Step 1: Press [2ND][x^2].

Step 2: Enter the number.

Step 3: Press [ENTER].

Practice

Simplify each radical expression:

$\sqrt{121} =$ 11

$-\sqrt{225} =$ −15

$\sqrt{10^2 - 8^2} =$ 6

$\sqrt{\frac{25}{81}} =$ 5/9

$\sqrt{100-64}$

$\sqrt{36}$

$\frac{\sqrt{25}}{\sqrt{81}}$

Estimating Non-Perfect Squares

For an integer that is not a perfect square, you can estimate the square roots.

What are the two whole numbers closest to $\sqrt{8}$? 2 and 3

What are the two whole numbers closest to $\sqrt{135}$? 11 and 12

What are the two whole numbers closest to $\sqrt{200}$? 14 and 15

What are the two whole numbers closest to $\sqrt{192}$? 13 and 14

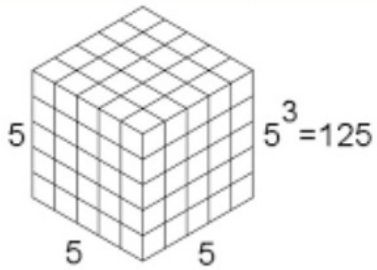
What are the two whole numbers closest to $\sqrt{37}$? 6 and 7

Find which two perfect squares the number is between, then take the square root of the numbers.

Perfect Cubes

When a number is cubed, it is multiplied by itself three times.

Finding The Perfect Cube Of Numbers



X	1	2	3	4	5	6	7	8	9	10
X^3	1	8	27	64	125	216	343	512	729	1000

If $a^3 = b$, then a is the cube root of b. A radical, $\sqrt[3]{\square}$ is used to represent the cube root – note the small three on the shelf of the radical.

The cube root of a positive number is always positive. Ex.) $\sqrt[3]{27} =$ 3

The cube root of a negative number is always negative Ex.) $\sqrt[3]{-216} =$ −6

$\sqrt{}$ – the square Root of

$\sqrt[3]{}$ – the cube Root of

On a TI-83/84:

Step 1: Press [MATH].

Step 2: Choose 4 to select $\sqrt[3]{\ }$.

Step 3: Enter the number.

Step 4: Press [ENTER].

Practice

Simplify each radical expression:

$\sqrt[3]{8} =$ 2

$\sqrt[3]{-125} =$ $-5 \cdot -5 \cdot -5$ -5

$\sqrt[3]{4^2 + 11} =$ 3

$\sqrt[3]{16+11}$

$\sqrt[3]{27}$

$\sqrt[3]{\frac{343}{1000}} =$ 7/10

$\frac{\sqrt{343}}{\sqrt{1000}}$

Solving Equations with Perfect Squares

$3^2 = 9$ ← the square

the square root

Opposite Operations

Squaring a number ↔	Taking the square root
$3^2 = 9$	$\sqrt{9} = 3$
Raising a number to the n^{th} power. ↔	Taking the n^{th} root.
$2^3 = 8$	$\sqrt[3]{8} = 2$

1. $\sqrt{x^2} = \sqrt{49}$ $x = 7$

2. $\sqrt{x^2} = \sqrt{625}$ $x = 25$

3. $\sqrt{x^2} = \sqrt{196}$ $x = 14$

7. $\sqrt{x^2} = \sqrt{576}$ $x = 24$

8. $x^2 = 1$ $x = 1$

9. $x^2 = 81$ $x = 9$

24
× 24
96
480

13. $\sqrt{16}$ = 4

14. $\sqrt{225}$ = 15

15. $\sqrt{1}$ = 1

19. $\sqrt{144}$ = 12

20. $\sqrt{4}$ = 2

21. $\sqrt{400}$ = 20

Solving Equations with Perfect Cubes

1. $x^3 = 8$

   $x =$ 2

2. $x^3 = 125$

   $x =$ 5

3. $x^3 = 343$

   $x =$ 7

7. $x^3 = 216$

   $x =$ 6

8. $x^3 = 1$

   $x =$ 1

9. $x^3 = \frac{27}{125}$

   $x =$ 3/5

13. $\sqrt[3]{64} =$ 4

14. $\sqrt[3]{1000} =$ 10

15. $\sqrt[3]{8} =$ 2

19. $\sqrt[3]{27} =$ 3

20. $\sqrt[3]{512} =$ 8

21. $\sqrt[3]{1} =$ 1