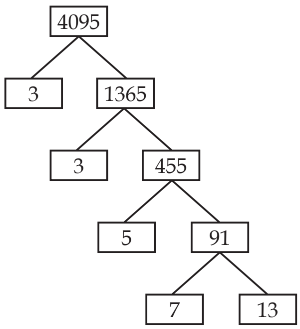
Real Numbers

CHAPTER 1

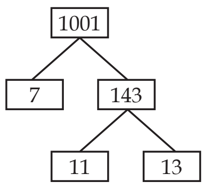
TRY YOURSELF SOLUTIONS

1. (i) Using factor tree method, we have



$\therefore$ $4095 = 3 \times 3 \times 5 \times 7 \times 13 = 3^2 \times 5 \times 7 \times 13$

(ii) Using factor tree method, we have



$\therefore$ $1001 = 7 \times 11 \times 13$

2. We have, $9 \times 13 \times 17 + 17$
$= 17(9 \times 13 + 1) = 17(117 + 1) = 17 \times 118$, which is not a prime number because it has 17 as a factor other than 1 and the number itself.

$\therefore$ $9 \times 13 \times 17 + 17$ is a composite number.

Also, we have $5 \times 6 \times 7 \times 8 \times 9 + 7 = 7(5 \times 6 \times 8 \times 9 + 1)$, which is again not a prime number because it has 7 as a factor other than 1 and the number itself.

$\therefore$ $5 \times 6 \times 7 \times 8 \times 9 + 7$ is a composite number.

3. If any number ends with the digit 0 or 5, it is always divisible by 5.

If 12^n ends with the digit zero or five, it must be divisible by 5.

This is possible only if prime factorisation of 12^n contains the prime number 5.

Now, $12 = 2 \times 2 \times 3 = 2^2 \times 3$

$\Rightarrow$ $12^n = (2^2 \times 3)^n = 2^{2n} \times 3^n$

Since, there is no term containing 5.

Hence, there is no value of n for which 12^n ends with the digit zero or five.

4. The prime factorisation of 144, 180 and 192 is,

$144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 = 2^4 \times 3^2$

$180 = 2 \times 2 \times 3 \times 3 \times 5 = 2^2 \times 3^2 \times 5$

$192 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 = 2^6 \times 3$

$\therefore$ HCF (144, 180, 192) $= 2^2 \times 3 = 12$

and LCM (144, 180, 192) $= 2^6 \times 3^2 \times 5 = 2880$

5. Since, the books are to be distributed equally among the students of section A or section B.

So, number of books must be a multiple of 32 as well as 36

$\therefore$ Required number of books is the LCM of 32 and 36

Prime factorisation of 32 and 36 is

$32 = 2 \times 2 \times 2 \times 2 \times 2 = 2^5$

$36 = 2 \times 2 \times 3 \times 3 = 2^2 \times 3^2$

$\therefore$ LCM of 32 and 36 is $2^5 \times 3^2 = 288$

Hence, required number of books is 288.

6. Given, HCF $(a, b) = 11$

Product of a and $b = 7623$

$\therefore$ LCM $(a, b) = \dfrac{\text{Product of } a \text{ and } b}{\text{HCF}(a, b)}$

$\Rightarrow$ LCM $(a, b) = \dfrac{7623}{11} = 693$

7. Given HCF (2520, 6600) = 120

LCM (2520, 6600) $= 252 \times k$

Now, HCF (2520, 6600) $\times$ LCM (2520, 6600) $= 2520 \times 6600$

$\Rightarrow$ $(120) \times (252 \times k) = 2520 \times 6600$

$\Rightarrow$ $k = \dfrac{2520 \times 6600}{252 \times 120} = 550$

8. We know that HCF $(a, b) \times$ LCM (a, b) = product of a and b

$\Rightarrow$ $12 \times$ LCM $(a, b) = 1152$

$\Rightarrow$ LCM $(a, b) = \dfrac{1152}{12} = 96$

9. Given, $x = p^2q^3$, $y = p^3q$, where p and q are primes.

LCM $(x, y) = p^3q^3$

HCF $(x, y) = p^2q$

Now, LCM $(x, y) = p^3q^3 = pq^2p^2q = pq^2 \times$ HCF (x, y)

$\therefore$ LCM is a multiple of HCF.

10. Let us assume that $\sqrt{3}$ is rational

So, we can find integers a and b ($b \neq 0$ and a, b are co-prime) such that

$\sqrt{3} = \dfrac{a}{b} \Rightarrow \sqrt{3}b = a$

$\Rightarrow$ $3b^2 = a^2$ [Squaring both sides]

$\therefore$ 3 divides a^2 $\Rightarrow$ 3 divides a ...(ii)

So, we can write $a = 3m$, where m is an integer

Putting $a = 3m$ in (i), we get

$3b^2 = 9m^2 \Rightarrow b^2 = 3m^2$

$\therefore$ 3 divides $b^2 \Rightarrow$ 3 divides b ...(iii)

From (ii) and (iii), 3 is a common factor of a and b, which contradicts the fact that a and b are co-prime.

$\therefore$ Our assumption that $\sqrt{3}$ is rational is wrong.

Hence, $\sqrt{3}$ is irrational.

11. Let us assume that $3+\sqrt{2}$ is rational.

So, we can find two integers a and b ($b \neq 0$ and a, b are co-prime)

such that $3+\sqrt{2} = \frac{a}{b}$, $\Rightarrow \sqrt{2} = \frac{a}{b} - 3 = \frac{a-3b}{b}$

Here, $\frac{a-3b}{b}$ is rational [$\because$ a and b are integers]

$\Rightarrow$ $\sqrt{2}$ is rational, which contradicts the fact that $\sqrt{2}$ is irrational

$\therefore$ Our supposition is wrong.

Hence, $3+\sqrt{2}$ is irrational.