

WA7MNAA3

Algebraic techniques

Core + Challenge

Squares, Cubes and Roots

I can find square numbers, cube numbers, square roots and cube roots, and estimate square roots.

Name: _____ Date: _____ Score: _____ / 56

Key idea

Square and square root: $9^2 = 9 \times 9 = 81$, so $\sqrt{81} = 9$. The square root undoes squaring.

Cube and cube root: $6^3 = 6 \times 6 \times 6 = 216$, so $\sqrt[3]{216} = 6$.

Estimating roots: $\sqrt{34}$ lies between $\sqrt{25} = 5$ and $\sqrt{36} = 6$. 34 is much closer to 36, so $\sqrt{34} \approx 5.8$ (calculator: 5.83).

Know your squares to $15^2 = 225$ and cubes to $5^3 = 125$, plus $10^3 = 1000$.

A

Fluency *practise the skill*

/ 16 marks

Evaluate or answer each without a calculator.

1. $13^2 =$ _____

9. $\sqrt{400} =$ _____

2. $15^2 =$ _____

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

3. $4^3 =$ _____

11. $\sqrt{(9 \times 16)} =$ _____

4. $10^3 =$ _____

12. $2^3 + 3^2 =$ _____

5. $\sqrt{121} =$ _____

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

6. $\sqrt{196} =$ _____

14. $\sqrt{50}$ lies between which two whole numbers? _____

7. $\sqrt[3]{27} =$ _____

15. $\sqrt{90}$ lies between which two whole numbers? _____

8. $\sqrt[3]{125} =$ _____

16. Estimate $\sqrt{34}$ to 1 d.p. _____

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B**Core** *apply the skill to problems*

/ 22 marks

- 1 A square garden has an area of 144 m^2 . [2 marks]
(a) How long is each side?
(b) What is its perimeter?

.....
.....

Answer: _____

- 2 A cube-shaped box has a volume of 343 cm^3 . How long is each edge? [2 marks]

.....

Answer: _____

- 3 A square room has an area of 30 m^2 . Estimate the side length to 1 decimal place, then check with a calculator. [2 marks]

.....
.....

Answer: _____

- 4 List all the square numbers between 50 and 150. [2 marks]

.....

Answer: _____

- 5 225 square tiles are arranged to make one large square. How many tiles are along each side? [2 marks]

.....

Answer: _____

- 6 Find a number greater than 1 and less than 100 that is both a square number and a cube number. [2 marks]

.....

Answer: _____

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7 Order from smallest to largest: $\sqrt{50}$ 7.2 $\sqrt[3]{343}$ 2^3 [3 marks]

.....

.....

Answer: _____

8 A square has a perimeter of 36 cm. What is its area? [2 marks]

.....

Answer: _____

9 A cube has a total surface area of 150 cm^2 . Find its volume. [3 marks]

.....

.....

Answer: _____

10 Use a calculator to find $\sqrt{2}$ to 2 decimal places. Square your answer. Why isn't it exactly 2? [2 marks]

.....

.....

Answer: _____

C Reasoning *explain, justify and check*

/ 9 marks

1 Explain why $\sqrt{81} = 9$. [2 marks]

.....

.....

2 Mia says $\sqrt{16} = 8$ because $16 \div 2 = 8$. Explain her mistake. [2 marks]

.....

.....

3 Explain why $\sqrt{34}$ is closer to 6 than to 5. [2 marks]

.....

.....

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- 4 Is the square of an odd number always odd? Give examples and explain.

[3 marks]

.....

.....

D Challenge *multi-step and problem-solving*

/ 9 marks

- 1 Find two consecutive whole numbers whose squares differ by 25.

[3 marks]

.....

.....

Answer: _____

- 2 What is the smallest whole number whose square is greater than 1000?

[2 marks]

.....

.....

Answer: _____

- 3 Find a number that is 1 more than a square number and 1 less than a cube number.

[2 marks]

.....

.....

Answer: _____

- 4 $\sqrt{a}$ lies between 8 and 9, and a is a multiple of 7. Find all possible whole-number values of a .

[2 marks]

.....

.....

Answer: _____

How did I go?

Fluency ____ / 16 Core ____ / 22 Reasoning ____ / 9 Challenge ____ / 9 **Total ____ / 56**

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