REAL NUMBER

LEVEL WISE QUESTIONS AND SOLUTIONS

LEVEL- 1 (1 mark Each)

1. Find HCF of 128 and 216.

Solution 1: Two numbers are : 216, 128

216 > 128

By using Euclid division lemma :

216 = 128 x 1 +88 ($R \neq 0$)

128 = 88 x 1 + 40 ($R \neq 0$)

88 = 40 x 2 + 8 ($R \neq 0$)

40 = 8 x 5 + 0

Here R = 0,

Divisor is 8, so HCF = 8. 1Mark

2. Given HCF(306,657) = 9. Find LCM(306,657)

Solution 2: HCF = 9, Ist number = 306, IInd number = 657
We know that :
HCFxLCM = Products of two number
9 x LCM = 306 X 657

LCM = $\frac{306 x 657}{9}$

LCM = 22338. 1 Mark

3. Prove that $3+2\sqrt{5}$ is an irrational number.

Solution 3: Let us suppose that $3+2\sqrt{5}$ is rational so, we can find co prime a and b where a and b are integers and $b \neq 0$.

So ,$3+2\sqrt{5} = \frac{a}{b}$

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

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

Since a and b both are integers

$\therefore \frac{a-3b}{2b}$ is rational number, so, $\sqrt{5}$ is also rational number

But this contradicts the facts that $\sqrt{5}$ is irrational.

$\therefore$ our supposition is wrong.

Hence $3+2\sqrt{5}$ is rational. 1 Mark

4. Explain why $7\times6\times5\times4\times3\times2\times1+5$ is a composite number.

Solution 4: we have

7x6x5x4x3x2x1+5

5(7x6x1x4x3x2x1+1)

5(1008+1)

5(1009)

5045

The of factors of 5045 are 1,5,1009,5045.

It has more than two factors, so it is a composite number 1Mark

LEVEL -2 (2 marks)

1. Check whether 6^n can end with the digit 0. For any natural number n.

Solution 1. : Let us suppose that 6^n ends with the digits 0 for some $n \in N$

So,6^n is divisible by 5

But prime factor of 6 are 2 and 3

$\therefore$ prime factor of 6^n are $(2x3)^n$

It is clear that in prime factorization of 6^n there is no place of 5.

So our supposition is wrong . Hence there exists no any natural number n for which 6^n ends with digit zero. 2 Marks

2. Find the LCM and HCF of 91 and 26, also verify that HCF×LCM= product of two
Solution: Two number are 91 and 26

91 = 7x13

26 = 2x13

HCF = 13

LCM = 13x2x7 = 182 1 Mark

Verification

HCFXLCM = Products of two number

13x182 = 91x26

2366 2366 1Mark

3. The HCF of two number is 4 and their LCM is 9696,if one number is 96,find the other number.

Solution: HCF = 4

LCM = 9696, Ist number = 96,

We know that HCFXLCM = Ist x IInd 1Mark

4x 9696 = 96 x IInd

$\frac{4x9696}{96}$ = IIndIInd number = 404

1 Mark

4 .Find the LCM and HCF of 12 , 15 and 21 by prime factorization method.

Solution4 : numbers are 12, 15, 21

12 = 2x2x3

15 = 3x5

21 = 3x7 1Mark

So, HCF = 3

LCM = 3X2X2X5X7 = 420. 1 Mark

LEVEL -3 (3 marks)

1. Prove that $\sqrt{2}$ is irrational number.

Solution 1: Let us suppose that $\sqrt{2}$ is rational number, so it can be put in the form of $\frac{p}{q}$

q≠0, and p and q are co prime

$\therefore \sqrt{2} = \frac{p}{q}$ squaring both side

$$2 = \frac{p^2}{q^2}$$

$q^2 = \frac{p^2}{2}$ here p^2 is divisible by 2, so p is also divisible by 2. 1 Mark

Let p = 2r putting this value in above relation

$$q^2 = \frac{4r^2}{2}$$

so, $r^2 = \frac{q^2}{2}$, here q^2 is divisible by 2, so q is also divisible by 2

from these two p and q both divisible by 2 but it is suppose p and q are co prime

which is contradiction so, $\sqrt{2}$ is irrational. 1 Mark

3 Show that the square of any positive integer is of the form 3m or 3m+1,for some integer m.

Solution 3: Let a be any positive integer then it is of the form 3q,3q+1or 3q+2

If a = 3q squaring both sides,

$a^2 = 9q^2$

$= 3(3q^2)$

$= 3m$, where $m = 3q^2$ 1Mark

If $a = 3q+1$ squaring both sides,

$a^2 = (3q+1)^2$

$= 9q^2+1+2x3qx1$

$= 3(3q^2+2q) +1$

4 $= 3m+1$, where $m = (3q^2+2q)$

Where m is also an integer, 1 Mark

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

4 Find the LCM and HCF of 510 and 92 and verify the thatLCMxHCF = Product of two no.

Solution 4. Two number are 510 and 92

510 = 2x3x5x17

92 = 2x2x23

HCF = 2 1 Mark

LCM = 2X2X3X5X17X23 = 23460

Verification : LCM X HCF =23460X2 = 46920

Products of two numbers = 510x92 = 46920

Hence verified . 1 Mark

LEVEL -4 (4 marks)

1:- Show that 3√2 is irrational.

Sol. 1 :- Let 3√2 is rational.

Therefore x = 3√2

=> x/3 = √2 2 Marks

=> x/3 is rational and √2 is also rational.

But this contradicts the fact that √2 is irrational.

=> 3√2 is irrational. 2 Marks

2 :- Explain why (7 x 11 x 13) + 13 is a composite number.

Sol.2 :- (7 X 11 X 13) +13 2 Marks

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

So , it is product of more than 2 factors. Hence it is a composite number. 2 Marks

3 : Find the HCF of 616 and 32 using Euclid's division algorithm.

Sol. 3:- **Using Euclid's division lemma,**

a = bq + r, . 0 ≤ r < b

Step 1 : 616 = 32 x 19 + 8 2 Marks

Step 2 : 32 = 8 x 4 + 0

HCF of 616 and 32 is 8. 2 Marks

4 .Use Euclid's division algoritha to find the largest number which divides 957 and 1280 leaving remainder 5 in each case.

Solution 4: 957-5=952 and 1280-5= 1275,are completely divisible by required number.

Now find the HCF by Euclid division lemma,

1275 > 952 by apply division lemma

1275 = 952 x 1 + 323 (since R≠ 0) 2 Marks

952 = 323 x 2 + 306 (since R≠ 0)

323 = 306 x 1 + 17 (since R ≠ 0)

306 = 17 x 18 + 0 here R = 0

Divisor in the last step is 17

$\therefore$ HCF of 1275 and 952 is 17.

Hence required number is 17. 2 Marks