NCERT Solutions for Class 10 Maths Chapter 1: Here are the solutions for Chapter 1 of Class 10 Maths, focusing on Real Numbers. Our expert teachers have prepared these solutions to help students with their board exam preparation. These solutions make it easier for students to solve problems by providing clear explanations for each question in the NCERT exercises.

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Topics Covered in the NCERT Solutions for Class 10 Maths Chapter 1 Overview

Here is the overview of the NCERT Solutions for Class 10 Maths Chapter 1:

Section Name	Topic Name
1	Real Numbers
1.1	Introduction
1.2	Euclid’s Division Lemma
1.3	The Fundamental Theorem of Arithmetic
1.4	Revisiting Irrational Numbers
1.5	Revisiting Rational Numbers and Their Decimal Expansions
1.6	Summary

NCERT Solutions for Class 10 Maths Chapter 1 PDF

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NCERT Solutions for Class 10 Maths Chapter 1 PDF

NCERT Solutions for Class 10 Maths Chapter 1 Real Numbers

Exercise 1.1 Page: 7

1. Use Euclid's division algorithm to find the HCF of:

i. 135 and 225

ii. 196 and 38220

iii. 867 and 255

Solutions:

To find the HCF (Highest Common Factor) using Euclid's division algorithm, we follow these steps:

Step 1: Perform the division with the larger number as the dividend and the smaller number as the divisor.

Step 2: Divide the divisor (smaller number) by the remainder obtained in the previous step.

Step 3: Continue this process until the remainder becomes zero. The divisor at this stage will be the HCF.

Let's apply these steps to the given numbers:

i. For 135 and 225: $225 = 135 \times 1 + 90$ $135 = 90 \times 1 + 45$ $90 = 45 \times 2 + 0$

So, the HCF of 135 and 225 is 45.

ii. For 196 and 38220: $38220 = 196 \times 195 + 0$

So, the HCF of 196 and 38220 is 196.

iii. For 867 and 255: $867 = 255 \times 3 + 102$ $255 = 102 \times 2 + 51$ $102 = 51 \times 2 + 0$

So, the HCF of 867 and 255 is 51.

Therefore, the HCF of: i. 135 and 225 is 45. ii. 196 and 38220 is 196. iii. 867 and 255 is 51.

2. Show that any positive odd integer is of the form $6q + 1$, or $6q + 3$, or $6q + 5$, where q is some integer.

Solution:

Let a be a given integer.

On dividing a by 6 , we get q as the quotient and r as the remainder such that,

a = 6q + r, r = 0,1,2,3,4,5

when r =0

a = 6q,even no
where r = 1

a = 6q + 1, odd no
where r = 2

a = 6q + 2, even no
where r = 3

a=6q + 3,odd no
where r = 4

a = 6q + 4, even no
where r = 5

a = 6q + 5, odd no
where r = 6

Therefore, 6q + 1, 6q + 3, 6q + 5 are not exactly divisible by 2. Hence, these expressions of numbers are odd numbers.

And therefore, any odd integer can be expressed in the form 6q + 1, or 6q + 3,or 6q + 5

3. An army contingent of 616 members is to march behind an army band of 32 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march?

Solution:

For the above problem, the maximum number of coulmns would be the HCF of 616 and 32

We can find the HCF of 616 and 32 by using Euclid Division algorithm.

Therefore

616 = 19 x 32 + 8

32 = 4 x 8 + 0

8 = 8 x 1 + 0

Therefore HCF (616, 32) = HCF of (32, 8) = 8

Therefore the maximum number of columns in which they can march is 8.

4. Use Euclid's division lemma to show that the square of any positive integer is either of the form 3m or 3m + 1 for some integer m.

Solutions:

If a and b are two positive integers, then,

$a = bq + r, 0 \leq r \leq b$ Let $b = 3$

Therefore, r = 0, 1, 2

Therefore, a = 3q or a = 3q + 1 or a = 3q + 2

If $a = 3q \Rightarrow a^2 = 9q^2 = 3(3q^2) = 3m$ where $m = 3q^2$

If $a = 3q + 1 \Rightarrow a^2 = 9q^2 + 6q + 1 = 3(3q^2 + 2q) + 1 = 3m + 1$ where $m = 3q^2 + 2q$

If $a = 3q + 2 \Rightarrow a^2 = 9q^2 + 12q + 4 = 3(3q^2 + 4q + 1) + 1 = 3m + 1$, where $m = 3q^2 + 4q + 1$

Therefore, the square of any positive integer is either of the form 3m or 3m + 1.

5. Use Euclid's division lemma to show that the cube of any positive integer is of the form 9m, 9m + 1 or 9m + 8.

Solution:

Let a be any positive integer and b = 3

a = 3q + r, where $q \geq 0$ and $0 \leq r < 3$

Therefore, every number can be represented as these three forms. There are three cases.

Case 1: When a = 3q,

Where m is an integer such that $m = (3q)^3$

Case 2: When a = 3q + 1,

$a^3 = (3q+1)^3$
$a^3 = 27q^3 + 27q^2 + 9q + 1$
$a^3 = 9(3q^3 + 3q^2 + q) + 1$
$a^3 = 9m + 1$
Where m is an integer such that $m = (3q^3 + 3q^2 + q)$

Case 3: When a = 3q + 2,

$a^3 = (3q+2)^3$
$a^3 = 27q^3 + 54q^2 + 36q + 8$
$a^3 = 9(3q^3 + 6q^2 + 4q) + 8$
$a^3 = 9m + 8$
Where m is an integer such that $m = (3q^3 + 6q^2 + 4q)$

Therefore, the cube of any positive integer is of the form 9m, 9m + 1, or 9m + 8.

NCERT Solutions for Class 10 Maths Chapter 1 Real Numbers Exercise 1.2 Page: 11

1. Express each number as a product of its prime factors:

(i) 140

(ii) 156

(iii) 3825

(iv) 5005

(v) 7429

Solutions:

(i) 140 = 2 x 2 x 5 x 7 = 2^2 x 5 x 7

(ii) 156 = 2 x 2 x 3 x 13 = 2^2 x 3 x 13

(iii) 3825 = 3 x 3 x 5 x 17 = 3^2 x 5^2 x x 17

(iv) 5005 = 5 x 7 x 11 x 13

(v) 7429 = 17 x 19 x 23

2. Find the LCM and HCF of the following pairs of integers and verify that LCM × HCF = product of the two numbers.

(i) 26 and 91

(ii) 510 and 92

(iii) 336 and 54

Solutions:

(i) 26 and 91

a = 26, b = 91

2	26	7	91
13	13	13	13
	1		1

∴ 26=2 x 13

91=7 x 13

∴ H.C.F = 13

L.C.M = 2 × 7 × 13

= 14 × 13 = 182

∴ H.C.F × L.C.M = a × b

13 × 182 = 26 × 96

2366 = 2366

(ii) 510 and 92

a = 510, b = 92

a = 510 b = 92

2	510	2	92
5	255	2	46
3	51	23	23
17	17		1
	1		

$\therefore$ 510 = 2 x 3 x 5 x 17

= 2 x 3 x 5 x 17

92 = 2 x 2 x 23 = 2^2 x 23

$\therefore$ H.C.F. = 2

L.C.M. = 2^2 x 3 x 5 x 17 x 23

= 4 x 3 x 5 x 17 x 23

= 60 x17 x 23

= 23460

$\therefore$ H.C.F. x L.C.M. = a x b

(a, b) x (a, b) = a x b

2 x 23460 = 26 x 96

46920 = 2366

(iii) 336 and 54

a = 336, b = 54

336= 2 x 2 x 2 x 2 x 3 x 7 = 2^4 x 3 x 7

54 = 2 x 3 x 3 x 3 = 2 x 3^3

HCF = 2 x 3 = 6

LCM = 2^4 x 3^3 x 7= 3024

Product of two numbers 336 and 54 = 336 x 54= 18144

3024 x 6= 18144

Hence, product of two numbers = 18144

3. Find the LCM and HCF of the following integers by applying the prime factorisation method.

(i) 12, 15 and 21

(ii) 17, 23 and 29

(iii) 8, 9 and 25

Solutions:

(i) 12, 15 and 21

2	12
2	6
3	3
	1

3	15
5	5
	1

3	21
7	7
	1

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

$15 = 3 \times 5$

and $21 = 3 \times 7$

For HCF, we find minimum power of prime factor

H.C.F. = $(3)^1 = 3$

For LCM, taking maximum power of prime factors

L.C.M. = $2^2 \times 3 \times 5 \times 7 = 4 \times 3 \times 5 \times 7 = 420$

So,H.C.F. = $(3)^1 = 3$

and L.C.M. = 420

(ii) 17, 23 and 29

$17 = 1 \times 17$

$23 = 1 \times 23$

$29 = 1 \times 29$

For HCF, common factor is 1

HCF = 1

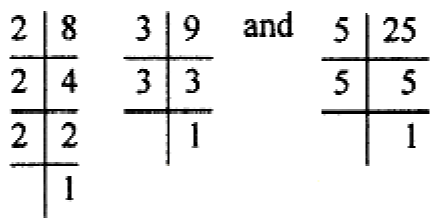
For LCM taking maximum power of prime factor.

L.C.M. = $1 \times 17 \times 23 \times 29 = 11339$

So H.C.F. = 1

L.C.M. = 11339

(iii) 8, 9 and 25



$8 = 2 \times 2 \times 2 \times 1 = 2^3 \times 1$

$9 = 3 \times 3 = 3^2$

and $25 = 5 \times 5 = 5^2$

For HCF common factor is 1

H.C.F. = 1

For LCM, taking maximum power of prime factors

L.C.M. = $2^3 \times 3^2 \times 5^2$

$= 8 \times 9 \times 25 = 1800$

So H.C.F. = 1

L.C.M. = 1800

4. Given that HCF (306, 657) = 9, find LCM (306, 657).

Solution:

HCF (306, 657) = 9

We know that, LCM × HCF = Product of two numbers

L.C.M x H.C.F = first Number x Second Number

L.C.M x 9 = 306 x 657

$$\text{L.C.M} = \frac{306 \times 657}{9}$$

LCM = 22338

5. Check whether 6^n can end with the digit 0 for any natural number n.

Solution: TO CHECK: Whether 6^2can end with the digit 0 for any natural number n.

We know that

$6^2 = (2 \times 3)^n$

$6^2 = (2)^n \times (3)^n$

Therefore, prime factorization of 6^ndoes not contain 5 and 2 as a factor together.

Hence 6^ncan never end with the digit 0 for any natural number n

6. Explain why 7 × 11 × 13 + 13 and 7 × 6 × 5 × 4 × 3 × 2 × 1 + 5 are composite numbers.

Solution:

So, the given expression has 6 and 13 as its factors. Therefore, we can conclude that it is a composite number.

Similarly,

7 x 6 x 5 x 4 x 3 x 2 x 1 + 5

= 5 x (7 x 6 x 4 x 3 x 2 x 1 + 1) [taking 5 out- common]

= 5 x (1008 + 1)

= 5 x 1009

Since, 1009 is a prime number the given expression has 5 and 1009 as its factors other than 1 and the number itself.

Hence, it is also a composite number.

7. There is a circular path around a sports field. Sonia takes 18 minutes to drive one round of the field, while Ravi takes 12 minutes for the same. Suppose they both start at the same point and at the same time, and go in the same direction. After how many minutes will they meet again at the starting point?

Solution:

It can be observed that Ravi takes lesser time than Sonia for completing 1 round of the circular path. As they are going in the same direction, they will meet again at the same time when Ravi will have completed 1 round of that circular path with respect to Sonia. And the total time taken for completing this 1 round of circular path will be the LCM of time taken by Sonia and Ravi for completing 1 round of circular path respectively i.e., LCM of 18 minutes and 12 minutes.

2	18	12
2	9	6
3	9	3
3	3	1
	1	1

LCM of 12 and 18= 2 x 2 x 3 x 3 = 36

Therefore, Ravi and Sonia will meet together at the starting point after 36 minutes.

NCERT Solutions for Class 10 Maths Chapter 1 Real Numbers Exercise 1.3 Page: 14

1. Prove that $\sqrt{5}$ is irrational.

Solutions:

Let us prove $\sqrt{2}$ irrational by contradiction.

Let us suppose that $\sqrt{2}$ is rational.

So it can be expressed in the form p/q where p, q are co-prime integers and $q \neq 0$

$\sqrt{2} = p/q$

Here p and q are coprime numbers and $q \neq 0$

Solving

$\sqrt{2} = p/q$

On squaring both the side we get,

$\Rightarrow 2 = (p/q)^2$

$\Rightarrow 2q^2 = p^2$ ....(1)

$\Rightarrow p^2 = q^2$

So 2 divides p and p is a multiple of 2.

⇒ $p = 2m$

⇒ $p^2 = 4m^2$ ………………………………..(2)

From equations (1) and (2), we get,

$2q^2 = 4m^2$

⇒ $q^2 = 2m^2$

⇒ q^2 is a multiple of 2

⇒ q is a multiple of 2

Hence, p, q have a common factor 2. This contradicts our assumption that they are co-primes. Therefore, p/q is not a rational number

$\sqrt{2}$ is an irrational number.

2. Prove that 3 + 2√5 + is irrational.

Solutions:

We will prove this by contradiction.

Let us suppose that $(3+2\sqrt{5})$ is rational.

It means that we have co-prime integers aand b(b ≠ 0) such that

So, it can be written in the form a/b

$3 + 2\sqrt{5} = a/b$

Here a and b are coprime numbers and b ≠ 0

Solving $3 + 2\sqrt{5} = a/b$ we get,

$\Rightarrow 2\sqrt{5} = a/b - 3$

$\Rightarrow 2\sqrt{5} = (a-3b)/b$

$\Rightarrow \sqrt{5} = (a-3b)/2b$

This shows (a-3b)/2b is a rational number. But we know that $\sqrt{5}$ is an irrational number.

So, it contradicts our assumption. Our assumption of $3 + 2\sqrt{5}$ is a rational number is incorrect.

3 + 2√5 is an irrational number

Hence Proved

3. Prove that the following are irrationals:

(i) 1/√2

(ii) 7√5

(iii) 6 + √2

Solutions:

(i) 1/√2

(i) We can prove $\frac{1}{\sqrt{2}}$ irrational by contradiction.

Let us suppose that $\frac{1}{\sqrt{2}}$ is rational.

It means we have some co-prime integers a and b (b ≠ 0) such that

1/√2 = p/q

√2 = q/p

By Squaring on both sides

$2 \times p^2 = q^2$

2, divides q^2

∴ 2, divides q

∵ q is an even number.

Similarly 'p' is an even number.

∴ p and q are even numbers.

∴ Common factor of p and q is 2.

This contradicts the fact that p and q also irrational.

∴ √2 is an irrational number.

$\therefore\ \frac{1}{\sqrt{2}}$ is an irrational number.

(ii) We can prove $7\sqrt{5}$ irrational by contradiction.

Let us suppose that $7\sqrt{5}$ is rational.

It means we have some co-prime integers a and b (b ≠ 0) such that

$\therefore 7\sqrt{5} = \frac{p}{q}$

$\sqrt{5} = \frac{p}{7q}$

Here, $\frac{p}{7q}$ is one rational number.

It means √5 which is equal also a rational number.

This contradicts to the fact that √5 is an irrational number.

This contradicts to the fact that 7√5 is rational number.

∴ 7√5 is a rational number.

(iii) We will prove $6 + \sqrt{2}$ irrational by contradiction.

Let us suppose that ($6 + \sqrt{2}$) is rational.

It means that we have co-prime integers aand b(b ≠ 0) such that

It means, $6 + \sqrt{2} = \frac{a}{b}$

$$\sqrt{2} = \frac{a}{b} - \frac{6}{1}$$

$$\sqrt{2} = \frac{a-6b}{b}$$

$\frac{a-6b}{b}$ is a rational number, b

∴ √2 is also rational number.

This contradicts to the fact that √2 is an irrational number.

This contradicts to the fact that 6 + √2 is a rational number.

∴ 6 + √2 is an irrational number.

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The benefits of using NCERT Solutions for Class 10 Maths Chapter 1 "Real Numbers" include:

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