Lesson 1.6 Square and Cube Roots (Day 2)

Objective

*I can evaluate and solve problems with square and cube roots by solving real world problems.

- **Common Core State Standards** *8EE1 & 8.E.E.2 Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.*
- **Mathematical Practices** 4. Model mathematics. 5. Use tools strategically. 6. Attend to precision. *MP 7 Look for and use structure*

Lesson 1.6 Square and Cube Roots (Day 2)

***Use Practice 1.6 to take notes**

Solve a real-world problem involving squares of unknowns.

Theresa wants to put a piece of carpet on the floor of her living room. The floor is a square with an area of 182.25 square feet. How long should the piece of carpet be on each side?

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***Use Practice 1.6 to take notes**

Theresa wants to put a piece of carpet on the floor of her living room. The floor is a square with an area of 182.25 square feet. How long should the piece of carpet be on each side?

Solution

Let the length of each side of the carpet be x feet.

$x^2 = 182.25$ Translate into an equation.

$\sqrt{x^2} = \sqrt{182.25}$ Solve for x by taking the positive square root of both sides.

$x = 13.5$ Use a calculator to find the square root.

The length of each side of the carpet is 13.5 feet.

Think Math

Why does the negative square root of 182.25 not make sense for this scenario? Explain.

Lengths are always positive.

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***Use Practice 1.6 to take notes**

A square field has an area of 98.01 square meters. Find the length of each side of the field.

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A square field has an area of 98.01 square meters. Find the length of each side of the field.

$x^2 =$? 98.01 Translate into an equation.

? = ? Solve for x by taking the positive ? root of both sides. $\sqrt{x^2}$; $\sqrt{98.01}$; square

$x =$? m Use a calculator to find the square root. 9.9

The length of each side is ? meters. 9.9

Lesson 1.6 Square and Cube Roots (Day 2)

***Use Practice 1.6 to take notes**

A fully inflated beach ball contains 288π cubic inches of air. What is the radius of the beach ball?

A beach ball is a sphere, so you can use the formula for the volume of a sphere.

$$V = \frac{4}{3}\pi r^3$$

By substituting 288π for V, you can solve for r.

Lesson 1.6 Square and Cube Roots (Day 2)

***Use Practice 1.6 to take notes**

A fully inflated beach ball contains 288π cubic inches of air. What is the radius of the beach ball?

Solution

Let the radius of the beach ball be r inches.

$$\frac{4}{3}\pi r^3 = 288\pi$$ Substitute values.

$$\frac{3}{4} \cdot \frac{4}{3}\pi r^3 = \frac{3}{4} \cdot 288\pi$$ Multiply both sides by $\frac{3}{4}$.

$$\pi r^3 = 216\pi$$ Simplify.

$$\frac{\pi r^3}{\pi} = \frac{216\pi}{\pi}$$ Divide both sides by π.

$$r^3 = 216$$ Simplify.

$$\sqrt[3]{r^3} = \sqrt[3]{216}$$ Solve for x by taking the cube root of both sides.

$$r = \sqrt[3]{216}$$ Simplify.

$$r = 6 \text{ in.}$$ Use a calculator to find the cube root.

The radius of the beach ball is 6 inches.

Using the value π, the approximate volume of the beach ball is 904.8 in^3 (rounded to the nearest tenth).

Think Math

288π cubic inches is an exact volume. What is an approximate volume of the beach ball? Explain.

Lesson 1.6 Square and Cube Roots (Day 2)

***Use Practice 1.6 to take notes**

Robin bought a crystal globe that has a volume of $1{,}774\frac{2}{3}\pi$ cubic centimeters. Find the radius of the crystal globe.

Let the radius of the crystal globe be r centimeters.

Math Note

Remember that you can express areas and volumes of circles and spheres in terms of π to simplify calculations.

Lesson 1.6 Square and Cube Roots (Day 2)

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Robin bought a crystal globe that has a volume of $1{,}774\frac{2}{3}\pi$ cubic centimeters. Find the radius of the crystal globe.

Let the radius of the crystal globe be r centimeters.

$\frac{4}{3}\pi r^3 = \_?\_$ Substitute values. $1{,}774\frac{2}{3}\pi$

$\_?\_ \cdot \_?\_ = \_?\_ \cdot \_?\_$ Multiply both sides by $\_?\_$. $\frac{3}{4}$; $\frac{4}{3}\pi r^3$; $\frac{3}{4}$; $1{,}774\frac{2}{3}\pi$; $\frac{3}{4}$

$\_?\_ = \_?\_$ Simplify. πr^3; $1{,}331\pi$

$\frac{?}{?} = \frac{?}{?}$ Divide both sides by $\_?\_$. $\frac{\pi r^3}{\pi}$; $\frac{1{,}331\pi}{\pi}$; π

$\_?\_ = \_?\_$ Simplify. r^3; $1{,}331$

$\_?\_ = \_?\_$ Solve for x by taking the $\_?\_$ root of both sides. $\sqrt[3]{r^3}$; $\sqrt[3]{1{,}331}$; cube

$\_?\_ = \_?\_$ Simplify. r; $\sqrt[3]{1{,}331}$

$r = \_?\_$ cm Use a calculator to find the cube root. 11

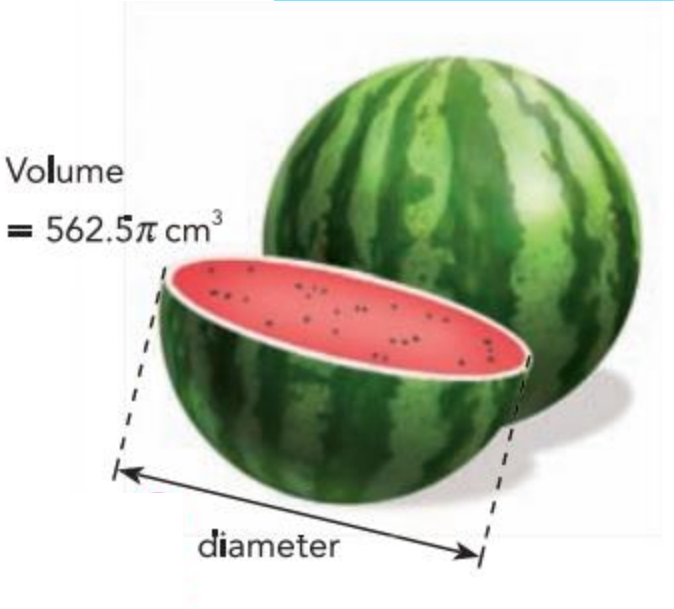
The radius of the crystal globe is $\_?\_$ centimeters. 11

Lesson 1.6 Square and Cube Roots (Day 2)

Your Turn

A spherical watermelon has a volume of 562.5π cubic centimeters. What is the diameter of the watermelon?

Let the radius of the watermelon be r centimeters.



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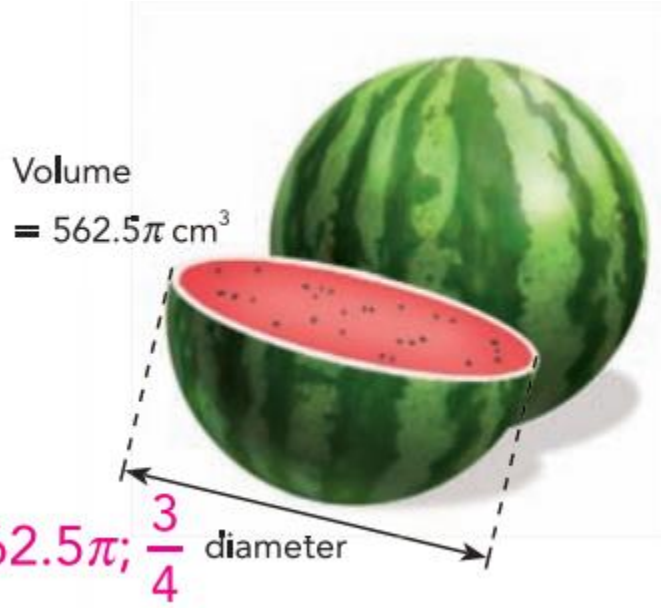

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$\frac{4}{3}\pi r^3 = \_?\_$ Substitute values. 562.5π

$\_?\_ \cdot \_?\_ = \_?\_ \cdot \_?\_$ Multiply both sides by $\_?\_$. $\frac{3}{4}$; $\frac{4}{3}\pi r^3$; $\frac{3}{4}$; 562.5π; $\frac{3}{4}$

$\_?\_ = \_?\_$ Simplify. πr^3; 421.875π

$\frac{?}{?} = \frac{?}{?}$ Divide both sides by $\_?\_$. $\frac{\pi r^3}{\pi}$; $\frac{421.875\pi}{\pi}$; π

$\_?\_ = \_?\_$ Simplify. r^3; 421.875

$\_?\_ = \_?\_$ Solve for x by taking the $\_?\_$ root of both sides. $\sqrt[3]{r^3}$; $\sqrt[3]{421.875}$; cube

$\_?\_ = \_?\_$ Simplify. r; $\sqrt[3]{421.875}$

$r = \_?\_$ cm Use a calculator to find the cube root. 7.5

Diameter $= 2 \cdot r$

$= 2 \cdot \_?\_$ Substitute values. 7.5

$= \_?\_$ cm Evaluate. 15

The diameter of the watermelon is $\_?\_$ centimeters. 15

Lesson 1.6 Square and Cube Roots

Independent Practice #9-16

Name:_____ Period_____

Practice 1.6

Examples

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Let the radius of the crystal globe be r centimeters.

Math Note

Remember that you can express areas and volumes of circles and spheres in terms of π to simplify calculations.

Solve each equation involving a variable that is squared. Round your answer to the nearest tenth when you can.

9 $a^2 = 46.24$

10 $b^2 = \frac{25}{49}$

11 $m^2 = 196$

12 $n^2 = 350$

Solve each equation involving a variable that is cubed. Write fractions in simplest form, and round decimal answers to the nearest tenth.

13 $x^3 = 74.088$

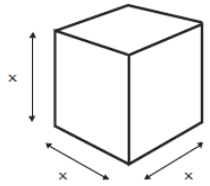
14 $x^3 = \frac{216}{729}$

15 $x^3 = 1{,}728$

16 $x^3 = 2{,}500$

Homework Cube Root

$\sqrt[3]{\text{CUBE ROOT}}$



$X^3 = Y$ $\sqrt[3]{Y}$

THE CUBE AND CUBE ROOT

Consider X as the cube root and Y as the cube.
To cube a number, multiply it 3 times.
If X=2, the cube of 2 would be 2x2x2=8
If X= 4, the cube of 4 would be 4x4x4=64
If Y=27, the cube root would be 3 because 3x3x3=27

Calculate the cube:

1. x = 3
2. x = 9
3. x = 1.5
4. x = - 4
5. x = 10
6. x = -8
7. x = 6
8. x = .5

Calculate the cube root :

Lesson Check #8 and 17 Can evaluate the cube root of a number and solve real-world problems