RD SHARMA

Solutions

Class 8 Maths

Chapter 4

Ex *4.2*

Q1. Find the cubes of:

(i) – 11 (ii) – 12 (iii) – 21

Answer:

(i) Cube of – 11 is given as: $(-11)^3$ = – 11 x – 11 x – 11 = – 1331

Thus, the cube of 11 is (-1331).

(ii) Cube of – 12 is given as: $(-12)^3$ = – 12 x – 12 x – 12 = – 1728

Thus, the cube of – 12 is (- 1728).

(iii) Cube of – 21 is given as:

$(-21)^3$ = – 21 x – 21 x – 21 = – 9261

Thus the cube of – 21 is (- 9261).

Q2. Which of the following numbers are cubes of negative integers?

(i) – 64

(ii) – 1056

(iii) – 2197

(iv) – 2744

(v) – 42875

Answer:

In order to check if a negative number is a perfect cube, first check if the corresponding positive integer is a perfect cube. Also, for any positive integer m, – m^3 is the cube of – m.

(i) On factorizing 64 into prime factors, we get:

64 = 2 x 2 x 2 x 2 x 2 x 2

On grouping the factors in triples of equal factors, we get:

64 = {2 x 2 x 2} x {2 x 2 x 2}

It is evident that the prime factors of 64 can be grouped into triples of equal factors and no factor is left over. Therefore, 64 is a perfect cube. This implies that – 64 is also a perfect cube.

Now, collect one factor from each triplet and multiply, we get: 2 x 2=4

This implies that 64 is a cube of 4. Thus, – 64 is the cube of -4.

(ii) On factorising 1056 into prime factors, we get:

1056 = 2 x 2 x 2 x 2 x 2 x 3 x 11

On grouping the factors in triples of equal factors, we get:

1056 ={2 x 2 x 2}x 2 x 2 x 3 x 11

It is evident that the prime factors of 1056 cannot be grouped into triples of equal factors such that no factor is left over.

Therefore, 1056 is not a perfect cube. This implies that – 1056 is not a perfect cube as well.

(iii) On factorising 2197 into prime factors, we get:

2197 =13 x 13 x 13

On grouping the factors in triples of equal factors, we get:

2197 = {13 x 13 x13}

It is evident that the prime factors of 2197 can be grouped into triples of equal factors and no factor is left over. Therefore, 2197 is a perfect cube. This implies that – 2197 is also a perfect cube.

Now, collect one factor from each triplet and multiply, we get 13. This implies that 2197 is a cube of 13. Thus, -2197 is the cube of – 13.

(iv) On factorizing 2744 into prime factors, we get:

2744 = 2 x 2 x 2 x 7 x 7 x 7

On grouping the factors in triples of equal factors, we get: 2744 = {2 x 2 x 2} x {7 x 7 x 7}

It is evident that the prime factors of 2744 can be grouped into triples of equal factors and no factor is left over. Therefore, 2744 is a perfect cube. This implies that – 2744 is also a perfect cube.

Now, collect one factor from each triplet and multiply, we get:

2 x 7 = 14

This implies that 2744 is a cube of 14.

Thus, – 2744 is the cube of – 14.

(v) On factorizing 42875 into prime factors, we get:

42875 = 5 x 5 x 5 x 7 x 7 x 7

On grouping the factors in triples of equal factors, we get:

42875 = {5 x 5 x 5} x {7 x 7 x 7}

It is evident that the prime factors of 42875 can be grouped into triples of equal factors and no factor is left over. Therefore, 42875 is a perfect cube.

This implies that – 42875 is also a perfect cube.

Now, collect one factor from each triplet and multiply, we get: 5 x 7 = 35

This implies that 42875 is a cube of 35. Thus, – 42875 is the cube of – 35.

Q3. Show that the following integers are cubes of negative integers. Also find the integer whose cube is the given integer.

(i) – 5832 (ii) – 2744000

Answer:

In order to check if a negative number is a perfect cube, first check if the corresponding positive integer is a perfect cube. Also, for any positive integer in, – m^3 is the cube of – m.

(i) On factorising 5832 into prime factors, we get:

5832 = 2 x 2 x 2 x 3 x 3 x 3 x 3 x 3 x 3

On grouping the factors in triples of equal factors, we get:

5832 = 2 x 2 x 2 x 3 x 3 x 3 x 3 x 3 x 3

It is evident that the prime factors of 5832 can be grouped into triples of equal factors and no factor is left over. Therefore, 5832 is a perfect cube.

This implies that -5832 is also a perfect cube.

Now, collect one factor from each triplet and multiply, we get:

2 x 3 x 3 = 18

This implies that 5832 is a cube of 18.

Thus, – 5832 is the cube of – 18.

(ii) On factorising 2744000 into prime factors, we get:

2744000 = 2 x 2 x 2 x 2 x 2 x 2 x 5 x 5 x 5 x 7 x 7 x 7

On grouping the factors in triples of equal factors, we get:

2744000 = {2 x 2 x 2} x {2 x 2 x 2} x {5 x 5 x 5} x {7 x 7 x 7}

It is evident that the prime factors of 2744000 can be grouped into triples of equal factors and no factor is left over. Therefore, 2744000 is a perfect cube. This implies that – 2744000 is also a perfect cube.

Now, collect one factor from each triplet and multiply, we get: 2 x 2 x 5 x 7 = 140

This implies that 2744000 is a cube of 140. Thus, – 2744000 is the cube of – 140.

Q4. Find the cube of:

(i) $\frac{7}{9}$

(ii) $-\frac{8}{11}$

(iii) $\frac{12}{7}$

(iv) $-\frac{13}{8}$

(v) $2\frac{2}{5}$

(vi) $3\frac{1}{4}$

(vii) 0.3

(viii) 1.5

(ix) 0.08

(x) 2.1

Answer:

$$\text{(i) } (\frac{m}{n})^3 = \frac{m^3}{n^3}$$

$$(\frac{7}{9})^3 = \frac{7^3}{9^3} = \frac{7\times7\times7}{9\times9\times9} = \frac{343}{729}$$

$$\text{(ii) } (-\frac{m}{n})^3 = \frac{-m^3}{n^3}$$

$$(-\frac{8}{11})^3 = -\frac{8^3}{11^3} = -(\frac{8\times8\times8}{11\times11\times11}) = -\frac{512}{1331}$$

$$\text{(iii) } (\frac{m}{n})^3 = \frac{m^3}{n^3}$$

$$(\frac{12}{7})^3 = \frac{12^3}{7^3} = (\frac{12\times12\times12}{7\times7\times7}) = \frac{1728}{343}$$

$$\text{(iv) } (-\frac{m}{n})^3 = -\frac{m^3}{n^3}$$

$$(-\frac{13}{8})^3 = \frac{13^3}{8^3} = -(\frac{13\times13\times13}{8\times8\times8}) = -\frac{2197}{512}$$

(v) We have:

$$2\frac{2}{5} = \frac{12}{5}$$

$$\text{Also, } (\frac{m}{n})^3 = \frac{m^3}{n^3}$$

$$(\frac{12}{5})^3 = \frac{12^3}{5^3} = \frac{12\times12\times12}{5\times5\times5} = \frac{1728}{125}$$

(vi) We have:

$$3\frac{1}{4} = \frac{13}{4}$$
$$\text{Also, } (\frac{m}{n})^3 = \frac{m^3}{n^3}$$
$$(\frac{13}{4})^3 = \frac{13^3}{4^3} = \frac{13\times13\times13}{4\times4\times4} = \frac{2197}{64}$$

(vii) We have:

$$0.3 = \frac{3}{10}$$
$$\text{Also, } (\frac{m}{n})^3 = \frac{m^3}{n^3}$$
$$(\frac{3}{10})^3 = \frac{3^3}{10^3} = \frac{3\times3\times3}{10\times10\times10} = \frac{27}{1000} = 0.027$$

(viii) We have:

$$1.5 = \frac{15}{10}$$
$$\text{Also, } (\frac{m}{n})^3 = \frac{m^3}{n^3}$$
$$(\frac{15}{10})^3 = \frac{15^3}{10^3} = \frac{15\times15\times15}{10\times10\times10} = \frac{3375}{1000} = 3.375$$

(ix) We have:

$$0.08 = \frac{8}{100}$$
$$\text{Also, } (\frac{m}{n})^3 = \frac{m^3}{n^3}$$
$$(\frac{8}{100})^3 = \frac{8^3}{100^3} = \frac{8\times8\times8}{100\times100\times100} = \frac{512}{1000000} = 0.000512$$

(x) We have:

$$2.1 = \frac{21}{10}$$
$$\text{Also, } (\frac{m}{n})^3 = \frac{m^3}{n^3}$$
$$(\frac{21}{10})^3 = \frac{21^3}{10^3} = \frac{21\times21\times21}{10\times10\times10} = \frac{9261}{1000} = 9.261$$

Q5. Find which of the following numbers are cubes of rational numbers?

(i) $\frac{27}{64}$

(ii) $\frac{125}{128}$

(iii) 0.001331 (iv) 0.04

Answer:

(i) We have:

$$\frac{27}{64} = \frac{3\times3\times3}{8\times8\times8} = \frac{3^3}{8^3} = (\frac{3}{8})^3$$

Therefore, $\frac{27}{64}$ is a cube of $\frac{3}{8}$

(ii) We have:

$$\frac{125}{128} = \frac{5\times5\times5}{2\times2\times2\times2\times2\times2\times} = \frac{5^3}{2^3\times2^3\times2}$$

It is evident that 128 cannot be grouped into triples of equal factors; Therefore, $\frac{125}{128}$ is not a cube of a rational number.

(iii) We have:

$$0.001331 = \frac{1331}{1000000} = \frac{11\times11\times11}{2\times2\times2\times2\times2\times2\times5\times5\times5\times5\times5\times5} = \frac{11^3}{(2\times2\times5\times5)^3}$$

(iv) We have:

$0.04 = \frac{4}{100} = \frac{2 \times 2}{5 \times 5 \times 5 \times 5}$

It is evident that 4 and 100 could not be grouped into triples of equal factors; therefore, 0.04 is not a cube of rational number.