Name: Date:

WORKSHEET :

Squares & Square Roots

Perfect Squares:

1. $2^2 =$ $3^2 =$ $4^2 =$
2. $5^2 =$ $6^2 =$ $7^2 =$
3. $8^2 =$ $9^2 =$ $10^2 =$
4. $11^2 =$ $12^2 =$ $13^2 =$
5. $14^2 =$ $15^2 =$ $16^2 =$
6. $17^2 =$ $18^2 =$ $19^2 =$
7. $20^2 =$ $21^2 =$ $22^2 =$

Square Roots:

8. $\sqrt{25} =$ $\sqrt{81} =$ $\sqrt{256} =$
9. $\sqrt{400} =$ $\sqrt{324} =$ $\sqrt{225} =$
10. $\sqrt{289} =$ $\sqrt{144} =$ $\sqrt{169} =$
11. $\sqrt{100} =$ $\sqrt{10{,}000} =$ $\sqrt{1{,}000{,}000} =$
12. $\sqrt{900} =$ $\sqrt{1{,}600} =$ $\sqrt{25{,}000{,}000} =$
13. $\sqrt{2{,}500} =$ $\sqrt{360{,}000} =$ $\sqrt{12{,}100} =$
14. $\sqrt{1000} =$ $\sqrt{10} =$ $\sqrt{100{,}000} =$
15. $\sqrt{8} =$ $\sqrt[3]{8} =$ $\sqrt[3]{27} =$

WORKSHEET :

Squares & Square Roots

Perfect Squares and Cubes Operations

Write the square or cube for each number.

1) $11^3 =$ _____ 2) $14^2 =$ _____ 3) $18^3 =$ _____

4) $2^3 =$ _____ 5) $4^3 =$ _____ 6) $20^2 =$ _____

Write the square root for each number.

7) $\sqrt{361} =$ _____ 8) $\sqrt{16} =$ _____ 9) $\sqrt{100} =$ _____

10) $\sqrt{81} =$ _____ 11) $\sqrt{4} =$ _____ 12) $\sqrt{225} =$ _____

Write the cube root for each number.

13) $\sqrt[3]{8000} =$ _____ 14) $\sqrt[3]{1728} =$ _____ 15) $\sqrt[3]{6859} =$ _____

16) $\sqrt[3]{4913} =$ _____ 17) $\sqrt[3]{8} =$ _____ 18) $\sqrt[3]{1331} =$ _____

WORKSHEET :

Squares & Square Roots

Algebraic Ops with Perfect Squares and Cubes

Find the variable in each quadratic or cubic equation.

1) $d^3 = -125$ 2) $a^3 = 2197$ 3) $m^2 = 256$

4) $g^3 = -8$ 5) $z^3 = 729$ 6) $x^2 = 196$

Find the variable in each quadratic equation.

7) $w^2 = 121$ 8) $t^2 = 196$ 9) $e^2 = 225$

10) $c^2 = 1$ 11) $n^2 = 144$ 12) $s^2 = 81$

Find the variable in each cubic equation.

13) $v^3 = -729$ 14) $r^3 = 1728$ 15) $k^3 = 6859$

16) $h^3 = -2744$ 17) $u^3 = -8000$ 18) $b^3 = 1000$

ANSWERS :

Squares & Square Roots

Perfect Squares:

1.	$2^2 = 4$	$3^2 = 9$	$4^2 = 16$
2.	$5^2 = 25$	$6^2 = 36$	$7^2 = 49$
3.	$8^2 = 64$	$9^2 = 81$	$10^2 = 100$
4.	$11^2 = 121$	$12^2 = 144$	$13^2 = 169$
5.	$14^2 = 196$	$15^2 = 225$	$16^2 = 256$
6.	$17^2 = 289$	$18^2 = 324$	$19^2 = 361$
7.	$20^2 = 400$	$21^2 = 441$	$22^2 = 484$

Square Roots:

8.	$\sqrt{25} = 5$	$\sqrt{81} = 9$	$\sqrt{256} = 16$
9.	$\sqrt{400} = 20$	$\sqrt{324} = 18$	$\sqrt{225} = 15$
10.	$\sqrt{289} = 17$	$\sqrt{144} = 12$	$\sqrt{169} = 13$
11.	$\sqrt{100} = 10$	$\sqrt{10{,}000} = 100$	$\sqrt{1{,}000{,}000} = 1{,}000$
12.	$\sqrt{900} = 30$	$\sqrt{1{,}600} = 40$	$\sqrt{25{,}000{,}000} = 5{,}000$
13.	$\sqrt{2{,}500} = 50$	$\sqrt{360{,}000} = 600$	$\sqrt{12{,}100} = 110$
14.	$\sqrt{1000} = 31.62$	$\sqrt{10} = 3.162$	$\sqrt{100{,}000} = 316.2$
15.	$\sqrt{8} = 2\sqrt{2}$	$\sqrt[3]{8} = 2$	$\sqrt[3]{27} = 3$

ANSWERS :

Squares & Square Roots

Perfect Squares and Cubes Operations

Write the square or cube for each number.

1) $11^3 = 1331$ 2) $14^2 = 196$ 3) $18^3 = 5832$

4) $2^3 = 8$ 5) $4^3 = 64$ 6) $20^2 = 400$

Write the square root for each number.

7) $\sqrt{361} = 19$ 8) $\sqrt{16} = 4$ 9) $\sqrt{100} = 10$

10) $\sqrt{81} = 9$ 11) $\sqrt{4} = 2$ 12) $\sqrt{225} = 15$

Write the cube root for each number.

13) $\sqrt[3]{8000} = 20$ 14) $\sqrt[3]{1728} = 12$ 15) $\sqrt[3]{6859} = 19$

16) $\sqrt[3]{4913} = 17$ 17) $\sqrt[3]{8} = 2$ 18) $\sqrt[3]{1331} = 11$

ANSWERS :

Squares & Square Roots

Algebraic Ops with Perfect Squares and Cubes

Find the variable in each quadratic or cubic equation.

1) $d^3 = -125$
$d = -5$

2) $a^3 = 2197$
$a = 13$

3) $m^2 = 256$
$m = \pm 16$

4) $g^3 = -8$
$g = -2$

5) $z^3 = 729$
$z = 9$

6) $x^2 = 196$
$x = \pm 14$

Find the variable in each quadratic equation.

7) $w^2 = 121$
$w = \pm 11$

8) $t^2 = 196$
$t = \pm 14$

9) $e^2 = 225$
$e = \pm 15$

10) $c^2 = 1$
$c = \pm 1$

11) $n^2 = 144$
$n = \pm 12$

12) $s^2 = 81$
$s = \pm 9$

Find the variable in each cubic equation.

13) $v^3 = -729$
$v = -9$

14) $r^3 = 1728$
$r = 12$

15) $k^3 = 6859$
$k = 19$

16) $h^3 = -2744$
$h = -14$

17) $u^3 = -8000$
$u = -20$

18) $b^3 = 1000$
$b = 10$

KEY CONCEPTS:

Learn the basic definition and behaviors of squares, memorize the squares up to 20^2, understand how to take the square root in reverse order to undo squaring, and accustom students with tips to quickly find square roots.

1. Any number, variable or expression squared is that number or variable multiplied by itself. The square is represented by a superscript 2 to the upper right of the value squared. e.g.

$5^2 = 5 \times 5$
$y^2 = y \times y$
$(x + 1)^2 = (x + 1)(x + 1) = x^2 + 2x + 1$

a. The square of either positive or negative value is always a positive value result.

2. The square root of a number, indicated by the radical symbol "√", is the inverse of squaring (almost),and it undoes the square operation. The square root of a number is the value that can be multiplied by itself to get the number in question. e.g.

$\sqrt{a} \times \sqrt{a} = a$
$\sqrt{3} \times \sqrt{3} = 3$

a. The square root of a negative value is not real but imaginary. e.g. $\sqrt{-1}$
b. The square root of a positive value has only a positive value solution by definition. e.g. $\sqrt{9} = +3$
c. One approach to estimate a square root is to assume the number in question is the square of some number and find the nearest perfect squares that would be above and below the number.

e.g. $\sqrt{425}$ is greater than $\sqrt{400} = 20$ and less than $\sqrt{441} = 21$, therefore the absolute value of square root will be between 20 and 21.

e.g. $\sqrt{10}$ is greater than $\sqrt{9} = 3$ and less than $\sqrt{16} = 4$, therefore the absolute value of the square root will be between 3 and 4.

d. Square roots of numbers ending in an even number of zeroes can be quickly evaluated by halving the number of zeroes. e.g. $\sqrt{10{,}000} = 100$

3. Cubes & Cube roots - introduce similar concept to squares, but the exponent is 3.
a. $5^3 = 5 \times 5 \times 5 = 125$ or $(-5)^3 = -5 \times -5 \times -5 = -125$ negative results are possible unlike squares
b. $\sqrt[3]{3} \times \sqrt[3]{3} \times \sqrt[3]{3} = 3$
c. $\sqrt[3]{8} = 2$ because $2 \times 2 \times 2 = 8$
d. $\sqrt[3]{-8} = -2$ negative roots are possible