Class 10 MATH Real Numbers NCERT Exemplar PYQs

Chapter Real Numbers - Ex 1.1

4. If the HCF of 65 and 117 is expressible in the form $65m - 117$, then the value of m is

(A) 4 (B) 2

(C) 1 (D) 3

[CBSE 2014, 12]

Answer: Option (B) 2 is correct

Solution:

Find the HCF of 65, 117 by factorisation method:

65 = 13 x 5

117 = 13 × 3 × 3

So, HCF of 65 and 117 = 13 …..(1)

It is given that,

HCF (65, 117) = 65m - 117 ……(2)

From eqs. (1) and (2), we get

65m - 117 = 13

65m = 130

m = 130/65

m = 2

Hence the value of m is 2.

5. The largest number which divides 70 and 125, leaving remainders 5 and 8, respectively, is

(A) 13 (B) 65

(C) 875 (D) 1750

[CBSE 2017]

Answer: Option (A) 13 is correct

Explanation: Since it is given that 5 and 8 are the remainders of 70 and 125 respectively, first we subtract these remainders from the given numbers, we get 65 = (70 - 5) and 117 = (125 - 8), then get HCF of the resulting number by using prime factorization method which is the required greatest number.

Now, the required number = HCF (65,117) [for the greatest number]

Find the HCF of 65, 117 by factorisation method:

$65 = 13 \times 5$

$117 = 13 \times 3 \times 3$

HCF of 65 and 117 = 13

Hence, 13 is the greatest number which divides 70 and 125 leaving reminders 5 and 8.

Ex 1.2

7. Explain why $3 \times 5 \times 7 + 7$ is a composite number.

[CBSE 2017,15]

Explanation: Prime numbers have only two factors one and the number itself. As we know that composite numbers are any number with more than two factors

Solution:

1 is neither prime nor composite.

If a number greater than 1 is not prime, it is a composite number.

Further, a prime number is divisible by 1 and the number itself.

Now,

$(3 \times 5 \times 7) + 7 = 105 + 7 = 112 = 7 \times 2^4$

So, it is a product of prime factors 2 and 7.i.e. it has factors other than 1 and itself.

Hence, $(3 \times 5 \times 7) + 7$ is a composite number.

Ex 1.3

10. Prove that $\sqrt{3}+\sqrt{5}$ is irrational.

[CBSE 2020,18,15,13,10,09]

Solution: Let us suppose that $\sqrt{3} + \sqrt{5}$ is rational.
Let $\sqrt{3} + \sqrt{5} = a$, where a is rational.
Therefore, $\sqrt{3} = a - \sqrt{5}$
On squaring both sides, we get
$(\sqrt{3})^2 = (a - \sqrt{5})^2$
$\Rightarrow 3 = a^2 + (\sqrt{5})^2 - 2a\sqrt{5}$
[$\because$ $(a - b)^2 = a^2 + b^2 - 2ab$]
$3 = a^2 + 5 - 2a\sqrt{5}$
$\Rightarrow 2a\sqrt{5} = a^2 + 5 - 3$
$\Rightarrow 2a\sqrt{5} = a^2 + 2$
$\Rightarrow \sqrt{5} = (a^2 + 2)/2a$
which is a contradiction as the right-hand side $(a^2 + 2)/2a$ is a rational number while $\sqrt{5}$ is irrational.
Hence, our assumption is wrong and $\sqrt{3} + \sqrt{5}$ is irrational.

11. Show that 12^n cannot end with the digit 0 or 5 for any natural number *n*.

[CBSE 2020,17,15]

Solution: If any number ends with the digit 0 or 5,
it is always divisible by 5.
If 12n ends with the digit zero or five it must be divisible by 5.
This is possible only if the prime factorisation of
12n contains the prime number 5.
Now, 12 = 2 x 2 x 3 = 2^2 x 3
12n = (2^2 x 3)^n = 2^2^n x 3^n
since, there is no term containing 5.
Hence, there is no value of n $\in$ N for which 12n ends with the digit 0 or 5.

12. On a morning walk, three persons step off together and their steps measure 40 cm, 42 cm and 45 cm, respectively. What is the minimum distance each should walk so that each can cover the same distance in complete steps?

[CBSE 2015]

Explanation: We know that LCM is a product of the greatest power of each prime factor of the numbers.

Solution: We have to find the LCM of 40 cm, 42 cm, and 45 cm to get the required minimum distance.

Prime factorisation of 40 = 2 x 2 x 2 x 5 , 42 = 2 x 3 x 7 and 45 = 3 x 3 x 5

∴ LCM(40,42,45) = 2 x 3 x 5 x 2 x 2 x 3 x 7

LCM(40,42,45) = 2520

Hence, the minimum distance each person should walk is 2520 cm so that each can cover the same distance in complete steps.