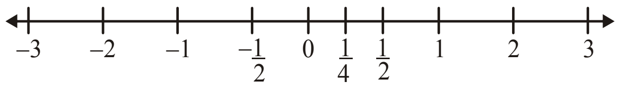
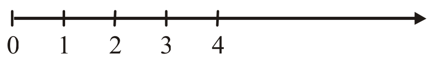
Chapter 1 Number System

Real Numbers

- **Number Line :** Representation of various types of numbers on the number line.



- **Various types of Numbers :**
  (i) Set of Natural Numbers, N = {1, 2, 3, …}
  (ii) Set of whole numbers, W = {0, 1, 2, 3, …}
  Number line of W



  (iii) Set of integers, Z = {…, –3, –2, –1, 0, 1, 2, 3, … }
  (iv) Rational numbers : A number 'r' is called a rational number, if it can be written in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.
- **Rational Numbers between any two given Rational Numbers :** In general, there are infinitely many rational numbers between any two given rational numbers. To find a rational number between s and t and divide by 2, that is, $\frac{s+t}{2}$ lies between s and t. Proceeding in this manner, we may find more rational numbers between s and t.
- **Irrational Numbers :** A number 's' is called irrational, if it cannot be written in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

  Examples : $\sqrt{2}, \sqrt{3}, \sqrt{15}, \prod$, 0.10110111011110...

  Note : when we use the symbol $\sqrt{\ }$, we assume that it is the positive square root of the number. So, $\sqrt{4} = 2$, though both 2 and – 2 are square roots of 4.

- **Properties of Decimal expansion of Rational Numbers**
  (i) Sum or difference of a rational and an irrational number is irrational.
  (ii) The product and quotient of a non-zero rational and irrational number is irrational.
  (iii) If p is a prime and p divides a^2, then p divides 'a' where a is a positive integer.

- **Real Numbers :** The set of rational numbers and irrational numbers form a set of real numbers. Which is denoted by R.
- **Real Number and their decimal expansions :**
- **Terminating Decimal Expansions :** In this case, the decimal expansion terminates or ends after a finite number of steps. We call such a decimal expansion as terminating.
- **Non-terminating Recurring Expansions :** In this case we have a repeating block of digits in the quotient. We say that this expansion is non-terminating recurring.
  (i) The decimal expansion of a rational number is either terminating or non-terminating recurring. Moreover, a number whose decimal expansion is terminating or non-terminating recurring is rational.
  (ii) The decimal expansion of an irrational number is non-terminating non- recurring. Moreover, a number whose decimal expansion is non-terminating non- recurring is irrational.
- **Operations on Rational Numbers :** Rational numbers satisfy the commutative, associative and distributive laws for addition and multiplication.
- **Operations on Irrational Numbers :** Irrational numbers also satisfy the commutative, associative and distributive laws for addition and multiplication.

Some useful facts

(i) The sum or difference of a rational number and an irrational number is irrational.
(ii) The product or quotient of a non-zero rational number with an irrational number is irrational.
(iii) If we add, subtract, multiply or divide two irrationals, the result may be rational or irrational.

- **n^{th} Root of a Real Number :** Let $a > 0$ be a real number and n be a positive integer.

  Then $\sqrt[n]{a} = b$, if $b^n = a$ and $b > 0$.
- **Some Identities related to Square Roots :** Let a and b be positive real numbers. Then

  (i) $\sqrt{ab} = \sqrt{a}\sqrt{b}$

  (ii) $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

  (iii) $(\sqrt{a}+\sqrt{b})(\sqrt{a}-\sqrt{b}) = a-b$

  (iv) $(a+\sqrt{b})(a-\sqrt{b}) = a^2 - b$

  (v) $(\sqrt{a}+\sqrt{b})(\sqrt{c}+\sqrt{d}) = \sqrt{ac}+\sqrt{ad}+\sqrt{bc}+\sqrt{bd}$

  (vi) $(\sqrt{a}+\sqrt{b})^2 = a+2\sqrt{ab}+b.$

- **Rationalisation :** When the denominator of an expression contains a term with a square root, the procedure of converting it to an equivalent expression whose denominator is a rational number is called rationalising the denominator.

Laws of Exponents for Real Numbers

(*i*) $a^m \,.\, a^n = a^{m+n}$

(*ii*) $(a^m)^n = a^{mn}$

(*iii*) $\dfrac{a^m}{a^n} = a^{m-n}, m > n$

(*iv*) $a^m b^m = (ab)^m$ where a is called the base and m and n are the exponents.

(*v*) Value of $(a)^0$: We have $(a)^0 = 1$.

(*vi*) $a^{-n} = \dfrac{1}{a^n}$.

- **Definition :** Let $a > 0$ be a real number. Let m and n be integers such that m and n have no common factors other than 1, and

  $n > 0$. Then, $a^{m/n} = (\sqrt[n]{a})^m = \sqrt[n]{a^m}$.

Euclid's Division Lemma (E.D.L)

Given two positive integers a and b, there exist unique integers q and r such that

$$a = bq + r, \quad 0 \le r < b$$

Euclid division Lemma can be used to find highest common factor (HCF) of two positive integers.

Fundamental Theorem of Arithmetic

Every composite number can be expressed (factorise) as a product of primes and this factorisation is unique. (neglecting the order in which the prime factors occur).

- **Regarding decimal expansion of rational number $x = \frac{p}{q}$**

  where p, q are co-prime integers and $q \neq 0$, we have

  (i) x is a terminating decimal expansion if prime factorisation of q is of the form $2^m 5^n$ where m,n are non-negative integers.

  (ii) If prime factorisation of q is not of the form $2^m 5^n$ then x is a non-terminating repeating decimal expansion.

To find the H. C. F. and L. C. M. by Prime Factorisation method

(i) H. C. F. = Product of each common prime factor(s) with smallest power involved in the numbers.

(ii) L.C. M. = Product of each prime factors with greatest power involved in the numbers.

(iii) For any two positive numbers a and b,
H. C. F. $(a, b) \times$ L.C. M. $(a, b) = a \times b$
Note : For any three positive integers p, q and r
H.C. F. $(p, q, r,) \times$ L.C. M. $(p, q, r) \neq p \times q \times r$
where H. C. F. (a, b) means H. C. F. of a and b and
L.C.M. (a, b) means L.C. M. of a and b.

Exercise 1

DIRECTIONS : *This section contains multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) out of which only one is correct.*

1. $\left(\frac{1}{64}\right)^0 + (64)^{-1/2} - (-32)^{4/5}$ is equal to

(1) $-15\frac{7}{8}$ (2) $16\frac{1}{8}$

(3) $-14\frac{7}{8}$ (4) $17\frac{1}{8}$

2. The value of x, when $2^{x+4}.3^{x+1} = 288$ is

(1) 1 (2) –1

(3) 0 (4) None

3. Value of

$$\frac{1}{1+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{4}}+\frac{1}{\sqrt{4}+\sqrt{5}}$$

$$+\frac{1}{\sqrt{5}+\sqrt{6}}+\frac{1}{\sqrt{6}+\sqrt{7}}+\frac{1}{\sqrt{7}+\sqrt{8}}+\frac{1}{\sqrt{8}+\sqrt{9}}$$

(1) 2 (2) 3

(3) 4 (4) 5

4. A rational number between $\sqrt{2}$ and $\sqrt{3}$ is

(1) $\frac{\sqrt{2}+\sqrt{3}}{2}$ (2) $\frac{\sqrt{2}\times\sqrt{3}}{2}$

(3) 1.5 (4) 1.4

5. The value of 0.423 is

(1) $\frac{423}{1000}$ (2) $\frac{423}{100}$

(3) $\frac{423}{990}$ (4) $\frac{419}{990}$

6. Value of x satisfying $\sqrt{x+3}+\sqrt{x-2}=5$ is

(1) 6 (2) 7

(3) 8 (4) 9

7. $\sqrt{7-4\sqrt{3}} =$

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

(3) $2+\sqrt{3}$ (4) $1+\sqrt{3}$

8. If $\sqrt{3}=1.732$, then the value of $\frac{1}{\sqrt{3}-1}$ is

(1) 5.689 (2) 1.366

(3) 7.188 (4) 1.867

9. Rationalizing factor of $2+\sqrt{3}$ =

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

(3) $2+\sqrt{3}$ (4) $3+\sqrt{3}$

10. Value of $\sqrt[3]{\left(\frac{1}{64}\right)^{-2}}$ is

(1) 4 (2) 16

(3) 32 (4) 64

11. Euclid's Division Lemma states that for any two positive integers a and b, there exist unique integers q and r such that $a = bq + r$, where r must satisfy

(1) $1 < r < b$ (2) $0 < r < b$

(3) $0 \le r < b$ (4) $0 < r \le b$

12. The decimal expansion of $\frac{21}{45}$ is

(1) terminating

(2) non-terminating and repeating

(3) non-terminating and non-repeating

(4) none of these

13. If $112 = q \times 6 + r$, then the possible values of r are

(1) 1, 2, 3, 4 (2) 0, 1, 2, 3, 4, 5

(3) 0, 1, 2, 3 (4) 2, 3, 5

14. By Euclid's division lemma $x = qy + r$, $x > y$, the value of q and r for $x = 27$ and $y = 5$ are

(1) $q = 5, r = 3$

(2) $q = 6, r = 3$

(3) $q = 5, r = 2$

(4) cannot be determined

15. If $\frac{p}{q}$ is a terminating decimal, what can you say about q?

(1) q must be in the form 2^n

(2) q must be in the form 5^m

(3) q must be in the form $2^n.5^m$

(4) q must be in the form $2^n.5^m$, where n and m are non negative integers.

16. If $\frac{32}{500}=\frac{32}{(2)^2\times(5)^m}$, then the value of m is

(1) 2 (2) 3

(3) 4 (4) 5

17. 7 × 11×13 + 13 is a/an

(1) prime number

(2) composite number

(3) odd number but not composite

(4) none of these

18. For some integer m, every even integer is of the form

(1) m (2) $m+1$

(3) $2m$ (4) $2m+1$

19. Prime factorisation of the denominators of the rational number 34.12345 is of the form :

(1) $2^m \times 5^n$ where m, n are integers.

(2) $2^m \times 5^n$ where m, n are positive integers.

(3) $2^m \times 5^n$ where m, n are non-negative integers.

(4) denominator has factors other than 2 or 5.

20. Prime factorization of the denominator of the rational number $34.\overline{5678}$ is of the form :

(1) $2^m \times 5^n$ where m, n are integers

(2) $2^m \times 5^n$ where m, n are positive integers

(3) $2^m \times 5^n$ where m, n are non-negative integers

(4) denominator has factors other than 2 or 5.

21. Which of the following is not correct?

(1) $\frac{1}{7}$ is rational having non-terminating is repeating decimal fraction.

(2) $\frac{11}{30}$ is rational non-terminating repeating decimal.

(3) $\frac{31}{91}$ is rational having non-terminating repeating decimal.

(4) $\frac{13}{125}$ is rational having non-terminating repeating decimal.

22. $119^2 - 111^2$ is

(1) prime number (2) composite

(3) odd prime (4) odd composite

23. Which of the following is true?

(1) π is equal to $\frac{22}{7}$.

(2) The only real numbers are rational numbers.

(3) Every non-terminating decimal can be written as a periodic decimal.

(4) 0.21 lies between 0.2 and 0.3.

24. Which of the following has terminating decimal expansion?

(1) $\frac{64}{455}$ (2) $\frac{19}{2^3 5^6}$

(3) $\frac{29}{343}$ (4) $\frac{125}{441}$

25. Which of the following is irrational?

(1) $\frac{22}{7}$

(2) 3.141592

(3) 2.78181818

(4) 0.123 223 222 322 22 3

26. Rational number between $\sqrt{2}$ and $\sqrt{3}$ is

(1) $\frac{\sqrt{2}+\sqrt{3}}{2}$ (2) $\frac{\sqrt{2}\times\sqrt{3}}{2}$

(3) 1.5 (4) 1.8

27. The number $(\sqrt{x}+\sqrt{y})(\sqrt{x}-\sqrt{y})$ where $x, y > 0$ is

(1) rational (2) irrational

(3) both (4) none

28. Which of the following numbers has the terminal decimal representation?

(1) $\frac{1}{7}$ (2) $\frac{1}{3}$

(3) $\frac{3}{5}$ (4) $\frac{17}{3}$

29. Which of the following is not a rational number?

(1) $\sqrt{2}$ (2) $\sqrt{4}$

(3) $\sqrt{9}$ (4) $\sqrt{16}$

30. The rational number of the form $\frac{p}{q}$, $q \neq 0$, p and q are positive integers , which represents $0.1\overline{34}$ i.e., (0.1343434....) is

(1) $\frac{134}{999}$ (2) $\frac{134}{990}$

(3) $\frac{133}{999}$ (4) $\frac{133}{990}$

31. Which of the following will have a terminating decimal expansion ?

(1) $\frac{77}{210}$ (2) $\frac{23}{30}$

(3) $\frac{125}{441}$ (4) $\frac{23}{8}$

32. π is

(1) rational (2) irrational

(3) imaginary (4) an integer

33. Rationalizing factor of $1 + \sqrt{2} + \sqrt{3}$ is

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

(3) 4 (4) $1 + \sqrt{2} + \sqrt{3}$

34. The smallest rational number by which $\frac{1}{3}$ should be multiplied so that its decimal expansion terminates after one place of decimal, is

(1) $\frac{3}{10}$ (2) $\frac{1}{10}$

(3) 3 (4) $\frac{3}{100}$

35. If a sum of LCM and HCF of two numbers is 1260 and their LCM is 900 more than their HCF, then the product of two numbers is

(1) 203400 (2) 194400

(3) 198400 (4) 205400

Exercise 2

MCQ Based Questions

DIRECTIONS (Qs. 1 to 8) : *This section contains multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) out of which only one is correct.*

1. The value of

$$\frac{2^{1/2}\times 3^{1/3}\times 4^{1/4}}{10^{-1/5}\times 5^{3/5}} \div \frac{4^{-2/3}\times 5^{-7/5}}{4^{-3/5}\times 6^{-1/3}}$$ is equal to

(1) 10 (2) 1
(3) 6 (4) 18

2. The value of $\frac{6^n \times 2^{2n}\times 3^{3n}}{30^n \times 3^{2n}\times 2^{3n}}$ is equal to

(1) 1 (2) $.3^{-n}$
(3) 3^{-n} (4) $.3^n$

3. The value of $\frac{2^{m+3}\times 3^{2m-n}\times 5^{m+n+3}\times 6^{n+1}}{6^{m+1}\times 10^{n+3}\times 15^m}$ is equal to

(1) 0 (2) 1
(3) 2^m (4) none of these

4. The exponent of 2 in the prime factorisation of 144, is
(1) 4 (2) 5
(3) 6 (4) 3

5. If $n = 2^3 \times 3^4 \times 4^4 \times 7$, then the number of consecutive zeros in n, where n is a natural number, is
(1) 2 (2) 3
(3) 4 (4) 7

6. If p_1 and p_2 are two odd prime numbers such that $p_1 > p_2$, then $p_1^2 - p_2^2$ is
(1) an even number (2) an odd number
(3) an odd prime number (4) a prime number

7. Which of the following rational numbers have terminating decimal?

(i) $\frac{16}{225}$ (ii) $\frac{5}{18}$

(iii) $\frac{2}{21}$ (iv) $\frac{7}{250}$

(1) (i) and (ii) (2) (ii) and (iii)
(3) (i) and (iii) (4) (i) and (iv)

8. What is the number x ?
I. The L.C.M of x and 18 is 36.
II. The H.C.F of x and 18 is 2.
(1) 1 (2) 2
(3) 3 (4) 4

Matching Based Questions

DIRECTIONS (Q. 9) : *Match the Column-I with Column-II and select the correct answer given below the columns.*

9.

	Column-I		Column-II
A.	An irrational number between $\sqrt{2}$ and $\sqrt{3}$ is	(p)	$\frac{52}{125}$
B.	Value of 0.424 is	(q)	$2-\sqrt{3}$
C.	If $\sqrt{3} = 1.732,$ then value of $(2+\sqrt{3})$ is	(r)	$\frac{\sqrt{2}+\sqrt{3}}{2}$
D.	Rationalising factor of $(2+\sqrt{3})$ is	(s)	3732

(1) A – (s), B – (q), C – (r), D – (p)
(2) A – (r), B – (p), C – (s), D – (q)
(3) A – (q), B – (r), C – (s), D – (p)
(4) A – (r), B – (s), C – (p), D – (q)

Statement Based Questions

10. Consider the following statements :
(a) Every integer is a rational number.
(b) The sum of a rational number and an irrational number is an irrational number.
(c) Every real number is rational.
(d) Every point on a number line is associated with a real number.
Which of these statement(s) is/are not correct?
(1) a and b only (2) b and c only
(3) Only a and c (4) only d

11. Consider the following statements :
(a) Every fraction is a rational number.
(b) Every rational number is a fraction.
(c) Every integer is a rational number.
Which of these statement(s) is/are correct?
(1) a, b and c only (2) a and b
(3) a and c (4) b and c

12. Consider the following statements :
(a) Between two integers, there exist infinite number of rational numbers
(b) Between two rational numbers, there exist infinite number of integers
(c) Between two rational numbers, there exist infinite number of rational numbers
(d) Between two real numbers, there exists infinite number of real numbers
Which of these statements is/are not correct?
(1) only a (2) only b
(3) only a and c (4) Both b and d

Passage Based Questions

DIRECTIONS (Qs. 13 to 17) : *Read the passage(s) given below and answer the questions that follow.*

PASSAGE - I

If p is prime, then $\sqrt{p}$ is irrational and if a, b are two odd prime numbers, then $a^2 - b^2$ is composite.

13. $\sqrt{7}$ is

(1) a rational number (2) an irrational number
(3) not a real number (4) terminating decimal

14. $119^2 - 111^2$ is

(1) prime number
(2) composite
(3) an odd prime number
(4) an odd composite number

PASSAGE - II

$$\text{LCM of several fractions} = \frac{\text{LCM of their numerators}}{\text{HCF of their denominators}}$$

$$\text{HCF of several fractions} = \frac{\text{HCF of their numerators}}{\text{LCM of their denominators}}$$

15. The L.C.M. of the fractions $\frac{5}{16}, \frac{15}{24}$ and $\frac{25}{8}$ is

(1) $\frac{5}{48}$ (2) $\frac{5}{8}$
(3) $\frac{75}{48}$ (4) $\frac{75}{8}$

16. The H.C.F. of $\frac{2}{5}, \frac{6}{25}$, and $\frac{8}{35}$ is

(1) $\frac{2}{5}$ (2) $\frac{24}{5}$
(3) $\frac{2}{175}$ (4) $\frac{24}{175}$

17. The H.C.F. of the fractions $\frac{8}{21}, \frac{12}{35}$, and $\frac{32}{7}$ is

(1) $\frac{4}{105}$ (2) $\frac{192}{7}$
(3) $\frac{4}{7}$ (4) $\frac{5}{109}$

Assertion Reason Based Questions

DIRECTIONS (Qs. 18 to 21) : *Following questions consist of two statements, one labelled as the **'Assertion' (A)** and the other as **'Reason' (R)**. You are to examine these two statements carefully and select the answer to these items using the code given below.*

Code :

(1) Both A and R are individually true and R is the correct explanation of A:
(2) Both A and R are individually true but R is not the correct explanation of A.
(3) A is true but R is false
(4) A is false but R is true.

18. Assertion : 2 is a rational number.
Reason : The square roots of all positive integers are irrationals.

19. Assertion : $5\sqrt{3}$ is an irrational number.
Reason : For any two given integers a and b there exist unique integers q and r satisfying $a = bq + r$; $0 \le r < b$

20. Assertion : The H.C.F. of two numbers is 16 and their product is 3072. Then their L.C.M = 162.
Reason : If a, b are two positive integers, then H.C.F × L.C.M. = $a \times b$.

21. Assertion : If L.C.M. $\{p, q\} = 30$ and H.C.M $\{p, q\} = 5$, then $p.q = 150$.
Reason : L.C.M. of $a, b \times$ H.C.F of $a, b = a.b$.

Hints SOLUTIONS

Exercise 1

1.	**(3)**	**2.**	**(1)**	**3.**	**(1)**	**4.**	**(3)**
5.	**(4)**	**6.**	**(1)**	**7.**	**(3)**	**8.**	**(2)**
9.	**(1)**	**10.**	**(1)**				

11. **(3)** $0 \le r < b$

12. **(2)** $\frac{21}{45} = \frac{21}{9\times5} = \frac{21}{3^2\times5}$. Clearly, 45 is not of the form $2^m \times 5^n$. So the decimal expansion of $\frac{21}{45}$ is non-terminating and repeating.

13. **(2)** For the relation $x = qy + r$, $\quad 0 \le r < y$
So, here r lies between $0 \le r < 6$.
Hence, $r = 0, 1, 2, 3, 4, 5$

14. **(3)** $x = qy + r \Rightarrow 27 = 5 \times 5 + 2 \Rightarrow q = 5, r = 2$

15. **(4)** For any rational number $\frac{p}{q}$, where prime factorization of q is of the form $2^n.5^m$, where n and m are non-negative integers, the decimal representation is terminating.

16. **(2)** $\frac{32}{500} = \frac{32}{(2)^2\times(5)^3}$
[$\because$ $500 = 2 \times 2 \times 5 \times 5 \times 5$]
$\therefore$ $m = 3$

17. **(2)** We have, $7 \times 11 \times 13 + 13$
$= 13\,(77 + 1) = 13 \times 78$
Since, the given number has 2 more factors other than 1 and itself, so, it is a composite number.

18. **(3)**

19. **(3)**

20. **(4)**

21. **(4)** Since $\frac{13}{125} = \frac{13}{53} = \frac{13\ 2^3}{(2)^3(5)^3} = \frac{104}{1000} = 0.104$
$\therefore$ (4) is not-correct (1), (2), (3) are correct
$\therefore$ (4) holds.

22. **(2)**

23. **(4)** $\because\ 0.2 < 0.21 < 0.3$

24. **(2)**

25. **(4)** $\because$ number given in option '*d*' is neither terminating nor repeating decimal.

26. **(3)** A and B are irrational. Number D is does not lie between $\sqrt{2}$ and $\sqrt{3}$.

27. **(1)**

28. **(3)** $\frac{3}{5} = 0.6$ where as other numbers have non-terminating decimals.

29. **(1)** $\sqrt{2}$ is not a rational number. It can't be expressed in the fractional form.

30. **(4)** $0.1\overline{34} = \frac{134-1}{990} = \frac{133}{990}$

31. **(4)**

32. **(2)** π is irrational

33. **(1)**

34. **(1)**

35. **(2)**

Exercise 2

1. **(1)** $\frac{2^{1/2}\times3^{1/3}\times4^{1/4}}{10^{-1/5}\times5^{3/5}} \div \frac{4^{-2/3}\times5^{-7/5}}{4^{-3/5}\times6^{-1/3}}$

$= \frac{2^{1/2}\times3^{1/3}\times2^{1/2}}{2^{-1/5}\times5^{-1/5}\times5^{3/5}} \div \frac{2^{-4/3}\times5^{-7/5}}{2^{-6/5}\times2^{-1/3}\times3^{-1/3}}$

$= \frac{2^{6/5}\times3^{1/3}}{5^{2/5}} \div \frac{2^{1/5}\times3^{1/3}}{5^{7/5}}$

$= 2^{\frac{6}{5}-\frac{1}{5}} \times 5^{\frac{7}{5}-\frac{2}{5}} = 2\times5 = 10$.

2. **(4)** $\frac{6^n\times2^{2n}\times3^{3n}}{30^n\times3^{2n}\times2^{3n}} = \frac{2^n\times3^n\times2^{2n}\times3^{3n}}{5^n\times2^n\times3^n\times3^{2n}\times2^{3n}} = \frac{3^n}{5^n\times2^n}$

$= \left(\frac{3}{10}\right)^n = (0.3)^n$

3. **(2)** $\frac{2^{m+3}\times3^{2m-n}\times5^{m+n+3}\times2^{n+1}\times3^{n+1}}{2^{m+1}\times3^{m+1}\times2^{n+3}\times5^{n+3}\times3^m\times5^m}$

$= \frac{2^{m+n+4}\times3^{2m+1}\times5^{m+n+3}}{2^{m+n+4}\times3^{2m+1}\times5^{m+n+3}} = 1$

4. **(1)**

5. **(2)**

6. **(1)**

7. **(4)**

8. **(4)** L.C.M × H.C.F = First number × second number
Hence, required number $= \frac{36\times2}{18} = 4$.

9. **(2)** (A)→(r), (B)→(p), (C) →(s), (D)→(q)

10. **(4)**

11. **(3)** 'a' and 'c' are correct.

12. **(2)** only statement b is not correct.

13. **(2)**

14. **(2)**

15. **(4)** L.C.M. of $\frac{5}{16}, \frac{15}{24}$ and $\frac{25}{8}$ $= \frac{\text{L.C.M. of numerators}}{\text{H.C.F. of denominators}}$

L.C.M. of 5, 15 and 25 is 75.

H.C.F. of 16, 24 and 8 is 8.

The HCF of the given fractions = $\frac{75}{8}$

16. **(3)** H.C.F. of the fractions $= \frac{\text{H.C.F. of numerators}}{\text{L.C.M. of denominators}}$

H.C.F. of 2, 6 and 8 is 2.

L.C.M. of 5, 25 and 35 is 175.

Thus, the H.C.F. of the given fractions $= \frac{2}{175}$

17. **(1)** H.C.F. of given fraction is

$$= \frac{\text{H.C.F. of 8, 12, 32}}{\text{L.C.M. of 21, 35, 7}} = \frac{4}{105}$$

18. **(3)** Here reason R is not true.

$\because \sqrt{4} = \pm 2$, which is not an irrational number.

Clearly assertion is true.

19. **(2)** If possible, let $5\sqrt{3}$ be a rational number.

So $5\sqrt{3} = \frac{p}{q}$, where p and q are integers and $q \neq 0$

$\Rightarrow \sqrt{3} = \frac{p}{5q}$

Since, p, q and 5 are integers therefore $\frac{p}{5q}$ is a rational number.

Hence, $\sqrt{3}$ is a rational number, which is a contradiction.

Therefore, $5\sqrt{3}$ is an irrational number.

$\therefore$ Assertion is true. Reason is also true but not the correct explanation of Assertion.

20. **(4)** Here reason is true [standard result]

Assertion is false. $\because \frac{3072}{16} = 192 \neq 162$ $\therefore$ (4) holds

21. **(1)**