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## CHAPTER 1

## REAL NUMBERS

## KEY POINTS

1. Euclid's division lemma :

For given positive integers ' $a$ ' and ' $b$ ' there exist unique whole numbers ' $q$ ' and ' $r$ ' satisfying the relation $a=b q+r, 0 \leq r<b$.
2. Euclid's division algorithms :

HCF of any two positive integers $a$ and $b$. With $a>b$ is obtained as follows:

Step 1 : Apply Euclid's division lemma to $a$ and $b$ to find $q$ and $r$ such that $a=b q+r, 0 \leq r<b$.

Step 2 : If $r=0, \operatorname{HCF}(a, b)=b$ if $r \neq 0$, apply Euclid's lemma to $b$ and $r$.
3. The Fundamental Theorem of Arithmetic :

Every composite number can be expressed (factorized) as a product of primes and this factorization is unique, apart from the order in which the prime factors occur.
4. Let $x=\frac{p}{q}, q \neq 0$ to be a rational number, such that the prime factorization of ' $q$ ' is of the form $2^{m} 5^{n}$, where $m, n$ are non-negative integers. Then $x$ has a decimal expansion which is terminating.
5. Let $x=\frac{p}{q}, q \neq 0$ be a rational number, such that the prime factorization of $q$ is not of the form $2^{m} 5^{n}$, where $m, n$ are non-negative integers. Then $x$ has a decimal expansion which is non-terminating repeating.
6. $\sqrt{ } p$ is irrational, which $p$ is a prime. A number is called irrational if it cannot be written in the form $\frac{p}{q}$ where $p$ and $q$ are integers and $q \neq 0$.

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## MULTIPLE CHOICE QUESTIONS

1. $5 \times 11 \times 13+7$ is $a$
(a) prime number
(b) composite number
(c) odd number
(d) none
2. Which of these numbers always ends with the digit 6 .
(a) $4^{n}$
(b) $2^{n}$
(c) $6^{n}$
(d) $8^{n}$
where $n$ is a natural number.
3. For $a, b(a \neq b)$ positive rational numbers $(\sqrt{a}+\sqrt{b})(\sqrt{a}-\sqrt{b})$ is $a$
(a) Rational number
(b) irrational number
(c) $(\sqrt{a}-\sqrt{b})^{2}$
(d) 0
4. If $p$ is a positive rational number which is not a perfect square then $-3 \sqrt{p}$ is
(a) integer
(b) rational number
(c) irrational number
(d) none of the above.
5. All decimal numbers are-
(a) rational numbers
(b) irrational numbers
(c) real numbers
(d) integers
6. In Euclid Division Lemma, when $a=b q+r$, where $a, b$ are positive integers which one is correct.
(a) $0<r \leq b$
(b) $0 \leq r<b$
(c) $0<r<b$
(d) $0 \leq r \leq b$
7. Which of the following numbers is irrational number
(a) 3.131131113...
(b) 4.46363636...
(c) 2.35
(d) $b$ and $c$ both

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8. The decimal expansion of the rational number $\frac{21}{7 \times 2^{3} \times 5^{4}}$ will terminate after $\qquad$ decimal places.
(a) 3
(b) 4
(c) 5
(d) never
9. HCF is always
(a) multiple of L.C.M.
(b) Factor of L.C.M.
(c) divisible by L.C.M.
(d) a and $c$ both
10. The product of two consecutive natural numbers is always.
(a) an even number
(b) an odd number
(c) a prime number
(d) none of these
11. Which of the following is an irrational number between 0 and 1
(a) $0.11011011 \ldots$
(b) 0.90990999...
(c) $1.010110111 \ldots$
(d) 0.3030303...
12. $p^{n}=(a \times 5)^{n}$. For $p^{n}$ to end with the digit zero $a=\ldots$ for natural no. $n$
(a) any natural number
(b) even number
(c) odd number
(d) none.
13. A terminating decimal when expressed in fractional form always has denominator in the form of -
(a) $2^{m} 3^{n}, m, n>0$
(b) $3^{m} 5^{n}, m, n>0$
(c) $5^{n} 7^{m}, m, n>0$
(d) $2^{m} 5^{n}, m, n>0$

## SHORT ANSWER TYPE QUESTIONS

14. What will be the value of $0 . \overline{3}+0 . \overline{4}$ ?
15. If unit's digit of $7^{3}$ is 3 then what will be the unit's digit of $7^{11}$.
16. Given that $\operatorname{HCF}(135,225)=45$. Find $\operatorname{LCM}(135,225)$.

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17. Solve $\sqrt{18} \times \sqrt{50}$. What type of number is it, rational or irrational.
18. Find the H.C.F. of the smallest composite number and the smallest prime number.
19. If $a=4 q+r$ then what are the conditions for $a$ and $q$. What are the values that $r$ can take?
20. What is the smallest number by which $\sqrt{5}-\sqrt{3}$ be multiplied to make it a rational no? Also find the no. so obtained.
21. What is the digit at unit's place of $9^{n}$ ?
22. Find one rational and one irrational no. between $\sqrt{3}$ and $\sqrt{5}$.
23. State Euclid's Division Lemma and hence find HCF of 16 and 28.
24. State fundamental theorem of Arithmetic and hence find the unique factorization of 120.
25. Prove that $\frac{1}{2-\sqrt{5}}$ is irrational number.
26. Prove that $5-\frac{2}{7} \sqrt{3}$ is irrational number.
27. Prove that $\sqrt{2}+\sqrt{7}$ is not rational number.
28. Find HCF and LCM of 56 and 112 by prime factorisation method.
29. Why $17+11 \times 13 \times 17 \times 19$ is a composite number? Explain.
30. Check whether $5 \times 6 \times 2 \times 3+3$ is a composite number.
31. Check whether $14^{n}$ can end with the digit zero for any natural number, $n$.
32. If the HCF of 210 and 55 is expressible in the form $210 \times 5+55 y$ then find $y$.

## LONG ANSWER TYPE QUESTIONS

33. Find HCF of 56,96 and 324 by Euclid's algorithm.

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34. Show that the square of any positive integer is either of the form $3 m$ or $3 m+1$ for some integer $m$.
35. Show that any positive odd integer is of the form $6 q+1,6 q+5$ where $q$ is some integer.
36. Prove that the square of any positive integer is of the form $5 q, 5 q+1$, $5 q+4$ for some integer, $q$.
37. Prove that the product of three consecutive positive integers is divisible by 6 .
38. Show that one and only one of $n, n+2, n+4$ is divisible by 3 .
39. Two milk containers contains $398 l$ and $436 l$ of milk. The milk is to be transferred to another container with the help of a drum. While transferring to another container $7 l$ and $11 l$ of milk is left in both the containers respectively. What will be the maximum capacity of the drum.

## ANSWERS



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28. $\mathrm{HCF}=28, \mathrm{LCM}=336$
31. No
33. H
35. $9=6 q+r$
39. 17
30. Yes
32. Find $\operatorname{HCF}(210,55)=5$,

$$
5=210 \times 5+55 y \Rightarrow y=-19
$$

34. $9=3 q+r$
35. $n=3 q+r$
