Chapter 1: Real Numbers

1.

Question: The decimal expansion of the rational number $\frac{33}{2^2 \times 5}$ will terminate after how many decimal places?

Options:

a) 1

b) 2

c) 3

d) 4

Answer: b) 2

Explanation: Denominator $2^2 \times 5 = 20$, prime factorization $2^2 \times 5$, so terminates after $\max(2,1) = 2$ decimal places.

2.

Question: The decimal expansion of $\frac{17}{8}$ will terminate after how many decimal places?

Options:

a) 1

b) 2

c) 3

d) It is non-terminating

Answer: c) 3

Explanation: $\frac{17}{8} = \frac{17}{2^3}$, terminates after 3 decimal places.

3.

Question: Which of the following has a terminating decimal expansion?

Options:

a) $\frac{77}{210}$

b) $\frac{23}{30}$

c) $\frac{125}{441}$

d) $\frac{129}{2^2 \times 5^7}$

Answer: d) $\frac{129}{2^2 \times 5^7}$

Explanation: Denominator in simplest form has only 2 and 5 as prime factors.

4.

Question: The HCF of 96 and 404 is:

Options:

a) 4

b) 6

c) 8

d) 12

Answer: a) 4

Explanation: Use prime factorization or Euclid's algorithm: $404 = 96 \times 4 + 20$, $96 = 20 \times 4 + 16$, $20 = 16 \times 1 + 4$, $16 = 4 \times 4 + 0$.

5.

Question: The LCM of 96 and 404 is:

Options:

a) 9696

b) 8484

c) 7272

d) 6464

Answer: a) 9696

Explanation: LCM × HCF = Product of numbers ⇒ LCM = $(96 \times 404)/4 = 9696$.

6.

Question: If HCF (306, 657) = 9, then LCM (306, 657) is:

Options:

a) 22338

b) 22436

c) 23228

d) 22148

Answer: a) 22338
Explanation: LCM × HCF = $306 \times 657 \Rightarrow$ LCM = $(306 \times 657)/9 = 22338$.

7.

Question: The least number divisible by all numbers from 1 to 10 is:
Options:
a) 2520
b) 1260
c) 5040
d) 100
Answer: a) 2520
Explanation: LCM(1,2,...,10) = 2520.

8.

Question: The largest number which divides 70 and 125, leaving remainders 5 and 8 respectively, is:
Options:
a) 13
b) 15
c) 17
d) 25
Answer: a) 13
Explanation: Required number = HCF(70−5, 125−8) = HCF(65, 117) = 13.

9.

Question: The number $7 \times 11 \times 13 + 13$ is:
Options:
a) Prime
b) Composite
c) Neither prime nor composite
d) None of these
Answer: b) Composite
Explanation: $13(7 \times 11 + 1) = 13 \times 78$, so it has factors other than 1 and itself.

10.

Question: The number $5 \times 3 \times 2 + 3$ is:
Options:
a) Prime
b) Composite
c) Odd prime
d) Even prime
Answer: b) Composite
Explanation: $3(5 \times 2 + 1) = 3 \times 11$, so composite.

11.

Question: If n is a natural number, then which number always ends with digit 0 from below?
Options:
a) 4^n
b) 2^n
c) 6^n
d) $(2 \times 5)^n$
Answer: d) $(2 \times 5)^n$
Explanation: 10^n always ends with 0.

12.

Question: Euclid's division lemma states that for any positive integers a and b, there exist unique integers q and r such that $a = bq + r$, where:
Options:
a) $0 \leq r < b$
b) $0 < r \leq b$
c) $0 \leq r \leq b$
d) $0 < r < b$
Answer: a) $0 \leq r < b$

13.

Question: The HCF of two consecutive integers is:

Options:

a) 0

b) 1

c) 2

d) Product of the numbers

Answer: b) 1

14.

Question: The HCF of two consecutive even numbers is:

Options:

a) 1

b) 2

c) 4

d) 0

Answer: b) 2

15.

Question: Which of these is an irrational number?

Options:

a) $\sqrt{4}$

b) $3\sqrt{27}$

c) $\sqrt{12}/\sqrt{3}$

d) $\sqrt{81}$

Answer: b) $3\sqrt{27}$

Explanation: $3\sqrt{27} = 3 \times 3\sqrt{3} = 9\sqrt{3}$ (irrational). Others simplify to integers or rationals.

16.

Question: The decimal expansion of $\frac{13}{625}$ will terminate after how many decimal places?

Options:

a) 1

b) 2

c) 3

d) 4

Answer: d) 4

Explanation: $625 = 5^4$, so terminates after 4 decimal places.

17.

Question: After how many places will the decimal expansion of $\frac{14587}{1250}$ terminate?

Options:

a) 1

b) 2

c) 3

d) 4

Answer: c) 3

Explanation: $1250 = 2 \times 5^4$, so terminates after $\max(1,4) = 4$ but simplest form check: $1250 = 2^1 \times 5^4$, so 4 decimal places. Correction: $1250 = 2 \times 5^4$, denominator has $2^1 \times 5^4$, so terminates after 4 decimal places. So answer d) 4.

18.

Question: If a and b are co-prime numbers, then a^2 and b^2 are:

Options:

a) Co-prime

b) Not co-prime

c) Even

d) Odd

Answer: a) Co-prime

19.

Question: If p is a prime number and p divides a^2 (where a is a positive integer), then p divides:

Options:

a) a only

b) a^3 only

c) Both a and a^2

d) None

Answer: a) a only
Explanation: By theorem: If p divides a^2, p divides a.

20.

Question: The HCF of 17 and 19 is:
Options:
a) 1
b) 17
c) 19
d) 323
Answer: a) 1

21.

Question: Given that HCF (26, 91) = 13, then LCM (26, 91) is:
Options:
a) 91
b) 182
c) 364
d) 2366
Answer: b) 182
Explanation: LCM × HCF = $26 \times 91 \Rightarrow$ LCM = $(26 \times 91)/13 = 182$.

22.

Question: The decimal expansion of π is:
Options:
a) Terminating
b) Non-terminating repeating
c) Non-terminating non-repeating
d) None
Answer: c) Non-terminating non-repeating

23.

Question: The product of a non-zero rational and an irrational number is:
Options:
a) Always rational
b) Always irrational
c) Rational or irrational
d) One
Answer: b) Always irrational

24.

Question: If the HCF of 85 and 153 is expressible in the form $85n - 153$, then $n = ?$
Options:
a) 3
b) 2
c) 4
d) 1
Answer: b) 2
Explanation: HCF(85,153) = 17. Given $85n - 153 = 17 \Rightarrow 85n = 170 \Rightarrow n = 2.$

25.

Question: Which of the following is not irrational?
Options:
a) $\left(3+\sqrt{7}\right)$
b) $\left(3-\sqrt{7}\right)$
c) $\left(3 + \sqrt{7}\right)(3 - \sqrt{7})$
d) $3\sqrt{7}$
Answer: c) $\left(3 + \sqrt{7}\right)(3 - \sqrt{7})$
Explanation: It equals $9 - 7 = 2$, a rational number.

26.

Question: The decimal expansion of $\frac{1}{7}$ is:
Options:
a) Terminating
b) Non-terminating repeating

c) Non-terminating non-repeating
d) None
Answer: b) Non-terminating repeating

27.

Question: If p and q are co-prime numbers, then p^2 and q^2 are:
Options:
a) Co-prime
b) Not co-prime
c) Even
d) Odd
Answer: a) Co-prime

28.

Question: The LCM of smallest prime and smallest odd composite natural number is:
Options:
a) 6
b) 4
c) 18
d) 10
Answer: c) 18
Explanation: Smallest prime = 2, smallest odd composite = 9, LCM(2,9)=18.

29.

Question: If n is any natural number, then $6^n - 5^n$ always ends with:
Options:
a) 1
b) 3
c) 5
d) 7
Answer: a) 1
Explanation: For $n = 1$, it's 1, pattern holds.

30.

Question: $\sqrt{2}$ is:
Options:
a) A rational number
b) An integer
c) An irrational number
d) None
Answer: c) An irrational number

31.

Question: The HCF of 8, 9, and 25 is:
Options:
a) 0
b) 1
c) 2
d) 25
Answer: b) 1

32.

Question: The LCM of two numbers is 1200. Which cannot be their HCF?
Options:
a) 600
b) 500
c) 200
d) 400
Answer: b) 500
Explanation: HCF must divide LCM. 500 does not divide 1200.

33.

Question: If two positive integers a and b are written as $a = x^3y^2$ and $b = xy^3$, where x, y are prime numbers, then HCF(a,b) is:
Options:
a) xy

b) xy^2
c) x^3y^3
d) x^2y^2
Answer: b) xy^2
Explanation: HCF = minimum powers: $x^{\min(3,1)}y^{\min(2,3)} = x^1y^2 = xy^2$.

34.

Question: For above (Q33), LCM(a,b) is:
Options:
a) x^3y^3
b) x^4y^5
c) x^2y^3
d) x^3y^2
Answer: a) x^3y^3
Explanation: LCM = maximum powers: $x^{\max(3,1)}y^{\max(2,3)} = x^3y^3$.

35.

Question: The decimal expansion of $\frac{3}{8}$ is:
Options:
a) 0.375
b) 0.365
c) 0.355
d) 0.335
Answer: a) 0.375

36.

Question: The HCF of 2472 and 1284, where 2472 > 1284, is:
Options:
a) 12
b) 6
c) 4
d) 2
Answer: a) 12

Explanation: Use Euclid's algorithm: 2472 = 1284×1 + 1188, 1284 = 1188×1 + 96, 1188 = 96×12 + 36, 96 = 36×2 + 24, 36 = 24×1 + 12, 24 = 12×2 + 0. HCF = 12.

37.

Question: The sum or difference of a rational and irrational number is:
Options:
a) Rational
b) Irrational
c) Both
d) Neither
Answer: b) Irrational

38.

Question: A number when divided by 61 gives 27 as quotient and 32 as remainder. The number is:
Options:
a) 1679
b) 1689
c) 1699
d) 1669
Answer: a) 1679
Explanation: Dividend = Divisor × Quotient + Remainder = $61 \times 27 + 32 = 1647 + 32 = 1679$.

39.

Question: The smallest number that when divided by 35, 56, and 91 leaves remainder 7 in each case is:
Options:
a) 3647
b) 3654
c) 3607
d) 3640
Answer: a) 3647
Explanation: LCM(35,56,91) = 3640, required number = 3640 + 7 = 3647.

40.

Question: Which of the following rational numbers has a terminating decimal expansion?

Options:

a) $\frac{15}{1600}$

b) $\frac{29}{343}$

c) $\frac{23}{2^3 \times 5^2}$

d) Both (a) and (c)

Answer: d) Both (a) and (c)

Explanation: (a) $\frac{15}{1600} = \frac{15}{2^6 \times 5^2}$, denominator has only 2 and 5; (c) clearly has only 2 and 5 in denominator.

Answer Key:

1. b 2. c 3. d 4. a 5. a 6. a 7. a 8. a 9. b 10. b
2. d 12. a 13. b 14. b 15. b 16. d 17. d 18. a 19. a 20. a
3. b 22. c 23. b 24. b 25. c 26. b 27. a 28. c 29. a 30. c
4. b 32. b 33. b 34. a 35. a 36. a 37. b 38. a 39. a 40. d