LECTURE_07

MODULE_23

Exercise 1.2

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

Sol. If the number 6^n for any $n \in N$ ends with the digit '0', then it is divisible by 5.

For e.g. 10, 20, 30,…

These nos. are divisible by 5

That means the prime factorisation of 6^n must contain the prime number 5.

It is not possible to get prime number 5

But,

$6^n = 6 \times 6 \times 6 \times ....$

That can also be written as,

$6^n = 2 \times 3 \times 2 \times 3 \times 2 \times 3 \times ....$

But this is not possible, because the primes in the prime factorisation of 6^n are 2 and 3.

By Fundamental Theorem of Arithmetic there are no other prime numbers except 2 and 3 in the factorisation of 6^n.

So, there is no natural number for which 6^n ends with the digit 0.

Exercise 1.2

Q.6 Explain why $7 \times 11 \times 13 + 13$ and $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 5$ are composite numbers.

Sol.

$7 \times 11 \times 13 + 13$

$= 13\,(7 \times 11 + 1)$

$= 13\,(77 + 1)$

$= 13 \times 78$

$= 13 \times 13 \times 2 \times 3$ Product of primes

$7 \times 11 \times 13 + 13$ is a composite number

Composite numbers are those numbers which can be expressed as product of primes

Also, $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 5$

$= 5\,(7 \times 6 \times 4 \times 3 \times 2 + 1)$

$= 5\,(1008 + 1)$

$= 5 \times 1009$ Product of primes

$7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 5$ is a composite number.

MODULE_24

Q. There are 156, 208 and 260 student in Groups A , B and C respectively. Buses are to be hired to take them for a field trip. Find minimum number of buses to be hired if the same number of students be accommodated in each bus.

Sol. The number of Buses will be minimum if each bus accommodated maximum number of students.

$\therefore$ The no. of students in each bus must be HCF of 156, 208 and 260 students

The prime factorisation of 156 , 208 and 260 are :

$156 = 2^2 \times 3 \times 13$

$208 = 2^4 \times 13$

$260 = 2^2 \times 5 \times 13$

$\therefore$ HCF of 156, 208 and 260 = $2^2 \times 13 = 52$

$\therefore$ In each bus 52 students can be accommodated

$\therefore$ Minimum no. of buses required $= \dfrac{\boxed{\text{Total no. of students}}}{52}$

$= \dfrac{\boxed{156 + 208 + 260}}{52} = \dfrac{624}{52}$

$=$ 18 buses.

$\therefore$ 18 no. of buses will be hired if the same number of students be accommodated in each bus.

2	156
2	78
3	39
13	13
	1

2	260
2	130
5	65
13	13
	1

2	208
2	104
2	52
2	26
13	13
	1

MODULE_25

Q.1 A mason has to fit a bathroom with square marble tiles of largest possible size. The size of the bathroom is 10 ft. by 8 ft. What would be the size in inches of the tile required that has to be cut and how many such tiles are required.

Sol.

$$\boxed{\text{Length of bathroom}} = 10 \text{ ft}$$

$$= 10 \times 12 \quad [\because \ 1 \text{ ft} = 12 \text{ inche}]$$

$$= \boxed{120} \text{ inches}$$

$$\boxed{\text{Breadth of bathroom}} = 8 \text{ ft}$$

$$= 8 \times 12 \quad [\because \ 1 \text{ ft} = 12 \text{ inches}]$$

$$= \boxed{96} \text{ inches}$$

$\therefore$ Area of bathroom $= 120 \times 96$

```
        1
 96 ) 120
     - 96    4
       24 ) 96
          - 96
             0
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$$120 = 96 \times 1 + 24 \quad ....(i)$$

$$96 = 24 \times 4 + 0 \quad ....(ii)$$

$\therefore$ HCF (120, 96) $= 24$

DIVIDEND = DIVISOR × QUOTIENT + REMAINDER

Q.1 A mason has to fit a bathroom with square marble tiles of largest possible size. The size of the bathroom is 10 ft. by 8 ft. What would be the size in inches of the tile required that has to be cut and how many such tiles are required.

Sol. Area of bathroom $= \boxed{120 \times 96}$

$\boxed{\text{HCF}(120, 96) = 24}$

$\therefore$ $\boxed{\text{The side of the tile} = 24}$

$\therefore$ Area of a tile $= \boxed{(\text{Side})^2}$

$= (24)^2$

$\therefore$ Area of a tile $= \boxed{24 \times 24}$

$\therefore$ Number of tiles $= \dfrac{\boxed{\text{Total Area of bathroom}}}{\boxed{\text{Area of Each Tile}}}$

$$= \frac{\overset{5}{\cancel{120}} \times \overset{4}{\cancel{96}}}{\cancel{24} \times \cancel{24}} = 20$$

$\therefore$ $\boxed{\text{No. of tiles required is 20.}}$