CLASS 8 · MATHEMATICS

# A Square and A Cube

## Sample paper · 15 questions · 22 marks

10 objective questions × 1 mark. Five written-response questions: 12 marks. Write your working where needed. Suggested time: 45 minutes. Answers and marking guidance follow the questions.

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## Section A · Objective questions (10 marks)

1. What is 17 squared?

A. 289

B. 249

C. 269

D. 299

2. What is the value of 6 cubed?

A. 216

B. 36

C. 126

D. 512

3. Which of these numbers is a perfect square?

A. 200

B. 96

C. 121

D. 50

4. Which of these numbers is a perfect cube?

A. 75

B. 250

C. 100

D. 343

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5. What is the units digit of 27 squared?

A. 3

B. 7

C. 9

D. 1

6. What is the sum of the first four odd numbers (1 + 3 + 5 + 7)?

A. 16

B. 20

C. 14

D. 12

7. Which number between 50 and 70 is a perfect square?

A. 68

B. 54

C. 60

D. 64

8. What is the units digit of 9 cubed?

A. 1

B. 7

C. 9

D. 3

9. What is the value of 2 cubed multiplied by 3 squared?

A. 72

B. 96

C. 36

D. 54

10. A triangle has sides 5 cm, 12 cm and 13 cm. Which statement is true?

A. 5 squared + 12 squared = 13 squared

B. 12 squared + 13 squared = 5 squared

C. 5 squared + 13 squared = 12 squared

D. 5 squared + 12 squared = 12 squared

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# Section B · Written responses (12 marks)

Attempt all five. Use a separate sheet if you need more space. The marks for each question are shown.

11. Show that 225 is a perfect square and name the number whose square it is. [2 marks]

12. Small cubes of side 1 cm are packed into a big cube of side 3 cm. How many small cubes fit inside? Explain your reasoning. [2 marks]

13. What is a square number and what is a triangular number? Give one number that is both, with justification. [2 marks]

14. Find the smallest positive integer by which 72 must be multiplied to make it a perfect square. Show your working. [3 marks]

15. Compute 13 squared minus 12 squared, and describe the pattern for the difference of two consecutive squares. [3 marks]

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# Answers & marking guidance

Use these after attempting the paper. Accept equivalent correct reasoning and sensible units. These are Evater model answers, not an official marking scheme.

## Section A · 1 mark each

1. A — 17 squared means 17 x 17 = 289.

2. A — 6 cubed means 6 x 6 x 6 = 216.

3. C — 121 = 11 x 11, so it is a perfect square; the others are not.

4. D — 343 = 7 x 7 x 7, so it is a perfect cube.

5. C — 27 squared is 729, whose units digit is 9; only the units digit 7 of 27 needs to be squared: 7 x 7 = 49.

6. A — 1 + 3 + 5 + 7 = 16, which is 4 squared, matching the pattern that the sum of the first n odd numbers is n squared.

7. D — 64 = 8 squared is the only perfect square between 49 and 81.

8. C — 9 cubed is 729, so its units digit is 9; odd powers of 9 end in 9.

9. A — 2 cubed = 8 and 3 squared = 9, and 8 x 9 = 72.

10. A — 25 + 144 = 169 = 13 squared, so 5, 12, 13 is a Pythagorean triple.

## Section B · Model answers

11. 225 = 15 x 15 = 15 squared, so 225 is a perfect square, namely the square of 15.

Marking: 1 mark for expressing 225 as 15 x 15; 1 mark for stating it is 15 squared.

12. The big cube has 3 cubes along each edge, so it holds 3 x 3 x 3 = 27 small cubes.

Marking: 1 mark for using 3 cubed or a 3 x 3 x 3 arrangement; 1 mark for 27.

13. A square number is a number that is the square of a whole number; a triangular number counts dots in a triangle of rows 1 + 2 + ... + n. 36 is both: 36 = 6 squared and 36 = 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8. (1 is also both.)

Marking: 1 mark for both definitions; 1 mark for a correct example with justification, such as 36 = 6 squared = 8 x 9 / 2.

14. 72 = 2 x 2 x 2 x 3 x 3 = 2 cubed x 3 squared. The prime 2 occurs an odd number of times, so multiplying by 2 pairs it up: 72 x 2 = 144 = 12 squared. The smallest such number is 2.

Marking: 1 mark for prime factorisation of 72; 1 mark for identifying the unpaired factor 2; 1 mark for confirming 144 = 12 squared.

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15. 13 squared - 12 squared = 169 - 144 = 25, which equals 13 + 12. In general, (n + 1) squared - n squared = 2 n + 1, the sum of the two consecutive numbers.

Marking: 1 mark for both square values; 1 mark for the difference 25; 1 mark for the pattern (n + 1) squared - n squared = 2 n + 1 (or n + (n + 1)).

## Topic references

NCERT Class 8 Mathematics, Ganita Prakash, Chapter 1: A Square and A Cube.

https://ncert.nic.in/textbook/pdf/hegp101.pdf

Concept reference only. Questions and model answers are original Evater practice material, not an official NCERT paper.

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