Exercise 1E

Question 1: State Euclid's division lemma.

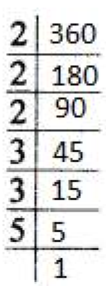
Solution:
As per Euclid's division lemma: For any two positive integers, say a and b, there exit unique integers q and r, such that a = bq + r; where $0 \le r < b$.

Also written as: Dividend = (Divisor x Quotient) + Remainder

Question 2: State fundamental theorem of Arithmetic.

Solution:
Every composite number can be uniquely expressed as a product of two primes, except for the order in which these prime factors occurs.

Question 3. Express 360 as product of its prime factors.
Solution:



$360 = 2 \times 2 \times 2 \times 3 \times 3 \times 5 = 2^3 \times 3^2 \times 5$

Question 4: If a and b are two prime numbers, then find HCF (a, b).
Solution:
HCF of two primes is always 1.

HCF (a, b) = 1

Question 5: If a and b are two prime numbers then find LCM (a, b).
Solution:
LCM of two prime numbers ia always the product of these two numbers.

If a and b are two prime numbers, then

LCM (a, b) = ab

Question 6: If the product of two numbers is 1050 and their HCF is 25, find their LCM.
Solution:
Product of two numbers = HCF x LCM ...(1)

Given: Product of two numbers = 1050

and HCF = 25

From equation (1), we have

1050 = 25 x LCM

or
LCM = 1050 / 25 = 42

Question 7: What is a composite number?
Solution:
A composite number has more than two factors.
Another definition: A composite number is a number which is not a prime.

Question 8: If a and b are relatively prime then what is their HCF?
Solution:
If a and b are two primes, then their HCF will be 1.

HCF (a, b) = 1

Question 9.
If the rational number a/b has a terminating b decimal expansion, what is the condition to be satisfied by b.

Solution:
Since a/b is a rational number and it has terminating decimal "b" will in the form 2^m x 5^n where m and n are some non-negative integers.

Question 10: Simplify

$$\frac{2\sqrt{45}+3\sqrt{20}}{2\sqrt{5}}$$

Solution:

$$\frac{2\sqrt{45}+3\sqrt{20}}{2\sqrt{5}} = \frac{2\sqrt{9\times5}+3\sqrt{4\times5}}{2\sqrt{5}}$$

$$= \frac{2 \times 3\sqrt{5} + 3 \times 2\sqrt{5}}{2\sqrt{5}}$$

$$= \frac{6\sqrt{5} + 6\sqrt{5}}{2\sqrt{5}} = 6$$

Question 11: Write the decimal expansion of

$$\frac{73}{2^4 \times 5^3}$$

Solution:

$$\frac{73}{2^4 \times 5^3} = \frac{73}{16 \times 125}$$

= 73/1000

= 0.073

Question 12: Show that there is no value of n for which (2^n x 5^n) ends in 5.

Solution:
2^n x 5^n can also be written as

2^n x 5^n = $(2 \times 5)^n$ = $(10)^n$

Which always ends in a zero

There is no value of n for which (2^n x 5^n) ends in 5

Question 13: Is it possible to have two numbers whose HCF is 25 and LCM is 520?

Solution:
HCF is always a factor is its LCM.
Given: HCF is 25 and LCM is 520
But 25 is not a factor of 520
It is not possible to have two numbers having HCF is 25 and LCM is 520.

Question 14: Give an example of two irrationals whose sum is rational.

Solution:
Let us consider two irrational number be (5 + √3) and (5 – √3).

Sum = $(5 + \sqrt{3}) + (5 - \sqrt{3}) = 10$
Which is a rational number.

Question 15: Give an example of two irrationals whose product is rational.

Solution:
Let us consider that the two irrational number be $(3 + \sqrt{2})$ and $(3 - \sqrt{2})$

Product = $(3 + \sqrt{2})(3 - \sqrt{2})$

$= (3)^2 - (\sqrt{2})^2 = 7$

Which is a rational number.

Question 16: If a and b are relatively prime, what is their LCM?

Solution: Two relatively prime numbers do not have a common factor other than 1.

i.e, HCF = 1.

We know HCF × LCM = product of numbers.

LCM = Product of numbers

If a and b are two numbers then

LCM = $a \times b = ab$.

Question 17: The LCM of two numbers is 1200. Show that the HCF of these numbers cannot be 500. Why?

Solution:
Given: LCM of two numbers = 1200

HCF should divide LCM exactly.

Using Euclid's division lemma - $a = bq + r$. where q is the quotient, r is the remainder and b is the divisor.

Let us say, $a = 1200$ and $b = 500$.

If HCF divides LCM completely, then remainder is zero.

Here 1200 = 500(2) + 200

r = 200 ≠ 0

Question 18: Express $0.\overline{4}$ as a rational number in simplest form.

Solution:

Let $x = 0.\overline{4}$ - (i)

Multiply 10 on both sides -

$10x = 4.\overline{4}$ - (ii)

Subtract the equations (i) from (ii)

$\Rightarrow 9x = 4$

So $x = \frac{4}{9}$

19. Express $0.\overline{23}$ as a rational number in simplest form.

Solution:

Let $x = 0.\overline{23}$ - (i)

Multiply 100 on both sides -

$100x = 23.\overline{23}$ - (ii)

Subtract the equations (i) from (ii)

$\Rightarrow 99x = 23$

So $x = \frac{23}{99}$

Question 20: Express why 0.15015001500015… is an irrational number.
Solution:
As we know, Irrational numbers are non-terminating non-recurring decimals.

Thus, 0.15015001500015 … is an irrational number.

Question 21: Show that √2/3 is irrational.

Solution: Let us assume that √2/3 is rational
Which is possible if 1/3 is rational and √2 is rational

But the fact is √2 is an irrational.

Which is contradict, our assumption is wrong.

√2/3 is irrational.

Question 22: Write a rational number between √3 and 2.
Solution:

The value of √3 is 1.73.

A rational number between √3 and 2 is 1.8.

Question 23: Explain why $3.\overline{1416}$ is a rational number.

Solution:

$3.\overline{1416}$

A non - terminating repeating decimal.

So it is a rational number.