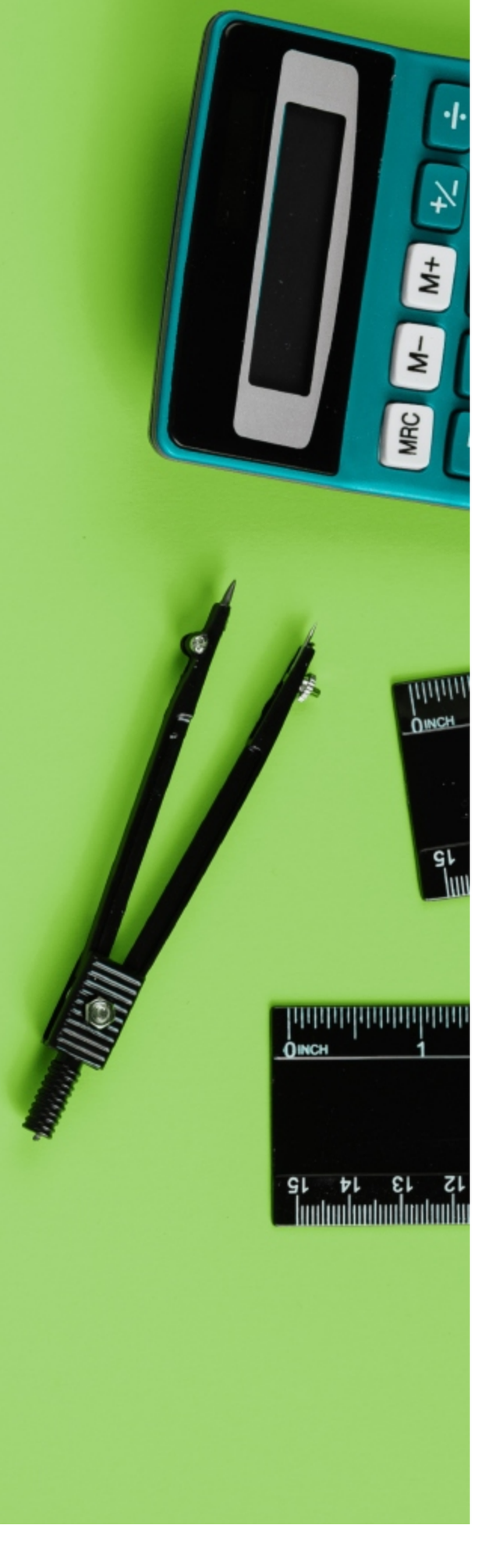
RD Sharma Solutions

Class 7

aglasem.com



Chapter-6
Exponents

Exercise 6.1

Q.1 Find the value of each of the following:

(i) 13^2 (ii) 7^3 (iii) 3^4

Solution (i) $13^2 = 13 \times 13 = 169$

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

(iii) $3^4 = 3 \times 3 \times 3 \times 3 = 81$

Q.2 Find the value of each of the following:

(i) $(-7)^2$ (ii) $(-3)^4$ (iii) $(-5)^5$

Solution: $(-7)^2 = -7 \times -7 = 49$

(ii) $(-3)^4 = (-3) \times (-3) \times (-3) \times (-3) = 81$

(iii) $(-5)^5 = (-5) \times (-5) \times (-5) \times (-5) \times (-5) = -3125$

Q.3 Simplify:

(i) 3×10^2 (ii) $2^2 \times 5^3$ (iii) $3^3 \times 5^2$

Solution (i) $3 \times 10^2 = 3 \times 100 = 300$

(ii) $2^2 \times 5^3 = 4 \times 125 = 500$ $\{\because 2^2 = 4, 5^3 = 125\}$

(iii) $3^3 \times 5^2 = 27 \times 25 = 675$

docs.aglasem.com

aglasem.com

Q.4 Simplify:

(i) $3^2 \times 10^4$ (ii) $2^4 \times 3^2$ (iii) $5^2 \times 3^4$

Solution (i) $3^2 \times 10^4 = 9 \times 10000 = 90000$

(ii) $2^4 \times 3^2 = 16 \times 9 = 144$ $(\because 2^4 = 16,\ 3^2 = 9)$

(iii) $5^2 \times 3^4 = 25 \times 81 = 2025$ $(\because 5^2 = 25;\ 3^4 = 81)$

Q.5 Simplify

(i) $(-2) \times (-3)^3$ (ii) $(-3)^2 \times (-5)^3$

(iii) $(-2)^5 \times (-10)^2$

Solution: (i) $(-2) \times (-3)^3 = -2 \times -27$ $\{\because (-3)^3 = -27\}$

$= 54$

(ii) $(-3)^2 \times (-5)^3$ $\{\because (-3)^2 = 9,\ (-5)^3 = -125\}$

$= 9 \times -125 = -1125$

(iii) $(-2)^5 \times (-10)^2 = -32 \times 100$ $\{\because (-2)^5 = -32,\ (-10)^2 = 100\}$

$= -3200$

Q6 Simplify

(i) $\left(\frac{3}{4}\right)^2$ (ii) $\left(\frac{-2}{3}\right)^4$ (iii) $\left(\frac{-4}{5}\right)^5$

docs.aglasem.com

aglasem.com

Solution: (i) $\left(\frac{3}{4}\right)^2 = \frac{3}{4} \times \frac{3}{4} = \frac{9}{16}$

(ii) $\left(\frac{-2}{3}\right)^4 = \left(\frac{-2}{3}\right) \times \left(\frac{-2}{3}\right) \times \left(\frac{-2}{3}\right) \times \left(\frac{-2}{3}\right)$

$$= \frac{(-2) \times (-2) \times (-2) \times (-2)}{3 \times 3 \times 3 \times 3} = \frac{16}{81}$$

(iii) $\left(\frac{-4}{5}\right)^5 = \frac{-4}{5} \times \frac{-4}{5} \times \frac{-4}{5} \times \frac{-4}{5} \times \frac{-4}{5} = \frac{-1024}{3125}$

Q7 Identify the greater number in each of the following:

(i) 2^5 or 5^2 (ii) 3^4 or 4^3 (iii) 3^5 or 5^3

Solution: (i) 2^5 or 5^2

$\because 2^5 = 2 \times 2 \times 2 \times 2 \times 2 = 32$; $5^2 = 5 \times 5 = 25$

$\because 32 > 25$

$\Rightarrow 2^5 > 5^2$

(ii) 3^4 or 4^3

$\because 3^4 = 3 \times 3 \times 3 \times 3 = 81$

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

$\because 81 > 64$

$\Rightarrow 3^4 > 4^3$

docs.aglasem.com

aglasem.com

(iii) 3^5 or 5^3

$3^5 = 3\times3\times3\times3\times3 = 243$

$5^3 = 5\times5\times5 = 125$

$\because 243 > 125$

$\Rightarrow 3^5 > 5^3$

Q.8 Express each of the following in exponential form:

(i) $(-5)\times(-5)\times(-5)$ (ii) $\frac{-5}{7}\times\frac{-5}{7}\times\frac{-5}{7}\times\frac{-5}{7}$

(iii) $\frac{4}{3}\times\frac{4}{3}\times\frac{4}{3}\times\frac{4}{3}\times\frac{4}{3}$

Solution (i) $(-5)\times(-5)\times(-5) = (-5)^3$

(ii) $\frac{-5}{7}\times\frac{-5}{7}\times\frac{-5}{7}\times\frac{-5}{7} = \left(\frac{-5}{7}\right)^4$

(iii) $\frac{4}{3}\times\frac{4}{3}\times\frac{4}{3}\times\frac{4}{3}\times\frac{4}{3} = \left(\frac{4}{3}\right)^5$

Q.9 Express each of the following in exponential form:

(i) $x\times x\times x\times x\times x\times a\times a\times b\times b\times b = x^4a^2b^3$

(ii) $(-2)\times(-2)\times(-2)\times(-2)\times a\times a\times a = (-2)^4a^3$

(iii) $\left(\frac{-2}{3}\right)\times\left(\frac{-2}{3}\right)\times x\times x\times x\times x = \left(\frac{-2}{3}\right)^2x^3$

docs.aglasem.com

aglasem.com

Q.10 Express each of the following numbers in exponential form

(i) 512 (ii) 625 (iii) 729

Solution (i) 512

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

$= 2^9$

2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

(ii)

5	625
5	125
5	25
5	5
	1

$\therefore 625 = 5\times5\times5\times5$

$= 5^4$

(iii)

3	729
3	243
3	81
3	27
3	9
3	3
	1

$\therefore 729 = 3\times3\times3\times3\times3\times3$

$= 3^6$

aglasem.com

docs.aglasem.com

Q.11 Express each of the following numbers as a product of their prime factors:

(i) 36 (ii) 675 (iii) 392

Solution

(i) $\because 36 = 2 \times 2 \times 3 \times 3$

$= 2^2 \times 3^2$

2	36
2	18
3	9
3	3
	1

(ii) $675 = 3 \times 3 \times 3 \times 3 \times 5$

$= 3^4 \times 5^1$

3	675
3	225
3	75
3	15
5	5
	1

(iii)

$\because 392 = 2 \times 2 \times 2 \times 7 \times 7$

$= 2^3 \times 7^2$

2	392
2	196
2	98
7	49
7	7
	1

Q.12 Express each of the following numbers as a product of powers of their prime factors:

(i) 450 (ii) 2800 (iii) 24000

docs.aglasem.com

aglasem.com

Solution (i) $450 = 2 \times 3 \times 3 \times 5 \times 5$

$= 2^1 \times 3^2 \times 5^2$

2	450
3	225
3	75
5	25
5	5
	1

(ii) $2800 =$

$2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 7$

$= 2^4 \times 5^2 \times 7^1$

2	2800
2	1400
2	700
2	350
5	175
5	35
7	7
	1

(iii) $24000 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 5 \times 5 \times 5$

$= 2^6 \times 3 \times 5^3$

2	24000
2	12000
2	6000
2	3000
2	1500
2	750
3	375
5	125
5	25
5	5
	1

aglasem.com

docs.aglasem.com

Q.13 Express each of the following as a rational number of the form $\frac{p}{q}$.

(i) $\left(\frac{3}{7}\right)^2$ (ii) $\left(\frac{7}{9}\right)^3$ (iii) $\left(\frac{-2}{3}\right)^4$

Solution (i) $\left(\frac{3}{7}\right)^2 = \frac{3^2}{7^2} = \frac{9}{49}$

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

(iii) $\left(\frac{-2}{3}\right)^4 = \frac{(-2)^4}{(3)^4} = \frac{16}{81}$

Q.14 Express each of the following rational number in power notation.

(i) $\frac{49}{64}$ (ii) $-\frac{64}{125}$ (iii) $-\frac{1}{216}$

Solution (i) $\frac{49}{64} = \frac{7^2}{8^2} = \left(\frac{7}{8}\right)^2$

(ii) $\frac{-64}{125} = \frac{(-4)^3}{(5)^3} = \left(\frac{-4}{5}\right)^3$

(iii) $\frac{-1}{216} = \frac{(-1)^3}{(6)^3} = \left(\frac{-1}{6}\right)^3$

docs.aglasem.com

aglasem.com

Q.15 Find the value of each of the following

(i) $\left(-\frac{1}{2}\right)^2 \times 2^3 \times \left(\frac{3}{4}\right)^2$ (ii) $\left(\frac{-3}{5}\right)^4 \times \left(\frac{4}{9}\right)^4 \times \left(\frac{-15}{18}\right)^2$

Solution (i) $\left(-\frac{1}{2}\right)^2 \times 2^3 \times \left(\frac{3}{4}\right)^2$

$= \frac{(-1)^2}{2^2} \times 2^3 \times \frac{3^2}{4^2}$

$= \frac{1}{4} \times \cancel{8}^{1} \times \frac{9}{\cancel{16}_{2}} = \frac{9}{8}$

(ii) $\left(\frac{-3}{5}\right)^4 \times \left(\frac{4}{9}\right)^4 \times \left(\frac{-15}{18}\right)^2$

$= \frac{(-3)^4}{(5)^4} \times \frac{(4)^4}{(9)^4} \times \frac{(-15)^2}{(18)^2}$

$= \frac{\cancel{81}^{1}}{\cancel{625}_{25}} \times \frac{\cancel{256}^{64}}{\cancel{576}_{789}} \times \frac{\cancel{225}^{1}}{\cancel{324}_{4}} = \frac{64}{18225}$

$= \frac{64}{18225}$

docs.aglasem.com

aglasem.com

Q.16 If $a=2, b=3$, then find the values of each of the following

(i) $(a+b)^a$ (ii) $(ab)^b$ (iii) $\left(\frac{b}{a}\right)^b$

(iv) $\left(\frac{a}{b}+\frac{b}{a}\right)^a$

Solution: (i) $(a+b)^a = (2+3)^2 = (5)^2 = 25$

(ii) $(ab)^b = (2\times 3)^3 = (6)^3 = 216$

(iii) $\left(\frac{b}{a}\right)^b = \left(\frac{3}{2}\right)^3 = \frac{3^3}{2^3} = \frac{27}{8}$

(iv) $\left(\frac{a}{b}+\frac{b}{a}\right)^a = \left(\frac{2}{3}+\frac{3}{2}\right)^2 = \left(\frac{4+9}{6}\right)^2$

$= \left(\frac{13}{6}\right)^2 = \frac{13^2}{6^2} = \frac{169}{36}$

aglasem.com

docs.aglasem.com