CH- 1 REAL NUMBERS : CASE BASED MCQs CLASS 10 MATHS STANDARD

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Case based MCQs

I. Read the following and answer any four questions from Q.1. to Q.5.

A place in which literary, musical, Artistic or reference materials (such as books, manuscripts, recordings or films) are kept for use but not for sale. In other words, The word derives from the Latin liber, "book", whereas a Latinized Greek word, bibliotheca, is the origin of the word for library in To enhance the reading skills of grade X students, the school nominates you and two of your friends to set up a class library. There are two sections- section German, Russian and the Roman language.

These questions are for practice and their solutions are available at the end of the chapter A and section B of grade X. There are 32 students in section A and 36 students in section B.

Q. 1. What is the minimum number of books you will acquire for the class library, so that they can be distributed equally among students of Section A or Section B?

(A) 144 (B) 128 (C) 288 (D) 272

Answer: Option (C) is correct: 288

Explanation: We have to find the LCM of 32 and 36.

Prime factorisation of 32 = 2 × 2 × 2 × 2 × 2

Prime factorisation of 36 = 2 × 2 × 3 × 3

LCM(32, 36) = 2^5 x 9 = 32 x 9 = 288

Hence, the minimum number of books required to distribute equally among students of section A and section B are 288.

Q. 2. If the product of two positive integers is equal to the product of their

HCF and LCM is true then, the HCF (32, 36) is

(A) 2 (B) 4 (C) 6 (D) 8

Answer: Option (B) is correct: 4

Explanation:

Prime factorisation of 32 = 2 × 2 × 2 × 2 × 2

Prime factorisation of 36 = 2 × 2 × 3 × 3

LCM(32, 36) = 2^5 x 9 = 32 x 9

LCM(32, 36) = 288

By using Formula, HCF x LCM = Product of two numbers

HCF (32, 36) = Product of given numbers/LCM (32, 36)

HCF (32, 36) = (32 x 36)/288

HCF (32, 36) = 4

Hence, the product of two positive integers is equal to the product of their HCF and LCM is true then, the HCF (32, 36) is 4.

Q. 3. 36 can be expressed as a product of its primes as

(A) 2^2 x 3^2 (B) 2^1 x 3^3 (C) 2^3x 3^1 (D) 2° x 3°

Answer: Option (A) is correct: 2^2 x 3^2

Explanation: Prime factorisation of 36 = 2 × 2 × 3 × 3

Prime factorisation of 36 = 2^2 x 3^2

Hence,36 can be expressed as a product of its primes as 2^2 x 3^2.

Q.4. 7 x 11 x 13 x 15 + 15 is a

(A) Prime number (B) Composite number (C) Neither prime nor composite (D) None of the above

Answer: Option (B) is correct:(B) Composite number

Explanation: We have,

7 x 11 x 13 x 15 + 15 = 15(7 x 11 x 13 + 1)

7 x 11 x 13 x 15 + 15 = 15(1001 + 1)

7 x 11 x 13 x 15 + 15 = 15 x 1002

7 x 11 x 13 x 15 + 15 = 3 × 5 × 1002

Hence, it is a composite number because it has more than 2 factors.

Q. 5. If p and q are positive integers such that p = ab^2 and q = ab, where a, b are prime numbers, then the LCM (p,q) is

(A) ab (B) a^2b^2 (C) a^3b^2 (D) a^3b^3

Answer: Option (B) is correct: a^2b^2
Explanation:
Given: $p = ab^2 = a \times b \times b$
$q = a^2b = a \times a \times b$
LCM of (p ,q) = a^2b^2
Hence, LCM (p,q) is a^2b^2 .

II. Read the following and answer any four questions from Q.1. to Q.5.
Educational organization means any organization within this state that is not organised for profit, the primary purpose of which is to educate and develop the capabilities of individuals through instruction by means of operating or contributing to the support of a school, academy, college or university.
A seminar is being conducted by an Educational Organisation, where the participants will be educators of different subjects. The number of participants in Hindi, English and Mathematics are 60, 84 and 108 respectively.

Q. 1. In each room the same number of participants are to be seated and all of them being in the same subject, hence maximum number participants that can accommodated in each room are
(A) 14 (B) 12 (C) 16 (D) 18

Answer: Option (B) is correct.
Explanation:
Number of participants seated in each room will be the HCF of all the three given numbers.
$60 = 2 \times 2 \times 3 \times 5$
$84 = 2 \times 2 \times 3 \times$
$108 = 2 \times 2 \times 3 \times 3 \times 3$
HCF (60,84,108) = $2 \times 2 \times 3 = 12$
Hence, the maximum number participants that can accommodated in each room are 12.

Q. 2. What is the minimum number of rooms required during the event?
(A) 11 (B) 31 (C) 41 (D) 21

Answer: Option (D) is correct- 21
Explanation: Minimum number of rooms required are total number of students divided by number of students in each room.
No. of rooms = Total number of students/ Number of students in each room
No. of rooms = (60 + 84 + 108)/12
No. of rooms = 252/12
No. of rooms = 21
Hence, the minimum number of rooms required during the event is 21.

Q. 3. The LCM of 60, 84 and 108 is
(A) 3780 (B) 3680 (C) 4780 (D) 4680

Answer: Option (A) is correct:3780
Explanation: Prime factorization of 60, 84 and 108:
60 = 2 × 2 × 3 × 5
84 = 2 × 2 x 3 x 7
108 = 2 × 2 x 3 × 3 × 3
LCM(60, 84 and 108) = 2 × 2 x 3 × 3 x 3 × 5 x 7
LCM(60, 84 and 108) = 4 × 27 × 35
LCM(60, 84 and 108) = 3780.
Hence, the LCM of 60, 84 and 108 is 3780.

Q. 4. The product of HCF and LCM of 60,84 and 108 is
(A) 55360 (B) 35360 (C) 45500 (D) 45360
Answer: Option (D) is correct: 45360
Explanation: Prime factorization of 60, 84 and 108:
60 = 2 × 2 × 3 × 5
84 = 2 x 2 x 3 x 7
108 = 2 x 2 x 3 x 3 x 3
HCF (60,84,108) = 2 x 2 x 3 = 12

Prime factorization of 60, 84 and 108:
60 = 2 × 2 × 3 × 5
84 = 2 × 2 x 3 x 7
108 = 2 × 2 x 3 × 3 × 3
LCM(60, 84 and 108) = 2 × 2 x 3 × 3 x 3 × 5 x 7

LCM(60, 84 and 108) = 4 × 27 × 35
LCM(60, 84 and 108) = 3780.
Product of HCF and LCM of 60, 84 and 108 = 12 x 3780
Product of HCF and LCM of 60, 84 and 108 = 45360.
Hence, the product of HCF and LCM of 60, 84 and 108 is 45360.

Q. 5.108 can be expressed as a product of its primes as
(A) 2×3^2 (B) $2^3 \times 3^3$ (C) $2^2 \times 3^2$ (D) $2^2 \times 3^3$
Answer: Option (D) is correct : $2^2 \times 3^3$
Explanation: Prime factorisation of 108 = 108 2 × 2 × 3 × 3 × 3
Prime factorisation of 108 = $2^2 \times 3^3$
Hence, 108 can be expressed as a product of its primes as $2^2 \times 3^3$.

III. Read the following and answer any four questions from Q.1. to Q.5.
A plot of ground, usually near a house, where flowers, shrubs, vegetables, fruits or herbs are cultivated. In the words, a piece of ground or other space, commonly with ornamental plants, trees etc., used as a park or other public recreation area, a public garden, a fertile and delightful spot or region. A garden consists of 135 rose plants planted in certain number of columns. There are another set of 225 marigold plants, which is to be planted in the same number of columns

Q. 1. What is the maximum number of columns in which they can be planted?
(A) 45 (B) 40 (C) 15 (D) 40
Answer: Option (A) is correct: 45
Explanation:
Number of Rose plants = 135
Number of marigold plants = 225
Maximum number of columns in which they can be planted = HCF of 135 and 225
Prime factorization of 135 and 225:
135 = 3 × 3 × 3 × 5
225 = 3 × 3 x 5 x 5
HCF (135, 225) = 3 x 3 x 5 = 45
Hence, the maximum number of columns in which they can be planted is 45.

Q. 2. Find the total number of plants

(A) 135 (B) 225 (C) 360 (D) 45

Answer: Option (C) is correct: 360

Explanation:

Number of Rose plants = 135

Number of marigold plants = 225

Total number of plants = 135 + 225 = 360 plants

Hence, the total number of plants is 360

Q. 3. Find the sum of exponents of the prime factors of the maximum number of columns in which they can be planted.

(A) 5 (B) 3 (C) 4 (D) 6

Answer: Option (B) is correct: 3

Explanation:

Number of Rose plants = 135

Number of marigold plants = 225

Maximum number of columns in which they can be planted = HCF of 135 and 225

Prime factorization of 135 and 225:

135 = 3 × 3 × 3 × 5

225 = 3 × 3 x 5 x 5

HCF (135,225) = 3 x 3 x 5 = 45

Maximum number of columns in which they can be planted = 45

We have proved that the maximum number of columns = 45

Prime factors of 45 = 3 x 3 x 5

Prime factors of 45 = 3^2 x 5^1

Exponents of 3 = 2

Exponents of 5 = 1

Sum of exponents of 3 and 5 = 2 + 1 = 3

Hence, the sum of exponents of the prime factors of the maximum number of columns in which they can be planted is 3.

Q. 4. What is total numbers of row in which they can be planted

(A) 3 (B) 5 (C) 8 (D) 15

Answer: Option (C) is correct: 8

Explanation:

Number of rows = Number of plants/Maximum number of columns

Number of rows of Rose plants = 135/ 45 = 3

Number of rows of marigold plants = 225/45 = 5

Total number of rows = 3 + 5 = 8

Hence, total numbers of row in which they can be planted is 8.

Q. 5. Find the sum of exponents of the prime factors of total number of plants.

(A) 2 (B) 3 (C) 5 (D) 6

Answer: Option (D) is correct: 6

Explanation:

Number of Rose plants = 135

Number of marigold plants = 225

Total number of plants = 135 + 225 = 360 plants

Prime factors of 360 = 2 x 2 x 2 × 3 × 3 × 5

Prime factors of 360 = 2^3 x 3^2 x 5^1

Exponents of 2 = 3

Exponents of 3 = 2

Exponents of 5 = 1

Sum of exponents = 3 + 2 + 1 = 6

Hence, the sum of exponents of the prime factors of total number of plants is 6.