

Cubes and Cube Roots

Question Paper, Set 02

Time: 1 hour 30 minutes

Maximum marks: 50

Name: _____ Class: _____ Date: _____

1. Answer all 20 questions. The marks for each question are shown in brackets.
2. Show your working for the 2, 3 and 5 mark questions.
3. The key sheet and worked solutions are at the end of this paper.

1. Write $y \times y \times y$ in power form. [1 mark]
2. Write $2 \times 2 \times 2 \times 7 \times 7 \times 7$ using cubes. [2 marks]
3. The cube of which number is 125? [1 mark]
4. Is 100 the cube of a whole number? Use the table of cubes. [2 marks]
5. A big cube is made of small cubes, with 6 small cubes along each edge. (i) How many small cubes are in one layer? (ii) How many small cubes are there in all? [3 marks]
6. Find 20^3 . [2 marks]
7. Three cube-shaped stacks are built from small wooden cubes. They have 11, 13 and 20 small cubes along each edge. How many small cubes are in each stack? [5 marks]
8. Write $(-a)^3$ in terms of a^3 . [1 mark]
9. Show that $(-8)^3 = -8^3$. [2 marks]
10. Find 7^3 and $(-7)^3$. How are the two answers related? [3 marks]
11. Find $4^3 + 4^3$. [1 mark]
12. Find the sum of the cubes of all the even numbers from 2 to 8. [5 marks]
13. Simplify $m^3 + (-m)^3$. [1 mark]
14. Find $(-2)^3 + (-5)^3$. [2 marks]
15. Ravi found $4^3 - 7^3 = 279$. Is he right? Find the correct answer. [2 marks]
16. Meena built a big cube using 7 small cubes along each edge. She then took it apart and used some of the small cubes to build a smaller cube with 4 small cubes along each edge. How many small cubes were left over? [3 marks]
17. Find $10^3 - 6^3 - 8^3$. [5 marks]
18. Simplify $x^3 - (-x)^3$. [1 mark]

19. Find $-3^3 - 7^3$. [3 marks]

20. Find the value of $(-3)^3 + 5^3 - (-2)^3 - 4^3$. [5 marks]

Key sheet

Q	Answer
1	y^3
2	$2^3 \times 7^3$
3	5
4	No, it lies between $4^3 = 64$ and $5^3 = 125$
5	(i) 36 (ii) 216
6	8000
7	1331, 2197, 8000 small cubes
8	$-a^3$
9	Both sides are -512
10	$7^3 = 343$, $(-7)^3 = -343$; same number, opposite signs
11	128
12	800
13	0
14	-133
15	No. $4^3 - 7^3 = -279$
16	279 small cubes
17	272
18	$2x^3$
19	-370
20	42

Solutions

1. Write $y \times y \times y$ in power form. [1]

$$y \times y \times y = y^3$$

Read it as 'y cubed'.

Ans: y^3

2. Write $2 \times 2 \times 2 \times 7 \times 7 \times 7$ using cubes. [2]

$$2 \times 2 \times 2 = 2^3$$

$$7 \times 7 \times 7 = 7^3$$

$$\therefore 2 \times 2 \times 2 \times 7 \times 7 \times 7 = 2^3 \times 7^3$$

Ans: $2^3 \times 7^3$

3. The cube of which number is 125? [1]

$$5 \times 5 \times 5 = 125$$

$$\therefore 125 = 5^3$$

Ans: 5

4. Is 100 the cube of a whole number? Use the table of cubes. [2]

From the table: $4^3 = 64$ and $5^3 = 125$.

$64 < 100 < 125$, and no whole number lies between 4 and 5.

So 100 is not a cube.

Ans: No, it lies between $4^3 = 64$ and $5^3 = 125$

5. A big cube is made of small cubes, with 6 small cubes along each edge. (i) How many small cubes are in one layer? (ii) How many small cubes are there in all? [3]

(i) One layer has 6 rows of 6: $6 \times 6 = 36$

(ii) There are 6 layers: $36 \times 6 = 216$

So there are $6^3 = 216$ small cubes.

Ans: (i) 36 (ii) 216

6. Find 20^3 . [2]

$$20 \times 20 = 400$$

$$400 \times 20 = 8000$$

$$\therefore 20^3 = 8000$$

Ans: 8000

7. Three cube-shaped stacks are built from small wooden cubes. They have 11, 13 and 20 small cubes along each edge. How many small cubes are in each stack? [5]

Edge 11: $11 \times 11 = 121$, $121 \times 11 = 1331$

Edge 13: $13 \times 13 = 169$, $169 \times 13 = 2197$

Edge 20: $20 \times 20 = 400$, $400 \times 20 = 8000$

Ans: 1331, 2197, 8000 small cubes

8. Write $(-a)^3$ in terms of a^3 . [1]

$$\begin{aligned}(-a)^3 &= (-a) \times (-a) \times (-a) \\ &= -a^3\end{aligned}$$

Ans: $-a^3$

9. Show that $(-8)^3 = -8^3$. [2]

$$\begin{aligned}\text{LHS} &= (-8)^3 = (-8) \times (-8) \times (-8) = 64 \times (-8) = -512 \\ \text{RHS} &= -8^3 = -(8 \times 8 \times 8) = -512 \\ \text{LHS} &= \text{RHS, so } (-8)^3 = -8^3.\end{aligned}$$

Ans: Both sides are -512

10. Find 7^3 and $(-7)^3$. How are the two answers related? [3]

$$\begin{aligned}7^3 &= 7 \times 7 \times 7 = 343 \\ (-7)^3 &= (-7) \times (-7) \times (-7) = -343 \\ \text{The two answers are the same number with opposite signs: } (-7)^3 &= -7^3.\end{aligned}$$

Ans: $7^3 = 343$, $(-7)^3 = -343$; same number, opposite signs

11. Find $4^3 + 4^3$. [1]

$$\begin{aligned}4^3 + 4^3 &= 64 + 64 \\ &= 128\end{aligned}$$

Ans: 128

12. Find the sum of the cubes of all the even numbers from 2 to 8. [5]

$$\begin{aligned}2^3 + 4^3 + 6^3 + 8^3 &= 8 + 64 + 216 + 512 \\ &= 800\end{aligned}$$

Ans: 800

13. Simplify $m^3 + (-m)^3$. [1]

$$\begin{aligned}(-m)^3 &= -m^3 \\ \therefore m^3 + (-m)^3 &= m^3 - m^3 = 0\end{aligned}$$

Ans: 0

14. Find $(-2)^3 + (-5)^3$. [2]

$$\begin{aligned}(-2)^3 + (-5)^3 &= -8 + (-125) \\ &= -8 - 125 \\ &= -133\end{aligned}$$

Ans: -133

15. Ravi found $4^3 - 7^3 = 279$. Is he right? Find the correct answer. [2]

$$4^3 - 7^3 = 64 - 343$$

We take away the bigger number 343 from the smaller number 64, so the answer is negative.

$$64 - 343 = -279$$

Ravi subtracted the other way round; the correct answer is -279 .

Ans: No. $4^3 - 7^3 = -279$

16. Meena built a big cube using 7 small cubes along each edge. She then took it apart and used some of the small cubes to build a smaller cube with 4 small cubes along each edge. How many small cubes were left over? [3]

$$\text{At first: } 7^3 = 343$$

$$\text{At the end: } 4^3 = 64$$

$$\text{Difference} = 343 - 64 = 279$$

Ans: 279 small cubes

17. Find $10^3 - 6^3 - 8^3$. [5]

$$\begin{aligned} 10^3 - 6^3 - 8^3 &= 1000 - 216 - 512 \\ &= 272 \end{aligned}$$

Ans: 272

18. Simplify $x^3 - (-x)^3$. [1]

$$(-x)^3 = -x^3$$

$$x^3 - (-x^3) = x^3 + x^3 = 2x^3$$

Ans: $2x^3$

19. Find $-3^3 - 7^3$. [3]

$$\begin{aligned} -3^3 - 7^3 &= -27 - 343 \\ &= -370 \end{aligned}$$

Ans: -370

20. Find the value of $(-3)^3 + 5^3 - (-2)^3 - 4^3$. [5]

$$\begin{aligned} (-3)^3 + 5^3 - (-2)^3 - 4^3 &= -27 + 125 - (-8) - 64 \\ &= -27 + 125 + 8 - 64 \\ &= 42 \end{aligned}$$

Ans: 42
