A Square and A Cube

Standard difficulty · 20 questions · 40 marks · Time: 33 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer 8 × 1 = 8 marks

1. $\sqrt{784}$ equals:

(a) 29 **(b)** 28 **(c)** 26 **(d)** 392

2. 11^3 equals:

(a) 1331 **(b)** 121 **(c)** 33 **(d)** 1342

3. A number that is the square of a whole number is called a:

(a) perfect cube **(b)** prime number
(c) perfect square **(d)** triangular number

4. $\sqrt[3]{12167}$ equals:

(a) 4055 **(b)** 24 **(c)** 529 **(d)** 23

5. Which of these is a perfect cube?

(a) 366 **(b)** 361 **(c)** 343 **(d)** 304

6. What is the ones digit of 44^3?

(a) 3 **(b)** 4 **(c)** 5 **(d)** 9

7. $\sqrt{144}$ equals:

(a) 11 **(b)** 14 **(c)** 12 **(d)** 72

8. How many non-square numbers lie between 529 and 576?

(a) 23 **(b)** 47 **(c)** 46 **(d)** 45

Section B — Short answer 8 × 2 = 16 marks

9. Find $\sqrt{64}$ using prime factorisation.

10. Find $\sqrt[3]{1728}$ using prime factorisation.

11. Find the smallest number by which 486 must be multiplied to make a perfect square, and the square root of the result.

12. Find the smallest number by which 72 must be multiplied to make a perfect cube.

13. Between which two consecutive whole numbers does $\sqrt{8186}$ lie?

14. Write 4^3 as the sum of 4 consecutive odd numbers.

15. Find 145^2 quickly, using the pattern for numbers ending in 5.

16. Is 1857 a perfect square? Give a reason.

Section C — Word problems — 4 × 4 = 16 marks

17. A square garden has an area of 3844 m^2. How long is each side, and how much fencing goes all round it?

18. A cube-shaped water tank holds 8000 litres, and 1 litre fills a cube of side 10 cm. How long is each side of the tank, in cm?

19. How many cubes of side 3 cm can be packed into a cube-shaped box of side 24 cm?

20. 9000 is the sum of two perfect cubes. Find them. (Hint: try cubes up to 20^3.)

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Answer key

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Q	Answer	Working
1	**(b) 28**	28 × 28 = 784
2	**(a) 1331**	11 × 11 × 11
3	**(c) perfect square**	—
4	**(d) 23**	23 × 23 × 23 = 12167
5	**(c) 343**	$7^3 = 343$
6	**(b) 4**	only the ones digit 4 matters: $4^3 = 64$
7	**(c) 12**	—
8	**(c) 46**	2 × 23
9	**8**	$64 = 2^6$; halve each power: $2^3 = 8$
10	**12**	$1728 = 2^6 \times 3^3$; divide each power by 3: $2^2 \times 3 = 12$
11	**6; $\sqrt{2916} = 54$**	$486 = 2 \times 3^5$: make every power even
12	**3**	$72 = 2^3 \times 3^2$: make every power a multiple of 3 → × 3 = 216 = 6^3
13	**90 and 91**	$90^2 = 8100 < 8186 < 8281 = 91^2$
14	**13 + 15 + 17 + 19 = 64**	start at $4^2 - 4 + 1 = 13$
15	**21025**	14 × 15 = 210, then write 25: 21025
16	**No**	$43^2 = 1849$ and $44^2 = 1936$; 1857 is between them
17	**62 m; 248 m**	$\sqrt{3844} = 62$; 4 × 62
18	**200 cm**	$\sqrt[3]{8000} = 20$ small cubes along each edge; 20 × 10 cm
19	**512**	24 ÷ 3 = 8 along each edge; $8^3 = 512$
20	**$10^3 + 20^3 = 1000 + 8000$**	1000 + 8000 = 9000

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