

By. Er. Dharmendra Sir

7974073108, 9584873492

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

BASIC NOTES (CBSE/NCERT)

NUMBERS SYSTEM

PART -1 OUT OF 1

6th, 7th & 8th

JOIN TODAY FOR ADVANCE CONCEPTS

ONLY IN ₹1000 PER MONTH

MRP: ₹ 100/- ONLY

ALSO, BASIC CONCEPTS CLASSES IN SUMMER

VACATION Apr, May & Jun (Every Year)

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

-: Number System :-

②. Factors : A factor of a number is an exact divisor of that number. each factors of a number is less than or equal.

③. A number is a multiple of each of its factors.

④. 1 is a factor of every number.

⑤. Every number is a factor of itself.



⑥. Number of factors of a given number are finite

⑦. Every multiple of a number is greater than or equal to that number.

⑧. The number of multiple of a given number is infinite

⑨. Every number is a multiple of itself.



⑩. A number for which sum of all its factors is equal to twice the number is called a perfect number.

Ex - Find the factor of 36

Sol. 1, 3, 9, 18, 36, 2, 4, 6

Arrange in Ascending order

1, 2, 3, 4, 6, 9, 18, 36

Sum of factors are $1+2+3+4+6+9+18+36 = 72$ (Twice)

$$\begin{array}{r}
 2 \overline{) 36} \\
 \underline{4} \\
 2 \overline{) 18} \\
 \underline{6} \\
 3 \overline{) 9} \\
 \underline{3} \\
 3 \overline{) 3} \\
 \underline{1}
 \end{array}$$

1.

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

②. Prime numbers :- The numbers other than 1 whose only factors are 1 and the number itself are called Prime numbers. Ex - 2, 3, 5, 7, 11, 13, 17, 19, 23, 29 etc.

③. Composite Numbers :- Numbers having more than two factors are called Composite numbers. Ex - 4, 6, 8, 20 etc.

- 1 is neither a prime nor a composite number.
- 2 is the smallest prime number which is even.
- Every prime number except 2 is odd.



④. Test for divisibility of numbers :-

- Divisibility by 2: A number is divisible by 2 if it has any of the digits 0, 2, 4, 6 or 8 in its once place.
- Divisibility by 3: If the sum of the digits is a multiple of 3, then the number is divisible by 3.
- Divisibility by 4: A number with 3 or more digits is divisible by 4 if the number formed by its last two digits (i.e. ones and tens) is divisible by 4.
- Divisibility by 5: A number which has either 0 or 5 in its ones place is divisible by 5.
- Divisibility by 6: If a number is divisible by 2 and 3 both then it is divisible by 6 also.
- Divisibility by 8: A number with 4 or more digits is divisible by 8, if the number formed by the last three digits is divisible by 8.



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number System :-

- Divisibility by 9 : If the sum of digits of a number is divisible by 9, then the number itself is divisible by 9.
- Divisible by 10: If a number has 0 in the ones place then it is divisible by 10.
- Divisibility by 11: Find the difference between the sum of the digits at odd places (from the right) and the sum of the digits at even places (from the right) of the number. If the difference is either 0 or divisible by 11, then the number is divisible by 11.

②. Common factors and Common multiples :-



- Two numbers having only 1 as a common factor are called co-prime numbers.
- the multiply of more than one number taken at a time is called common multiples.



③. Some more divisibility rules :-

- If a number is divisible by another number then it is divisible by each of the factors of that number.
- If a number is divisible by two co-prime numbers then it is divisible by their product also.
- If two given numbers are divisible by a number, then their sum is also divisible by that number.
- If two given numbers are divisible by a number, then their difference is also divisible by that number.

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number System : -

Q. HCF : The highest common factor (HCF) of two or more given numbers is the highest (or greatest) of their common factors. It is also known as Greatest Common divisor (GCD)

Q. LCM : The lowest common multiple (LCM) of two or more given numbers is the lowest (or smallest or least) of their common multiples.

Q. Examples : -

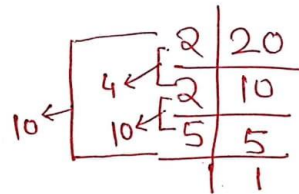


Q. Write all the factors of the following number : -

(a) 20 (b) 18

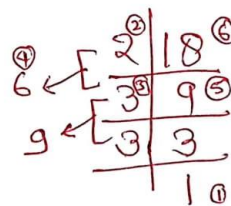
Sol. (a) 20

All factors of 20 are
1, 2, 4, 5, 10 and 20



(b) 18

All factors of 18 are
1, 2, 3, 6, 9, 18



Q. Write first five multiples of : -

(a) 5 (b) 9

Sol. (a) multiple of 5 are 5, 10, 15, 20, 25

(b) multiple of 9 are 9, 18, 27, 36, 45

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number System :-

③ Factors ; - Examples :-

• Common factors :-

Q. (a) 20 and 28

(b) 4, 8, 12

Sol. (a)

Factors of 20 are :-

①, ②, ④, 5, 10, 20



$$\begin{array}{r} 20 \\ 2 \overline{) 20} \\ \underline{4} \\ 10 \\ 2 \overline{) 10} \\ \underline{5} \\ 5 \\ 5 \overline{) 5} \\ \underline{1} \\ 1 \end{array}$$

$$\begin{array}{r} 28 \\ 2 \overline{) 28} \\ \underline{14} \\ 14 \\ 2 \overline{) 14} \\ \underline{7} \\ 7 \\ 7 \overline{) 7} \\ \underline{1} \\ 1 \end{array}$$

Factors of 28 are :-

①, ②, ④, 7, 14, 28

Common factors are 1, 2 and 4.

Sol. (b)

factors of 4 are :-

①, ②, ④

factors of 8 are :-

①, ②, ④, 8

Factors of 12 are :-

①, ②, 3, ④, 6, 12



$$\begin{array}{r} 4 \\ 2 \overline{) 4} \\ \underline{2} \\ 2 \\ 2 \overline{) 2} \\ \underline{1} \\ 1 \end{array}$$

$$\begin{array}{r} 8 \\ 2 \overline{) 8} \\ \underline{4} \\ 4 \\ 2 \overline{) 4} \\ \underline{2} \\ 2 \\ 2 \overline{) 2} \\ \underline{1} \\ 1 \end{array}$$

Note: Like 8 factor are same then divisible complete no is by same no each time then factor are simply

Common factors are 1, 2 and 4.

DPM CLASSES

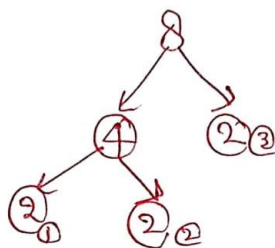
6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number System :-

Q. Tree factor (factor tree) :-

Q. (a) 8 (b) 90

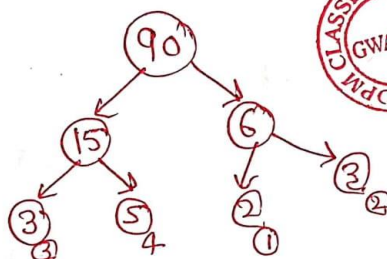
Sol. (a) 8



Prime factors of 8 are 2, 2, 2

$$8 = 2 \times 2 \times 2$$

(b)



Prime factors of 90 are 2, 3, 3, 5

$$90 = 2 \times 3 \times 3 \times 5$$

Q. Prime factors (division by prime numbers)

Q. (a) 16 (b) 48

Sol. (a) 16

$$16 = 2 \times 2 \times 2 \times 2$$

(b) 48

$$48 = 2 \times 2 \times 2 \times 2 \times 3$$

$$\begin{array}{r} 2 \overline{)16} \\ \underline{2} \\ 8 \\ \underline{2} \\ 4 \\ \underline{2} \\ 2 \\ \underline{2} \\ 0 \end{array}$$

$$\begin{array}{r} 2 \overline{)48} \\ \underline{2} \\ 24 \\ \underline{2} \\ 12 \\ \underline{2} \\ 6 \\ \underline{2} \\ 3 \\ \underline{3} \\ 0 \end{array}$$

Always divide by prime numbers.

Q. Some prime numbers are:

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97.

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

- Number System :-

Q. HCF (Highest Common factor) : By prime factorisation

Q. (a) 18, 48 (b) 12, 45, 75

Sol. (a) 18, 48

$$18 = 2 \times 3 \times 3$$

$$48 = 2 \times 2 \times 2 \times 2 \times 3$$

$$\begin{aligned} \text{HCF} &= 2 \times 3 \\ &= 6 \end{aligned}$$



$$\begin{array}{r|l} 2 & 18 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 48 \\ \hline 2 & 24 \\ \hline 2 & 12 \\ \hline 2 & 6 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

(b) 12, 45, 75

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

$$45 = 3 \times 3 \times 5$$

$$75 = 3 \times 5 \times 5$$

$$\text{HCF} = 3$$

$$\begin{array}{r|l} 2 & 12 \\ \hline 2 & 6 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 3 & 45 \\ \hline 3 & 15 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 3 & 75 \\ \hline 5 & 25 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

[Note: If factor are Co-prime]
Then HCF is 1 always.]

Q. LCM (Least Common multiply) : By prime factorisation

Q. (a) 20, 25, 30 (b) 9, 18, 27

Sol. (a) 20, 25, 30

LCM of 20, 25 and 30 is

$$= 2 \times 2 \times 3 \times 5 \times 5$$

$$= 4 \times 15 \times 5$$

$$= 60 \times 5$$

$$\text{LCM} = 300$$

$$\begin{array}{r|l} 2 & 20, 25, 30 \\ \hline 2 & 10, 25, 15 \\ \hline 3 & 5, 25, 15 \\ \hline 5 & 5, 25, 5 \\ \hline 5 & 1, 5, 1 \\ \hline & 1, 1, 1 \end{array}$$



(b) do itself.

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

~ Number Systems! -

Q. Write the next three natural numbers after 10999

Sol. Next three natural numbers after 10999 are

11000, 11001, 11002

Q. Write the three whole numbers occurring just before 10001

Sol. 3 whole numbers just before 10001 are

10000, 9999, 9998

Q. Which is the smallest whole number?

Sol. The smallest whole number is 0

Q. How many whole numbers are there between 32 and 53?

Sol. Whole number between 32 and 53 ($53 - 32 - 1 = 20$)

(33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52)

Q. Write the successor of:

(a) 2440701 (b) 100199 (c) 1099999 (d) 2345670

Sol. (a) 2440701 [do other itself]

Successor of 2440701 is $2440701 + 1 = 2440702$

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number systems:-

Q. Write the predecessor of :

(a) 94 (b) 10000 (c) 208090 (d) 7654321

Sol. (a) 94 [do other itself]

predecessor of 94 is $= 94 - 1 = 93$

Q. Which of the following statements are true (T) and which are false (F).

(a) zero is the smallest natural number.

Sol. False, 0 is not a natural number.



(b) 400 is the predecessor of 399.

Sol. False, as predecessor of 399 is 398 ($399 - 1 = 398$)

(c) zero is the smallest whole number.

Sol. True,



(d) 600 is the successor of 599

Sol. True, ($599 + 1 = 600$)

(e) All natural number are whole number.

Sol. True,

(f) All whole numbers are natural number

Sol. False, 0 is a whole number but it is not a natural number.

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number systems:-

(g) the predecessor of a two digit number is never a single digit number.

Sol. False, predecessor of 10 is 9.

(h) 1 is the smallest whole number.

Sol. False, 0 is the smallest whole number.

(i) The natural number 1 has no predecessor.

Sol. True, 0 is the predecessor of 1 but it is not a natural number.

(j) The whole number 1 has no predecessor.

Sol. False, 0 is the predecessor of 1 and it is whole no.

(k) The whole number 13 lies between 11 and 12.

Sol. False, 13 does not lie between 11 and 12.

(l) The whole number 0 has no predecessor.

Sol. True, predecessor of 0 is -1, but it is not a whole no.

(m) the successor of a two digit number is always a two digit number.

Sol. False, Successor of 99 is 100 (three digit)



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

~! Number Systems!~

Q. Find the sum by suitable rearrangement:

(a) $837 + 208 + 363$

Sol. $837 + 208 + 363$

$$= (837 + 363) + 208$$

$$= 1200 + 208$$

$$= 1408$$

(b) $1962 + 453 + 1538 + 647$

Sol. $1962 + 453 + 1538 + 647$

$$= (1962 + 1538) + (453 + 647)$$

$$= 3500 + 1100$$

$$= 4600$$



Q. Find the product by suitable rearrangement:

(a) $2 \times 1768 \times 50$

Sol. $2 \times 1768 \times 50$

$$= 2 \times 50 \times 1768$$

$$= 100 \times 1768$$

$$= 176800$$



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

~ Number systems! -

(b) $4 \times 166 \times 25$

सं. $4 \times 166 \times 25$

$= 4 \times 25 \times 166$

$= 100 \times 166$

$= 16600$

(c) $8 \times 291 \times 125$

सं. $8 \times 125 \times 291$

$= 1000 \times 291$

$= 291000$

(d) $625 \times 276 \times 16$

सं. $625 \times 276 \times 16$

$= 625 \times 16 \times 276$

$= 10000 \times 276$

$= 2760000$

(e) $285 \times 5 \times 60$

सं. $285 \times 5 \times 60$

$= 285 \times 300$

$= 85500$



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

~! Number Systems!~

$$(f) \quad 125 \times 40 \times 8 \times 25$$

$$\text{Sol.} \quad 125 \times 40 \times 8 \times 25$$

$$= 125 \times 8 \times 40 \times 25$$

$$= 1000 \times 1000$$

$$= 1000000$$



Q. Find the value of the following :-

$$(a) \quad 297 \times 17 + 297 \times 3$$

$$\text{Sol.} \quad 297 \times 17 + 297 \times 3$$

$$= 297 (17+3)$$

$$= 297 \times 20$$

$$= 5940$$



$$(b) \quad 54279 \times 92 + 8 \times 54279$$

$$\text{Sol.} \quad 54279 \times 92 + 8 \times 54279$$

$$= 54279 (92+8)$$

$$= 54279 \times 100$$

$$= 5427900$$

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

~! Number Systems!~

(c) $81265 \times 169 - 81265 \times 69$

Sol. $81265 \times 169 - 81265 \times 69$

$$= 81265 (169 - 69)$$

$$= 81265 \times 100$$

$$= 8126500$$

(d) $3845 \times 5 \times 782 + 769 \times 25 \times 218$

Sol. $3845 \times 5 \times 782 + 769 \times 25 \times 218$

$$= 3845 \times 5 \times 792 + 769 \times 5 \times 5 \times 218$$

$$= 3845 \times 5 \times 792 + 3845 \times 5 \times 218$$

$$= 3845 \times 5 (792 + 218)$$

$$= 19225 \times 1000$$

$$= 19225000$$



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems:-

Q. Find the product using suitable properties.

(a) 738×103

Sol. 738×103

$$= 738 \times (100 + 3)$$

$$= 738 \times 100 + 738 \times 3$$

$$= 73800 + 2214$$

$$= 76014$$



(b) 854×102

Sol. 854×102

$$= 854 \times (100 + 2)$$

$$= 854 \times 100 + 854 \times 2$$

$$= 85400 + 1708$$

$$= 87108$$



(c) 258×1008

Sol. 258×1008

$$= 258 \times (1000 + 8)$$

$$= 258 \times 1000 + 258 \times 8$$

$$= 258000 + 2064$$

$$= 260064$$

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems:-

(d) 1005×168

Sol. 1005×168

$$= (1000 + 5) \times 168$$

$$= 168000 + 168 \times 5$$

$$= 168000 + 840$$

$$= 168840$$



Q. A taxi driver filled his car petrol tank with 40ltr of petrol on monday. The next day, he filled the tank with 50 litres of petrol. If the petrol cost ₹ 44 per ltr. How much he spend in all on petrol?

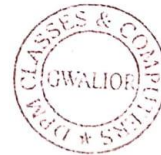
Sol. Quantity of petrol filled on monday = 40 l

Quantity of petrol filled on Tuesday = 50 l.

$$\text{Total quantity filled} = (40 + 50) = 90 \text{ l}$$

$$\text{Cost of 1 litres petrol} = ₹ 44$$

$$\begin{aligned} \text{Total money spent} &= 44 \times 90 \\ &= ₹ 3960 \end{aligned}$$



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems :-

Q. A vendor supplies 32 l of milk to a hotel in the morning and 68 l of milk in the evening. If the milk costs ₹ 45 per litre, how much money is due to the vendor per day?

Sol. [do it self]

Q. Commutativity under multiplication.

$$2 \times 49 \times 50 = 2 \times 50 \times 49$$

Q. Commutativity under addition.

$$80 + 2005 + 20 = 80 + 20 + 2005$$

Q. Distributive of multiplication over addition

$$425 \times 136 = 425 \times (6 + 30 + 100)$$



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number systems:-

Q. If the product of two whole numbers is zero, can we say that one or both of them will be zero? Justify through examples.

Sol. If the product of 2 whole numbers is zero, then one of them is definitely zero.

For example, $0 \times 2 = 0$, $17 \times 0 = 0$

If the product of 2 whole number is zero, then both of them may be zero.

$0 \times 0 = 0$ However, $2 \times 3 = 6$



(Since numbers to be multiplied are not equal to zero, the result of the product will also be non-zero)



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

~! Number Systems!~

Q. If the product of two whole numbers is 1, Can we say that one or both of them will be 1? Justify through examples.

Sol. If the product of 2 numbers is 1, then both the numbers have to be equal to 1.

For example, $1 \times 1 = 1$

However, $1 \times 6 = 6$

Clearly, the product of two whole numbers will be 1 in the situation when both numbers to be multiplied are 1.

Q. Find using distributive property!

(a) 728×101
 $728 \times (100 + 1)$

$$= 728 \times 100 + 728 \times 1$$

$$= 72800 + 728$$

$$= 73528$$

(b) 5437×1001 (c) 824×25 (d) 4275×125

(e) 504×35 [do it self]

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems! -

Q. Study the pattern!

$$1 \times 8 + 1 = 9$$

$$12 \times 8 + 2 = 98$$

$$123 \times 8 + 3 = 987$$

$$1234 \times 8 + 4 = 9876$$

$$12345 \times 8 + 5 = 98765$$



Write the next two steps. Can you say how the pattern works?

Sol. $123456 \times 8 + 6 = 987654$

$$12345678 \times 8 + 7 = 9876543$$

Yes, the pattern works.



$$123456 = 111111 + 11111 + 1111 + 111 + 11 + 1$$

$$123456 \times 8 = (111111 + 11111 + 1111 + 111 + 11 + 1) \times 8$$

$$= 888888 + 88888 + 8888 + 888 + 88 + 8$$

$$= 987648$$

$$123456 \times 8 + 6 = 987648 + 6$$

$$= 987654$$

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems! -

Q. Write all the factors of the following numbers :

(a) 24 (b) 15 (c) 21 (d) 27 (e) 12

(f) 20 (g) 18 (h) 23 (i) 36

Sol. (a) 24

$$1 \times 24 = 24$$

$$2 \times 12 = 24$$

$$3 \times 8 = 24$$

$$4 \times 6 = 24$$



2	24
2	12
2	6
3	3
	1

Factors of 24 are 1, 2, 3, 4, 6, 8, 12, 24

(g) 18

$$1 \times 18 = 18$$

$$2 \times 9 = 18$$

$$3 \times 6 = 18$$



2	18
3	9
3	3
	1

Factors of 18 are 1, 2, 3, 6, 9, 18

[do other it self]

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems! -

Q. Write first five multiple of

(a) 5 (b) 8 (c) 9 (d) 18

Sol. (a) 5

$$5 \times 1 = 5, 5 \times 2 = 10, 5 \times 3 = 15, 5 \times 4 = 20, 5 \times 5 = 25$$

The required multiples are 5, 10, 15, 20 and 25.

[do other itself]



Q. Find all the multiple of 9 upto 100.

$$\begin{aligned} \text{Sol. } 9 \times 1 &= 9, & 9 \times 2 &= 18, & 9 \times 3 &= 27, & 9 \times 4 &= 36 \\ 9 \times 5 &= 45, & 9 \times 6 &= 54, & 9 \times 7 &= 63, & 9 \times 8 &= 72 \\ 9 \times 9 &= 81, & 9 \times 10 &= 90, & 9 \times 11 &= 99. \end{aligned}$$

Therefore, the multiples of 9 upto 100 are

9, 18, 27, 36, 45, 54, 63, 72, 81, 90, 99



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems! -

- Q. What is the sum of any two (a) odd numbers?
(b) Even numbers?

Sol. (a) The sum of two odd numbers is even

$$\text{Ex - } 1+3=4$$

$$13+19=32$$

(b) The sum of two even numbers is even

$$\text{Ex - } 2+4=6$$

$$10+18=28$$



- Q. State whether the following statements are True or False.

(a) The sum of three odd numbers is even.

Sol. False, $3+5+7=15$ i.e. odd.

(b) The sum of two odd numbers and one even number is even.

Sol. True, $3+5+6=14$ i.e. even.



(c) The product of three odd numbers is odd.

Sol. True, $3 \times 5 \times 7 = 105$ i.e. odd.

(d) If an even number is divided by 2, the quotient is always odd.

Sol. False, $4 \div 2 = 2$ i.e. even.

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

✓ Number Systems! ✓

(e) All prime numbers are odd.

Sol. False, 2 is a prime number and it is also even.

(f) Prime numbers do not have any factors.

Sol. False, 1 and the number itself are factors of the number.

(g) Sum of two prime numbers is always even.

Sol. False, $2+3=5$ i.e. odd.

(h) 2 is the only even prime number.

Sol. True.

(i) All even numbers are Composite numbers.

Sol. False, 2 is a prime number.

(j) The product of two even numbers is always even.

Sol. True, $2 \times 4 = 8$ i.e. even.

Q. The number 13 and 31 are prime numbers. both these numbers have same digits 1 and 3. Find such pairs of prime numbers upto 100.

Sol. 17, 71
37, 73
79, 97



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems:-

Q. Write down separately the prime and composite numbers less than 20.

Sol. Prime numbers less than 20 are

2, 3, 5, 7, 11, 13, 17, 19

Composite numbers less than 20 are

4, 6, 8, 9, 10, 12, 14, 15, 16, 18



Q. What is the greatest prime number b/w 1 and 10

Sol. Prime numbers b/w 1 and 10 are 2, 3, 5, 7.

Among these numbers, 7 is the greatest.

Q. Express the following as the sum of two odd primes

(a) 44 (b) 36 (c) 24 (d) 18

Sol. (a) $44 = 37 + 7$

(b) $36 = 31 + 5$

(c) $24 = 19 + 5$

(d) $18 = 11 + 7$



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems :-

Q. Give three pairs of prime numbers whose difference is 2

Sol. $3, 5$
 $41, 43$
 $71, 73$

Q. Write seven consecutive composite numbers less than 100 so that there is no prime number b/w them.

Sol. between 89 and 97, both are prime numbers, there are 7 composite numbers. They are
 $90, 91, 92, 93, 94, 95, 96$



Q. Express each of the following numbers as the sum of three odd primes:

(a) 21 (b) 31 (c) 53 (d) 61

Sol. (a) $21 = 3 + 7 + 11$
(b) $31 = 5 + 7 + 19$
(c) $53 = 3 + 19 + 31$
(d) $61 = 11 + 19 + 31$



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems :-

Q. Write five pairs of prime numbers less than 20 whose sum is divisible by 5. (Hint : $3+7=10$)

Sol.

$$2+3=5$$

$$2+13=15$$

$$3+17=20$$

$$7+13=20$$

$$19+11=30$$


Q. Fill in the blanks :

(a) A number which has only two factors is called a

Sol. Prime number

(b) A number which has more than two factors is called a (Sol. Composite number)

(c) 1 is neither nor

Sol. prime number, composite number

(d) The smallest prime number is (Sol. 2)

(e) The smallest composite number is (Sol. 4)

(f) The smallest even number is (Sol. 2)



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

! Number Systems!

Q. Using divisibility tests, determine which of the following numbers are divisible by 4; by 8.

(a) 572 (b) 726352 (c) 5500 (d) 6000

(e) 12159 (f) 14560 (g) 21084 (h) 31795072

(i) 1700 (j) 2150

Sol. If last two digit divisible by 4 or 00 in last then given no is divisible by 4.

If last three digit divisible by 8 or 000 in last then given no is divisible by 8.

(a) 572

Last two digit divisible by 4,
so this no is divisible by 4

$$\begin{array}{r} 4 \overline{) 72} \quad 18 \\ \underline{4} \\ 32 \\ \underline{32} \\ 00 \end{array}$$

Last three digit not divisible by 8
so given no is not divisible by 8

$$\begin{array}{r} 8 \overline{) 572} \quad 71 \\ \underline{56} \\ 12 \\ \underline{8} \\ 4 \end{array}$$

[do other it self]



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number systems! -

Q. Using divisibility tests, determine which of following numbers are divisible by 6.

(a) 297144 (b) 1258 (c) 4335 (d) 61233

(e) 901352 (f) 438750 (g) 1790184 (h) 12583

(i) 639210 (j) 17852.

Sol. If no is divisible by 2 and 3 then also divisible by 6.

∴ If last digit of no is 0, 2, 4, 6, 8 then given no is divisible by 2.

∴ If sum of digit is multiple of 3 then given no is divisible by 3.



(j) 17852

Last digit is 2, so given no is divisible by 2.

$$1 + 7 + 8 + 5 + 2 = 23 = 2 + 3 = 5$$

Sum of digit is not in multiple of 3, so given no is not divisible by 3.

Therefore, 17852 is not divisible by 6.

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems! -

Q. Using divisibility tests, determine which of the following numbers are divisible by 11.

(a) 5445 (b) 10824 (c) 7138965

(d) 70169308 (e) 10000001 (f) 901183

Sol. If the difference between the sum of digits at odd places and the sum of the digits at even places is 0 or divisible by 11, then given no is divisible by 11.

(a) 5445

5445
①②③④

Sum of odd places = $5 + 4 = 9$

Sum of even places = $4 + 5 = 9$

Difference = $9 - 9 = 0$

Difference is 0, so the given no is divisible by 11.



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems! -

Q. Write the smallest digit and the greatest digit in the blank space of each of the following numbers so that the number formed is divisible by 3.

Sol. (a) — 6724 (b) 4765 — 2

(a) — 6724



$$\begin{aligned}\text{Sum of digit} &= 6+7+2+4 \\ &= 19 \text{ is not divisible by 3}\end{aligned}$$

required 2 more for divisible by 3

$$19+2 = 21 \text{ is divisible by 3.}$$

So, the required smallest ~~no.~~ digit is 2
and required greatest digit is $2+3+3 = 8$

(b) 4765 — 2



$$\begin{aligned}\text{Sum of digit} &= 4+7+6+5+2 \\ &= 24 \text{ is divisible by 3.}\end{aligned}$$

So no required any digit for this number.

So, the required smallest digit is 0

$$\text{and required greatest digit is } 0+3+3+3 = 9$$

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

~! Number Systems ~!

Q. Write a digit in the blank space of each of the following numbers so that the number formed is divisible by 11:

(a) 92_389 (b) 8_9484

Sol. (a) $92x389$
 ① ② ③ ④ ⑤ ⑥



$$\text{Sum of odd digit} = 9 + x + 8 = 17 + x$$

$$\text{Sum of even digit} = 2 + 3 + 9 = 14$$

$$\begin{aligned} \text{Difference } 17 + x - 14 &= 3 + x \\ &= 3 + \textcircled{8} \\ &= 11 \end{aligned}$$

Therefore, the required no is 8

(b) 8_9484

[do it self]



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems! -

Q. Find the common factors of :

(a) 20 and 28 (b) 15 and 25 (c) 35 and 50

(d) 56 and 120

Sol. (a) 20 and 28

Factors of

20 - 1, 2, 4, 5, 10, 20

Factors of

28 - 1, 2, 4, 7, 14, 28

Common factors are - 1, 2, 4

$$\begin{array}{r|l}
 2 & 20 \\
 \hline
 2 & 10 \\
 \hline
 5 & 5 \\
 \hline
 & 1
 \end{array}
 \quad
 \begin{array}{r|l}
 2 & 28 \\
 \hline
 2 & 14 \\
 \hline
 7 & 7 \\
 \hline
 & 1
 \end{array}$$



(c) 35 and 50

Factors of

35 - 1, 5, 7, 35

Factors of

50 - 1, 2, 5, 10, 25, 50

$$\begin{array}{r|l}
 5 & 35 \\
 \hline
 7 & 7 \\
 \hline
 & 1
 \end{array}
 \quad
 \begin{array}{r|l}
 2 & 50 \\
 \hline
 5 & 25 \\
 \hline
 5 & 5 \\
 \hline
 & 1
 \end{array}$$



Common factors are 1, 5

[do other itself]

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

~ Number Systems! -

Q. Find the common factors of:

(a) 4, 8 and 12 (b) 5, 15 and 25

Sol. (a) 4, 8 and 12

Factors of

4 - 1, 2, 4

Factors of

8 - 1, 2, 4, 8

Factors of

12 - 1, 2, 3, 4, 6, 12

Common factors are - 1, 2, 4

(b) 5, 15 and 25

Factors of 5 - 1, 5

Factors of 15 - 1, 3, 5, 15

Factors of 25 - 1, 5, 25

Common factors are - 1, 5

$$\begin{array}{r} 2 \overline{)4} \\ 2 \\ \hline 1 \end{array} \quad \begin{array}{r} 2 \overline{)8} \\ 2 \\ \hline 4 \\ 2 \\ \hline 2 \\ 2 \\ \hline 1 \end{array} \quad \begin{array}{r} 2 \overline{)12} \\ 2 \\ \hline 6 \\ 3 \\ \hline 3 \\ 3 \\ \hline 1 \end{array}$$



$$\begin{array}{r} 5 \overline{)5} \\ 5 \\ \hline 1 \end{array} \quad \begin{array}{r} 3 \overline{)15} \\ 3 \\ \hline 5 \\ 5 \\ \hline 1 \end{array} \quad \begin{array}{r} 5 \overline{)25} \\ 5 \\ \hline 5 \\ 5 \\ \hline 1 \end{array}$$



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems! -

Q. Find first three common multiples of :

(a) 6 and 8 (b) 12 and 18

Sol. (a) 6 and 8

multiples of 6 are 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, ...

multiples of 8 are 8, 16, 24, 32, 40, 48, 56, 64, 72, ...

First three common multiples are 24, 48, 72

[do other itself]



Q. Write all the numbers less than 100 which are common multiples of 3 and 4

Sol. multiples of 3 = 3, 6, 9, 12, 15, ...

multiples of 4 = 4, 8, 12, 16, 20, ...

$3 \times 4 = 12$ So, the common multiple is multiple of 12

the common multiple of 3 and 4 are

12, 24, 36, 48, 60, 72, 84, 96.



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems! -

Q. Which of the following numbers are co-prime?

(a) 18 and 35 (b) 15 and 37 (c) 30 and 415

(d) 17 and 68 (e) 216 and 215 (f) 81 and 16

Sol. If common factor is only 1, then they are co-prime numbers.

(a) 18 and 35

Factors of 18 - 1, 2, 3, 6, 9, 18

Factors of 35 - 1, 5, 7, 35

Common factor is 1

∴ given numbers are co-prime numbers.

(b) 15 and 37

Factors of 15 - 1, 3, 5, 15

Factors of 37 - 1, 37

Common factor is 1

∴ given numbers are co-prime numbers.

[do other it self]

$$\begin{array}{r|l} 2 & 18 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array} \quad \begin{array}{r|l} 5 & 35 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$



$$\begin{array}{r|l} 3 & 15 \\ \hline 5 & 5 \\ \hline & 1 \end{array} \quad \begin{array}{r|l} 37 & 37 \\ \hline & 1 \end{array}$$



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

~ Number Systems! -

Q. A number is divisible by both 5 and 12. By which other number will that number be always divisible?

Sol.

Factors of 5 = 1, 5

Factors of 12 = 1, 2, 3, 4, 6, 12

$$\begin{array}{r} 5 \overline{)5} \\ 1 \end{array} \quad \begin{array}{r} 2 \overline{)12} \\ 2 \overline{)6} \\ 3 \overline{)3} \\ 1 \end{array}$$

The common factor is 1. The given numbers are co-prime and the number will also be divisible by their product i.e. 60



the factors of 60 are 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60

Q. A number is divisible by 12. By what other numbers will that number be divisible?

Sol. Since the number is divisible by 12, it will also be divisible by its factors i.e. 1, 2, 3, 4, 6, 12



Therefore, 1, 2, 3, 4, 6 and 12 are numbers other than 12 by which this number is also divisible.

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems! —

Q. Which of the following statements are true?

(a) If a number is divisible by 3, it must be divisible by 9.

sol. False, 6 is divisible by 3, but not by 9.

(b) If a number is divisible by 9, it must be divisible by 3 (sol. True)

(c) A number is divisible by 18, if it is divisible by both 3 and 6.

sol. False, 30 is divisible by 3 and 6 both, but it is not divisible by 18.

(d) If a number is divisible by 9 and 10 both, then it must be divisible by 90.

sol. True

(e) If two numbers are co-primes, at least one of them must be prime.

sol. False, 15 and 32 are co-primes and also composite.

(f) All numbers which are divisible by 4 must also be divisible by 8

sol. False, 12 is divisible by 4, but not by 8

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

~ Number Systems! -

(g) All numbers which are divisible by 8 must also be divisible by 4

Sol. True.

(h) If a number exactly divides two numbers separately, it must exactly divide their sum.

Sol. True, 2 divides 4 and 8 as well as 12 ($4+8=12$)

(i) If a number exactly divides the sum of two numbers, it must exactly divide the two numbers separately.

Sol. False, 2 divides 12, but does not divide 7 and 5

Q. Which factors are not included in the prime factorisation of a composite number?

Sol. 1 and the number itself.



Q. Write the greatest 4-digit number and express it in terms of its prime factors.

Sol. greatest four digit number = 9999

$$9999 = 3 \times 3 \times 11 \times 101$$



Q. Write the smallest 5-digit number and express it in the form of its prime factors.

Sol. Smallest five-digit number = 10,000

$$10000 = 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5 \times 5$$

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems:-

Q. Find all the prime factors of 1729 and arrange them in ascending order. Now state the relation, if any, between two consecutive prime factors.

Sol.

$$1729 = 7 \times 13 \times 19$$

$$13 - 7 = 6$$

$$19 - 13 = 6$$

7	1729
13	247
19	19
	1



The difference of two consecutive prime factors is 6

Q. The product of three consecutive numbers is always divisible by 6. verify this statement with the help of some examples.

Sol. $2 \times 3 \times 4 = 24$, which is divisible by 6

$$9 \times 10 \times 11 = 990, \text{ which is divisible by } 6$$

$$20 \times 21 \times 22 = 9240, \text{ which is divisible by } 6$$



Q. The sum of two consecutive odd numbers is divisible by 4. verify this statement with the help of some examples.

Sol. $3 + 5 = 8$, which is divisible by 4

$$15 + 17 = 32, \text{ which is divisible by } 4$$

$$19 + 21 = 40, \text{ which is divisible by } 4$$

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

Number Systems

Q. In which of the following expressions, prime factorisation has been done?

(a) $24 = 2 \times 3 \times 4$ (b) $56 = 7 \times 2 \times 2 \times 2$

(c) $70 = 2 \times 5 \times 7$ (d) $54 = 2 \times 3 \times 9$

Sol. (a) $24 = 2 \times 3 \times 4$

Since 4 is composite, prime factorisation has not been done.

(b) $56 = 7 \times 2 \times 2 \times 2$

Sol. Since all the factors are prime, prime factorisation has been done.

[do other itself]

Q. I am the smallest number, having four different prime factors. Can you find me?

Sol. Since it is the smallest number of such type, it will be the product of 4 smallest prime numbers

$$2 \times 3 \times 5 \times 7 = 210$$

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

~ Number Systems ~

Q. Determine if 25110 is divisible by 45.

Sol. $45 = 5 \times 9$

Factors of 5 = 1, 5

Factors of 9 = 1, 3, 9



Therefore, 5 and 9 are Co-prime numbers.

Since the last digit of 25110 is 0, it is divisible by 5

Sum of the digits of 25110 = $2+5+1+1+0 = 9$

the sum of the digits of 25110 is divisible by 9,

therefore, 25110 is divisible by 9

Since the number is divisible by 5 and 9 both, it is divisible by 45.



Q. 18 is divisible by both 2 and 3. It is also divisible by $2 \times 3 = 6$, similarly, a number is divisible by both 4 and 6. Can we say that the number must also be divisible by $4 \times 6 = 24$? If not, give an example to justify your answers.

Sol. No, it is not necessary because 12 and 36 are divisible by 4 and 6 both but are not divisible by 24.

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems:-

Q. Find the HCF of the following numbers:-

(a) 18, 48 (b) 30, 42 (c) 18, 60 (d) 27, 63

(e) 36, 84 (f) 34, 102 (g) 70, 105, 175

(h) 91, 112, 49 (i) 18, 54, 81 (j) 12, 45, 75

Sol. (a) 18, 48

$$18 = 2 \times 3 \times 3$$

$$48 = 2 \times 2 \times 2 \times 2 \times 3$$

Common factor 2 and 3

Thus, HCF of 18 and 48 is $2 \times 3 = 6$

$$\begin{array}{r}
 2 \overline{) 18} \\
 \underline{3 } \\
 3 \\
 \underline{6 } \\
 0
 \end{array}$$

$$\begin{array}{r}
 2 \overline{) 48} \\
 \underline{2 } \\
 2 \\
 \underline{2 } \\
 0 \\
 \underline{3 } \\
 0
 \end{array}$$



(i) 18, 54, 81

$$18 = 2 \times 3 \times 3$$

$$54 = 2 \times 3 \times 3 \times 3$$

$$81 = 3 \times 3 \times 3 \times 3$$



$$\begin{array}{r}
 2 \overline{) 18} \\
 \underline{3 } \\
 3 \\
 \underline{6 } \\
 0
 \end{array}
 \quad
 \begin{array}{r}
 2 \overline{) 54} \\
 \underline{3 } \\
 3 \\
 \underline{3 } \\
 0 \\
 \underline{3 } \\
 0
 \end{array}
 \quad
 \begin{array}{r}
 3 \overline{) 81} \\
 \underline{3 } \\
 3 \\
 \underline{3 } \\
 0 \\
 \underline{3 } \\
 0
 \end{array}$$

Common factors of 18, 54 and 81 are 3 (occurring twice)

Thus, HCF of 18, 54 and 81 is $3 \times 3 = 9$.

[do other itself]

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems:-

Q. What is the HCF of two consecutive

(a) numbers? (b) even numbers? (c) odd numbers?

Ans. (a) 1 i.e. HCF of 2 and 3 is 1

(b) 2 i.e. HCF of 2 and 4 is 2

(c) 1 i.e. HCF of 3 and 5 is 1.



Q. HCF of co-prime numbers 4 and 15 was found as follows by factorisation: $4 = 2 \times 2$ and $15 = 3 \times 5$ since there is no common prime factor, so HCF of 4 and 15 is 0. Is the answer correct? If not, what is the correct HCF?

Ans. No, The answer is not correct. 1 is the correct HCF



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

~ Number Systems! ~

Q. Renu purchases two bags of fertiliser of weights 75 kg and 69 kg. Find the maximum value of weight which can measure the weight of the fertiliser exact number of times.

Sol. Weight of the two bags = 75 kg and 69 kg
 maximum weight = HCF (75, 69)

$$\begin{array}{r|l} 3 & 75 \\ \hline 5 & 25 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 3 & 69 \\ \hline 23 & 23 \\ \hline & 1 \end{array}$$



$$75 = 3 \times 5 \times 5$$

$$69 = 3 \times 23$$

$$\text{HCF} = 3$$

Hence, the maximum value of weight which can measure the weight of the fertiliser exact number of times, is 3 kg.



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

Number Systems :-

Q. Three boys step off together from the same spot. Their steps measure 63cm, 70cm and 77 cm respectively. What is the minimum distance each should cover so that all can cover the distance in complete steps?

Sol. Step measure of 1st boy = 63 cm
 Step measure of 2nd boy = 70 cm
 Step measure of 3rd boy = 77 cm

Lcm of 63, 70 and 77

2	63, 70, 77
3	63, 35, 77
3	21, 35, 77
5	7, 35, 77
7	7, 7, 77
11	1, 1, 11
	1, 1, 1

$$\begin{aligned} \text{Lcm} &= 2 \times 3 \times 3 \times 5 \times 7 \times 11 \\ &= 6930 \end{aligned}$$

Hence, the minimum distance each should cover so that all can cover the distance in complete steps is 6930 cm.



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

~ Number Systems! ~

Q. The length, breadth and height of a room are 825 cm, 675 cm and 450 cm respectively. Find the longest tape which can measure the three dimensions of the room exactly.

Sol. Find HCF of 825, 675 and 450

$$\begin{array}{r|l} 3 & 825 \\ \hline 5 & 275 \\ \hline 5 & 55 \\ \hline 11 & 11 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 3 & 675 \\ \hline 3 & 225 \\ \hline 3 & 75 \\ \hline 5 & 25 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 450 \\ \hline 3 & 225 \\ \hline 3 & 75 \\ \hline 5 & 25 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$825 = 3 \times 5 \times 5 \times 11$$

$$675 = 3 \times 3 \times 3 \times 3 \times 5$$

$$450 = 2 \times 3 \times 3 \times 5 \times 5$$

$$\text{HCF} = 3 \times 5 \times 5 = 75$$

Therefore, the longest tape is 75 cm.



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number systems! -

Q. Determine the smallest 3-digit number which is exactly divisible by 6, 8 and 12.

Sol. smallest number = Lcm of 6, 8, 12

2	6, 8, 12
2	3, 4, 6
2	3, 2, 3
3	3, 1, 3
	1, 1, 1



$$\begin{aligned} \text{Lcm} &= 2 \times 2 \times 2 \times 3 \\ &= 24 \end{aligned}$$

We have to find the smallest 3-digit multiple of 24

$$24 \times 4 = 96$$

$$24 \times 5 = 120$$



Hence, the smallest 3-digit number which is exactly divisible by 6, 8 and 12 is 120

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

~! Number Systems!~

Q. Determine the greatest 3-digit number exactly divisible by 8, 10 and 12

Sol. Lcm of 8, 10 and 12

2	8, 10, 12
2	4, 5, 6
2	2, 5, 3
3	1, 5, 3
5	1, 5, 1
	1, 1, 1



$$\begin{aligned} \text{Lcm} &= 2 \times 2 \times 2 \times 3 \times 5 \\ &= 120 \end{aligned}$$

We have to find the greatest 3-digit multiple of 120

it can be seen that $120 \times 8 = 960$ and $120 \times 9 = 1080$

Hence, the greatest three digit number exactly divisible by 8, 10 and 12 is 960



DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems :-

Q. The traffic lights at three different road crossings change after every 48 seconds, 72 seconds and 108 seconds respectively. If they change simultaneously at 7 AM, at what time will they change simultaneously again?

Sol. Time period after which these light will change
= Lcm of 48, 72 and 108

2	48, 72, 108
2	24, 36, 54
2	12, 18, 27
2	6, 9, 27
3	3, 9, 27
3	1, 3, 9
3	1, 1, 3
	1, 1, 1



$$\text{Lcm} = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$$

$$= 432$$

They will change together after every 432 seconds i.e. 7 min 12 seconds.

Hence, They will change simultaneously at 7:07:12 AM

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems:-

Q. Three tankers contain 403 l, 434 l and 465 l of diesel respectively. Find the maximum capacity of a container that can measure the diesel of the three containers exact number of times.

Sol. Maximum Capacity of the required tanker

$$= \text{HCF of } 403, 434, 465$$



$$403 = 13 \times 31$$

$$434 = 2 \times 7 \times 31$$

$$465 = 3 \times 5 \times 31$$

13	403	2	434	3	465
13	31	7	217	5	155
	1	31	31	31	31
			1		1

$$\text{HCF} = 31$$

A container of capacity 31 l can measure the diesel of 3 containers exact number of times.

Q. Find the least number which when divided by 6, 15 and 18 leave remainder 5 in each case.

Sol. Lcm of 6, 15, 18

$$\begin{aligned} \text{Lcm} &= 2 \times 3 \times 3 \times 5 \\ &= 90 \end{aligned}$$



2	6, 15, 18
3	3, 15, 9
3	1, 5, 3
5	1, 5, 1
	1, 1, 1

$$\begin{aligned} \text{Hence, required number} \\ &= 90 + 5 \\ &= 95 \end{aligned}$$

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number systems:-

Q. Find the smallest 4-digit number which is divided by 18, 24 and 32

Sol. Lcm of 18, 24 and 32

2	18, 24, 32
2	9, 12, 16
2	9, 6, 8
2	9, 3, 4
2	9, 3, 2
3	9, 3, 1
3	3, 1, 1
	1, 1, 1

$$\begin{aligned} \text{Lcm} &= 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \\ &= 288 \end{aligned}$$

We have to find the smallest 4-digit multiple of 288

it can be observed that $288 \times 3 = 864$ and $288 \times 4 = 1152$

Therefore, the smallest 4-digit number which is divisible by 18, 24 and 32 is 1152

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

∴ Number Systems:-

Q. Find the Lcm of the following numbers :

(a) 9 and 4 (b) 12 and 5 (c) 6 and 5 (d) 15 and 4

Observe a common property in the obtain Lcms. Is
8 of, Lcm the product of two numbers in each case?

$$\begin{array}{r|l}
 2 & 9, 4 \\
 \hline
 2 & 9, 2 \\
 \hline
 3 & 9, 1 \\
 \hline
 3 & 3, 1 \\
 \hline
 & 1, 1
 \end{array}$$

$$\begin{aligned}
 \text{Lcm} &= 2 \times 2 \times 3 \times 3 \\
 &= 36
 \end{aligned}$$

$$\begin{array}{r|l}
 2 & 12, 5 \\
 \hline
 2 & 6, 5 \\
 \hline
 3 & 3, 5 \\
 \hline
 5 & 1, 5 \\
 \hline
 & 1, 1
 \end{array}$$

$$\begin{aligned}
 \text{Lcm} &= 2 \times 2 \times 3 \times 5 \\
 &= 60
 \end{aligned}$$



$$\begin{array}{r|l}
 2 & 6, 5 \\
 \hline
 3 & 3, 5 \\
 \hline
 5 & 1, 5 \\
 \hline
 & 1, 1
 \end{array}$$

$$\begin{aligned}
 \text{Lcm} &= 2 \times 3 \times 5 \\
 &= 30
 \end{aligned}$$



$$\begin{array}{r|l}
 2 & 15, 4 \\
 \hline
 2 & 15, 2 \\
 \hline
 3 & 15, 1 \\
 \hline
 5 & 5, 1 \\
 \hline
 & 1, 1
 \end{array}$$

$$\begin{aligned}
 \text{Lcm} &= 2 \times 2 \times 3 \times 5 \\
 &= 60
 \end{aligned}$$

Yes, it can be observed that in each case, the Lcm of the given numbers is the product of these numbers.

When two numbers are co-prime, their Lcm is the product of those numbers. Also, in each case,

Lcm is a multiple of 3.

DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

~! Number Systems !~

Q. Find the Lcm of the following numbers in which one number is the factor of the other.

(a) 5, 20 (b) 6, 18 (c) 12, 48 (d) 9, 45

What do you observe in the results obtained.

Sol.

$$\begin{array}{r|l}
 2 & 5, 20 \\
 \hline
 2 & 5, 10 \\
 \hline
 5 & 5, 5 \\
 \hline
 & 1, 1
 \end{array}$$

$$\begin{aligned}
 \text{Lcm} &= 2 \times 2 \times 5 \\
 &= 20
 \end{aligned}$$

$$\begin{array}{r|l}
 2 & 6, 18 \\
 \hline
 3 & 3, 9 \\
 \hline
 3 & 1, 3 \\
 \hline
 & 1, 1
 \end{array}$$

$$\begin{aligned}
 \text{Lcm} &= 2 \times 3 \times 3 \\
 &= 18
 \end{aligned}$$



$$\begin{array}{r|l}
 2 & 12, 48 \\
 \hline
 2 & 6, 24 \\
 \hline
 2 & 3, 12 \\
 \hline
 2 & 3, 6 \\
 \hline
 3 & 3, 3 \\
 \hline
 & 1, 1
 \end{array}$$

$$\begin{aligned}
 \text{Lcm} &= 2 \times 2 \times 2 \times 2 \times 3 \\
 &= 48
 \end{aligned}$$

$$\begin{array}{r|l}
 3 & 9, 45 \\
 \hline
 3 & 3, 15 \\
 \hline
 5 & 1, 5 \\
 \hline
 & 1, 1
 \end{array}$$

$$\begin{aligned}
 \text{Lcm} &= 3 \times 3 \times 5 \\
 &= 45
 \end{aligned}$$



yes, it can be observed that in each case, the Lcm of the given numbers is the larger number. When one number is a factor of the other number, their Lcm will be the larger number.