RG CLASSES

EDUCATING FOR BETTER FUTURE...

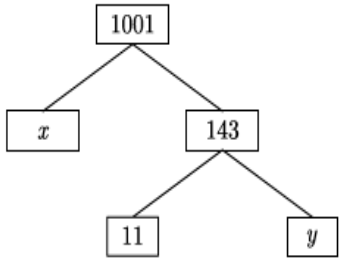
GRADE X

Question Bank (MATHEMATICS)

Chapter-1 Real Numbers

1 marks:

1. If two positive integers p and q can be expressed as $p = ab^2$ and $q = a^3b$, where a and b are prime numbers then $LCM(a, b) =$ **[BOARD 2024]**
   a) ab b) a^2b^2 c) a^3b^2 d) a^3b^3
2. If p and q are natural numbers and 'p' is the multiple of 'q', then what is the HCF of 'p' and 'q'? **[BOARD 2023]**
   a) pq b) p c) q d) $p + q$
3. Let a and b be two positive integers such that $a = p^3q^4$ and $b = p^2q^3$, where p and q are prime numbers. If $HCF(a, b) = p^mq^n$ and $LCM(a, b) = p^rq^s$, then $(m + n)(r + s) =$
   a) 15 b) 30 c) 35 d) 72
4. The sum of exponents of prime factors in the prime factorization of 196 is
   a) 3 b) 4 c) 5 d) 2
5. The sum of exponents of prime factors in the prime factorization of 1764 is
   a) 3 b) 4 c) 5 d) 6
6. The values of x and y in the given figure are



   a) 7, 13 b) 13, 7 c) 9, 12 d) 12, 9
7. The total number of factors of prime number is
   a) 1 b) 0 c) 2 d) 3
8. The HCF and LCM of 12, 21, 15 respectively are
   a) 3, 140 b) 12, 420 c) 3, 420 d) 420, 3
9. The HCF and LCM of 378, 180, 420 are **[BOARD 2024]**
   a) 6, 3980 b) 12, 3780 c) 6, 3780 d) 12, 3980
10. If the product of two co-prime numbers is 553, then their HCF is **[BOARD 2024]**
    a) 1 b) 553 c) 7 d) 79
11. The LCM of smallest two digit composite number and smallest composite number is
    a) 12 b) 4 c) 20 d) 44

12. The ratio of LCM and HCF of the least composite and the least prime numbers is **[BOARD 2023]**

a) 1: 2 b) 2: 1 c) 1: 1 d) 1: 3

13. If $HCF(336, 54) = 6, LCM(336, 54)$ is

a) 2024 b) 3024 c) 1012 d) 1512

14. The value of 'a', if $HCF(x, 18) = 2\ and\ LCM(x, 18) = 36$, is

a) 2 b) 5 c) 7 d) 4

15. HCF of two numbers is 27 and their LCM is 162. If one of the numbers is 54 then the other number is

a) 36 b) 35 c) 9 d) 81

16. The LCM of two numbers is 14 times their HCF. The sum of LCM and HCF is 600. If one number is 280 then the other number is

a) 20 b) 28 c) 60 d) 80

17. HCF of 144 and 198 is

a) 9 b) 18 c) 6 d) 12

18. 225 can be expressed as

a) 5×3^2 b) $5^2 \times 3$ c) $5^2 \times 3^2$ d) $5^3 \times 3$

19. 108 can be expressed as a product of its prime as

a) $2^3 \times 3^2$ b) $2^3 \times 3^3$ c) $2^2 \times 3^2$ d) $2^2 \times 3^3$

20. When 2120 is expressed as the product of its prime factors we get

a) $2 \times 5^3 \times 53$ b) $2^3 \times 5 \times 53$ c) $5 \times 7^2 \times 31$ d) $5^2 \times 7 \times 33$

21. $2\sqrt{3}$ is _____ number.

a) Integer b) rational c) irrational d) whole

22. If a and b are two positive integers such that the least prime factor of a is 3 and the least prime factor of b is 5. Then the least prime factor of $(a + b)$ is

a) 1 b) 2 c) 3 d) 4

23. Select the least number that is divisible by all numbers between 1 and 10 (both inclusive)

a) 2520 b) 5040 c) 1010 d) 2020

24. If 'n' is a natural number then which of the following numbers end with zero? **[BOARD 2023]**

a) $(3 \times 2)^n$ b) $(2 \times 5)^n$ c) $(6 \times 2)^n$ d) $(5 \times 3)^n$

25. If $p^2 = \frac{32}{50}$ then p is_____ number. **[BOARD 2023]**

a) Whole b) integer c) rational d) irrational

26. If the $HCF(2520, 6600) = 40$ and $LCM(2520, 6600) = 252 \times k$ then the value of k is **[BOARD 2024]**

a) 1650 b) 1600 c) 165 d) 1625

27. If $a = 2^2 \times 3^x, b = 2^2 \times 3 \times 5, c = 2^2 \times 3 \times 7$ and $LCM(a, b, c) = 3780$ then x is **[BOARD 2024]**

a) 1 b) 2 c) 3 d) 0

28. If $3825 = 3^x \times 5^y \times 17^z$ then the value of $x + y - 2z$ is **[BOARD 2024]**

a) 0 b) 1 c) 2 d) 3

29. A pair of irrational numbers whose product is a rational number is **[BOARD 2024]**

a) $(\sqrt{16}, \sqrt{4})$ b) $(\sqrt{5}, \sqrt{2})$ c) $(\sqrt{3}, \sqrt{27})$ d) $(\sqrt{36}, \sqrt{2})$

30. The smallest irrational number by which $\sqrt{20}$ should be multiplied so as to get a rational number, is **[BOARD 2024]**

a) $\sqrt{20}$ b) $\sqrt{2}$ c) 5 d) $\sqrt{5}$

31. The greatest number which divides 281 and 1249, leaving remainder 5 and 7 respectively, is **[BOARD 2024]**

a) 23 b) 276 c) 138 d) 69

Options for Assertion and Reasoning Questions:

a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)
b) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)
c) Assertion (A) is true but reason (R) is false
d) Assertion (A) is false but reason (R) is true

32. ***Assertion (A):*** If HCF of 510 and 92 is 2 then their LCM is 32460.
Reason (R): $HCF(a, b) \times LCM(a, b) = a \times b$

33. ***Assertion (A):*** If the product of two numbers is 5780 and their HCF is 17, then their LCM is 340.
Reason (R): HCF is always factor of LCM.

34. ***Assertion (A):*** If $HCF(90, 144) = 18, LCM(90, 144) = 720$
Reason (R): $HCF(a, b) \times LCM(a, b) = a \times b$

35. ***Assertion (A):*** The HCF of two numbers is 5 and their product is 150 then their LCM is 30.
Reason (R): $HCF(a, b) + LCM(a, b) = a \times b$

36. ***Assertion (A):*** The HCF of two numbers is 9 and their LCM is 2016. If one number is 54 then the other number is 336.
Reason (R): $HCF(a, b) \times LCM(a, b) = a \times b$

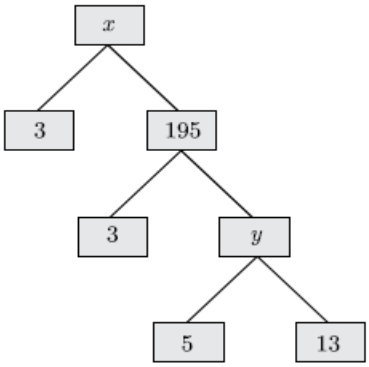
37. ***Assertion (A):*** The number 6^n never end with digit 0 for any natural number n.
Reason (R): The number 9^n never end with digit 0 for any natural number n.

38. ***Assertion (A):*** The number 5^n never ends with digit 0 for any natural number n.
Reason (R): Prime factorisation of 5 has only two factors, 1 and 5. **[BOARD 2023]**

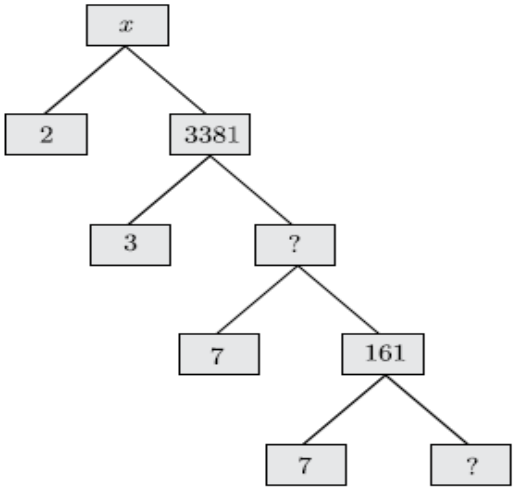
39. ***Assertion (A):*** The largest number that divides 70 and 125 which leaves remainder 5 and 8 is 13.
Reason (R): $HCF(65, 117) = 13$

2 marks:

1. Explain why $(7 \times 13 \times 11) + 11$ and $(7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1) + 3$ are composite numbers. **[BOARD 2024]**
2. Explain whether $(3 \times 12 \times 101) + 4$ is a prime number or a composite number.
3. Given that $HCF(306, 1314) = 18$. Find $LCM(306, 1314)$.
4. Check whether 4^n can end with the digit 0 for any natural number n. **[BOARD 2023 & BOARD 2024]**
5. Show that $5\sqrt{6}$ is an irrational number.
6. If two positive integers p and q are written as $p = a^2b^3$ and $q = a^3b$ where a and b are prime numbers then verify $LCM(p, q) \times HCF(p, q) = pq$.
7. Prove that $3 + \sqrt{5}$ is an irrational number. **[BOARD 2023]**
8. Prove that $6 - \sqrt{7}$ is an irrational number. **[BOARD 2023]**
9. Two numbers are in the ratio 2:3 and their LCM is 180. What is the HCF of these numbers? **[BOARD 2023]**
10. Using prime factorization find HCF and LCM of 96 and 120. **[BOARD 2023]**
11. Find the greatest number which divides 85 and 72 leaving remainders 1 and 2 respectively. **[BOARD 2023]**
12. Find the greatest 3-digit number which is divisible by 18, 24 and 36. **[BOARD 2023]**
13. Find the least number which when divided by 12, 16 and 24 leaves remainder 7 in each case. **[BOARD 2023]**
14. Find the smallest natural number by which 1200 should be multiplied so that the square root of the product is a rational number.
15. In a school, there are two sections of class X. There are 40 students in the first section and 48 students in the second section. Determine the minimum number of books required for their class library so that they can be distributed equally among students of both sections. **[BOARD 2024]**
16. Complete the following factor tree and find the composite number x.



17. Complete the following factor tree and find the composite number x.



3 marks:

1. Prove that $\sqrt{5}$ is an irrational number. **[BOARD 2023]**
2. Given that $\sqrt{3}$ is an irrational, prove that $5 + 2\sqrt{3}$ is an irrational number. **[BOARD 2024]**
3. Given that $\sqrt{5}$ is an irrational, prove that $2\sqrt{5} - 3$ is an irrational number.
4. Given that $\sqrt{3}$ is an irrational, prove that $\frac{2-\sqrt{3}}{5}$ is an irrational number. **[BOARD 2024]**
5. Given that $\sqrt{2}$ is an irrational, prove that $5 + 3\sqrt{2}$ is an irrational number.
6. Prove that $(\sqrt{2} + \sqrt{3})^2$ is irrational number, given that $\sqrt{6}$ is an irrational number. **[BOARD 2024]**
7. Write the smallest number which is divisible by both 306 and 657.
8. Find HCF and LCM of 16 and 36 by prime factorization and check your answer.
9. Find HCF and LCM of 26, 65 and 117 using prime factorization. **[BOARD 2023]**
10. Find HCF and LCM of 378, 180 and 420 by prime factorization. Verify that $HCF \times LCM$ = product of two numbers.
11. Find by prime factorization the LCM of the numbers 18180 and 7575. Also find the HCF of two numbers. **[BOARD 2023]**
12. 144 cartons of Coke cans and 90 cartons of Pepsi cans are to be stacked in a canteen. If each stack is of the same height and if it equal contain cartons of the same drink, what would be the greatest number of cartons each stack would have?
13. Three bells toll at intervals of 9, 12, 15 minutes respectively. If they start tolling together, after what time will they next toll together? **[BOARD 2024]**
14. Three bells ring at intervals of 6, 12 and 18 minutes. If all the three bells rang at 6 a.m., when will they ring together again? **[BOARD 2023]**
15. Four bells toll at an interval of 8, 12, 15 and 18 seconds respectively. All the four begin to toll together. Find the number of times they toll together in one hour excluding the one at the start.

16. The length, breadth and height of a room are 8m 50cm, 6m 25cm and 4m 75cm respectively. Find the length of the longest rod that can measure the dimensions of the room exactly.
17. On a morning walk, three persons step off together and their steps measure 40 cm, 42 cm and 45 cm respectively. Find the minimum distance each should walk so that each can cover the same distance in complete steps.
18. The traffic lights at three different road crossings change after every 48 seconds, 72 seconds and 108 seconds respectively. If they change simultaneously at 7 a.m, at what time will they change together next? **[BOARD 2023]**
19. National Art convention got registrations from students from all parts of the country, of which 60 are interested in music, 84 are interested in dance and 108 students are interested in handicrafts. For optimum cultural exchange, organisers wish to keep them in minimum number of groups such that each group consists of students interested in the same artform and the number of students in each group is the same. Find the number of students in each group. Find the number of groups in each art form. How many rooms are required if each group will be allotted a room?
20. In a teacher's workshop the number of teacher teaching French, Hindi and English are 48, 80 and 144 respectively. Find the minimum number of rooms required if in each room the same numbers of teachers are seated and all of them are of same subject. **[BOARD 2024]**

Case Based Questions:

1. February 14 is celebrated as International Book Giving Day and many countries in the world celebrate this day. Some people in India also started celebrating this day and donated the following number of books of various subjects to a public library: History = 96, Science = 240, Mathematics = 336.

   These books have to be arranged in minimum number of stacks such that each stack contains books of only one subject and the number of books on each stack is the same. **[BOARD 2023]**

   Based on the above information, answer the following questions:

   (i) How many books are arranged in each stack? **1**

   (ii) How many stacks are used to arrange all the Mathematics books? **1**

   (iii) (a) Determine the total number of stacks that will be used for arranging all the books. **2**

   OR

   (b) If the thickness of each book of History, Science and Mathematics is 1·8 cm, 2·2 cm and 2·5 cm respectively, then find the height of each stack of History, Science and Mathematics books. **2**

2. Three sets of English, Hindi and Mathematics books have to be stacked in such a way that all the books are stored topic wise and the height of each stack is the same. The number of English books is 96, the number of Hindi books is 240 and the number of Mathematics books is 336. Assuming that the books are of the same thickness.

(i) Find the number of stacks of Hindi books? **1**

(ii) Find the number of stacks of English books? **2**

OR

Find the number of stacks of Mathematics books? **2**

(iii) What is the number of books that can be stored in each stack? **1**

3. Teaching Mathematics through activities is a powerful approach that enhances students' understanding and engagement. Keeping this in mind, Ms. Muktha planned a prime number game for class 5 students. She announces the number 2in her class and asked the first student to multiply it by a prime number and then pass it to second student. Second student also multiplied it by a prime number and passed it to third student. In this way by multiplying to a prime number, the last student got 173250. **[BOARD 2024]**

Now, Muktha asked some questions as given below to the students:

(i) What is the least prime number used by students? **1**

(ii) How many students are in the class? **2**

OR

What is the highest prime number used by students? **2**

(iii) Which prime number has been used maximum times? **1**