

NTI Mathematics

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1. What is the difference between a rational number and an irrational number?

2. Which number represents $5.3\overline{3}$ written as a fraction?

- (A) $\frac{533}{100}$
 (B) $\frac{53.3}{10}$
 (C) $\frac{5}{3}$
 (D) $\frac{16}{3}$

3. Select all numbers that are rational.

- 3
 $3.\overline{75}$
 $-\sqrt{2}$
 $\frac{1563}{25}$
 $\frac{\pi}{2}$

4. Which number represents $6.8\overline{33}$ written as a mixed number?

- (A) $6\frac{8}{3}$
 (B) $6\frac{1}{3}$
 (C) $6\frac{833}{1000}$
 (D) $6\frac{5}{6}$

5. Select the fraction that is equivalent to each repeating decimal.

	$\frac{56}{11}$	$\frac{50}{9}$	$\frac{7}{9}$
0.77	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.09	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.55	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Select all the equations that correctly relate a decimal to a fraction or mixed number.

- $2.5 = \frac{25}{10}$
 $6.8 = 6\frac{8}{5}$
 $4.\overline{1} = \frac{37}{9}$
 $\sqrt{5} = 2\frac{2}{5}$
 $1.\overline{25} = \frac{5}{4}$

7. Write $4.\overline{18}$ as an improper fraction and a mixed number.

8. Select all the numbers that are irrational.

- $\sqrt{2}$ $5.\overline{87}$
 $\frac{10}{\sqrt{100}}$ $\frac{\sqrt{8}}{\sqrt{2}}$
 $\sqrt{7}$

9. What is $0.\overline{3}$ written as a fraction?

10. Convert $6\frac{8}{11}$ to a decimal.

11. Select all the numbers that are irrational.

- $-\sqrt{5}$
 $-\sqrt{49}$
 $\sqrt{0}$
 π
 $-0.\overline{7}$

12. Select all the numbers that are rational.

- 3
 $2 + 2$
 $\sqrt{-97}$
 $\frac{7}{10}$
 $3\sqrt{2}$

13. Convert $\frac{1}{8}$ to a decimal.

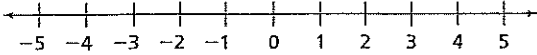
14. Represent $7.\overline{6}$ as a mixed number and improper fraction.

15. Select all numbers that are equivalent to a repeating decimal.

- $\frac{3}{7}$
 $\frac{9}{18}$
 $\frac{3}{5}$
 $\frac{2}{10}$
 $\frac{8}{24}$

1. What is the approximate value of $\sqrt{7}$, to the nearest tenth?

2. Place a point where you think $-\sqrt{5}$ would go on the number line.



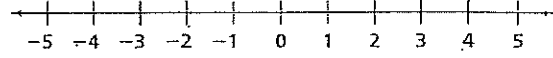
3. Which is the best approximation of $\sqrt{11}$?

- (A) 3.5
- (B) 2.5
- (C) 5
- (D) 5.5

4. In which list are the numbers in order from least to greatest?

- (A) $\pi, \frac{11}{3}, \sqrt{11}, 3.5$
- (B) $\frac{11}{3}, \pi, 3.5, \sqrt{11}$
- (C) $\pi, \sqrt{11}, 3.5, \frac{11}{3}$
- (D) $\sqrt{11}, \frac{11}{3}, \pi, 3.5$

5. Place a point where you think $\sqrt{22}$ would go on the number line.



6. Which value is the closest approximation of $\sqrt{27}$?

- (A) 4.5
- (B) 5
- (C) 5.5
- (D) 5.9

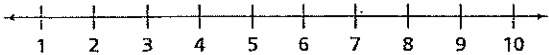
7. Osa is trying to estimate $\sqrt{8}$. So far she has 2.8, but she wants one more digit to make it more accurate. What value would you add to Osa's estimate of $\sqrt{8}$? How can you tell that your estimate is more accurate than Osa's?

8. Which fraction is the closest estimate to $\sqrt{10}$?

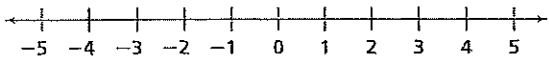
- (A) $2\frac{1}{2}$
- (B) $3\frac{1}{5}$
- (C) 3
- (D) $\frac{1}{10}$

9. What is the approximate value of $\sqrt{68}$, to the nearest tenth?

10. Place a point where you think $\sqrt{78}$ would go on the number line.



11. Place where you think $-\sqrt{15}$ would go on the number line.



12. Between which two integers does $-\sqrt{46}$ appear on the number line?

13. Which is the closest approximation to $\sqrt{103}$?

- (A) 10
- (B) 10.1
- (C) 10.3
- (D) 10.5

14. What is the approximate value of $\sqrt{74}$, to the nearest tenth?

15. Which is the closest approximation of $\sqrt{53}$?

- (A) 7.1
- (B) 7
- (C) 7.2
- (D) 7.3

16. Which is the closest approximation of $\sqrt{28}$?

- (A) 5
- (B) 6
- (C) 5.5
- (D) 5.3

Name _____

1. Write an equivalent expression for $6^3 \cdot 6^2 \cdot 6^5 \cdot 6$.

2. Select all the pairs of equivalent expressions.

- $5^3 \cdot 5$ and 25^2
 $5^3 \cdot 4^2$ and 20^6
 $(6^2)^3$ and 6^5
 $(3^2)^3$ and $3^2 \cdot 3^2 \cdot 3^2$
 $5^4 \cdot 5^4 \cdot 5^4$ and $(5^4)^4$

3. Which expression is equivalent to $3^7 \div 9$?

- (A) $\frac{17}{3}$
 (B) 3^6
 (C) 3^5
 (D) $\frac{15}{3}$

4. Match the equivalent expressions.

	5	1	$\frac{1}{25}$	25
5^0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5^2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5^{-2}	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5^1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. Simplify the expression $2^4 \div 2^{10}$.

6. Select all the expressions that are equivalent to $2^3 \cdot 4^3$.

- 4^6
 8^3
 2^8
 2^9
 8^6

7. Rewrite $\left(\frac{1}{7}\right)^{-2}$ with a positive exponent.

8. Simplify $5^2 \cdot 5^4 \cdot 5^{-3}$.

9. Is $2^3 \cdot 3^2 = 6^5$? Explain.

10. What is the value of $6^5 \times 6^{-8}$?

- (A) 6^3
- (B) $-\frac{1}{216}$
- (C) 216
- (D) $\frac{1}{216}$

11. Which expression has a value that is less than zero?

- (A) 8^0
- (B) $-(8^0)$
- (C) $(\frac{1}{8})^0$
- (D) $(-\frac{1}{8})^{-2}$

12. Which expression has a value greater than 1?

- (A) 7^{-2}
- (B) $(7)^{-1}$
- (C) $(\frac{1}{7})^{-2}$
- (D) -7^2

13. What is the value of $3^7 \div 3^8 \cdot 3^4$?

- (A) 3^3
- (B) 3^{20}
- (C) 3^5
- (D) 3^{-5}

14. Is $5^4 \cdot 3^4 = 15^4$ a true statement? Explain.

15. Which expression has a value less than one?

- (A) $(\frac{1}{9})^{-2}$
- (B) 9^0
- (C) 9^{-1}
- (D) $(-\frac{1}{9})^{-2}$

16. What is the value of $(\frac{1}{5})^{-2} \cdot 5^3 \div 5^7$?

- (A) 5^{-6}
- (B) 25
- (C) 5^{-8}
- (D) $\frac{1}{25}$

17. Select all the pairs of expressions that are equivalent.

- $6^7 \div 6^{-2}$ and 6^5
- $(6^3)^0$ and 6^1
- $5^{-1} \cdot 5^{-1}$ and 25^{-1}
- $8^0 \cdot 8^3$ and 8^3
- $4^{-3} \div 4^2$ and 4^5

18. Which expression is equivalent to $(2 \cdot 2 \cdot 2 \cdot 2) \cdot (3 \cdot 3 \cdot 3)$?

- (A) $2(6)^2$
- (B) $3(2)^4$
- (C) $8 \cdot 9$
- (D) $2(6^3)$

1. Which number is a perfect square?

- (A) 4
(B) 6
(C) 8
(D) 10

2. The area of a square is 36 cm^2 . What is the side length, s ?

3. Solve the equation $x^2 = 6$.

- (A) $x = 3$
(B) $x = \pm 3$
(C) $x = \sqrt{6}$
(D) $x = \pm \sqrt{6}$

4. Solve the equation $x^2 = 49$.

5. Which is an irrational number?

- (A) $\sqrt{2}$
(B) $\sqrt{4}$
(C) $\sqrt[3]{8}$
(D) $\sqrt{16}$

6. Karen is making a frame for a square picture with an area of 169 square inches. How many inches of framing are needed?

7. A cube-shaped box has a volume of 95 cm^3 . Which equation would you use to determine the length of one edge, E , of the box?

- (A) $E = \frac{95}{6} \text{ cm}^2$
(B) $E = \sqrt{95} \text{ cm}$
(C) $E = \sqrt[3]{95} \text{ cm}$
(D) $E = 95^3$

8. Solve the equation $x = \sqrt[3]{216}$.

9. Solve the equation $x^2 = 121$.

- (A) $x = \sqrt{11}$
(B) $x = 121$
(C) $x = \pm 11$
(D) $x = 11^2$

10. Marie is building a fence around a yard in the shape of a square. The area of the yard is 169 square feet. How many feet of fencing does Marie need for her yard?

- (A) 13 feet
(B) 52 feet
(C) 26 feet
(D) 676 feet

11. Enrico is laying 1-ft square tiles on a square bathroom floor. If he needs 81 tiles to cover the floor, how many tiles run along each wall?

12. Eli has 600 cubes that are 1 cubic inch. Select the smallest length a cube-shaped box can have while being able to hold the 600 cubes.

- (A) 7 in.
- (B) 8 in.
- (C) 9 in.
- (D) 10 in.

13. The perimeter of a square is 20 feet. What is the area of the square?

- (A) 5 ft^2
- (B) 20 ft^2
- (C) 25 ft^2
- (D) 100 ft^2

14. Solve the equation $x^3 = 0.027$.

- (A) $x = 0.3$
- (B) $x = \pm 0.3$
- (C) $x = 0.03$
- (D) $x = \pm 0.03$

15. Lisa has a cube-shaped box with a volume of 512 cm^3 . If Lisa fills the box with 1-cubic centimeter blocks, how many blocks make up each layer?

- (A) 8
- (B) 64
- (C) 16
- (D) 256

16. Select all the pairs that are equivalent.

- 1^3 and 1^2
- $\sqrt{729}$ and 3^3
- $\sqrt{81}$ and 3^3
- 8^2 and 4^3
- $\sqrt[3]{64}$ and 4^2

17. A cube-shaped box has a volume of 1,331 cubic inches. How would you determine the area of one side?

- (A) Set the volume equal to x^3 , solve for x and multiple by 6.
- (B) Set the volume equal to x^3 , solve for x , square x .
- (C) Set the volume equal to x^2 , solve for x and multiple by 4.
- (D) Set the volume to equal to x^2 , solve for x .

1. Which is the best estimate of 7,625,750,263?

(A) 7×10^{10}
 (B) 7×10^9
 (C) 8×10^{10}
 (D) 8×10^9

2. Complete the table by estimating and writing each number as a single digit times a power of 10.

Number	Estimate using a single digit and power of 10
23,898,497	
0.000136	
26,857	
0.0302	

3. Which number is the best estimate of 0.00003762?

(A) 4×10^5
 (B) 4×10^{-5}
 (C) 3×10^{-4}
 (D) 3×10^{-5}

4. The number 11,934,734 can be estimated by 1 times a power of 10. What is the power of 10?

(A) 10^7
 (B) 10^6
 (C) 10^1
 (D) 10^{-6}

5. The population of the United States is approximately 3×10^8 . The population of Iceland is approximately 1,000 times smaller than the population of the United States. Write an estimate for the population of Iceland.

6. The mass of a sesame seed is 0.0046 g. The mass of a pollen grain is 0.000000000513 g. About how many times greater is the mass of a sesame seed than the mass of a pollen grain?

7. A human blinks 9,460,800 times per year. A dog blinks 1,861,440 times per year. About how many more times does a human blink than a dog?

(A) 10
 (B) 8
 (C) 5
 (D) 2

8. The number -0.0084 can be estimated by -8 times a power of 10. What is the power of 10?

9. The *Challenger Deep* is the deepest part of the ocean at 36,070 feet below sea level. *Mount Everest* is the world's highest mountain at 29,029 feet above sea level. How can you estimate how many times greater the distance to the bottom of *Challenger Deep* is than the distance to the top of *Mount Everest*?

- (A) $\frac{3 \times 10^4}{2 \times 10^4}$
- (B) $\frac{3 \times 10^5}{2 \times 10^5}$
- (C) $\frac{4 \times 10^4}{3 \times 10^4}$
- (D) $\frac{3 \times 10^5}{4 \times 10^5}$

10. What number is 30 times larger than 3×10^4 ?

11. The number 0.0201 can be estimated by 2 times a power of 10. What is the power of 10?

- (A) 10^{-3}
- (B) 10^{-2}
- (C) 10^{-1}
- (D) 10^2

12. 6×10^{-4} is an estimate for which number?

- (A) 59,459
- (B) 0.00067
- (C) 69,237
- (D) 0.00058

13. Which number's estimate written as a single digit times a power of 10 will have a negative exponent?

- (A) 0.0023967
- (B) 1,023,967
- (C) 10,239,670
- (D) 23,967

14. Select the best estimate for each number.

	5×10^{-5}	5×10^4	5×10^{-3}	5×10^6
48,753	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0.005376	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4,632,125	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0.0000492	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Name _____

Reteach to Build
Understanding

1-1

Day
6

How can you write $0.\overline{72}$ as a fraction?

$$\text{Let } x = 0.\overline{72}.$$

Set the decimal number equal to x .

$$100x = 72.\overline{72}$$

Multiply each side by a power of 10 to get repeating numbers to the left of the decimal point.

$$100x - x = 72.\overline{72} - 0.\overline{72}$$

Subtract the equations to eliminate the repeating decimals.

$$99x = 72$$

$$\frac{99x}{99} = \frac{72}{99}$$

Solve for x .

$$x = \frac{8}{11}$$

In yesterday's basketball game, Raul made $77.\overline{7}\%$ of his shots. What fraction of his shots did he make?

1. How would you write $77.\overline{7}\%$ as a decimal? Set that decimal equal to x . What digit or digits repeat?
2. Multiply each side of the equation by a power of 10 to get the repeating digit(s) to the left of the decimal point. Since you only need to move one place, multiply each side by 10.
3. Subtract the equation in Exercise 1 from the equation in Exercise 2. Then simplify.
4. Divide each side of the equation by 9 to solve for x . What fraction is equal to x ? Show your work.
5. What fraction of Raul's shots did he make?

On the Back!

6. This season, Jenny's lacrosse team had a winning percentage of $0.8\overline{3}$. What fraction of their games did Jenny's team win?

Name _____

Choose the term from the list that *best* represents the item in each box.

equivalent
power of 10

fraction
repeating decimal

mixed number
repeating digits

nonrepeating digit
terminating decimal

1. $4\frac{3}{11}$

2. $0.\overline{6}$

3. $0.\overline{45} \cdot 100 = 45.\overline{45}$



4. $2.8333\dots$



5. $2.181818\dots$



6. $0.555\dots = \frac{5}{9}$



7. $\frac{5}{6}$

8. 0.625

Name _____

Reteach to Build
Understanding

1-2

Day 7

Rational Numbers

Any number that can be written as a ratio of two nonzero integers is a rational number.

Decimal expansions of rational numbers either terminate or repeat.

All integers are rational numbers.

Examples: -235 $\frac{3}{4}$ $0.9\bar{4}$

Irrational Numbers

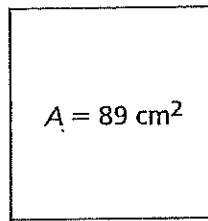
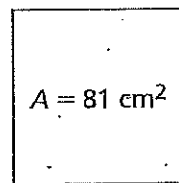
Numbers that are not rational are called irrational.

The decimal expansion of an irrational number does not terminate or repeat.

Square roots of nonperfect squares are irrational numbers.

Examples: $4.121121112\dots$ π $\sqrt{8}$

For each square below, is the side length rational or irrational?



1. What is the formula for the area of a square?
2. If you know the area of a square, how can you find its side length?
3. Write the side length of each square as a square root.
4. Is each side length rational or irrational? Explain.

On the Back!

5. Vidal has a screw that measures $\frac{1}{7}$ inch. Is $\frac{1}{7}$ a rational number or an irrational number? Explain.

Name _____

Complete the vocabulary chart. Include two examples of each term.

Word or Phrase	Definition	Examples
rational number		46, $-\frac{3}{7}$
irrational number	An irrational number is any number that cannot be written in the form $\frac{a}{b}$, where a and b are integers and $b \neq 0$.	
square root		$\sqrt{4} = 2$ because $2^2 = 4$; $\sqrt{36} = 6$ because $6^2 = 36$.
perfect square		9 because $3^2 = 9$; 25 because $5^2 = 25$.
real number	A real number is a number that is a rational or irrational number.	

Name _____

Reteach to Build
Understanding

1-3

Day 8

Between which two whole numbers is $\sqrt{19}$?

$$16 < 19 < 25$$

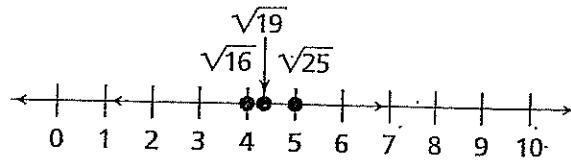
Order 19 between two consecutive perfect squares.

$$\sqrt{16} < \sqrt{19} < \sqrt{25}$$
 Take the square root of each number.

$$4 < \sqrt{19} < 5$$

$$\sqrt{16} = 4 \text{ and } \sqrt{25} = 5.$$

$\sqrt{19}$ is closer to 4 than it is to 5 since 19 is closer to 16 than it is to 25.



Cameron wants the longest skateboard sticker he can find. An online shop has stickers that are $9\frac{2}{5}$ inches, 9.35 inches, and $\sqrt{80}$ inches long. What is the length of the longest sticker?

1. Write $9\frac{2}{5}$ in decimal form.
2. Approximate $\sqrt{80}$ by using perfect squares. 80 is between which two perfect squares?

What are the square roots of those two perfect squares?

What is the approximate value of $\sqrt{80}$?

3. Write the lengths of the bumper stickers in order from least to greatest.
4. What is the length of the longest bumper sticker?

On the Back!

5. Ephraim's car is $\sqrt{120}$ feet long. Hadley's car is 15 feet long. Whose car is longer? Explain.

Name _____

Use the bank below to complete each sentence. You may use terms more than once

rational number	greater than	approximation	square root
perfect square	irrational number	less than	order

1. $\sqrt{36} = 6$ $\sqrt{5} = 2.2360667\dots$
- a. The number 36 is a(n) _____ because $6 \times 6 = 36$.
- b. The number 2.2360667... is a(n) _____
because it cannot be written as a fraction.
- c. To compare $\sqrt{36}$ and $\sqrt{5}$, you can write $\sqrt{36}$ is
_____ $\sqrt{5}$.

2. $\sqrt{81} > \sqrt{64} > \sqrt{44}$
- a. The value of $\sqrt{64}$ is _____ $\sqrt{81}$ and _____
 $\sqrt{44}$.
- b. You know the number 44 is not a(n) _____,
because no integer multiplied by itself equals 44.
- c. Rounded to the nearest tenth, a(n) _____
for $\sqrt{44}$ is 6.6.

3. $\sqrt{25} = 5$ $\sqrt{16} = 4$ $\pi \approx 3.14$
- a. The _____ of 25 equals 5.
- b. The _____ of 16 equals 4.
- c. Rounded to the nearest hundredth, a(n) _____
for π is 3.14.
- d. Compare and _____ the numbers from least to greatest;
 π is _____ $\sqrt{16}$, which is _____ $\sqrt{25}$.

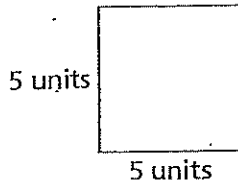
Name _____

Reteach to Build
Understanding

1-4

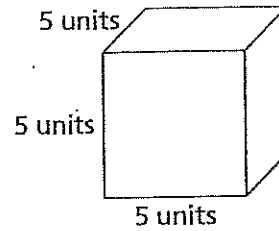
Day 9

A square root is one of
two equal factors of a number.



$$5 \times 5 = 25, \text{ so } \sqrt{25} = 5.$$

A cube root is one of
three equal factors of a number.



$$5 \times 5 \times 5 = 125, \text{ so } \sqrt[3]{125} = 5.$$

Alistair has a cube-shaped box that has a volume of 216 cubic inches. What is the edge length of Alistair's box?

1. What is the formula for the volume of a cube?
2. If you know the volume of a cube, how do you find its edge length?
3. How would you write the edge length of Alistair's box using a cube root?
4. Fill in the boxes to find the cube root.

$$\begin{aligned}\sqrt[3]{216} &= \sqrt[3]{6 \cdot \square \cdot \square} \\ &= \sqrt[3]{\square^3} \\ &= \square\end{aligned}$$

5. What is the edge length of Alistair's box?

On the Back!

6. Sian's room is in the shape of a square. Its area is 121 square feet. How long is one side of Sian's room?

Name _____

Complete the vocabulary chart.

Term	Definition	Example
square root	The square root of a number is a number whose square is equal to that number.	
perfect square		Since $7^2 = 49$, 49 is a perfect square.
cube root		Since $\sqrt[3]{8} = 2$, 2 is the cube root of 8.
perfect cube	A perfect cube is a number that is the cube of an integer.	

Complete each sentence using the terms from the vocabulary chart above. You may use each term more than once.

1. The number 25 is a . The of 25 equals 5.
2. The number 216 is a . The of 216 equals 6.
3. The number 64 is a and a . Its is 8 and its is 4.

Name _____

Reteach to Build
Understanding

1-5

Day 10

Sandi is tiling her bathroom counter. Each square tile has an area of 9 square inches. How many tiles will fit along a side of the counter that measures 15 inches?

Find the side length of each tile.

$$A = s^2 \quad \text{Use the formula for area of a square.}$$

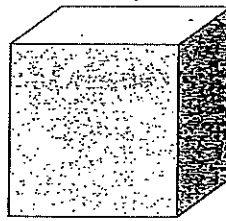
$$9 = s^2 \quad \text{Substitute 9 for } A.$$

$$\sqrt{9} = \sqrt{s^2} \quad \text{Take the square root of each side.}$$

$$\pm 3 = s \quad \text{Simplify.}$$

Since length is positive, each side length of the tile is 3 inches. So, the number of tiles that will fit along a 15-inch side of the counter is $15 \div 3 = 5$, or 5 tiles.

Carlo is building a wooden box that is shaped like a cube. He wants the box to have a volume of 64 cubic inches. How many square inches of wood does Carlo need to build the box?



$$V = 64 \text{ in.}^3$$

1. What is the length of one edge of the box?
2. What is the area of one face of the box?
3. What is the total area of all faces of the box?
4. How much wood does Carlo need to build his box?

On the Back!

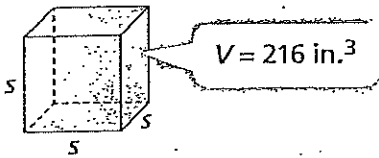
5. Marjorie has a square tabletop whose area is 36 square feet. What is the tabletop's perimeter?

Name _____

Use the bank below to complete each sentence.

square root	perfect square	length	area	positive
cube root	perfect cube	edge	volume	negative

1. $V = s^3$



- The of this cube is 216 cubic inches.
- The of 216 is 6 because $6 \times 6 \times 6 = 216$.
- The number 216 is a because $6^3 = 216$.
- The of each of the cube is 6 inches.
- The of one face of the cube is 36 square inches.

2. If $x^2 = 121$, what is $\sqrt{x^2}$?

- Since $11^2 = 121$, the number 121 is a .
- The number 11 is a of 121, as is its opposite -11 .
- The square root of a number can be either or .