

Powers and Roots

KS3 Maths · Follows the national curriculum

Name _____ Class _____ Date _____

1. Worked example

Find 7^2 and $\sqrt{49}$

Step 1 · 7^2 means 7 multiplied by itself

$$7^2 = 7 \times 7 = 49$$

Step 2 · $\sqrt{49}$ asks: what number $\times$ itself = 49?

$$\sqrt{49} = 7 \text{ (the inverse of squaring)}$$

Step 3 · Check: does $7^2 = 49$?

$$7 \times 7 = 49 \checkmark$$

Answer: $7^2 = 49$ and $\sqrt{49} = 7$

Check: Squaring and square-rooting are inverse operations

2. Now try one with the steps

Calculate 3^5

Step 1 · 3^5 means five 3s multiplied together

Step 2 · Build up in stages to avoid errors

Step 3 · Write the answer

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Work out 8^2 [1]

2. Find $\sqrt{81}$ [1]

3. Calculate 4^3 [1]

4. Work out 2^6 [2]

5. Is 75 a square number? Explain. [2]

6. Between which two consecutive whole numbers does $\sqrt{200}$ lie? [2]

7. Find $\sqrt{144}$ [1]

8. Work out 5^3 [1]

9. Find $\sqrt[3]{1000}$ [1]

10. Work out 3^4 [1]

11. Work out $2^3 + 3^2$ [2]

12. Work out 10^6 [1]

13. Work out $(-4)^2$ [1]

14. Work out $\sqrt{(16 + 9)}$ [2]

15. Work out $\sqrt{(5^2 - 4^2)}$ [2]

16. A square has an area of 196 cm^2 . Find its perimeter. [3]

17. Without a calculator, estimate $\sqrt{50}$ to 1 decimal place. [3]

4. Before you hand it in

$7^2 = 14$ (multiplied by 2 instead of by itself)

n^2 means n multiplied by n . $7^2 = 7 \times 7 = 49$. The exponent (2) tells you how many times to use 7 factor.

$\sqrt{81} = 40.5$ (divided by 2)

$\sqrt{n}$ asks 'what number $\times$ itself = n ?'. $\sqrt{81} = 9$, because $9 \times 9 = 81$. Dividing by 2 is not related.

$5^3 = 15$ (multiplied by 3 instead of cubing)

5^3 means $5 \times 5 \times 5 = 125$. The exponent says how many times to use 5 factor, not what to multiply by.

$2^5 = 10$ (multiplied base by index: 2×5)

$2^5 = 2 \times 2 \times 2 \times 2 \times 2 = 32$. Build up: 2, 4, 8, 16, 32. Never multiply the base by the power.