

Cubes and Cube Roots

Question Paper, Set 05

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. Express $13 \times 13 \times 13$ as a cube. [1 mark]
2. Expand 6^3 and find its value. [2 marks]
3. Fill in the blank: $\square^3 = 343$ [1 mark]
4. Find 4^3 and 7^3 . [2 marks]
5. Write the cubes of all the odd numbers from 1 to 10. [3 marks]
6. Find the cube of 50. [2 marks]
7. Find 12^3 , 30^3 and 17^3 . Multiply each number by itself first, then by the number again. [5 marks]
8. Simplify $(-y)^3$. [1 mark]
9. Show that $(-7)^3 = -7^3$. [2 marks]
10. Find $(-9)^3$ and 9^3 . Which of the two is bigger, and why? [3 marks]
11. Find the value of $1^3 + 6^3$. [1 mark]
12. Find $4^3 + 5^3 + 6^3 + 7^3$. [5 marks]
13. Find the value of $(-x)^3 + x^3$. [1 mark]
14. Find $(-2)^3 + 4^3 + (-3)^3$. [2 marks]
15. Find the value of $2^3 - 9^3$. [2 marks]
16. Find $7^3 - 3^3$ and $3^3 - 7^3$. Which answer is negative, and why? [3 marks]
17. Sita packs dice into two cube-shaped boxes. The first box holds 6 dice along each edge and the second holds 9. (i) How many dice does each box hold? (ii) How many more dice does the second box hold? [5 marks]
18. Find $2^3 - (-2)^3$. [1 mark]
19. Find $3^3 \times (-4)^3$. [3 marks]

20. Find $(-1)^3 + (-2)^3 + (-3)^3 + (-4)^3 + (-5)^3 + (-6)^3$.

[5 marks]

Key sheet

Q	Answer
1	13^3
2	$6 \times 6 \times 6 = 216$
3	7
4	$4^3 = 64, 7^3 = 343$
5	$1^3 = 1, 3^3 = 27, 5^3 = 125, 7^3 = 343, 9^3 = 729$
6	125000
7	$12^3 = 1728, 30^3 = 27000, 17^3 = 4913$
8	$-y^3$
9	Both sides are -343
10	$9^3 = 729$ is bigger than $(-9)^3 = -729$
11	217
12	748
13	0
14	29
15	-721
16	316 and -316 ; the second is negative
17	(i) 216 and 729 (ii) 513
18	16
19	-1728
20	-441

Solutions

1. Express $13 \times 13 \times 13$ as a cube. [1]

13 is multiplied by itself 3 times.

$$\therefore 13 \times 13 \times 13 = 13^3$$

Ans: 13^3

2. Expand 6^3 and find its value. [2]

$$6^3 = 6 \times 6 \times 6$$

$$= 36 \times 6 = 216$$

Ans: $6 \times 6 \times 6 = 216$

3. Fill in the blank: $\square^3 = 343$ [1]

$$7 \times 7 \times 7 = 343$$

$$\therefore 343 = 7^3$$

Ans: 7

4. Find 4^3 and 7^3 . [2]

$$4^3 = 4 \times 4 \times 4 = 64$$

$$7^3 = 7 \times 7 \times 7 = 343$$

Ans: $4^3 = 64, 7^3 = 343$

5. Write the cubes of all the odd numbers from 1 to 10. [3]

$$1^3 = 1 \times 1 \times 1 = 1$$

$$3^3 = 3 \times 3 \times 3 = 27$$

$$5^3 = 5 \times 5 \times 5 = 125$$

$$7^3 = 7 \times 7 \times 7 = 343$$

$$9^3 = 9 \times 9 \times 9 = 729$$

Ans: $1^3 = 1, 3^3 = 27, 5^3 = 125, 7^3 = 343, 9^3 = 729$

6. Find the cube of 50. [2]

$$50 \times 50 = 2500$$

$$2500 \times 50 = 125000$$

$$\therefore 50^3 = 125000$$

Ans: 125000

7. Find 12^3 , 30^3 and 17^3 . Multiply each number by itself first, then by the number again. [5]

$$12 \times 12 = 144, 144 \times 12 = 1728$$

$$30 \times 30 = 900, 900 \times 30 = 27000$$

$$17 \times 17 = 289, 289 \times 17 = 4913$$

$$12^3 = 1728, 30^3 = 27000, 17^3 = 4913$$

Ans: $12^3 = 1728, 30^3 = 27000, 17^3 = 4913$

8. Simplify $(-y)^3$. [1]

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

Ans: $-y^3$

9. Show that $(-7)^3 = -7^3$. [2]

$$\begin{aligned}\text{LHS} &= (-7)^3 = (-7) \times (-7) \times (-7) = 49 \times (-7) = -343 \\ \text{RHS} &= -7^3 = -(7 \times 7 \times 7) = -343 \\ \text{LHS} &= \text{RHS, so } (-7)^3 = -7^3.\end{aligned}$$

Ans: Both sides are -343

10. Find $(-9)^3$ and 9^3 . Which of the two is bigger, and why? [3]

$$\begin{aligned}9^3 &= 9 \times 9 \times 9 = 729 \\ (-9)^3 &= (-9) \times (-9) \times (-9) = -729 \\ 729 &\text{ is positive and } -729 \text{ is negative, so } 9^3 \text{ is bigger.}\end{aligned}$$

Ans: $9^3 = 729$ is bigger than $(-9)^3 = -729$

11. Find the value of $1^3 + 6^3$. [1]

$$\begin{aligned}1^3 + 6^3 &= 1 + 216 \\ &= 217\end{aligned}$$

Ans: 217

12. Find $4^3 + 5^3 + 6^3 + 7^3$. [5]

$$\begin{aligned}4^3 + 5^3 + 6^3 + 7^3 &= 64 + 125 + 216 + 343 \\ &= 748\end{aligned}$$

Ans: 748

13. Find the value of $(-x)^3 + x^3$. [1]

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

Ans: 0

14. Find $(-2)^3 + 4^3 + (-3)^3$. [2]

$$\begin{aligned}(-2)^3 + 4^3 + (-3)^3 &= -8 + 64 + (-27) \\ &= -8 + 64 - 27 \\ &= 29\end{aligned}$$

Ans: 29

15. Find the value of $2^3 - 9^3$. [2]

$$\begin{aligned}2^3 - 9^3 &= 8 - 729 \\ 9^3 &\text{ is bigger than } 2^3, \text{ so the answer is negative.} \\ &= -721\end{aligned}$$

Ans: -721

16. Find $7^3 - 3^3$ and $3^3 - 7^3$. Which answer is negative, and why? [3]

$$7^3 - 3^3 = 343 - 27 = 316$$

$$3^3 - 7^3 = 27 - 343 = -316$$

In the second, the bigger cube 343 is taken from the smaller cube 27, so the answer is negative.

Ans: 316 and -316 ; the second is negative

17. Sita packs dice into two cube-shaped boxes. The first box holds 6 dice along each edge and the second holds 9. (i) How many dice does each box hold? (ii) How many more dice does the second box hold? [5]

(i) First: $6^3 = 6 \times 6 \times 6 = 216$

Second: $9^3 = 9 \times 9 \times 9 = 729$

(ii) $729 - 216 = 513$

Ans: (i) 216 and 729 (ii) 513

18. Find $2^3 - (-2)^3$. [1]

$$2^3 - (-2)^3 = 8 - (-8)$$

$$= 8 + 8$$

$$= 16$$

Ans: 16

19. Find $3^3 \times (-4)^3$. [3]

$$3^3 = 27, (-4)^3 = -64$$

$$27 \times (-64) = -1728$$

Ans: -1728

20. Find $(-1)^3 + (-2)^3 + (-3)^3 + (-4)^3 + (-5)^3 + (-6)^3$. [5]

$$(-1)^3 + (-2)^3 + (-3)^3 + (-4)^3 + (-5)^3 + (-6)^3 = -1 + (-8) + (-27) + (-64) + (-125) + (-216)$$

$$= -1 - 8 - 27 - 64 - 125 - 216$$

$$= -441$$

Ans: -441
