Exercise 4.2

Q.1 Find the cubes of:

(i) -11 (ii) -12 (iii) -21

Sol: (i) $(-11)^3 = -11 \times -11 \times -11 = -1331$

(ii) $(-12)^3 = -12 \times -12 \times -12 = -1728$

(iii) $(-21)^3 = -21 \times -21 \times -21 = -9261$

Q.2 Which of the following numbers are cubes of negative integers.

(i) -64 (ii) -1056 (iii) -2197

(iv) -2744 (v) -42875

Sol: (i) -64

$\because \sqrt[3]{-64} = -\sqrt[3]{64}$

$\because 64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$

2	64
2	32
2	16
2	8
2	4
2	2
	1

$\therefore$ 64 can be written in ~~pairs~~ triples of their prime factors.

Hence it is a cube of negative integers.

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(ii) -1056

$\therefore 1056 = 2\times2\times2\times2\times2\times3\times11$

$\therefore$ Prime factors are not in groups of three.

2	1056
2	528
2	264
2	132
2	66
3	33
11	11
	1

Hence it is not a cube number.

(iii) -2197

$\therefore 2197 = 13\times13\times13$

$\therefore$ Yes it is a perfect cube of negative number.

13	2197
13	169
13	13
	1

(iv) -2744

$\therefore 2744 = 2\times2\times2\times7\times7\times7$

$2744 = (2\times7)^3 = (14)^3$

$\therefore$ Yes, it is a cube of negative number

2	2744
2	1372
2	686
7	343
7	49
7	7
	1

(v) -42875

$\therefore 42875 = 5\times5\times5\times7\times7\times7$

$= (5\times7)^3$

$= 35^3$

$\therefore -42875 = (-35)^3$

Yes, it is a perfect cube of negative int

5	42875
5	8575
5	1715
7	343
7	49
7	7
	1

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Q.3 Show that the following integers are cubes of negative integers. Also, find the integer whose cube is the given integer (i) -5832 (ii) -2744000

Sol:

(i) -5832

$\because \sqrt[3]{-5832} = -\sqrt[3]{5832}$

By Prime factorisation

2	5832
2	2916
2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

$\because 5832 = 2\times2\times2\times3\times3\times3 \times3\times3\times3$

$\therefore \sqrt[3]{5832} = 2\times3\times3 = 18$

Hence

$\sqrt[3]{-5832} = -18$

(ii) $\sqrt[3]{-2744000} = -\sqrt[3]{2744000}$

$= -\sqrt[3]{2744}\times\sqrt[3]{1000}$

2	2744
2	1372
2	686
7	343
7	49
7	7
	1

$\because \sqrt[3]{2744} = 2\times7 = 14$

$\therefore \sqrt[3]{-2744000} = -14\times10$

$= -140$

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Q.4 Find the cubes 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

(x) 0.08 (x) 2.1

Solution: (i) $\left(\frac{7}{9}\right)^3 = \frac{7^3}{93} = \frac{7\times7\times7}{9\times9\times9} = \frac{343}{729}$

(ii) $\left(\frac{-8}{11}\right)^3 = \frac{-8}{11}\times\frac{-8}{11}\times\frac{-8}{11} = -\frac{512}{1331}$

(iii) $\left(\frac{12}{7}\right)^2 = \frac{12\times12\times12}{7\times7\times7} = \frac{1728}{343}$

(iv) $\left(\frac{-13}{8}\right)^3 = \frac{-13\times-13\times-13}{8\times8\times8} = -\frac{2197}{512}$

(v) $\left(2\frac{2}{5}\right)^3 = \left(\frac{12}{5}\right)^3 = \frac{12\times12\times12}{5\times5\times5} = \frac{1728}{125}$

(vi) $\left(3\frac{1}{4}\right)^3 = \left(\frac{13}{4}\right)^3 = \frac{13\times13\times13}{4\times4\times4} = \frac{2197}{64}$

(vii) $(0.3)^3 = 0.3\times0.3\times0.3 = 0.027$

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(viii) $(1.5)^3 = 1.5 \times 1.5 \times 1.5 = 3.375$

(ix) $(0.08)^3 = 0.08 \times 0.08 \times 0.08 = 0.000512$

(x) $(2.1)^3 = 2.1 \times 2.1 \times 2.1 = 9.261$

Q.5 Find which of the following numbers are cube of rational number.

(i) $\frac{27}{64}$ (ii) $\frac{125}{128}$ (iii) 0.001331 (iv) 0.04

Solution: (i) $\frac{27}{64} = \frac{3 \times 3 \times 3}{4 \times 4 \times 4} = \left(\frac{3}{4}\right)^3$.

$\therefore \frac{27}{64}$ is a cube of $\frac{3}{4}$.

(ii) $\frac{125}{128} =$ $\because 125 = (5)^3$

also 128 is not a perfect cube

$\therefore \frac{125}{128}$ is not a cube of any rational number.

(iii) $0.001331 = (0.011)^3$

$\therefore$ yes, it is a cube of rational nubers.

(iv) $0.04 = \frac{4}{100}$ $\because$ $100 = (10)^2$

$4 = (2)^2$

$\therefore$ 0.04 is not a perfect cube.

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