

Cubes and Cube Roots

Question Paper, Set 09

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 $8 \times 8 \times 8$ using the power 3. [1 mark]
2. Write $4 \times 4 \times 4 \times 9 \times 9 \times 9$ using cubes. [2 marks]
3. Write the next number in the pattern 1000, 729, 512, 343, ... [1 mark]
4. Using the table of cubes, write the values of 5^3 and 10^3 . [2 marks]
5. Write the cubes of 6, 7, 8, 9 and 10. [3 marks]
6. Fill in the boxes: $12^3 = 12 \times 12 \times 12 = \square \times 12 = \square$ [2 marks]
7. Find the values of 13^3 , 40^3 and 16^3 , showing your working. [5 marks]
8. Fill in the box: $(-c)^3 = \square$ [1 mark]
9. Show that $(-6)^3 = -6^3$. [2 marks]
10. Find $(-15)^3$ by first finding $(-15) \times (-15)$. [3 marks]
11. Find the sum of the cubes of 1 and 9. [1 mark]
12. Find the sum of the cubes of all the odd numbers from 1 to 11. [5 marks]
13. Find $5^3 + (-3)^3$. [1 mark]
14. Find $(-2)^3 + 9^3$. [2 marks]
15. Find $4^3 - 10^3$. [2 marks]
16. Find $6^3 - 9^3$ and $9^3 - 6^3$. What do you notice? [3 marks]
17. Two cube-shaped cartons are packed with soap boxes, 5 along each edge in the first and 8 in the second. (i) How many soap boxes are in each carton? (ii) How many more soap boxes are in the second carton? [5 marks]
18. Find $(-1)^3 \times 7^3$. [1 mark]
19. Find the value of $-2^3 - 4^3$. [3 marks]

20. Find the values of: (i) $(-8)^3 - 8^3$ (ii) $(-8)^3 + 8^3$ (iii) $-8^3 + (-8)^3$ (iv) $8^3 - (-8)^3$

[5 marks]

Key sheet

Q	Answer
1	8^3
2	$4^3 \times 9^3$
3	216
4	$5^3 = 125, 10^3 = 1000$
5	$6^3 = 216, 7^3 = 343, 8^3 = 512, 9^3 = 729, 10^3 = 1000$
6	144 and 1728
7	$13^3 = 2197, 40^3 = 64000, 16^3 = 4096$
8	$-c^3$
9	Both sides are -216
10	-3375
11	730
12	2556
13	98
14	721
15	-936
16	-513 and 513 ; same number with opposite signs
17	(i) 125 and 512 (ii) 387
18	-343
19	-72
20	(i) -1024 (ii) 0 (iii) -1024 (iv) 1024

Solutions

1. Write $8 \times 8 \times 8$ using the power 3. [1]

8 is multiplied by itself 3 times.

$$\therefore 8 \times 8 \times 8 = 8^3$$

Ans: 8^3

2. Write $4 \times 4 \times 4 \times 9 \times 9 \times 9$ using cubes. [2]

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

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

$$\therefore 4 \times 4 \times 4 \times 9 \times 9 \times 9 = 4^3 \times 9^3$$

Ans: $4^3 \times 9^3$

3. Write the next number in the pattern 1000, 729, 512, 343, ... [1]

These are $10^3, 9^3, 8^3, 7^3$.

$\therefore$ the next number is $6^3 = 216$

Ans: 216

4. Using the table of cubes, write the values of 5^3 and 10^3 . [2]

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

$$10^3 = 10 \times 10 \times 10 = 1000$$

Ans: $5^3 = 125, 10^3 = 1000$

5. Write the cubes of 6, 7, 8, 9 and 10. [3]

$$6^3 = 6 \times 6 \times 6 = 216$$

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

$$8^3 = 8 \times 8 \times 8 = 512$$

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

$$10^3 = 10 \times 10 \times 10 = 1000$$

Ans: $6^3 = 216, 7^3 = 343, 8^3 = 512, 9^3 = 729, 10^3 = 1000$

6. Fill in the boxes: $12^3 = 12 \times 12 \times 12 = \square \times 12 = \square$ [2]

$$12 \times 12 = 144$$

$$144 \times 12 = 1728$$

$$\therefore 12^3 = 144 \times 12 = 1728$$

Ans: 144 and 1728

7. Find the values of 13^3 , 40^3 and 16^3 , showing your working. [5]

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

$$40 \times 40 = 1600, 1600 \times 40 = 64000$$

$$16 \times 16 = 256, 256 \times 16 = 4096$$

$$13^3 = 2197, 40^3 = 64000, 16^3 = 4096$$

Ans: $13^3 = 2197, 40^3 = 64000, 16^3 = 4096$

8. Fill in the box: $(-c)^3 = \square$ [1]

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

Ans: $-c^3$

9. Show that $(-6)^3 = -6^3$. [2]

$$\text{LHS} = (-6)^3 = (-6) \times (-6) \times (-6) = 36 \times (-6) = -216$$

$$\text{RHS} = -6^3 = -(6 \times 6 \times 6) = -216$$

$$\text{LHS} = \text{RHS, so } (-6)^3 = -6^3.$$

Ans: Both sides are -216

10. Find $(-15)^3$ by first finding $(-15) \times (-15)$. [3]

$$(-15) \times (-15) = 225$$

$$225 \times (-15) = -3375$$

$$\therefore (-15)^3 = -3375$$

Ans: -3375

11. Find the sum of the cubes of 1 and 9. [1]

$$1^3 + 9^3 = 1 + 729$$

$$= 730$$

Ans: 730

12. Find the sum of the cubes of all the odd numbers from 1 to 11. [5]

$$11^3 = 1331$$

$$1^3 + 3^3 + 5^3 + 7^3 + 9^3 + 11^3 = 1 + 27 + 125 + 343 + 729 + 1331$$

$$= 2556$$

Ans: 2556

13. Find $5^3 + (-3)^3$. [1]

$$5^3 + (-3)^3 = 125 + (-27)$$

$$= 125 - 27$$

$$= 98$$

Ans: 98

14. Find $(-2)^3 + 9^3$. [2]

$$(-2)^3 + 9^3 = -8 + 729$$

$$= 721$$

Ans: 721

15. Find $4^3 - 10^3$. [2]

$$4^3 - 10^3 = 64 - 1000$$

10^3 is bigger than 4^3 , so the answer is negative.

$$= -936$$

Ans: -936

16. Find $6^3 - 9^3$ and $9^3 - 6^3$. What do you notice? [3]

$$6^3 - 9^3 = 216 - 729 = -513$$

$$9^3 - 6^3 = 729 - 216 = 513$$

Changing the order of subtraction changes only the sign of the answer.

Ans: -513 and 513 ; same number with opposite signs

17. Two cube-shaped cartons are packed with soap boxes, 5 along each edge in the first and 8 in the second. (i) How many soap boxes are in each carton? (ii) How many more soap boxes are in the second carton? [5]

(i) First: $5^3 = 5 \times 5 \times 5 = 125$

Second: $8^3 = 8 \times 8 \times 8 = 512$

(ii) $512 - 125 = 387$

Ans: (i) 125 and 512 (ii) 387

18. Find $(-1)^3 \times 7^3$. [1]

$$(-1)^3 = -1, 7^3 = 343$$

$$-1 \times 343 = -343$$

Ans: -343

19. Find the value of $-2^3 - 4^3$. [3]

$$-2^3 - 4^3 = -8 - 64$$

$$= -72$$

Ans: -72

20. Find the values of: (i) $(-8)^3 - 8^3$ (ii) $(-8)^3 + 8^3$ (iii) $-8^3 + (-8)^3$ (iv) $8^3 - (-8)^3$ [5]

$$8^3 = 512 \text{ and } (-8)^3 = -512$$

(i) $(-8)^3 - 8^3 = -512 - 512, = -1024$

(ii) $(-8)^3 + 8^3 = -512 + 512, = 0$

(iii) $-8^3 + (-8)^3 = -512 + (-512), = -512 - 512, = -1024$

(iv) $8^3 - (-8)^3 = 512 - (-512), = 512 + 512, = 1024$

Ans: (i) -1024 (ii) 0 (iii) -1024 (iv) 1024
