

NOTES

CLASS 6

MATHS

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PLAYING WITH NUMBERS

Important Concepts/ Result:

Factors and Multiples:

- (i) A factor of a number is an exact divisor of that number.
- (ii) 1 is a factor of every number.
- (iii) every number is a factor of itself.
- (iv) every factor of a number is an exact divisor of that number.
- (v) every factor is less than or equal to the given number.
- (vi) number of factors of a given number are finite.
- (vii) every multiple of a number is greater than or equal to that number.
- (viii) the number of multiples of a given number is infinite.
- (ix) every number is a multiple of itself.

Perfect Number:-A number for which sum of all its factors is equal to twice the number is called a perfect number.

Prime and Composite Numbers:-

- (i) The numbers other than 1 whose only factors are 1 and the number itself are called Prime numbers.
- (ii) Numbers having more than two factors are called Composite numbers.
- (iii) 1 is neither a prime nor a composite number.
- (iv) 2 is the smallest prime number which is even.
- (v) every prime number except 2 is odd.

Co-prime Numbers:- Two numbers having only 1 as a common factor are called co-prime numbers.

Twin Prime Numbers:- Two prime numbers whose difference is 2 are called twin primes.



Tests for Divisibility of Numbers:-

- (i) Divisibility by 2 :- a number is divisible by 2 if it has any of the digits 0, 2, 4, 6 or 8 in its ones place.
- (ii) Divisibility by 3 :- if the sum of the digits is a multiple of 3, then the number is divisible by 3.
- (iii) 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.
- (iv) Divisibility by 5 :- a number which has either 0 or 5 in its ones place is divisible by 5.
- (v) Divisibility by 6 :- if a number is divisible by 2 and 3 both then it is divisible by 6 also.
- (vi) 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.
- (vii) Divisibility by 9 :- if the sum of the digits of a number is divisible by 9, then the number itself is divisible by 9.
- (viii) Divisibility by 10 :- if a number has 0 in the ones place then it is divisible by 10.
- (ix) Divisibility by 11 :- if 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 is either 0 or divisible by 11, then the number is divisible by 11.

Highest Common Factor:- 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).

Lowest Common Multiple:- The Lowest Common Multiple (LCM) of two or more given numbers is the lowest (or smallest or least) of their common multiples.

II. Some illustrations/Examples (with solution) .

1	Which of the following is not a prime number? (a) 1 (b) 2 (c) 3 (d) 5 Ans 1
2	Which of the following is a composite number? (a) 2 (b) 3 (c) 4 (d) 5 Ans 4
3	Which of the following is a factor of 6? (a) 6 (b) 9 (c) 12 (d) 15 Ans 6
4	Which of the following is a multiple of 8? (a) 2 (b) 4 (c) 6 (d) 8 Ans 8
5	Case based study question: Two tankers contain 850 litres and 680 litres of kerosene oil respectively. Find the maximum capacity of a container which can measure the kerosene oil of both the tankers when used an exact number of times. Solution : The required container has to measure both the tankers in a way that the count is an exact number of times. So its capacity must be an exact divisor of the capacities of both the tankers. Moreover, this capacity should be maximum. Thus, the maximum capacity of such a container will be the HCF of 850 and 680. Now $850 = 2 \times 5 \times 5 \times 17$ and $680 = 2 \times 2 \times 2 \times 5 \times 17$ The common factors of 850 and 680 are 2, 5 and 17.



	Thus, the HCF of 850 and 680 is $2 \times 5 \times 17 = 170$. Therefore, maximum capacity of the required container is 170 litres. It will fill the first container in 5 and the second in 4 refills.
6	Write all the factors of 24. Ans: All factors of 24 are 1,2,3,4,6,8,12,24.
7	Find all the multiples of 9 up to 100. Ans: 9,18,27,36,45,54,63,72,81,90,99
8	Write all the prime numbers less than 15. Ans: By observing the Sieve Method, we can easily write the required prime numbers as 2, 3, 5, 7, 11 and 13.
9	: Find the LCM of 40, 48 and 45. Solution : The prime factorisations of 40, 48 and 45 are; $40 = 2 \times 2 \times 2 \times 5$ $48 = 2 \times 2 \times 2 \times 2 \times 3$ $45 = 3 \times 3 \times 5$ The prime factor 2 appears maximum number of four times in the prime Factorisation of 48, the prime factor 3 occurs maximum number of two times in the prime factorization of 45, The prime factor 5 appears one time in the prime factorisations of 40 and 45, we take it only once. Therefore, required LCM = $(2 \times 2 \times 2 \times 2) \times (3 \times 3) \times 5 = 720$
10	Find the least number which when divided by 12, 16, 24 and 36 leaves a remainder 7 in each case. We first find the LCM of 12, 16, 24 and 36 as follows : Thus, LCM = $2 \times 2 \times 2 \times 2 \times 3 \times 3 = 144$ 144 is the least number which when divided by the given numbers will leave remainder 0 in each case. But we need the least number that leaves remainder 7 in each case. Therefore, the required number is 7 more than 144. The required least number = $144 + 7 = 151$



III. Questions for Practice: Number of questions should be as mentioned in the table:

1	Which of the following is a prime number? (a) 1 (b) 2 (c) 4 (d) 6
2	Which of the following is a composite number? (a) 1 (b) 2 (c) 3 (d) 4
3	A number which has only two factors is called a (a) prime number (b) odd number (c) even number (d) composite number
4	HCF of two co-prime numbers is (a) 1 (b) 2 (c) 3 (d) 4
5	The greatest prime number less than 10 is (a) 3 (b) 5 (c) 7 (d) 9
6	A number which has more than two factors is called a (a) prime number (b) odd number (c) composite number (d) even number
7	Using divisibility tests, determine the numbers 14560 is not divisible by (a) 2 (b) 3 (c) 4 (d) 5
8	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) $70 = 10 \times 7$ (d) $54 = 2 \times 3 \times 9$
9	A number is divisible by both 5 and 12. By which other number will that number be always divisible? (a) 50 (b) 60 (c) 70 (d) 80
10	Smallest perfect number is (a) 2 (b) 4 (c) 6 (d) 8
SHORT ANSWER QUESTIONS	
11	Write the greatest 2-digit number and express it in terms of its prime factors.
12	Find the prime factorisation of 980.
13	Find the common factors of 20 and 28.



14	Write all the numbers less than 100 which are common multiples of 3 and 4.
15	Using divisibility tests, determine which of the following numbers are divisible by 4; by 8: (a) 572 (b) 726352
16	Using divisibility tests, determine which of following numbers are divisible by 6: (a) 297144 (b) 1258
17	Using divisibility tests, determine which of the following numbers are divisible by 11: (a) 5445 (b) 10824
18	Find the HCF of the following numbers 18, 48
19	Find the LCM of 12 and 18.
20	Write three pairs of prime numbers whose difference is 2.
LONG ANSWER QUESTIONS	
21	Write five pairs of prime numbers less than 20 whose sum is divisible by 5.
22	Write down separately the prime and composite numbers less than 20.
23	Three tankers contain 403 litres, 434 litres and 465 litres of diesel respectively. Find the maximum capacity of a container that can measure the diesel of the three containers exact number of times.
24	Three boys step off together from the same spot. Their steps measure 63 cm, 70 cm and 77 cm respectively. What is the minimum distance each should cover so that all can cover the distance in complete steps?
25	Determine the greatest 3-digit number exactly divisible by 8, 10 and 12.
26	Find the least number which when divided by 6, 15 and 18 leave remainder 5 in each case.
27	Case based study question: In a morning walk, three persons step off together. Their steps measure 80 cm, 85 cm and 90 cm respectively. What is the minimum distance each should walk so that all can cover the same distance in complete steps? 
28	Case based study question: 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 a.m., at what time will they change simultaneously again? 



IV. ANSWERS :

Q.N.	ANS	Q.N.	ANS
1	b	6	c
2	d	7	b
3	a	8	b
4	a	9	b
5	c	10	c

Q. Nos.	Ans.	Q. Nos.	Ans.
11	99, $99=3 \times 3 \times 11$	21	2,3; 2,13; 3,17; 7,13; 11,19
12	$980=2 \times 2 \times 5 \times 7 \times 7$	22	Prime numbers: 2,3,5,7,11,13,17,19 Composite Numbers: 4,6,8,9,10,12,14,15,16,18
13	1,2,4	23	31 litres
14	12,24,36,48,60,72,84,96	24	6930 cm
15	Divisible by 4: (a), (b) Divisible by 8: (b)	25	960
16	(a)	26	95
17	(a), (b)	27	12240
18	6	28	7 minutes 12 seconds past 7 am
19	36		
20	3,5; 5,7; 11,13		



Chapter Test-1 (20 marks)

S.Nos.	Questions.	Marks
1	Write all the factors of the number 18.	2
2	Write first five multiples of 8.	2
3	Using divisibility tests, determine which of the following numbers are divisible by 4; by 8:(a) 572 (b) 726352.	2
4	Write all the prime numbers less than 25.	2

5	What is the sum of any two (a) Odd numbers? (b) Even numbers?	2
6	The numbers 13 and 31 are prime numbers. Both these numbers have same digits 1 and 3. Find such pairs of prime numbers upto 100.	2
7	What is the greatest prime number between 1 and 100?	2
8	Write five pairs of prime numbers less than 30 whose sum is divisible by 5.	2
9	Find the common factors of 75, 60 and 210	2
10	Write all the numbers less than 100 which are common multiples of 3 and 4.	2

Chapter Test-2 (30marks)

S.Nos.	Questions.	Marks
1	A number is divisible by 12. By what other numbers will that number be divisible?	2
2	Find the prime Factorisation of 720.	2
3	Which factors are not included in the prime factorisation of a composite number?	2
4	Find the HCF of the numbers 24 and 36.	2
5	Find the LCM of 40, 48 and 45.	2
6	Using divisibility tests, determine whether the numbers 297144 is divisible by 6.	2
7	Determine the smallest 3-digit number which is exactly divisible by 6, 8 and 12.	3
8	Determine the greatest 3-digit number exactly divisible by 8, 10 and 12.	3
9	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	3
10	Find the common multiples of 3, 6 and 9.	3
11	Write seven consecutive composite numbers less than 100 so that there is no prime number between them.	3
12	Find all the prime factors of 1729 and arrange them in ascending order. Now state the relation, if any; between two consecutive prime factors.	3





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