EXPERIMENT No.....

Page No.
Date

Exercise 4 (A)

1. Find the cube of :

(i) Sol: $7 \times 7 \times 7 = 7^3 = 343$

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

(iii) Sol: $16 \times 16 \times 16 = 16^3 = 4096$

(iv) Sol: $23 \times 23 \times 23 = 23^3 = 12,167$

(v) Sol: $31 \times 31 \times 31 = 31^3 = 29,791$

(vi) Sol: $42 \times 42 \times 42 = 42^3 = 74,088$

(vii) Sol: $54 \times 54 \times 54 = 54^3 = 1,48,877$

2. Find which of the following are perfect cubes?

Sol: (iii) and (v)

3. Find the cubes of :

(i) Sol: $2.1 \times 2.1 \times 2.1 = (2.1)^3 = 9.261$

(ii) Sol: $0.4 \times 0.4 \times 0.4 = (0.4)^3 = 0.064$

(iii) Sol: $1.6 \times 1.6 \times 1.6 = (1.6)^3 = 4.096$

(iv) Sol: $2.5 \times 2.5 \times 2.5 = (2.5)^3 = 15.625$

(v) Sol: $0.12 \times 0.12 \times 0.12 = (0.12)^3 = 0.001728$

(vi) Sol: $0.02 \times 0.02 \times 0.02 = (0.02)^3 = 0.000008$

(vii) Sol: $0.8 \times 0.8 \times 0.8 = (0.8)^3 = 0.512$

EXPERIMENT No.....

Page No.
Date

4 Find the cubes of :

(i) $3/7 \times 3/7 \times 3/7 = (3/7)^3 = \frac{27}{343}$

(ii) $8/9 \times 8/9 \times 8/9 = (8/9)^3 = \frac{512}{729}$

(iii) $\frac{10}{13} \times \frac{10}{13} \times \frac{10}{13} = \left(\frac{10}{13}\right)^3 = \frac{1000}{2197}$

(iv) $\frac{9}{7} \times \frac{9}{7} \times \frac{9}{7} = \left(\frac{9}{7}\right)^3 = \frac{729}{343}$

(v) $\frac{5}{2} \times \frac{5}{2} \times \frac{5}{2} = \left(\frac{5}{2}\right)^3 = \frac{125}{8}$

5. Find the cubes of :

(i) $-3 \times -3 \times -3 = -27 = (-3)^3$

(ii) $-7 \times -7 \times -7 = -343 = (-7)^3$

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

(iv) $-18 \times -18 \times -18 = (-18)^3 = 5832$

(v) $-25 \times -25 \times -25 = (-25)^3 = 15,625$

(vi) $-30 \times -30 \times -30 = (-30)^3 = -27000$

(vii) $-50 \times -50 \times -50 = (-50)^3 = 125000$

6. Which of the following are cubes of :

(i) an even number → 216, 8000 and 4096

(ii) an odd number → 729, 3375, 125, 343 and 9261.

Diploma

Signed / Examined by

EXPERIMENT No.....

Page No.
Date

7. Find the least number by which 1323 must be multiplied so that the product is a perfect cube.

Sol:

3	1323
3	441
3	147
7	49
7	7
	1

On finding the prime factors of 1323
we get: $1323 = 3\times3\times3\times7\times7$
Clearly, 1323 must be multiplied by 7
Ans → $1323\times7 = (3\times3\times3\times7\times7)\times7$
$= 3\times3\times3\times7\times7\times7$
$= (3\times7)\times(3\times7)\times(3\times7) = 21\times21\times21 = (21)^3$

8. Find the smallest number by which 8768 must be divided so that the quotient is a perfect cube.

Sol:

2	8768
2	4384
2	2192
2	1096
2	548
2	274
	137

On finding the prime factors of 8768
we get: $8768 = 2\times2\times2\times2\times2\times2\times137$
Clearly, 8768 must be divided by 137
Ans → $\frac{8768}{137} = \frac{2\times2\times2\times2\times2\times2\times137}{137}$
$69 = (2\times2)\times(2\times2)\times(2\times2) = 4\times4\times4 = 4^3$

9. Find the smallest number by which 27783 be multiplied to get a perfect cube number.

Sol:

9	27783
9	3087
7	343
7	49
7	7
	1

On finding the prime factors of 27783
We get: $27783 = 9\times9\times7\times7\times7$
Clearly, 27783 must be multiplied by 9
Ans → $27783\times9 = (9\times9\times7\times7\times7)\times9$
$= 9\times9\times9\times7\times7\times7$
$= (9\times7)\times(9\times7)\times(9\times7)$
$= 63\times63\times63 = 63^3$

Signed / Examined by

Diplomat

EXPERIMENT No.....

Page No.
Date

10. With what least number must 8640 be divided so that the quotient is a perfect cube?

Sol:

4	8640
4	2160
4	540
3	135
3	45
3	15
5	5
	1

On finding the prime factors of 8640
We get: $4\times4\times4\times3\times3\times3\times5$
Clearly, 8640 must be divided by 5

Ans $\Rightarrow \frac{8640}{5} = \frac{4\times4\times4\times3\times3\times3\times\cancel{5}}{\cancel{5}}$

$1728 = 4\times4\times4\times3\times3\times3$.

$(4\times3)\times(4\times3)\times(4\times3) = 12\times12\times12 = 12^3$

11. Which is the smallest number that must be multiplied to 77175 to make it a perfect cube?

Sol:

3	77175
3	25725
5	8575
5	1715
7	343
7	49
7	7
	1

On finding the prime factors of 77175
We get: $3\times3\times5\times5\times7\times7\times7$
Clearly, 77175 must be multiplied by 3×5

Ans $\Rightarrow 8640\times3\times5 = (3\times3\times5\times5\times7\times7\times7)\,3\times5$

$= 3\times3\times3\times5\times5\times5\times7\times7\times7$

$= (3\times5\times7)\times(3\times5\times7)\times(3\times5\times7)$

$= 105\times105\times105 = 105^3$

Diplomat

Signed / Examined by

EXPERIMENT No.....

Page No.
Date

Exercise 4(B)

1. Cube-roots of

(i). $64 = 4$

(ii) $729 = 9$

(iii) $9261 = 21$

(iv) $8000 = 20$

(v) $343 = 7$

(vi) $1728 = 12$

(vii) $4096 = 16$

(viii) $3375 = 15$

2(i) $\frac{27}{64} = \frac{3\times3\times3}{4\times4\times4} = \left(\frac{3}{4}\right)^3$

(ii) $\frac{125}{216} = \frac{5\times5\times5}{6\times6\times6} = \left(\frac{5}{6}\right)^3$

(iii) $\frac{343}{512} = \frac{7\times7\times7}{8\times8\times8} = \left(\frac{7}{8}\right)^3$

(iv) $64\times729 = 4\times4\times4\times9\times9\times9 = (9\times4)^3 = (36)^3$

(v) $64\times27 = 4\times4\times4\times3\times3\times3 = (3\times4)^3 = (12)^3$

(vi) $729\times8000 = 9\times9\times9\times20\times20\times20 = (20\times9)^3 = 180$

Diplomat

Signed / Examined by

EXPERIMENT No.....

Page No.
Date

(vii) $3375 \times 512 = 15 \times 15 \times 15 \times 8 \times 8 \times 8 = (15 \times 8)^3 = 120$

3. (i) $-216 = (-6)^3$

(ii) $-512 = (-8)^3$

(iii) $-1331 = (-11)^3$

(iv) $\frac{-27}{125} = \left(\frac{-3}{5}\right)^3$

(v) $\frac{-64}{343} = \left(\frac{-4}{7}\right)^3$

(vi) $\frac{-512}{343} = \left(\frac{-8}{7}\right)^3$

(vii) $-2197 = (-13)^3$

(viii) $-5832 = (-18)^3$

(ix) $-2744000 = (-140)^3$

4(i) $82.744 = \sqrt[3]{\frac{2744}{1000}}$

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

$= \sqrt[3]{\frac{2 \times 2 \times 2 \times 7 \times 7 \times 7}{10 \times 10 \times 10}}$

$= \frac{2 \times 7}{10} = \frac{14}{10} = 1.4$

Diplomat

Signed / Examined by

EXPERIMENT No.....

Page No.
Date

(ii) $9.261 = \sqrt[3]{\frac{9261}{1000}} = \sqrt{\frac{3\times3\times3\times7\times7\times7}{10\times10\times10}}$

3 | 9261
3 | 3087
3 | 1029
7 | 343
7 | 49
7 | 7
1

$= \frac{3\times7}{10} = \frac{21}{10} = 2.1$

(iii) $0.000027 = \sqrt[3]{\frac{27}{1000000}}$

$= \sqrt[3]{\frac{3\times3\times3}{100\times100\times100}} = \frac{3}{100} = 0.03$

(iv) $-0.512 = \sqrt[3]{\frac{-512}{1000}} = \sqrt{\frac{-8\times-8\times-8}{10\times10\times10}}$

$= \frac{-8}{10} = -0.8$

(v) $-15.625 = \sqrt[3]{\frac{-15625}{1000}}$ @ $= \sqrt[3]{\frac{-(5\times5\times5)\times(5\times5\times5)}{10\times10\times10}}$

5 | 15625
5 | 3125
5 | 625
5 | 125
5 | 25
5 | 5
1

$= \frac{-5\times5}{10} = \frac{-25}{10} = -2.5$

Diplomat

Signed / Examined by

EXPERIMENT
No.....

Page No.
Date

(vi) $-125 \times 1000 = \sqrt{-(25 \times 100}$

$= \sqrt{-(5\times5\times5)\times(10\times10\times10)}$

$= -5 \times 10 = 50$

5.

2	26244
2	13122
3	6561
3	2187
3	729
3	243
3	81
3	27
3	9
3	3
	1

$= 2\times2\times3\times3\times3\times3\times3\times3\times3\times3$

$= (3\times3\times3)\times(3\times3\times3)\times3\times3\times2\times2$

Clearly, 26244 must be divided with 36 ($3\times3\times2\times2$)

6.

3	30375
3	10125
3	3375
3	1125
3	375
5	125
5	25
5	5
	1

$= (3\times3\times3)\times(5\times5\times5)\times3\times3$

Clearly 30375 must be multiplied by 3.

Diplomat

Signed / Examined by

EXPERIMENT No.....

Page No.
Date

7(i) $700 \times 2 \times 49 \times 5$

$2\times2\times5\times5\times7\times2\times7\times7\times5$

$= (2\times2\times2)\times(5\times5\times5)\times(7\times7\times7)$

$= 2\times5\times10 = 70$

2	700
2	350
5	175
5	35
7	7
	1

(ii) -216×1728

$= -(2\times2\times2\times3\times3\times3)\times(2\times2\times2\times2\times2\times3\times3\times3\times3)$

$= -2\times3\times2\times2\times3 = -72$

2	1728
2	864
2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

(iii) -64×-125

$= -(4\times4\times4)\times-(5\times5\times5)$

$= -4\times-5 = 20$

(iv) $\frac{-27}{343} = \frac{3\times3\times3}{7\times7\times7} = -\frac{3}{7}$

(v) $\frac{729}{-1331} = \frac{(9\times9\times9)}{-(11\times11\times11)} = -\frac{9}{11}$

Diplomat

Signed / Examined by

EXPERIMENT No.....

Page No.
Date

(ii) $250.047 = \frac{250047}{1000}$

$= \frac{(3\times3\times3)\times(3\times3\times3)\times(7\times7\times7)}{(10\times10\times10)}$

$= \frac{3\times3\times7}{10} = \frac{63}{10} = 6.3$

3	250047
3	83349
3	27783
3	9261
3	3087
3	1029
7	343
7	49
7	7
	1

(iii) -175616

2	175616
2	27808
2	43904
2	21952
2	10976
2	5488
2	2744
2	1372
2	686
7	343
7	49
7	7
	1

$= -[(2\times2\times2)\times(2\times2\times2)\times(2\times2\times2)\times(7\times7\times7)]$

$= -[2\times2\times2\times7] = -56$

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