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Chapter - 6

Factors and Multiples

Factors :-

When a number divides another number exactly, then the divisor is called a factor of the dividend.

ex- 4 is a factor of 12., 7 is a factor of 35.

Properties of factors

(1) Every non-zero number has a limited number of factors.

(2) 1 is a factor of every number and it is the smallest factor of that number.

(3) Every non-zero number is the largest factor of itself.

(4) Every non-zero number is a factor of 0.

(5) We know that division by 0 is meaningless. So, 0 is not a factor of any number.

(6) Every factor of a non-zero number is either less than or equal to the given number.

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Highest Common Factor (HCF)

Exercise - 19

Q-2 Find all the factors of

(a) 42

Solution: We have

$42 = 1 \times 42$
$42 = 2 \times 21$
$42 = 3 \times 14$
$42 = 6 \times 7$

∴ All the factors of 42 is 1, 2, 3, 6, 7, 14, 21 and 42.

(b) 72

Solution: We have

$72 = 1 \times 72$
$72 = 2 \times 36$
$72 = 3 \times 24$
$72 = 9 \times 8$
$72 = 12 \times 6$
$72 = 18 \times 4$

∴ All the factors of 72 is 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36 and 72.

Q-2 i.e. - (b)

Q-3 - (b)

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Q=4 Check by division method whether 6 is a factor of 1296.

Solution

$$6 \overline{)1296} \quad 216$$

$$-12\downarrow$$

$$\times 9$$

$$-6\downarrow$$

$$36$$

$$-36$$

$$0$$

Ans: Yes 6 is a factor of 1296. because here remainder is 0.

Q=6 Show that 14 is a factor of 1246.

Solution

$$14 \overline{)1246} \quad 89$$

$$-112\downarrow$$

$$\times 126$$

$$-126$$

$$0$$

Ans: Yes 14 is a factor of 1246 Because, 14 divides 1246 exactly.

Q=8 Show that 25 is not a factor of 245.

Solution:

$$25 \overline{)245} \quad 9$$

$$225$$

$$\times 20$$

Clearly, on dividing 245 by 25, We get 20 as remainder.
Hence 25 is not a factor of 245.

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Q=12 Write the smallest and the largest factor of 21.

Solution ⇒ $21 = 1 \times 21$
$21 = 3 \times 7$

Hence, 1 is the smallest factor and 21 is the largest factor of 21.

Q=13 Find the HCF of

(a) 8 and 12

Solution Factors of 8 = 1, 2, 4, 8
Factors of 12 = 1, 2, 3, 4, 6, 12

∴ Common factors of 8 and 12 are 1, 2, 4

Hence, the HCF of 8 and 12 is 4.

(c) 27 and 36

Solution Factors of 27 = 1, 3, 9, 27
Factors of 36 = 1, 2, 3, 4, 6, 9, 12, 18, 36

∴ Common factors of 27 and 36 are 1, 3, 9

Hence, the HCF of 27 and 36 is 9.

(e) 56 and 96

Solution: Factors of 56 = 1, 2, 4, 7, 8, 28, 56
Factors of 96 = 1, 2, 3, 4, 6, 8, 12, 48, 96

∴ Common factors of 56 and 96 are 1, 2, 4, 8

Hence HCF of 56 and 96 is 8.

Multiples

When a number divides another number exactly, then the dividend is called a multiple of the divisor.

Properties of Multiples

(1) Every non-zero number has unlimited number of multiples.
(2) Every number is a multiple of 1.
We know that 1 is a factor of every number.

(3) Every non-zero number is a multiple of itself.

(4) 0 is a multiple of every non-zero number.

(5) Every multiple of a non-zero is either greater than or equal to the given number.

(6) The first multiple of a number is the number itself.

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Exercise 20

Q=2 Write the first ten multiples of 9.

Solution First 10 multiples of 9 = 9, 18, 27, 36, 45, 54, 63, 72, 81, 90.

Q=5 Examine whether 591 is a multiples of 7.

Solution

$$
\begin{array}{r|l}
7 & 591 \\
 & -56 \\
\hline
 & \times 31 \\
 & -28 \\
\hline
 & \times 3
\end{array}
$$

Here 591 is not multiples of 7 because we get 3 as remainder.

Ans ⇒ No

Q=>6 Show that 192 is a multiple of 6.

Solution

$$
\begin{array}{r|l}
6 & 192 \\
 & -18 \\
\hline
 & \times 12 \\
 & -12 \\
\hline
 & \times
\end{array}
$$

Hence 192 is a multiple of 6.

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Prime Numbers

A counting number having exactly two factors is called a prime number.

ex → 2, 3, 5, 7, 11, 13 -- etc.

Composite Numbers

A counting number having more than two factors is called a composite number.

ex 4, 6, 8, 9, 10, 12 -- etc

NOTE ⇒ 1 is neither prime nor composite.

"In order to succeed, your desire for success should be greater than your fear of failure." –Narendra Modi

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Q=9 Find the LCM of

(a) 4 and 6

Solution Multiples of 4 = 4, 8, (12), 16, 20, (24), 28, 32, (36) ...
Multiples of 6 = 6, (12), 18, (24) 30 (36) - - - -

Common multiples of 4 and 6 are 12, 24, 36

∴ LCM of 4 and 6 is 12.

(b) 10, 15 and 20

Solution Multiples of 10 = 10, 20, 30, 40, 50, (60), 70, 80, 90, 100, (120) ...
Multiples of 15 = 15, 30, 45, (60), 75, 90, 105 (120) ...
Multiples of 20 = 20, 40, (60), 80, 100, (120) ...

Common Multiples of 10, 15 and 20 are 60 and 120

∴ LCM of 10, 15 and 20 is 60.

"The butterfly counts not months but moments, and has time enough."—Rabindranath Tagore

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Exercise - 21

(2) Write all prime numbers less than 20.

Prime Numbers ⇒

A counting number having exactly two factors is called a Prime number.

examples ⇒ 2, 3, 5, 7, 11, 13, 17, 19, 23, 29 etc. is a prime number.

Composite Number ⇒

A counting number having more than two factors is called a Composite number.

examples ⇒ 4, 6, 8, 9, 10, 12, 14, 16, 18 etc is a composite number.

NOTE ⇒ 1 is neither prime nor composite.

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Ex-2|

Q-2 Write all prime numbers less than 40.

Solution: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37.

Q-3 (Ex-2a) Write the first nine multiples of 16.

Solution: 16, 32, 48, 64, 80, 96, 112, 128, 144

Q-3 Write all prime numbers between 40 and 80.

Solution: 41, 43, 47, 53, 59, 61, 67, 71, 73, 79

Q-5 Write all composite numbers between 40 and 60.

Solution: 42, 44, 45, 46, 48, 49, 50, 51, 52, 54, 55, 56, 57, 58.

"The butterfly counts not months but moments, and has time enough."—Rabindranath Tagore

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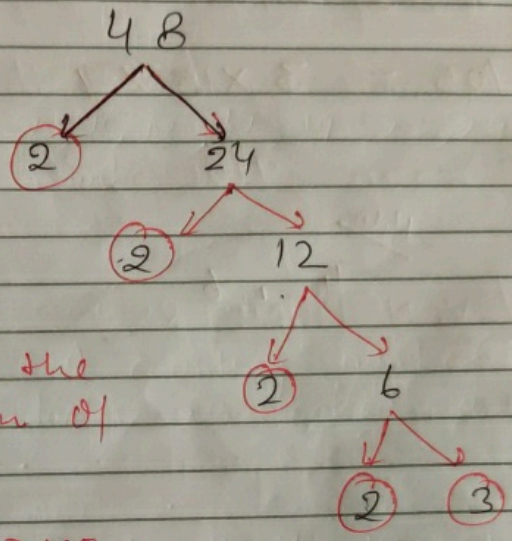
Exercise - 22

Find the prime factorisation of each of the following numbers by building factor trees.

1) 48

Solution: We have

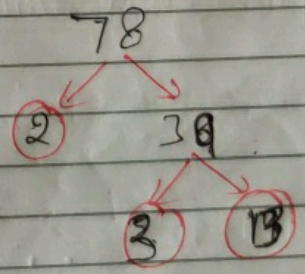


Thus, we write the prime factorisation of 48 as:

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

(3) 78

Solution: We have



The, prime factorisation of 78 as

$78 = 2 \times 3 \times 13$

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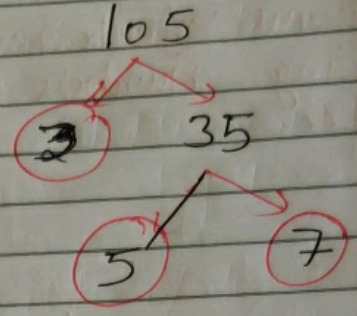
(8) 105

Solution We have



Thus prime factorisation of 105 as

$105 = 3 \times 5 \times 7$

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Tests of Divisibility

① **Test of Divisibility by 2 ⇒**

A given number is divisible by 2. if its unit digit is 0, 2, 4, 6 or 8.

ex→ 1560, 5272, 7164, 9376 and 7538

② **Test of Divisibility by 3 ⇒**

A given number is divisible by 3, if the sum of its digits is divisible by 3.

ex→ 57102
sum of digits = (5+7+1+0+2) = 15, which is divisible by 3.

(3) **Test of Divisibility by 5 ⇒**

A given number is divisible by 5, if its unit digit is 0 or 5.

ex→ 7310 and 8135 is divisible by 5.

(4) **Test of Divisibility by 6 ⇒**

A given number is divisible by 6, if its divisible by both 2 and 3.

ex⇒ 13074
Sum of its digits = (1+3+0+7+4) = 15
which is divisible by 3
⇒ Its unit digit is 4, so its also divisibly by 2.
Hence, it is divisible by 6.

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(5) Test of Divisibility by 9 ⇒ A given number is divisible by 9, if the sum of its digits is divisible by 9.

ex⇒ 14517 ⇒ (1+4+5+1+7) = 18
which divisible by 9.

(6) Test of Divisibility of 10 ⇒ A given number is divisible by 10, if its unit digit is 0.

ex⇒ 5370, 9140, 8650 is divisible by 10

EVEN NUMBERS ⇒

Every number is divisible by 2, is called an even number.

ex⇒ 1560, 1472, 2954, 3796, 5408.

Odd Numbers ⇒

A number which is not divisible by 2, is called and odd number.

ex⇒ 7681, 5473, 6125, 4037 and 8119

(V)

Q-2 (a)
Solution

(g)
Solution

Q-2

Solution (f)

(f)
Solution

Q-3

(a)

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Exercise -23

Q-1 Which of the following numbers are divisible by 2 ?

(a) 36708

Solution: 36708
Given Number is divisible by 2, because its unit digit is 8.

(g) 64285

Solution: 64285
Given number is ~~do~~ not divisible by 2 ; because its unit is 5 (its not a even number).

Q-2 Which of the following numbers are divisible by 3 ?

(d) 2382

Solution: ⇒ Sum of given digits $= (2+3+8+2) = 15$.
which is divisible by 3.
∴ 2382 is divisible by 3.

(f) 40513

Solution: Sum of given digits $= (4+0+5+1+3) = 13$.
which is not divisible by 3.
∴ 40513 is not divisible by 3.

Q-3 Which of the following numbers are divisible by 6 ?

(a)

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(a) 7848

Solution: 7848

Its unit digit is 8, it is divisible by 2.

Sum of digit = (7+8+4+8) = 27 which is not divisiby by 3.

Thus 7848 is not divisible by 6.

(d) 17076

Solution: Its unit digit is 6, it is divisible by 2.

Sum of digit = (1+7+0+7+6) = 21, which is divisible by 3.

Hence 17076 is divisible by 6.

Q=4 Which of the following numbers are divisible by 5?

(a) 130705.

Solution: Given number 130705 is divisible by 5 because its unit digit is 5.

(g) 3760106

Solution: Given number 3760106 is not divisible by 5 because its unit digit is 6.

"I sincerely believe that Indians have the ability to compete with the best in the world."—Dhirubhai Ambani

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Q-5 Which of the following numbers are divisible by 9 ?

Solution (a) 57123

Ans> 57123

Sum of given digits = (5+7+1+2+3) = 18
= which is divisible by 9.

∴ 57123 divisible by 9.

(f) 23549

Solution 23549

sum of given digits = (2+3+5+4+9) = 23,
which is not divisible by 9.

∴ 23549 is not divisible by 9.

Q-6 Which of the following numbers are divisible by 10 ?

(a) 23570

Solution 23570, Given number is divisible by 10, because its unit digit is 0.

∴ 23570 is divisible by 10.

(d) 463512

Solution 463512, Given number is not divisible by 10, because its unit digit is 2.

∴ 463512 is not divisible by 10.

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Q=7 Separate the even and odd numbers from the following:

(a) 369725

Solution

	Even Number	Odd Number
(1)	397256	369725
	549032	648307
	510570	467051
	502104	
	962048	

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