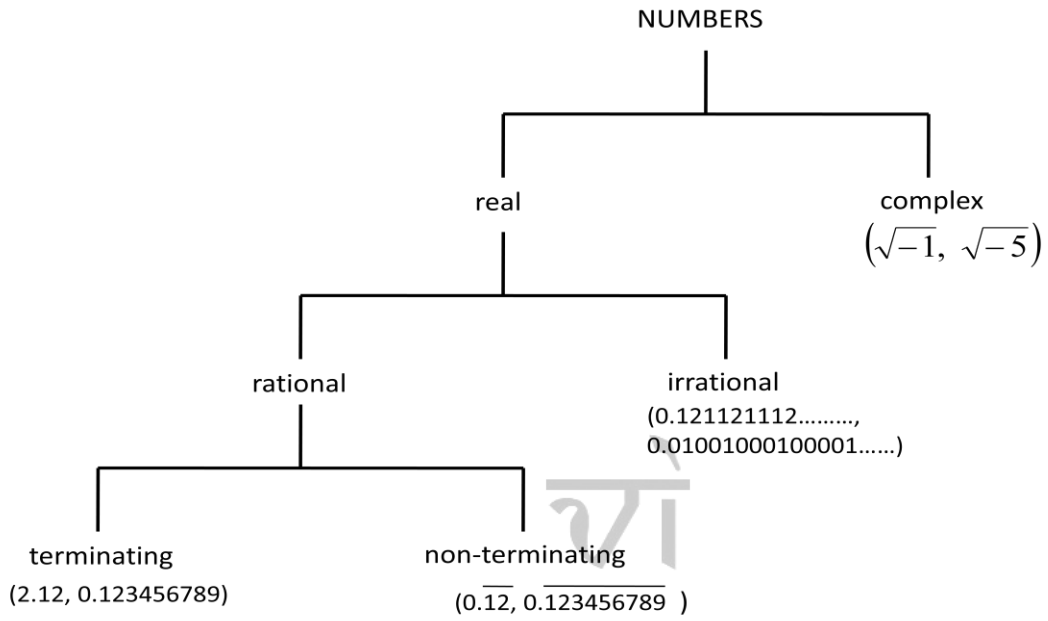
NUMBER SYSTEM

BASIC CONCEPTS AND FORMULAE:



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- The numbers that are non-terminating as well as non-repeating are called irrational numbers.

  These numbers cannot be converted into $\frac{p}{q}$ form.

  Example: $0.01001000100001\ldots\ldots\ldots,\ 0.12112211122211112222\ldots\ldots\ldots\ldots$

- Mean of numbers a and $b = \frac{a+b}{2}$.

  Then number $\frac{a+b}{2}$ lies exactly in the mid of a and b.

- Consider a fraction $\frac{p}{q}$, where p and q are co-prime.

  The $\frac{p}{q}$ will give a terminating decimal if and only if factors of 'q' doesn't have any number other than 2 or 5.

  Example:

Fractions $\frac{13}{16}$, $\frac{41}{25}$ and $\frac{11}{250}$ will terminate when converted into decimal as $\frac{13}{16}=\frac{13}{2^4}$, $\frac{41}{25}=\frac{41}{5^2}$, $\frac{11}{250}=\frac{11}{2\times5^3}$.

Fraction $\frac{11}{300}$ will give non-terminating decimal as $\frac{11}{300}=\frac{11}{2^2\times3\times5^2}$ i.e. factors of 300 have other number than 2 and 5.

Note: Two numbers are said to be co-prime if their HCF is 1.

- Numbers like $\sqrt{3}$, $\sqrt[3]{5}$, $\sqrt[5]{12}$ are called surds.

  Order of $\sqrt{3}$ = 2

  Order of $\sqrt[3]{5}$ = 3

  Order of $\sqrt[5]{12}$ = 5

  Note: $\sqrt{16}$ *is not a surd as* $\sqrt{16}=4$ *(a rational number)*

- $\sqrt[n]{a}=a^{\frac{1}{n}}$

  $\left(\sqrt[n]{a}\right)^n=a$

  $\sqrt[n]{a}\times\sqrt[n]{b}=\sqrt[n]{ab}=(ab)^{\frac{1}{n}}$

  $\frac{\sqrt[n]{a}}{\sqrt[n]{b}}=\sqrt[n]{\frac{a}{b}}=\left(\frac{a}{b}\right)^{\frac{1}{n}}$

  $\sqrt[m]{\sqrt[n]{a}}=\sqrt[mn]{a}=a^{\frac{1}{mn}}$

  $\sqrt[m]{\sqrt[n]{a^q}}=\left(\sqrt[m]{\sqrt[n]{a}}\right)^q=a^{\frac{q}{mn}}$

- If product of two surds is a rational number, then each surd is called rationalizing factor of other surd.

  Example:

  $\sqrt{3}\times\sqrt{3}=3$

  Therefore, $\sqrt{3}$ is a rationalizing factor of $\sqrt{3}$.

$(\sqrt{3}+1)(\sqrt{3}-1)=2$

Therefore, $(\sqrt{3}+1)$ is a rationalizing factor of $(\sqrt{3}-1)$ and $(\sqrt{3}-1)$ is a rationalizing factor of $(\sqrt{3}+1)$.

- **Laws of exponents:**

$a^x \times a^y = a^{x+y}$

$a^x \div a^y = a^{x-y}$

$(a^x)^y = (a^y)^x = a^{xy}$

$a^{x^y} = a^{x^y} \neq a^{xy}$

$a^{-x} = \frac{1}{a^x}, (a \neq 0)$

$a^{\frac{1}{2}} = \sqrt{a}$

$a^0 = 1, (a \neq 0)$

WORKSHEET

1) Find 3 rational and 3 irrational numbers between $\frac{-3}{13}$ and $\frac{3}{13}$.

2) Find 3 rational and 3 irrational numbers between $\sqrt{2}$ and $\sqrt{3}$.

3) Write two rational numbers whose sum is rational.

4) Write two irrational numbers whose sum is rational.

5) Write two irrational numbers whose sum is irrational.

6) Write two irrational numbers whose product is rational.

7) Write two irrational numbers whose product is irrational.

8) Plot following on number line:

$\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$, $\sqrt{5}+1$, $2\sqrt{5}$, $\sqrt{50}$, $\sqrt{2}+2$, $\sqrt{2}-2$, $\sqrt{7.6}$, 2.1234, 3.491, $0.\overline{13}$ to three decimal places.

9) Convert following in p/q form:

(i) 0.6 (ii) $0.\overline{6}$ (iii) $0.\overline{06}$

(iv) $0.0\overline{6}$ (v) $0.\overline{1}+0.\overline{2}+0.\overline{3}$ (vi) $1.2\overline{3}$

10) Convert the following fractions in decimal form:

(i) $\frac{1}{9}$ (ii) $\frac{1}{125}$ (iii) $\frac{1}{16}$

(iv)** $\frac{1}{19}$ (v)** $\frac{1}{29}$ (vi) $\frac{1}{5^{10}}$

(vii) $\frac{1}{2^4 \times 5^6}$ (viii) $\frac{1}{2^6 \times 5^4}$

11) Evaluate:

(i) $2\sqrt{2} \times 3\sqrt{2}$ (ii) $3\sqrt{2} \times 2\sqrt{3}$ (iii) $\sqrt{2} \times \sqrt{3} \times \sqrt{5}$

(iv) $\left(3\sqrt{2} \times 2\sqrt{3}\right)^2$ (v) $\left(3\sqrt{2} + 2\sqrt{3}\right)^2$ (vi) $\left(\sqrt{2}+1\right)^2 + \left(\sqrt{2}-1\right)^2$

(vii) $\sqrt[3]{2} \times \sqrt{2}$ (viii) $\sqrt{4} \times \sqrt[3]{4} \times \sqrt[6]{4}$ (ix) $\sqrt{4} \times \sqrt[3]{4} \div \sqrt[6]{4}$

(x) $\sqrt{2} + \sqrt{8} + \sqrt{18} + \sqrt{32}$

12) If $a = \frac{\sqrt{5}+\sqrt{2}}{\sqrt{5}-\sqrt{2}}$, $b = \frac{\sqrt{5}-\sqrt{2}}{\sqrt{5}+\sqrt{2}}$, find value of following:

(i) $a^2 + b^2 + ab$ (ii) $a^2 - b^2$ (iii) $\frac{a^2+b^2+ab}{a^2+b^2-ab}$

13) Rationalize the denominator:

(i) $\frac{1}{3\sqrt{2}}$ (ii) $\frac{1}{\sqrt[3]{2}}$ (iii) $\frac{1}{\sqrt{5}-\sqrt{3}}$

(iv) $\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$ (v) $\frac{1}{\left(\sqrt{3}+\sqrt{2}\right)\left(\sqrt{5}+2\right)}$ (vi) $\frac{1}{3\sqrt{2}+2\sqrt{3}+\sqrt{15}+\sqrt{10}}$

(vii) $\frac{1}{1+\sqrt{2}+\sqrt{3}}$ (viii) $\frac{1}{\sqrt{6}+\sqrt{5}+\sqrt{11}}$ (ix) $\frac{4}{\sqrt{3}-2\sqrt{2}+\sqrt{5}}$

(x) $\frac{\sqrt{a^2+b^2}+\sqrt{a^2-b^2}}{\sqrt{a^2+b^2}-\sqrt{a^2-b^2}}$

14) Evaluate:

(i) $\frac{7\sqrt{3}}{\sqrt{10}+\sqrt{3}} - \frac{2\sqrt{5}}{\sqrt{6}+\sqrt{5}} - \frac{3\sqrt{2}}{\sqrt{15}+3\sqrt{2}}$

(ii) $\frac{\sqrt{6}}{\sqrt{2}+\sqrt{3}} + \frac{3\sqrt{2}}{\sqrt{6}+\sqrt{3}} - \frac{4\sqrt{3}}{\sqrt{6}+\sqrt{2}}$

(iii) $\dfrac{2\sqrt{5}+3\sqrt{2}}{2\sqrt{5}-3\sqrt{2}}-\dfrac{2\sqrt{5}-3\sqrt{2}}{2\sqrt{5}+3\sqrt{2}}$

(iv) $\dfrac{1}{2-\sqrt{3}}-\dfrac{1}{\sqrt{3}+\sqrt{2}}+\dfrac{7}{3-\sqrt{2}}$

(v) $\dfrac{\sqrt{5}+\sqrt{3}}{\sqrt{80}+\sqrt{48}-\sqrt{45}-\sqrt{27}}$

(vi) $\dfrac{1}{1+\sqrt{2}}+\dfrac{1}{\sqrt{2}+\sqrt{3}}+\dfrac{1}{\sqrt{3}+\sqrt{4}}+.....+\dfrac{1}{\sqrt{24}+\sqrt{25}}$

(vii) $\dfrac{1}{1+\sqrt{2}}+\dfrac{1}{\sqrt{2}+\sqrt{3}}+\dfrac{1}{\sqrt{3}+\sqrt{4}}+.....+\dfrac{1}{\sqrt{99}+\sqrt{100}}$

(viii) $\dfrac{1}{1+\sqrt{2}+\sqrt{3}}-\dfrac{1}{1+\sqrt{2}-\sqrt{3}}$

(ix) $\dfrac{1}{\sqrt{2}+\sqrt{3}+\sqrt{5}}+\dfrac{1}{\sqrt{2}+\sqrt{3}-\sqrt{5}}$

(x) $\dfrac{1}{\sqrt{5}-\sqrt{6}+\sqrt{11}}-\dfrac{1}{\sqrt{5}-\sqrt{6}-\sqrt{11}}$

(xi) $\dfrac{\sqrt{a^2-b^2}+a}{\sqrt{a^2+b^2}+b}\div\dfrac{\sqrt{a^2+b^2}-b}{a-\sqrt{a^2-b^2}}$

15) Given $\sqrt{2}$ = 1.414, $\sqrt{3}$ = 1.732, $\sqrt{5}$ = 2.236, $\sqrt{6}$ = 2.449, $\sqrt{10}$ = 3.162, find the value of following:

(i) $\dfrac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ (ii) $\dfrac{\sqrt{5}+\sqrt{2}}{\sqrt{5}-\sqrt{2}}-\dfrac{\sqrt{5}-\sqrt{2}}{\sqrt{5}+\sqrt{2}}$ (iii) $\dfrac{\sqrt{5}+2}{\sqrt{5}-2}-\dfrac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}-\dfrac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}$

16) Find the values of 'a' and 'b' where 'a' and 'b' are rational numbers:

(i) $\dfrac{4+\sqrt{2}}{2+\sqrt{2}}=a-\sqrt{b}$ (ii) $\dfrac{5+3\sqrt{3}}{7+4\sqrt{3}}=a+b\sqrt{3}$ (iii) $\dfrac{4+3\sqrt{5}}{4-3\sqrt{5}}=a\sqrt{5}-b$

(iv) $\dfrac{\sqrt{5}+1}{\sqrt{5}-1}=a+b\sqrt{5}$ (v) $\dfrac{\sqrt{5}+1}{\sqrt{5}-1}=2a-b\sqrt{5}$ (vi) $\dfrac{\sqrt{5}+1}{\sqrt{5}-1}+\dfrac{\sqrt{5}-1}{\sqrt{5}+1}=a\sqrt{5}-b$

17) Find x:

(i) $2^{1/x}=0.5$ (ii) $2^{x-3}=0.25$ (iii) $12^{x-3}=1$

18) Prove the following:

(i) $\left(\dfrac{x^b}{x^c}\right)^a\times\left(\dfrac{x^c}{x^a}\right)^b\times\left(\dfrac{x^a}{x^b}\right)^c=1$

(ii) $\left(\frac{x^a}{x^b}\right)^{1/ab} \times \left(\frac{x^b}{x^c}\right)^{1/bc} \times \left(\frac{x^c}{x^a}\right)^{1/ca} = 1$

(iii) $\left(\frac{x^a}{x^b}\right)^{a^2+ab+b^2} \times \left(\frac{x^b}{x^c}\right)^{b^2+bc+c^2} \times \left(\frac{x^c}{x^a}\right)^{c^2+ca+a^2} = 1$

(iv) $\left(\frac{x^a}{x^b}\right)^{a+b} \times \left(\frac{x^b}{x^c}\right)^{b+c} \times \left(\frac{x^c}{x^a}\right)^{c+a} = 1$

(v) $\left(\frac{x^a}{x^b}\right)^{a+b-c} \cdot \left(\frac{x^b}{x^c}\right)^{b+c-a} \cdot \left(\frac{x^c}{x^a}\right)^{a+c-b} = 1$

(vi) $\sqrt{x^{-1}y} \cdot \sqrt{y^{-1}z} \cdot \sqrt{z^{-1}x} = 1$

(vii) $\frac{x^{a(b-c)}}{x^{b(a-c)}} \div \left(\frac{x^b}{x^a}\right)^c = 1$

(viii) $\frac{\left(x^{a+b}\right)^2\left(x^{b+c}\right)^2\left(x^{c+a}\right)^2}{\left(x^a x^b x^c\right)^4} = 1$

(ix) $\left(\frac{64}{125}\right)^{-2/3} + \frac{1}{\left(\frac{256}{625}\right)^{1/4}} + \left(\frac{\sqrt{25}}{\sqrt[3]{64}}\right)^0 = \frac{61}{16}$

(x) $\frac{2^n + 2^{n-1}}{2^{n+1} - 2^n} = \frac{3}{2}$

(xi) $\frac{3^{n-1} + 3^{n+1}}{3^{n+1} - 3^{n-1}} = \frac{5}{4}$

(xii) $\frac{16 \times 2^{n+1} - 4 \times 2^n}{16 \times 2^{n+2} - 2 \times 2^{n+2}} = \frac{1}{2}$

(xiii) $\frac{3^{-3} \times 6^2 \times \sqrt{98}}{5^2 \times \sqrt[3]{1/25} \times (15)^{-4/3} \times 3^{1/3}} = 28\sqrt{2}$

(xiv) $\frac{(0.6)^0 - (0.1)^{-1}}{\left(\frac{3}{8}\right)^{-1}\left(\frac{3}{2}\right)^3 + \left(\frac{-1}{3}\right)^{-1}} = \frac{-3}{2}$

(xv) $\left(\frac{81}{16}\right)^{\frac{-3}{4}}\left[\left(\frac{25}{9}\right)^{\frac{-3}{2}} \div \left(\frac{5}{2}\right)^{-3}\right] = 1$

(xvi) $\dfrac{\sqrt[4]{625^{-3}} \times \sqrt[5]{0.00001} \times \sqrt[3]{729} \times \sqrt[3]{0.008^{-2}}}{\sqrt[5]{243} \times \sqrt[3]{125^{-2}}}$

19) **Find x and y if $2^x \times 3^y = 12$.

20) If a = 2 and b = – 1, find the value of $a^a + b^b$.

21) If a = –2 and b = 1, find the value of $a^b + b^a$.

22) If a = –2 and b = – 1, find the value of $(ab)^{ab}$.

23) If a = 2, b = 3, c = –2, d = –1, then what is the value of $(ab + cd)^{ac+bd}$?

24) If $x = 5 + 2\sqrt{6}$`, then find the value of $\sqrt{x} + \dfrac{1}{\sqrt{x}}$.

25) If $x = 5 - 2\sqrt{6}$, then find the value of $\sqrt{x} + \dfrac{1}{\sqrt{x}}$.

26) If $x = 12 + 2\sqrt{35}$, then find the value of $\sqrt{x} - \dfrac{2}{\sqrt{x}}$.

27) If $\dfrac{9^n \times 3^2 \times \left(3^{\frac{-n}{2}}\right)^{-2} - 27^n}{3^{3m} \times 2^3} = \dfrac{1}{27}$, prove that $m - n = 1$.

SELECT THE CORRECT OPTION(S) (MORE THAN ONE OPTION CAN BE CORRECT)

(not meant for examination point of view)

28) Which of the following number(s) is(are) irrational?

(a) $\sqrt{2}$ (b) $0.\overline{1}$ (c) 22/7 (d) 0.12112122112211

29) Which of the following number(s) is(are) irrational?

(a) $\left(\sqrt{3} + \sqrt{2}\right)\left(\sqrt{3} + \sqrt{2}\right)$ (b) $\left(\sqrt{3} + \sqrt{2}\right)\left(\sqrt{3} - \sqrt{2}\right)$

(c) $\left(\sqrt{3} + \sqrt{2}\right)^2 + \left(\sqrt{3} - \sqrt{2}\right)^2$ (d) $\left(\sqrt{3} + \sqrt{2}\right)^2 - \left(\sqrt{3} - \sqrt{2}\right)^2$

30) If $x = \dfrac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}}$, then $\dfrac{1}{x} =$

(a) $\dfrac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$ (b) $5 - 2\sqrt{6}$ (c) $\dfrac{1}{5 + 2\sqrt{6}}$ (d) $5 + 2\sqrt{6}$

31) If $\sqrt{2}$ =1.414 then $\frac{1}{\sqrt{2}} =$

(a) 1.414 (b) 0.707 (c) 0.77 (d) 0.777

32) If $\left(1+\sqrt{2}+\sqrt{3}\right)^2 = a+b\sqrt{2}+c\sqrt{3}+d\sqrt{6}$, then

(a) $a=6$ (b) $b=2$ (c) $c=2$ (d) $a+b+c+d=12$

33) If $\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}} = a+b\sqrt{2}+c\sqrt{3}+d\sqrt{6}$, which of the following is true?

(a) $a+b=5$ (b) $2b+c=0$ (c) $b+2c+d=2$ (d) $a+2b+3c+4d=13$

34) Which of the following lies between –2 and –3?

(a) –1.732963 (b) –2.23456 (c) –3.23754 (d) –5/2

35) If $x=\sqrt{3}+\sqrt{2}$, $xy=1$, $x^2+y^2=$

(a) 10 (b) 5 (c) $4\sqrt{6}$ (d) $5+2\sqrt{6}$

36) If $2^x = 2^{\frac{1}{3}} \times 2^{\frac{1}{4}}$, then $x=$

(a) $2^{\frac{1}{12}}$ (b) $2^{\frac{7}{12}}$ (c) $\frac{1}{12}$ (d) $\frac{7}{12}$

37) If $32^x = 2^2 \times 4^3 \times 8^4 \times 16^5$ then $x=$

(a) 40 (b) 10 (c) 8 (d) 5

38) $\sqrt{2}\times\sqrt{6}\times\sqrt{12} =$

(a) 12 (b) 6 (c) $\sqrt{12}$ (d) $\sqrt{144}$

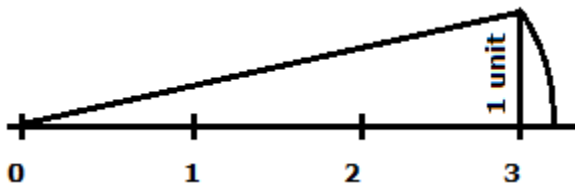
39) $\frac{1}{1+\sqrt{2}+\sqrt{3}} =$

(a) $\frac{1+\sqrt{2}-\sqrt{3}}{\left(1+\sqrt{2}-\sqrt{3}\right)^2}$ (b) $\frac{1+\sqrt{2}-\sqrt{3}}{\left(1+\sqrt{2}\right)^2-\sqrt{3}^2}$ (c) $\frac{\sqrt{2}+2-\sqrt{6}}{4}$ (d) $\frac{\sqrt{2}+2-\sqrt{6}}{-4}$

40) $999\frac{1}{999} =$

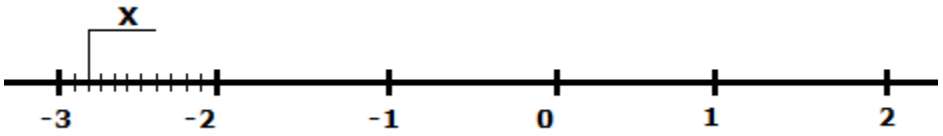
(a) $999+\frac{1}{999}$ (b) $\frac{999^2+1}{999}$ (c) $999\times\frac{1}{999}$ (d) $999-\frac{1}{999}$

41) What fraction is represented by the following number line?



(a) $\sqrt{3}$ (b) $\sqrt{10}$ (c) $2\sqrt{3}$ (d) $\sqrt{13}$

42) What fraction is represented by X in the following number line?



(a) $-3\frac{2}{11}$ (b) $-2\frac{9}{11}$ (c) $-3\frac{2}{10}$ (d) $-2\frac{8}{10}$

43) If $23^x - 1 = 0$, then x =

(a) 23 (b) 1 (c) –1 (d) 0

44) If $|x| = 2$, then $x =$

(a) 2 (b) –2 (c) 0 (d) ±2

45) If $a^2b^2 \times ab^2 \times ab \times a^2b^2 = a^m b^n$, then

(a) m = 2 (b) n = 2 (c) m = 4 (d) m > n

46) Given $a = \sqrt{5} + \sqrt{6}$, $b = \sqrt{3} + \sqrt{8}$, $c = \sqrt{10} + 1$. Which of the following is true?

(a) $a = b = c$ (b) a has greatest value (c) b has greatest value (d) c has greatest value

47) Given $a = 2^{2^3}$, $b = 2^{3^2}$, $c = \left(2^3\right)^2$, $d = \left(2^2\right)^3$. Which of the following is true?

(a) $a - b > 0$ (b) $b > c$ (c) $c > d$ (d) $a = b = c = d$

answers

3) 2, 3

4) $2+\sqrt{3}, 2-\sqrt{3}$

5) $\sqrt{3}, \sqrt{2}$

6) $3\sqrt{3}, 2\sqrt{3}$

7) $\sqrt{3}, \sqrt{2}$

9) (i) $\frac{3}{5}$ (ii) $\frac{2}{3}$ (iii) $\frac{2}{33}$

(iv) $\frac{1}{15}$ (v) $\frac{2}{3}$ (vi) $\frac{37}{30}$

10) (i) $0.\overline{1}$ (ii) 0.008 (iii) 0.0625

(iv) $0.\overline{0526315789\ 47368421}$ (v) $0.\overline{0344827586\ 2068965517\ 24137931}$

(vi) 0.0000001024 (vii) 0.000004 (viii) 0.000025

11) (i) 12 (ii) $6\sqrt{6}$ (iii) $\sqrt{30}$ (iv) 216

(v) $30+12\sqrt{6}$ (vi) 6 (vii) $\sqrt[6]{32}$ (viii) 4

(ix) $\sqrt[3]{16}$ (x) $10\sqrt{2}$

12) (i) $\frac{187}{9}$ (ii) $\frac{56\sqrt{10}}{9}$ (iii) $\frac{187}{169}$

13) (i) $\frac{\sqrt{2}}{6}$ (ii) $\frac{\sqrt[3]{4}}{2}$ (iii) $\frac{\sqrt{5}+\sqrt{3}}{2}$ (iv) $4+\sqrt{15}$

(v) $\sqrt{15}-\sqrt{10}-2\sqrt{3}+2\sqrt{2}$ (vi) $\left(\sqrt{3}-\sqrt{2}\right)\left(\sqrt{6}-\sqrt{5}\right)$

(vii) $\frac{\sqrt{2}+2-\sqrt{6}}{4}$ (viii) $\frac{6\sqrt{5}+5\sqrt{6}-\sqrt{330}}{60}$ (ix) $\frac{10\sqrt{3}+6\sqrt{5}-4\sqrt{30}}{15}$ (x) $\frac{a^2+\sqrt{a^4-b^4}}{b^2}$

14) (i) 1 (ii) 0 (iii) $12\sqrt{10}$ (iv) 5

(v) 1 (vi) 4 (vii) 9 (viii) $\frac{-\sqrt{6}}{2}$

(ix) $\frac{2\sqrt{3}+3\sqrt{2}}{6}$ (x) $\frac{\sqrt{330}}{30}$ (xi) $\frac{b^2}{a^2}$

15) (i) 0.102 (ii) 4.21 (iii) 9.944

16) (i) a = 3, b = 2 (ii) a = –1, b = 1 (iii) $a=\frac{-24}{29}, b=\frac{61}{29}$ (iv) $a=\frac{3}{2}, b=\frac{1}{2}$

(v) $a = \frac{3}{4}, b = \frac{-1}{2}$ (vi) a = 0,b = –3

17) (i) –1	(ii) 1	(iii) 3	19) x = 2, y = 1
20) 3	21) –1	22) 4	23) 2^{-21}
24) $2\sqrt{3}$	25) $2\sqrt{3}$	26) $2\sqrt{5}$	
28)a	29)ad	30)abc	31)b
32)abcd	33)abcd	34)bd	35)a
36)d	37)c	38)ad	39)bc
40)ab	41)b	42)b	43)d
44)abd	45)d	46)b	47)b

sOmEthIng UsELEss cUm IntErEstIng

Roman Numerals

I=1		(I with a bar is not used)
V=5		$\overline{V}$=5,000
X=10		$\overline{X}$=10,000
L=50		$\overline{L}$=50,000
C=100		$\overline{C}$ = 100 000
D=500		$\overline{D}$=500,000
M=1,000		$\overline{M}$=1,000,000

There is no zero in the roman numeral system.