

CHAPTER

02

FOUR FUNDAMENTAL OPERATIONS ON WHOLE NUMBERS

Whole Numbers

All natural numbers together with 0 (zero) are called whole numbers. Addition as well as multiplication of two whole numbers must be a whole number but same is not true while having the operation like subtraction and division on whole number.

Fundamental Operations

Closure Law

For addition	For multiplication
$1 + 2 = 3$	$2 \times 3 = 6$
$4 + 5 = 9$	$4 \times 5 = 20$

Commutative Law

For addition	For multiplication
$2 + 3 = 3 + 2$	$2 \times 3 = 3 \times 2$
$11 + 7 = 7 + 11$	$11 \times 7 = 7 \times 11$

Associative Law

For addition

$$1 + (2 + 3) = (1 + 2) + 3$$
$$5 + (9 + 11) = (5 + 9) + 11$$

For multiplication

$$1 \times (2 \times 3) = (1 \times 2) \times 3$$
$$5 \times (9 \times 11) = (5 \times 9) \times 11$$

Distributive Law

$$2 \times (4 + 5) = 2 \times 4 + 2 \times 5$$
$$(11 + 7) \times 5 = 11 \times 5 + 7 \times 5$$

Identity Elements

Zero is the identity element for addition and 1 is the identity element for multiplication.

Properties of Zero

- When zero is added or subtracted from any number, the result is the number itself.
e.g., $4 + 0 = 4$, $18 + 0 = 18$
 $6 - 0 = 6$, $24 - 0 = 24$
- Product of any whole number and zero is zero.
e.g., $4 \times 0 = 0$
- If we divide zero by any whole number, the result is zero.
e.g., $0 \div 10 = 0$, $0 \div 4 = 0$
- If power of any number is zero, then the value of that number will be 1.
e.g., $1^0 = 1$, $4^0 = 1$

Properties of One

The product of any whole number and 1 is the whole number itself.

e.g., $18 \times 1 = 18$, $5 \times 1 = 5$

So, divisor is 98.

Example 3. What least number should be added to the least number of four digits, so that the resulting number is exactly divisible by 89?

- (1) 68 (2) 64
(3) 51 (4) 52

Sol. (1) Least number of four digits = 1000

$$\begin{array}{r} 89) 1000 \text{ (11)} \\ \underline{89} \\ 110 \\ \underline{89} \\ 21 \end{array}$$

\therefore Required number = $89 - 21 = 68$

Unit Digit

Extreme right digit of a number is known as unit digit of that number.

Unit Digit in the Multiplication of Numbers

If we want to the unit digit in the multiplication of some numbers, we can do so by multiplying only the unit digits of the given numbers.

e.g., Unit digit in $786 \times 498 \times 189 \times 592$

$$= \text{Unit digit in } 6 \times 8 \times 9 \times 2$$

$$= \text{Unit digit in } 864 = 4$$

Entrance Corner

- When -1 is multiplied by itself 100 times, the product is c
(1) 1 (2) -1 (3) 100 (4) -100
- A store sells a packet of 5 apples in ₹25 and a single apple in ₹ 6, if a lady purchase 27 apples. How much money will she pay?
(1) ₹ 128 (2) ₹ 130 [JNV 2018]
(3) ₹ 137 (4) ₹ 150
- Kaku got 7 marks less than Bakshi while Raman got 3 marks more than Kaku. If the total marks obtained by all three is 76. Find the marks obtained by Raman.
[JNV 2018]
(1) 22 (2) 25 (3) 29 (4) 31
- Ram got 8 marks more than Shyam in an examination. Anil got 4 marks more than Ram in the same examination. If all three of them got 128 marks together as a total, Ram's marks would be [JNV 2016]
(1) 36 (2) 44 (3) 48 (4) 54
- Rajesh's weight is 5 kg less than Ram's weight and Neha's weight is 3 kg more than Ram's weight. If the weight of three is 103 kg, then the weight of Ram is [JNV 2015]
(1) 34 kg (2) 38 kg (3) 33 kg (4) 35 kg
- In an examination Karan got 10 marks more than Bhavna. Isha got 5 marks less than Bhavna. If Trio get a total of 170, then what is the marks obtained by Isha?
[JNV 2014]
(1) 65 (2) 55 (3) 50 (4) 45
- 1000000 is obtained, when a number is subtracted from the sum of 893645 and 635489, find that number. [JNV 2014]
(1) 106355 (2) 364511
(3) 51329 (4) 529134
- A shopkeeper charges ₹ 10 for every bottle of coke or ₹ 240 for every crate of 30 bottles. If Vandana wants to buy 185 bottle of coke, what amount she will have to pay? [JNV 2014]
(1) ₹ 1480 (2) ₹ 1490
(3) ₹ 1600 (4) ₹ 1850
- What is the maximum difference between the smallest number formed by 7 numerals and the largest number formed by 6 numerals? [JNV 2014]
(1) 1 (2) 35802
(3) 38502 (4) 999998
- Unit digit of product of first ten prime number is [JNV 2014]
(1) 6 (2) 4 (3) 2 (4) 0
- The difference between the highest and lowest five digits number using 0, 3, 6, 8 and 9 digit (each digits using once time). [JNV 2013]
(1) 94941 (2) 61821 (3) 61740 (4) 67941
- The sum of two numbers is 234560. If one number is more than other number by ten thousand ten. Find the greatest number. [JNV 2013]
(1) 112272 (2) 112275 (3) 132285 (4) 117280

- 13.** Find out the unit's digit in the product of $(3207 \times 12 \times 17 \times 13)$. [JNV 2013]
(1) 0 (2) 3 (3) 4 (4) 7
- 14.** Which of the following is the smallest four digits number? [JNV 2011]
(1) 1000 (2) 1100 (3) 1300 (4) 1900
- 15.** The multiple of 7 between 14 and 77 is [JNV 2011]
(1) 10 (2) 9 (3) 8 (4) 7
- 16.** What value must be given to *, so that the number 6912* is divisible by 25? [JNV 2011, 1997]
(1) 3 (2) 5 (3) 4 (4) 7
- 17.** The value of $20.91 \div 0.17$ is [JNV 2011]
(1) 0.0123 (2) 1.230 (3) 12.30 (4) 123.0
- 18.** 14 rows in a park 420 cars stand in every row. Then, how many cars will stand in the park? [JNV 2010]
(1) 5880 (2) 434 (3) 406 (4) 30
- 19.** A number
- is less than 50 - multiple of 7
- have 3 factors
Then, the number is [JNV 2010]
(1) 14 (2) 42 (3) 49 (4) 70
- 20.** What should be added to 65° to make it a right angle? [JNV 2008]
(1) 35° (2) 45° (3) 40° (4) 25°
- 21.** In a well water level was 18 m below. Due to rains water level increased by 3.5 m. What is the water level in the well now? [JNV 2008]
(1) 14.5 m (2) 15.6 m (3) 21.5 m (4) 3.5 m
- 22.** What is the greatest four digits number in which all the digits are different? [JNV 2007]
(1) 9876 (2) 9768 (3) 9867 (4) 9786
- 23.** 2408×200 is equal to [JNV 2007]
(1) 480160 (2) 480016
(3) 481600 (4) 461600
- 24.** The product of three numbers is 7980. In which the product of two numbers is 228, then what is the third number? [JNV 2007]
(1) 25 (2) 15 (3) 16 (4) 35
- 25.** The sum of the greatest and the smallest 4 digit numbers is [JNV 2004]
(1) 8999 (2) 10999
(3) 11110 (4) 111111
- 26.** The product of two numbers is 8192. One of the number is two times the second number, the smaller number is [JNV 2004]
(1) 8 (2) 16 (3) 32 (4) 64
- 27.** The smallest odd number formed by the digits 1, 0, 3, 4 and 5 will be [JNV 2004]
(1) 10345 (2) 10453
(3) 10543 (4) 10534
- 28.** The number 13013 is divisible by 13. The smallest 5 digit number beginning with 14 and exactly divisible by 13 is [JNV 2003, 1995]
(1) 14040 (2) 14001
(3) 14014 (4) 14027
- 29.** In a question of division if divisor is 51, quotient 16 and remainder 27, then the dividend will be [JNV 2003, 1995]
(1) 843 (2) 483
(3) 9 (4) 1393

Answers

1. (2)	2. (3)	3. (2)	4. (2)	5. (4)	6. (3)	7. (4)	8. (2)	9. (1)	10. (4)
11. (4)	12. (2)	13. (3)	14. (1)	15. (3)	16. (2)	17. (4)	18. (1)	19. (2)	20. (4)
21. (1)	22. (1)	23. (3)	24. (4)	25. (2)	26. (4)	27. (1)	28. (2)	29. (1)	

Hints and Solutions

- 1.** According to the question,
 \therefore Required answer $= (-1) \times (1)^{100} = (-1)^{101} = -1$
- 2.** Price of packet of 5 apples is ₹ 25.
 Price of a single apple = ₹ 6
 Now, 27 apples = 5×5 packet + 2 apple
 $= 5 \times 25 + 2 \times 6 = 125 + 12 = ₹ 137$

\therefore Price of 27 apples = ₹ 137

- 3.** \therefore Let marks obtained by Kaku = x
 Marks obtained by Raman = $x + 3$
 Marks obtained by Bakshi = $x + 7$
 According to the question
 $x + x + 3 + x + 7 = 76$

- $3x + 10 = 76 \Rightarrow 3x = 66 = 22$
 \therefore Marks obtained by Raman = $x + 3 = 22 + 3 = 25$
4. Let the marks obtained by Shyam be x .
 Then, marks obtained by Ram = $x + 8$
 and marks obtained by Anil = $x + 8 + 4$
 $= x + 12$
 According to the question,
 $x + x + 8 + x + 12 = 128$, $3x + 20 = 128$
 $3x = 108$, $x = 36$
 So, marks obtained by Ram = $x + 8 = 36 + 8 = 44$
5. Suppose Ram's weight = x kg
 Then, Rajesh's weight = $(x - 5)$ kg
 and Neha's weight = $(x + 3)$ kg
 Then, $x + (x - 5) + (x + 3) = 103$
 $\Rightarrow 3x - 2 = 103 \Rightarrow 3x = 105$
 $\therefore x = \frac{105}{3} = 35$ kg
6. Let the score of Bhavna be x , then
 Score of Karan = $x + 10$
 Score of Isha = $x - 5$
 According to the question,
 $x + 10 + x - 5 + x = 170$
 $\Rightarrow 3x + 5 = 170 \Rightarrow 3x = 165$
 $\therefore x = 55$
 Obtained mark of Isha = $55 - 5 = 50$
7. Sum = $893645 + 635489 = 1529134$
 Let the number which is to be subtracted is x ,
 then $1529134 - x = 1000000$
 $\Rightarrow x = 1529134 - 1000000 = 529134$
8. Given, 1 crate = 30 bottles
 185 bottles = 6 crate + 5 bottles
 $= 6 \times 240 + 5 \times 10 = 1440 + 50 = ₹ 1490$
9. Smallest number of seven digit = 1000000
 Greatest number of six digit = 999999
 Required difference = $1000000 - 999999 = 1$
10. First ten prime numbers
 2, 3, 5, 7, 11, 13, 17, 19, 23, 29
 Product of first ten prime numbers
 $2 \times 3 \times 5 \times 7 \times 11 \times 13 \times 17 \times 19 \times 23 \times 29$
 \therefore Unit digit of product of $2 \times 3 \times 5 = 0$
 Hence, the unit digit of first ten prime number
 $= 0$ (0 multiplied by any number gives always 0).
11. Largest number of 5 digits = 98630
 Smallest number of 5 digits = 30689
 Hence, required difference
 $= 98630 - 30689 = 67941$
12. Suppose, first number = x
 and second number = $x + 10010$
 Then, $x + x + 10010 = 234560$
 $\Rightarrow 2x = 234560 - 10010$
 $\Rightarrow 2x = 224550 \Rightarrow x = 112275$
 Hence, greatest number = $x + 10010$
 $= 112275 + 10010 = 122285$
13.
$$\begin{array}{cccc} 3207 & \times & 12 & \times & 17 & \times & 13 \\ \uparrow & & \uparrow & & \uparrow & & \uparrow \\ 7 & & 2 & & 7 & & 3 \end{array}$$

 \therefore Unit's digits are 7, 2, 7 and 3.
 Hence, required product = $7 \times 2 \times 7 \times 3 = 294$
 \therefore Unit's digit = 4
14. Smallest four digits number = 1000
15. Multiples of 7 between 14 and 77
 $= 21, 28, 35, 42, 49, 56, 63, 70$
 So, total numbers of multiples are = 8
16. The numbers divisible by 25 are only the numbers with last digits 25, 50, 75 and 100. So, 5 is required number.
17. $\therefore 20.91 \div 0.17 = \frac{2091}{100} \times \frac{100}{17} = 123.0$
18. Required number of cars = $14 \times 420 = 5880$
19. Required number = 42
 \therefore Factors of 42 = $2 \times 3 \times 7$
20. Right angle is 90° .
 $\therefore 90^\circ - 65^\circ = 25^\circ$
21. Required level = $18 - 3.5 = 14.5$ m
22. Arrange it in descending order starting from 9.
 Hence, required number = 9876
23. $2408 \times 200 = 481600$
24. Third number = $\frac{7980}{228} = 35$
25. The greatest 4 digit number = 9999
 The smallest 4 digit number = 1000
 Total = 10999
26. Let the number be x and $2x$.
 $\therefore x \times 2x = 8192$
 $x \times x = \frac{8192}{2} = 4096$
 $\Rightarrow x^2 = 4096$
 $\Rightarrow x = \sqrt{4096}$
 $\Rightarrow x = 64$
28. The smallest five digit number beginning with 14 is 14000.
 13) 14000 (1076

$$\begin{array}{r}
 13 \\
 \hline
 100 \\
 91 \\
 \hline
 90 \\
 78 \\
 \hline
 12
 \end{array}$$

∴ The required number will be

$$\begin{aligned}
 &= 14000 + (13 - 12) \\
 &= 14000 + 1 \\
 &= 14001
 \end{aligned}$$

29. As we know,
 Dividend = Divisor + Quotient + Remainder
 Dividend = $51 \times 16 + 27$
 $= 816 + 27 = 843$

Practice Exercise

- On dividing a number by 9, the quotient is 12 and remainder is 7. The number is
 (1) 114 (2) 93 (3) 115 (4) 108
- What least number must be subtracted from 543 to get a number exactly divisible by 8?
 (1) 9 (2) 1 (3) 5 (4) 7
- The number 4318 should be divided by which number, so that the quotient is 17.
 (1) 253 (2) 254 (3) 244 (4) 354
- What must be added to 2910, so that the quotient is 243 on dividing by 12?
 (1) 7 (2) 4 (3) 5 (4) 6
- Which of the greatest four digits number, is exactly divisible by 88?
 (1) 9944 (2) 9988 (3) 9996 (4) 9966
- Which one of the following numbers is exactly divisible by 11?
 (1) 1552 (2) 1331 (3) 1882 (4) 1902
- If $10 * 4$ divisible by 3, the number at * is
 (1) 4 (2) 1 (3) 2 (4) 3
- If the number $325 * 6$ is exactly divisible by 3, the number which comes at the place of * is
 (1) 4 (2) 2 (3) 3 (4) 1
- If $34 * 24$ is divisible by 9, the number at * is
 (1) 5 (2) 9 (3) 2 (4) 3
- Find the unit's digit in the product of (4326×5321) .
 (1) 6 (2) 8
 (3) 1 (4) 3
- The unit's digit in the product $(2467)^{153} \times (341)^{72}$ is
 (1) 9 (2) 3 (3) 1 (4) 7
- A man's monthly salary is ₹ 25000. He spent ₹ 2500 on clothes, ₹ 4000 on food, ₹ 3000 on house rent and ₹ 3500 on education monthly. His monthly saving is
 (1) ₹ 1200 (2) ₹ 1800
 (3) ₹ 12000 (4) None of these
- The unit digit in the product of $163 \times 87 * \times 239$ be 1, then the digit that the place of * will be
 (1) 1 (2) 3 (3) 7 (4) 9
- On dividing 55055 by 11, the quotient obtained is
 (1) 550 (2) 5005 (3) 505 (4) 50005
- If the number $9708 * 3$ is divisible by 9 and 3, the number which comes at the place of * is
 (1) 0 (2) 1 (3) 3 (4) 6
- Find the greatest number of 4 digits which is exactly divisible by 75
 (1) 9975 (2) 9927 (3) 7799 (4) 9978

Answers

1. (3)	2. (4)	3. (2)	4. (4)	5. (1)	6. (2)	7. (2)	8. (2)	9. (1)	10. (1)
11. (4)	12. (3)	13. (2)	14. (2)	15. (1)	16. (1)				

Hints and Solutions

1. Dividend = Quotient \times Divisor + Remainder
 $= 12 \times 9 + 7 = 108 + 7 = 115$

2.
$$\begin{array}{r} 8) \quad 543 \quad (67 \\ \underline{48} \\ 63 \\ \underline{56} \\ 7 \text{ Remainder} \end{array}$$

\therefore 7 is the required least number.

3. The required number $= \frac{4318}{17} = 254$

4. The required number $= (243 \times 12) - 2910$
 $= 2916 - 2910 = 6$

5. The greatest number of four digits is 9999.

$$\begin{array}{r} 88) \quad 9999 \quad (113 \\ \underline{88} \\ 119 \\ \underline{88} \\ 319 \\ \underline{264} \\ 55 \end{array}$$

\therefore Required number $= 9999 - 55 = 9944$

6. \therefore In 1331; $(1 + 3) - (3 + 1) = 0$

[The difference between the sum of digits at even places and sum of the digits at odd places is 0].

7. For divisibility by 3, the sum of digits of a number must be divisible by 3, sum of the digits of the number $10 * 4 = 1 + 0 + 4 = 5$, which must be 6, so the digit at * place must be $(6 - 5) = 1$.

8. For divisibility by 3, the sum of digits of a number must be divisible by 3.

The sum of digits of the number $325 * 6$
 $= 3 + 2 + 5 + 6 = 16$, which must be 18.

So, the digit at * place must be $(18 - 16) = 2$.

9. For divisibility by 9, the sum of digits of a number must be divisible by 9.

The sum of digits of the number $34 * 24$

$= 3 + 4 + 2 + 4 = 13$, which must be 18.

So, the digit at * place must be $(18 - 13) = 5$.

10. Product of unit's digit $= 6 \times 1 = 6$

\therefore Required digit $= 6$

11. Unit's digit of $(2467) \times (341)$

$= 7 \times 1 = 7$

12. Total spent $= 2500 + 4000 + 3000 + 3500$

$= ₹ 13000$,

Salary $= ₹ 25000$

\therefore His monthly saving $= 25000 - 13000$
 $= ₹ 12000$

13. $163 \times 87 * \times 239$

The unit digit in product of 3, *, 9 should be 1.

\therefore The required number of * should be 3.

$\therefore 3 \times 3 \times 9 = 81$

14. $11) \quad 55055 \quad (5005$

$$\begin{array}{r} \underline{55} \\ 055 \\ \underline{55} \\ \times \end{array}$$

15. If the sum of digits of a number is divisible by both 9 and 3, that number will also be divisible by 9 and 3. Here, sum of digits $= 9 + 7 + 0 + 8 + * + 3 = 27 + *$, 27 is divisible by both 9 and 3. \therefore The number, which comes at the place of * is 0.

16. $9999 \div 75$, remainder $= 24$

\therefore The required number
 $= 9999 - 24$
 $= 9975$

Self Practice

1. The greatest number of five digits exactly divisible by 8 is
(1) 99992 (2) 99984 (3) 90000 (4) 10000
2. In the election, a candidate 'A' gets 252130 votes while, candidate 'B' gets 113717 votes. Then, the number of votes with which candidate 'A' wins are
(1) 148413 (2) 138413 (3) 365847 (4) None of these
3. Which one of the numbers is exactly divisible by 3?
(1) 2572 (2) 3411 (3) 2732 (4) 3521
4. Which of the following numbers is exactly divisible by 9?
(1) 20756 (2) 10836 (3) 31525 (4) 53162
5. Which of the numbers is exactly divisible by 8?
(1) 444 (2) 8442 (3) 8096 (4) 8844
6. If 2×345 is divisible by 9 what will come at *?
(1) 4 (2) 1 (3) 9 (4) 8
7. What least number should be subtracted from 413, so that the resulting number is exactly divisible by 13?
(1) 12 (2) 10 (3) 11 (4) 17
8. ₹ 125000 is to be distributed among 5 persons. Then, the share of each person is
(1) ₹ 2500 (2) ₹ 20000 (3) ₹ 25000 (4) ₹ 20005
9. The greatest number of three digits divisible by 5 is
(1) 9990 (2) 990 (3) 995 (4) 105
10. What least number should be added to 64 to make it divisible by 7?
(1) 4 (2) 6 (3) 12 (4) 3
11. The number 7254*38 is divisible by 9, then the number which comes at the place of * is
(1) 4 (2) 7 (3) 6 (4) 5
12. 57244 is divisible by
(1) 11, 4 (2) 4, 7 (3) 7, 11 (4) 7, 9
13. The number between 800 and 900 divisible completely by 13 and 17 is
(1) 878 (2) 884 (3) 888 (4) 868
14. What is the unit digit in $(44 \times 88 \times 11)$?
(1) 1 (2) 3 (3) 2 (4) 5

Answers

1. (1)	2. (2)	3. (2)	4. (2)	5. (3)	6. (1)	7. (2)	8. (3)	9. (3)	10. (2)
11. (2)	12. (1)	13. (2)	14. (3)						