CBSE Test Paper 01
Chapter 1 Real Number

1. The HCF and LCM of two numbers is 9 and 459 respectively. If one of the number is 27, then the other number is **(1)**
   a. 153
   b. 150
   c. 459
   d. 135
2. What is the number x? The LCM of x and 18 is 36. The HCF of x and 18 is 2. **(1)**
   a. 1
   b. 3
   c. 2
   d. 4
3. The HCF and LCM of two numbers are 9 and 90 respectively. If one number is 18, then the other number is **(1)**
   a. 54
   b. 36
   c. 45
   d. 63
4. Sound of crackers is heard during festival days, but the sound of supernova explosion in space is not heard on the surface of earth because of **(1)**
   a. lesser gravity
   b. the influence of the other planets
   c. large distance
   d. absence of medium
5. If the LCM of two numbers is 45 times their HCF and the sum of LCM and HCF is 1150, then HCF = **(1)**
   a. 50
   b. 45
   c. 1150
   d. 25

6. Find the HCF and LCM of 11008 and 7344 using fundamental theorem of arithmetic. **(1)**
7. Show that any positive integer is of the form 3q or, 3q + 1 or, 3q + 2 for some integer q. **(1)**
8. Express the given number as the product of its prime factors: 5005. **(1)**
9. Find HCF and LCM of 625, 1125 and 2125 using fundamental theorem of arithmetic. **(1)** $-$
10. If - 1 is a zero of the polynomial f(x) = x^2- 7x - 8, then calculate the other zero. **(1)**
11. Express 0.8 as a fraction in simplest form. **(2)**
12. Show that the cube of a positive integer is of the form 6q + r, where q is an integer and r = 0, 1, 2, 3, 4, 5. **(2)**
13. Without actual division, show that rational number $\frac{17}{625}$ is a terminating decimal. Express decimal form. **(2)**
14. Prove that $\sqrt{2}$ is an irrational number. **(3)**
15. Use Euclid division lemma to show that the square of any positive integer cannot be of the form 5m + 2 or 5m + 3 for some integer m. **(3)**
16. Prove that $4 - 5\sqrt{2}$ is an irrational number. **(3)**
17. Amita, Suneha and Raghav start preparing cards for greeting each person of an old age home on new year. In order to complete one card, they take 10, 16 and 20 minutes respectively. If all of them started together, after what time will they start preparing a new card together? Why do you think there is a need to show elders that the young generation cares for them and remembers the contribution made by them in the prime of their life? **(3)**
18. Show that square of any positive integer cannot be of the form 5q + 2 or 5q + 3 for some integer m. **(4)**
19. Can the number 6^n, n being a natural number, end with the digit 5? Give reasons. **(4)**
20. Three sets of physics, chemistry and mathematics books have to be stacked in such a way that all the books are stored topic wise and the number of books in each stack is the same. The number of physics books is 192, the number of chemistry books is 240 and the number of mathematics books is 168. Determine the number of stacks of physics, chemistry and mathematics books. **(4)**

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Solution

1. a. 153

   Explanation: Using the result,

   $HCF \times LCM$ = Product of two natural numbersx^2 - 8x - 1280 = 0 $\Rightarrow$ the other number = $\frac{9\times459}{27}$ = 153

2. d. 4

   Explanation: We know that LCM $\times$ HCF = First number $\times$ Second number

   HCF (x , 18) $\times$ LCM (x , 18) = x $\times$ 18

   2 $\times$ 36 = x $\times$ 18

   $\therefore$ x= $\frac{36\times2}{18}$ = 4

3. c. 45

   Explanation: Using the result,

   $HCF \times LCM$ = Product of two natural numbers

   $\Rightarrow$ the other number = $\frac{9\times90}{18}$ = 45

4. d. absence of medium

   Explanation: Sound needs medium to travel. As there is no medium in the space, it can not travel from space to earth.

5. d. 25

   Explanation: Given: $LCM = 45 \times HCF$ ....(i)

   And LCM + HCF = 1150....................... (ii)

   Putting value of LCM from eq. (i) in eq. (ii), we get

   $45 \times HCF + HCF = 1150$

   HCF (45 + 1) = 1150

   $\Rightarrow 46 \times HCF = 1150$

   $\Rightarrow$ HCF = 25

6. 11008 =$2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 43$

   = $2^8 \times 43$

   7344 = $2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 17$

= $2^4 \times 3^3 \times 17$

HCF = 2^4 = 16

LCM = $2^8 \times 43 \times 3^3 \times 17$ = 5052672

7. Let p be any positive integer and b = 3. Applying division Lemma with p and b =3 , we have

   p = 3q + r, where $0 \leq$ r < 3 and q is some integer

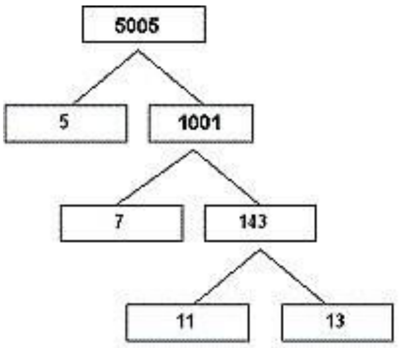
   So r=0,1,2

   If r=0 , p=3q

   If r=1, p=3q+1

   If r=2, p=3q+2

   Therefore any positive integer is of form 3q,3q+1,3q+2 for some integer q.

8. 

   So, 5005 = 5 $\times$ 7$\times$ 11 $\times$ 13.

9. Here, 625 =5×5×5×5= 5^4

   1125 =3×3×5×5×5= $3^2 \times 5^3$

   2125 =5×5×5×17= $5^3 \times 17$

   Therefore, HCF = 5^3 = 125

   LCM = $5^4 \times 3^2 \times 17$ = 95625

10. $f(x) = x^2 - 7x - 8$

    As, one zero is -1.

    Let, other zero be k,

    then, Sum of zeroes - 1 + k = $-\left(\frac{-7}{1}\right)$ = 7

    $\Rightarrow$ k = 8

11. We have to express the given decimal in fractional form. For that let $x = 0.\overline{8}$

then, x = 0.8888....... (i)

$\therefore$ 10x = 8.8888.......(ii)

Subtract (i) from (ii), we get

$9x = 8 \Rightarrow x = \frac{8}{9}$

Hence, $0.\overline{8} = \frac{8}{9}$

12. We have to show that the cube of a positive integer is of the form 6q + r, where q is an integer and r = 0, 1, 2, 3, 4, 5.

We know that any positive integer x can be of the form 6m, 6m + 1, 6m + 2, 6m + 3, 6m + 4 or 6m + 5.

CASE I When x = 6q : In this case,

$x^3 = (6q)^3 = 6\,(36q^3) = 6m$, where $m = 36q^3$

CASE II When x = 6q + 1: In this case,

$x^3 = (6q + 1)^3 = 216q^3 + 108q^2 + 18q + 1 = 6\,(36q^3 + 18q^2 + 3q) + 1$

$= 6m + 1$, where $m = 36q^3 + 18q^2 + 3q$ and so on.

13. The number is $\frac{17}{625}$.

And, $625 = 5^4$ and 5 is not a factor of 17.

So, the given number is in its simplest form.

The denominator $625 = 25 \times 25 = 5^2 \times 5^2 = 2^0 \times 5^4$

So the denominator is in the form of $2^m \times 5^n$ where m=0 and n=4

Hence the given number is a terminating decimal.

Now, $\frac{17}{625} = \frac{17}{5^4} = \frac{17\times2^4}{5^4\times2^4} = \frac{17\times16}{(5\times2)^4} = \frac{272}{(10)^4}$

$= \frac{272}{10000}$.

$= 0.0272$

14. We have to prove that $\sqrt{2}$ is an irrational number.

Let $\sqrt{2}$ be a rational number.

$\therefore \quad \sqrt{2} = \frac{p}{q}$

where p and q are co-prime integers and $q \neq 0$

On squaring both the sides, we get,

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

or, $p^2 = 2q^2$

$\therefore$ p^2 is divisible by 2.

p is divisible by 2 .... (i)

Let p = 2r for some integer r

or, $p^2 = 4r^2$

$2q^2 = 4r^2$ [$\because$ $p^2 = 2q^2$]

or, $q^2 = 2r^2$

or, q^2 is divisible by 2.

$\therefore$q is divisible by 2 .... (ii)

From (i) and (ii)

p and q are divisible by 2, which contradicts the fact that p and q are co-primes.

Hence, our assumption is wrong.

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

15. Let n be any positive integer.

By Euclid's division lemma, n = 5q + r, $0 \leqslant r < 5$

n = 5q,5q + 1,5q + 2 ,5q 4- 3 or 5q + 4, where $q \in \omega$

Now we find the square of n

If n=5q then $(5q)^2 = 25q^2 = 5(5q^2) = 5m$

If n=5q+1then n2= $(5q + 1)^2 = 25q^2 + 10q + 1 = 5m + 1$

If n=5q+2 then $n^2 = (5q + 2)^2 = 25q^2 + 20q + 4 = 5m + 4$

If n=5q+4 then $n^2=(5q + 3)^2=25q^2+30q+9=5m + 1$

Thus square of any positive integer is in the form of 5m,5m+1 or 5m+4, hence cannot be of the form 5m + 2 or 5m + 3.

16. Let us assume that $4-5\sqrt{2}$ is rational. Then, there must exist positive co-primes between a and b such that

$$4-5\sqrt{2}=\frac{a}{b}$$
$$5\sqrt{2}=\frac{a}{b}-4$$
$$\sqrt{2}=\frac{\frac{a}{b}-4}{5}$$
$$\sqrt{2}=\frac{a-4b}{5b}$$

$\Rightarrow$ $\sqrt{2}$ is a rational number

Since a,b are integers,$\therefore$ $\frac{a-4b}{5b}$ is a rational number. Therefore,we get $\sqrt{2}$ is a rational number, which is a contradiction as $\sqrt{2}$ is an irrational number.

∴ Our supposition is wrong.

Hence $4 - 5\sqrt{2}$ is irrational.

17. (i) The required number of minutes after which they start preparing a new card together = LCM of 10,16 and 20 minutes

Prime factorisation of 10 = 2 × 5

and prime factorisation of 16 = 2 × 2 × 2 × 2

and prime factorisation of 20 = 2 × 2 × 5

Now, LCM(10,16,20) = 2 × 2 × 2 × 2× 5 = 80

Therefore, Number of minutes after which they start preparing a new card together = 80 minutes.

(ii) Recognition and care for elders removes the loneliness due to age related diseases. Moreover they feel happy to help young minds through their experience.

18. Let n be any positive integer. Applying Euclids division lemma with divisor = 5, we get

$n = 5q+1, 5q+2, 5q+3 \; and \; 5q+4$

Now $(5q)^2 = 25q^2 = 5m$, where $m = 5q^2$, which is an integer;

$(5q + 1)^2 = 25q^2 + 10q + 1 = 5(5q^2 + 2q) + 1 = 5m + 1$

$where \; m = 5q^2 + 2q, \; which \; is \; an \; integer;$

$(5q + 2)^2 = 25q^2 + 20q + 4 = 5(5q^2 + 4q) + 4 = 5m + 4,$

$where \; m = 5q^2 + 4q, \; which \; is \; an \; integer;$

$(5q + 3)^2 = 25q^2 + 30q + 9 = 5(5q^2 + 6q + 1) + 4 = 5m + 4,$

$where \; m = 5q^2 + 6q + 1, \; which \; is \; an \; integer;$

$(5q + 4)^2 = 25q^2 + 40q + 16 = 5(5q^2 + 8q + 3) + 1 = 5m + 1,$

$where \; m = 5q^2 + 8q + 3, \; which \; is \; an \; integer$

Thus, the square of any positive integer is of the form 5m, 5m + 1 or 5m + 4 for some integer m.

It follows that the square of any positive integer cannot be of the form 5m + 2 or 5m + 3 for some integer m.

19. If 6^n ends with 0 or 5 then it must have 5 as a factor.

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

The prime factors of 6^n are only 2 and 3

And from the fundamental theorem of arithmetic, the prime factorization of every composite number is unique.

$\therefore$ 6^n can never end with 0 or 5.

20. The number of physics books is 192, the number of chemistry books is 240 and the number of mathematics books is 168.

Here, we have to find the HCF of 192, 240 and 168 because the HCF will be the largest number which divides 192, 240 and 168 exactly.

$192 = 2^6 \times 3$

$240 = 2^4 \times 3 \times 5$

$168 = 2^3 \times 3 \times 7$

Now, the HCF of 192, 240 and 168 is $= 2^3 \times 3 = 24$

There must be 24 books in each stack

$\therefore$Number of stacks of physics books = $\frac{192}{24} = 8$

And number of stacks of chemistry books = $\frac{240}{24} = 10$

And number of stacks of mathematics books = $\frac{168}{24} = 7$