Exponents and Powers

EXERCISE : 4.1

1

i) 3^7

Base = 3 ; Exponent = 7

ii) $(-7)^5$

Base = -7 ; Exponent = 5

iii) $\left(\frac{2}{5}\right)^{11}$

Base = $\frac{2}{5}$; exponent = 11

iv) Base = 6 ; Exponent = 8

exponential form = $\text{Base}^{\text{exponent}} = 6^8$

2

i) $2^6 = 2\times2\times2\times2\times2\times2 = 64$

ii) $5^5 = 5\times5\times5\times5\times5 = 3125$

iii) $(-6)^4 = -6\times-6\times-6\times-6 = 1296$

iv) $\left(\frac{2}{3}\right)^4 = \frac{2^4}{3^4} = \frac{2\times2\times2\times2}{3\times3\times3\times3} = \frac{16}{81}$

v) $\left(-\frac{2}{3}\right)^5 = \frac{(-2)^5}{3^5} = \frac{-2\times-2\times-2\times-2\times-2}{3\times3\times3\times3\times3} = -\frac{32}{729}$

vi) $(-2)^9 = -2\times-2\times-2\times-2\times-2\times-2\times-2\times-2\times-2$

$= -512$

3

i) $6 \times 6 \times 6 \times 6 \times 6 = 6^5$

ii) $t \times t \times t = t^3$

iii) $2 \times 2 \times a \times a \times a \times a = 2^2 \times a^4$

iv) $a \times a \times a \times c \times c \times c \times c \times d = a^3 \times c^4 \times d^1$

4

i) $7 \times 10^3 = 7 \times 1000 = 7000$

ii) $2^5 \times 9 = 2 \times 2 \times 2 \times 2 \times 2 \times 9 = 288$

iii) $3^3 \times 10^4 = 3 \times 3 \times 3 \times 10 \times 10 \times 10 \times 10 = 27,000$

5

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

$= -3 \times -2 \times -2 \times -2$

$= 24$

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

$= -3 \times -3 \times -5 \times -5$

$= 225$

iii) $(-2)^3 \times (-10)^4$

$= -2 \times -2 \times -2 \times -10 \times -10 \times -10 \times -10$

$= -80,000$

iv) $(-1)^9 = -1 \times -1 \times -1 \times -1 \times -1 \times -1 \times -1 \times -1 \times -1 = -1$

v) $25^2 \times (-1)^{31} = 25 \times 25 \times -1 = -625$

vi) $4^2 \times 3^3 \times (-1)^{122} = 4 \times 4 \times 3 \times 3 \times 3 \times 1 = 432$

6.

i) $4^3 = 4 \times 4 \times 4 = 64$; $3^4 = 3 \times 3 \times 3 \times 3 = 81$

$\therefore 3^4$ is greater

ii) 7^3 or 3^7

$7^3 = 7 \times 7 \times 7 = 343$; $3^7 = 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 2187$

$\therefore 3^7$ is greater

iii) $4^5 = 4 \times 4 \times 4 \times 4 \times 4 = 1024$; $5^4 = 5 \times 5 \times 5 \times 5 = 625$

$\therefore 4^5$ is greater

iv) $2^{10} = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 1024$; $10^2 = 10 \times 10 = 100$

$\therefore 2^{10}$ is greater

7.

i) 8

$= 2 \times 2 \times 2$

$= 2^3$

2	8
2	4
	2

ii) 128

$= 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

$= 2^7$

2	128
2	64
2	32
2	16
2	8
2	4
	2

iii) 1024

$= 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

$= 2^{10}$

2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
	2

8. Let $(-2)^x = 16$

$(-2)^x = (-2)^4$

Base is equal so, exponent should be same

i.e $x = 4$.

∴ Up to 4 should be raised

9.

i) $9 = -3 \times -3 = (-3)^2$

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

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

10.

i) $7^x = 343$

$7^x = 7^3$

Base is equal, exponent should be same

$x = 3$

ii) $3^x = 729$

$3^x = 3^6$

Base equal, exponent is same

i.e $x = 6$.

3	729
3	243
3	81
3	27
3	9
	3

iii) $(-8)^x = -512$

$(-8)^x = -8 \times -8 \times -8$

$(-8)^x = (-8)^3$

Base is equal, exponent should be same

$x = 3$.

8	512
8	64
	8

$= 8 \times 8 \times 8$

iv) $(-4)^x = -1024$

$(-4)^x = -4 \times -4 \times -4 \times -4 \times -4$

$(-4)^x = (-4)^5$

Base is equal, exponent should be same

$x = 5$

4	1024
4	256
4	64
4	16
	4

$= 4 \times 4 \times 4 \times 4 \times 4$

$= 4^5$

v) $\left(\frac{2}{5}\right)^x = \frac{32}{3125}$

$\left(\frac{2}{5}\right)^x = \frac{2 \times 2 \times 2 \times 2 \times 2}{5 \times 5 \times 5 \times 5 \times 5}$

$\left(\frac{2}{5}\right)^x = \frac{2^5}{5^5}$

$\left(\frac{2}{5}\right)^x = \left(\frac{2}{5}\right)^5$

Base equal, exponent should be same

i.e. $x = 5$

vi) $\left(\frac{-3}{4}\right)^x = \frac{-243}{1024}$

$\left(\frac{-3}{4}\right)^x = \frac{-3\times-3\times-3\times-3\times-3}{4\times4\times4\times4\times4}$

$\left(\frac{-3}{4}\right)^x = \frac{(-3)^5}{(4)^5}$

$\left(\frac{-3}{4}\right)^x = \left(\frac{-3}{4}\right)^5$

Base is equal, exponent should be same

$\therefore x = 5$

II.

i) 72

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

$= 2^3 \times 3^2$

2	72
2	36
2	18
3	9
	3

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

ii) 360

$= 2\times2\times2\times3\times3\times5$

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

2	360
2	180
2	90
3	45
3	15
	5

iii) 405

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

$= 3^4 \times 5^1$

5	405
3	81
3	27
3	9
	3

iv) 540

$= 2 \times 2 \times 3 \times 3 \times 3 \times 5$

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

3	540
3	180
3	60
5	20
2	4
	2

v) 2280

$= 2 \times 2 \times 2 \times 3 \times 5 \times 19$

$= 2^3 \times 3^1 \times 5^1 \times 19^1$

2	2280
2	1140
2	570
5	285
3	57
	19

vi) 3600

$= 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5$

$= 2^4 \times 3^2 \times 5^2$

3	3600
3	1200
2	400
2	200
2	100
2	50
5	25
	5

vii) 4725

$= 3 \times 3 \times 3 \times 5 \times 5 \times 7$

$= 3^3 \times 5^2 \times 7$

5	4725
5	945
3	189
3	63
3	21
	7

viii) 8400

$= 2 \times 2 \times 2 \times 2 \times 3 \times 5 \times 5 \times 7$

$= 2^4 \times 3^1 \times 5^2 \times 7$

5	8400
5	1680
3	336
2	112
2	56
2	28
2	14
	7

EXERCISE : 4.2

1. As we know that $a^m \times a^n = a^{m+n}$

i. $2^7 \times 2^4$

$= 2^{7+4} = 2^{11}$

ii. $p^5 \times p^3 = p^{5+3} = p^8$

iii. $(-7)^5 \times (-7)^{11} = (-7)^{5+11} = (-7)^{16}$

iv. $\left(\frac{3}{5}\right)^6 \div \left(\frac{3}{5}\right)^2$

As we know $a^m \div a^n = a^{m-n}$

i.e $= \left(\frac{3}{5}\right)^{6-2} = \left(\frac{3}{5}\right)^4$

v. $(-6)^7 \div (-6)^3$

$= (-6)^{7-3}$

$= (-6)^4$

vi. $7^x \times 7^3$

$= 7^{x+3}$

2 As we know that $a^m \times a^n = a^{m+n}$; $a^m \div a^n = a^{m-n}$

i) $5^3 \times 5^7 \times 5^{12}$

$= 5^{3+7+12}$

$= 5^{22}$

ii. $a^5 \times a^3 \times a^7$

$= a^{5+3+7}$

$= a^{15}$

iii. $(7^{12} \times 7^3) \div 7^4$

$= 7^{12+3} \div 7^4$

$= 7^{15} \div 7^4$

$= 7^{15-4}$

$= 7^{11}$

3.

i) $(2^2)^{100}$

As we know $(a^m)^n = a^{mn}$

$= 2^{2\times100} = 2^{200}$

ii. $((-7)^6)^5$

$= (-7)^{6\times5} = (-7)^{30}$

iii. $(3^2)^5 \times (3^4)^7$

$= 3^{2\times5} \times 3^{4\times7}$

$= 3^{10} \times 3^{28}$

$= 3^{10+28}$

$= 3^{38}$

4.

i) $\frac{a^3 \times a^5}{(a^3)^2}$

$= \frac{a^{3+5}}{a^{3\times 2}}$

$= \frac{a^8}{a^6}$

$= a^{8-6} = a^2$

ii. $(2^3)^4 \div 2^5$

$= 2^{3\times 4} \div 2^5$

$= 2^{12} \div 2^5$

$= 2^{12-5}$

$= 2^7$

iii. $[(6^2)^3 \div 6^3] \times 6^5$

$= [6^{2\times 3} \div 6^3] \times 6^5$

$= [6^6 \div 6^3] \times 6^5$

$= 6^{6-3} \times 6^5$

$= 6^3 \times 6^5$

$= 6^{3+5}$

$= 6^8$

5.

i) $5^4 \times 8^4$

As we know that $a^m \times 5^m = (a \times 5)^m = (ab)^m$

$= (5 \times 8)^4$

$= 40^4$

ii. $(-3)^6 \times (-5)^6$

$= (-3 \times -5)^6$

$= 15^6$

iii. $\left(\frac{3}{10}\right)^5 \times \left(\frac{2}{15}\right)^5$

$= \left[\frac{3}{10} \times \frac{2}{15}\right]^5$ $\quad \frac{3^1}{10_5} \times \frac{2^1}{15_5} = \frac{1}{25}$

$= \left[\frac{1}{25}\right]^5$

6

i. $\frac{2^4 \times 2 \times 3^3 \times 3^2}{2^3 \times 3^4}$

$= \frac{2^{4+1} \times 3^{3+2}}{2^3 \times 3^4}$

$= \frac{2^5}{2^3} \times \frac{3^5}{3^4}$

$= 2^{5-3} \times 3^{9-4}$

$= 2^2 \times 3^5$

ii. $\dfrac{(3^2)^3 \times (-2)^5}{(-2)^3}$

$= \dfrac{3^{2\times3} \times (-2)^5}{(-2)^3}$

$= 3^6 \times \dfrac{(-2)^5}{(-2)^3}$

$= 3^6 \times (-2)^{5-3}$

$= 3^6 \times (-2)^2$

iii. $\dfrac{2^8 \times a^5}{4^3 \times a^3}$

As $4 = 2^2$

$= \dfrac{2^8 \times a^5}{(2^2)^3 \times a^3}$

$= \dfrac{2^8}{2^6} \times \dfrac{a^5}{a^3}$

$= 2^{8-6} \times a^{5-3}$

$= 2^2 \times a^2 = (2 \times a)^2 = 4a^2$

iv. $\frac{3 \times 7^2 \times 11^8}{21 \times 11^7}$

As $21 = 7 \times 3$

$= \frac{3 \times 7^2 \times 11^8}{3 \times 7 \times 11}$

$= \frac{7^2}{7^1} \times \frac{11^8}{11^1}$

$= 7^{2-1} \times 11^{8-1}$

$= 7^1 \times 11^7$

v. $(2^0 + 3^0)4^0$

As we know $a^0 = 1$

i.e $2^0 = 1 \; ; 3^0 = 1 \; ; 4^0 = 1$

$= (1+1) \times 1 = 2 \times 1 = 2$

vi $3^0 \times 4^0 \times 5^0$

As we know $a^0 = 1$

$3^0 = 1 \; ; 4^0 = 1 \; ; 5^0 = 1$

$= 1 \times 1 \times 1$

$= 1$

7

i) $\frac{25}{64}$

$= \frac{5^2}{2^6}$

5 | 25
5

$= 5 \times 5$

$= 5^2$

2 | 64
2 | 32
2 | 16
2 | 8
2 | 4
2

$= 2 \times 2 \times 2 \times 2 \times 2 \times 2$

$= 2^6$

ii) $-\frac{125}{216}$

$= -\frac{5^3}{6^3}$

$= \left(\frac{-5}{6}\right)^3$

5 | 125
5 | 25
5

$= 5 \times 5 \times 5$

$= 5^3$

3 | 216
2 | 72
2 | 36
2 | 18
3 | 9
3

$= 2 \times 2 \times 2 \times 3 \times 3 \times 3$

$= 2^3 \times 3^3 = (3 \times 2)^3$

$= 6^3$

iii $-\frac{343}{729}$

$= -\frac{7^3}{9^3}$

$= \left(\frac{-7}{9}\right)^3$

7 | 343
7 | 49
7

$= 7 \times 7 \times 7$

$= 7^3$

9 | 729
9 | 81
9

$= 9 \times 9 \times 9$

$= 9^3$

8.

i) $\frac{(2^5)^2 \times 7^3}{8^3 \times 7}$ $\quad 8 = 2^3$

$= \frac{2^{5\times2} \times 7^3}{(2^3)^3 \times 7}$

$= \frac{2^{10} \times 7^3}{2^9 \times 7^1}$ $= 2^{10-9} \times 7^{3-1}$

$= 2^1 \times 7^2 = 2 \times 49 = 98$

ii) $\frac{25 \times 5^2 \times t^8}{10^3 \times t^4}$

$10 = 5 \times 2$; $25 = 5 \times 5 = 5^2$

$= \frac{5^2 \times 5^2 \times t^8}{(5\times2)^3 \times t^4}$

$= \frac{5^{2+2} \times t^8}{5^3 \times 2^3 \times t^4}$

$= \frac{5^4}{5^3} \times \frac{t^8}{t^4} \times \frac{1}{2^3}$

$= \frac{5^{4-3} \times t^{8-4}}{2^3} = \frac{5 \times t^4}{2^3} = \frac{5 \times t^4}{8}$.

iii. $\frac{3^5 \times 10^5 \times 25}{5^7 \times 6^5}$

As $10 = 5 \times 2$; $25 = 5 \times 5$; $6 = 3 \times 2$

$= \frac{3^5 \times (5 \times 2)^5 \times 5 \times 5}{5^7 \times 6^5}$

$= \frac{3^5 \times 5^5 \times 2^5 \times 5^2}{5^7 \times (3 \times 2)^5}$

$= \frac{3^5 \times 2^5 \times 5^{5+2}}{5^7 \times 3^5 \times 2^5}$

$= \frac{3^5}{3^5} \times \frac{2^5}{2^5} \times \frac{5^7}{5^7}$

$= 3^{5-5} \times 2^{5-5} \times 5^{7-7}$

$= 3^0 \times 2^0 \times 5^0$

$= 1 \times 1 \times 1 = 1$

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

As we know $a^{-n} = \frac{1}{a^n}$

$= \frac{1}{\left(\frac{-3}{5}\right)^3}$

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

$= \frac{(-5)^3}{(3)^3}$

$= \frac{-5 \times -5 \times -5}{3 \times 3 \times 3}$

$= -\frac{125}{27}$

9.

i. $\left[\frac{-1}{2}\right]^5 \times 2^6 \times \left(\frac{3}{4}\right)^3$

$= \frac{(-1)^5 \times 2^6 \times 3^3}{(-2)^5 \times 4^3}$

$= \frac{+1 \times 64 \times 27}{+32 \times 64}$

$= \frac{27}{32}$

$2^6 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 64$

$3^3 = 3 \times 3 \times 3 = 27$

$2^5 = 2 \times 2 \times 2 \times 2 \times 2 = 32$

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

ii. $\left[\left(\frac{-3}{4}\right)^3 \div \left(\frac{-5}{2}\right)^3\right] \times \left(-\frac{2}{3}\right)^4$

$= \left(+\frac{3}{42} \times \frac{2}{+5}\right)^3 \times \left(-\frac{2}{3}\right)^4$

$= \frac{3^3}{10^3} \times \frac{-2 \times -2 \times -2 \times -2}{3 \times 3 \times 3 \times 3}$

$$= \frac{{}^{1}\cancel{27} \times \cancel{t^2}}{\cancel{1000} \times \cancel{t}} \quad {}^{125}\quad {}_{3}$$

$$= \frac{9}{375}$$

10.

i) $\left(\frac{3}{2}\right)^{-1} \div \left(-\frac{2}{5}\right)^{-1}$

$\left(\frac{3}{2}\right)^{-1} = \frac{1}{\left(\frac{3}{2}\right)} = \frac{2}{3}$

$\left(\frac{-2}{5}\right)^{-1} = \frac{1}{\left(\frac{-2}{5}\right)} = \frac{5}{-2}$

$= \frac{\cancel{2}^{1}}{3} \times \frac{5}{-\cancel{2}_{1}}$

$= \frac{-5}{3}$

ii. $\left[\left\{\left(\frac{-1}{4}\right)^{2}\right\}^{-1}\right]^{-2}$

$= \left(\frac{-1}{4}\right)^{2x-1x-2}$

$= \left(\frac{-1}{4}\right)^{4} = \frac{(-1)^4}{4^4}$

$= \frac{-1 \times -1 \times -1 \times -1}{4 \times 4 \times 4 \times 4}$

$= \frac{1}{256}$

11. $\left(\frac{1}{3}\right)^{-2} + \left(\frac{1}{4}\right)^{-2} + \left(\frac{1}{5}\right)^{-2} - \left(\frac{1}{6}\right)^{-2}$

As we know $a^{-n} = \frac{1}{a^n}$

$$\frac{1}{\left(\frac{1}{3}\right)^2} + \frac{1}{\left(\frac{1}{4}\right)^2} + \frac{1}{\left(\frac{1}{5}\right)^2} - \frac{1}{\left(\frac{1}{6}\right)^2}$$

$= 3^2 + 4^2 + 5^2 - 6^2$

$= 9 + 16 + 25 - 36$

$= 50 - 36$

$= 14.$

12

i) 108×192

3	108
3	36
3	12
2	4
	2

3	192
2	64
2	32
2	16
2	8
2	4
	2

$108 = 3 \times 3 \times 3 \times 2 \times 2$

$= 2^2 \times 3^3$

$192 = 2 \times 2 \times 2 \times 2 \times 2 \times 3$

$= 2^5 \times 3^1$

$108 \times 192 = 2^2 \times 3^3 \times 2^5 \times 3^1$

$= 2^{2+5} \times 3^{3+1}$

$= 2^7 \times 3^4$

ii. 729×64

3	729
3	243
3	81
3	27
3	9
	3

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

$729 = 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 3^6$

$64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 2^6$

$729 \times 64 = 2^6 \times 3^6$

iii) 384×147

3	384
2	128
2	64
2	32
2	16
2	8
2	4
	2

3	147
7	49
7	7
	1

$384 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

$= 2^7$

$147 = 3 \times 7 \times 7$

$= 3 \times 7^2$

$384 \times 147 = 2^7 \times 3 \times 7^2$

13.

i) $3^3 \times 2^2 + 2^2 \times 5^0$

$= 3 \times 3 \times 3 \times 2 \times 2 + 2 \times 2 \times 1$

$= 108 + 4$

$= 112$

2	112
2	56
2	28
2	14
	7

$= 2 \times 2 \times 2 \times 2 \times 7$

$= 2^4 \times 7^1$

ii) $9^2 + 11^2 - 2^2 \times 3 \times 7^0$

$2^2 \times 3 \times 7^0 = 4 \times 3 \times 1 = 12$

$9^2 = 9 \times 9 = 81$

$11^2 = 11 \times 11 = 121$

$= 81 + 121 - 12$

$= 202 - 12$

$= 190.$

14. i) Let the number multiplied be x

$\therefore \quad x \times 3^4 = 3^7$

$x = \frac{3^7}{3^4}$

$x = 3^{7-4}$

$x = 3^3 = 3 \times 3 \times 3$

$x = 27$

$\therefore$ 27 should be multiplied in order to get 3^7

ii. Let the number multiplied be x.

$(-6)^{-1} \times x = 10^{-1}$

$\frac{1}{-6} \times x = \frac{1}{10}$

$x = \frac{-6}{10}$

$x = \frac{-3}{5}$

So, $-\frac{3}{5}$ should be multiplied in order to get 10^{-1}.

15. $\left(\frac{12}{13}\right)^4 \times \left(\frac{13}{12}\right)^{-8} = \left(\frac{12}{13}\right)^{2x}$

$$\left(\frac{12}{13}\right)^4 \times \frac{1}{\left(\frac{13}{12}\right)^8} = \left(\frac{12}{13}\right)^{2x}$$

$$\left(\frac{12}{13}\right)^4 \times \left(\frac{12}{13}\right)^8 = \left(\frac{12}{13}\right)^{2x}$$

$$\left(\frac{12}{13}\right)^{4+8} = \left(\frac{12}{13}\right)^{2x}$$

$$\left(\frac{12}{13}\right)^{12} \left(\frac{12}{13}\right)^{2x}$$

Base equal, exponent should be same

$$2x = 12$$

$$\therefore x = 6$$

EXERCISE: 4.3.

1

i. $530.7 = 5.307 \times 10^2$

ii) $3908.78 = 3.90878 \times 10^3$

iii) $39087.8 = 3.90878 \times 10^4$

iv) 2.35 , it is a standard form

v) $3,43,000 = 3.43000 \times 10^5$

vi) $70,00,000 = 7.000000 \times 10^6$

vii) $3,18,65,00,000 = 3.186500000 \times 10^9$

viii) $893,000,000 = 8.93000000 \times 10^8$

ix) $70,040,000,000 = 7.00400000000 \times 10^{10}$.

2

i) $4.7 \times 10^3 = 4700$

ii) $1.205 \times 10^5 = 120500$

iii) $1.234 \times 10^6 = 1234000$

iv) $4.87 \times 10^7 = 48700000$

v) $6.05 \times 10^8 = 605000000$

vi) $9.083 \times 10^{11} = 908300000000$

3

i) The distance between earth and the moon is 384,000,000

$= 3.84 \times 10^8$ m

ii) The diameter of sun = 1,400,000,000

$= 1.4 \times 10^9$ m

iii) The universe is estimated to be about 12,000,000,000 years old.

$= 1.2 \times 10^{10}$ years old

iv) In a galaxy there are on an average 100,000,000,000 stars

$= 1.0 \times 10^{11}$ stars

v) The distance of sun from the centre of milky way is

300,000,000,000,000,000

$= 3 \times 10^{17}$ km

vi) A light year is about 9,467,500,000,000 km

$= 9.4675 \times 10^{12}$ km

4

i) 4.3×10^{14} ; 3.01×10^{17}

The given numbers are 4.3×10^{14} and 3.01×10^{17}. Note that both the numbers are in standard form.

Since the power of 10 in 4.3×10^{14} is less than power of 10 in 3.01×10^{17}.

$\therefore 4.3 \times 10^{14} < 3.01 \times 10^{17}$.

ii. The given numbers are 1.439×10^{12} and 1.4335×10^{12}. Note that both the numbers are in standard form. Also note that both the numbers have same power of 10.

So, we compare their significands.

The significands in 1.439×10^{12} is 1.439 and the significand in 1.4335×10^{12} is 1.4335.

As, $1.439 > 1.4335$, so

$\therefore 1.439 \times 10^{12} > 1.4335 \times 10^{12}$

5 i) 279404

$279404 = 2 \times 100000 + 7 \times 10000 + 9 \times 1000 + 4 \times 100 + 0 \times 10 + 4 \times 1$

$= 2 \times 10^5 + 7 \times 10^4 + 9 \times 10^3 + 4 \times 10^2 + 0 \times 10^1 + 4 \times 10^0$

$= 2 \times 10^5 + 7 \times 10^4 + 9 \times 10^3 + 4 \times 10^2 + 4 \times 10^1$.

ii) $3006194 = 3\times1000000 + 0\times100000 + 0\times10000 + 6\times1000 + 1\times100 + 9\times10 + 4\times1$

$= 3\times10^6 + 0\times10^5 + 0\times10^4 + 6\times10^3 + 1\times10^2 + 9\times10^1 + 4\times10^0$

$= 3\times10^6 + 6\times10^3 + 1\times10^2 + 9\times10^1 + 4\times10^0$

iii) $28061906 = 2\times10000000 + 8\times1000000 + 0\times100000 + 6\times10000 + 1\times1000 + 9\times100 + 0\times10 + 6\times1$

$= 2\times10^7 + 8\times10^6 + 0\times10^5 + 6\times10^4 + 1\times10^3 + 9\times10^2 + 0\times10^1 + 6\times10^0$

$= 2\times10^7 + 8\times10^6 + 6\times10^4 + 1\times10^3 + 9\times10^2 + 6\times10^0$.

6.

i) $3\times10^4 + 7\times10^2 + 5\times10^0$

$= 3\times10000 + 7\times100 + 5\times1$

$= 30000 + 700 + 5$

$= 30705$

ii) $4\times10^5 + 5\times10^3 + 7\times10^2 + 2\times10^0$

$= 4\times100000 + 5\times1000 + 7\times100 + 2\times1$

$= 400000 + 5000 + 700 + 2$

$= 405302$

(iii) $8 \times 10^7 + 3 \times 10^4 + 7 \times 10^3 + 5 \times 10^2 + 8 \times 10^1$

$= 8 \times 10000000 + 3 \times 10000 + 7 \times 1000 + 5 \times 100 + 80$

$= 80000000 + 30000 + 7000 + 500 + 80$

$= 80037580$.