4. Find the difference between the smallest number of 7 digits and the largest number of 4 digits.

5. Ravi opened his account in a bank by depositing ₹ 136000. Next day he withdrew ₹ 73129 from it. How much money was left in his account?

6. Mrs Saxena withdrew ₹ 100000 from her bank account. She purchased a TV set for ₹ 38750, a refrigerator for ₹ 23890 and jewellery worth ₹ 35560. How much money was left with her?

7. The population of a town was 110500. In one year it increased by 3608 due to new births. However, 8973 persons died or left the town during the year. What was the population at the end of the year?

8. Find the whole number n when:

   (i) $n + 4 = 9$ (ii) $n + 35 = 101$ (iii) $n - 18 = 39$ (iv) $n - 20568 = 21403$
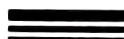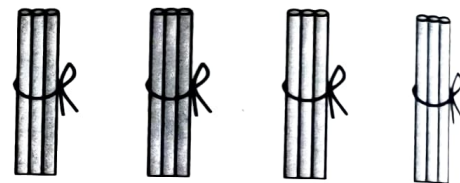
MULTIPLICATION OF WHOLE NUMBERS

Let us consider 4 bundles, each consisting of 3 sticks.

   Total number of sticks
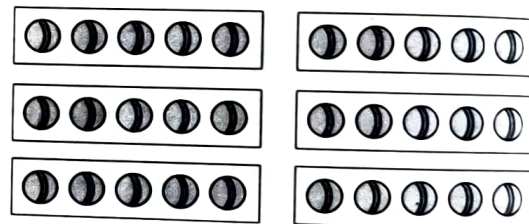 $= 3 + 3 + 3 + 3 = 12$.
   Also, we may write:
      total number of sticks
      = 4 times 3, written as 4×3.
      $\therefore \quad 4 \times 3 = 12$.

Again, consider 6 packets of 5 balls each.

   Total number of balls
      $= 5 + 5 + 5 + 5 + 5 + 5 = 30$.
   Also, we may write:
      total number of balls
      = 6 times 5, written as 6×5.
   Therefore, $6 \times 5 = 30$.

It follows that *multiplication is repeated addition.*

If the numbers are small, we can perform the operation of multiplication mentally as above and find the product.

If the numbers are large, we multiply them using the multiplication tables about which you have learnt earlier.

However, we now list the various properties of multiplication on whole numbers. These properties will help us in finding easily the products of numbers, however large they may be.

PROPERTIES OF MULTIPLICATION OF WHOLE NUMBERS

(i) CLOSURE PROPERTY   *If a and b are whole numbers, then $(a \times b)$ is also a whole number.*

EXAMPLES   Let us take a few pairs of whole numbers and check in each case whether their product is a whole number.

One whole number	Another whole number	Product	Is the product a whole number?
9	8	$9 \times 8 = 72$	Yes
12	7	$12 \times 7 = 84$	Yes
16	10	$16 \times 10 = 160$	Yes

Thus, we see that if we multiply two whole numbers, the product is also a whole number.

(II) COMMUTATIVE LAW *If a and b are any two whole numbers then $(a \times b) = (b \times a)$.*

EXAMPLES (i) $7 \times 5 = 35$ and $5 \times 7 = 35$.

Is $(7 \times 5) = (5 \times 7)$? Yes.

(ii) $19 \times 12 = 228$ and $12 \times 19 = 228$.

Is $(19 \times 12) = (12 \times 19)$? Yes.

In general, commutative law of multiplication holds in whole numbers.

(iii) MULTIPLICATIVE PROPERTY OF ZERO *For every whole number a, we have* $(a \times 0) = (0 \times a) = 0$.

EXAMPLES (i) $9 \times 0 = 0 \times 9 = 0$ (ii) $37 \times 0 = 0 \times 37 = 0$ (iii) $2386 \times 0 = 0 \times 2386 = 0$

(iv) MULTIPLICATIVE PROPERTY OF 1 *For any whole number a we have:* $(a \times 1) = (1 \times a) = a$.

EXAMPLES (i) $8 \times 1 = 1 \times 8 = 8$ (ii) $76 \times 1 = 1 \times 76 = 76$ (iii) $2345 \times 1 = 1 \times 2345 = 2345$

(v) ASSOCIATIVE LAW *If a, b, c are any whole numbers, then* $(a \times b) \times c = a \times (b \times c)$.

EXAMPLE Take the whole numbers 9, 7 and 10.

$(9 \times 7) \times 10 = 63 \times 10 = 630$.

$9 \times (7 \times 10) = 9 \times 70 = 630$.

$\therefore$ $(9 \times 7) \times 10 = 9 \times (7 \times 10)$.

(vi) DISTRIBUTIVE LAW OF MULTIPLICATION OVER ADDITION *For any whole numbers a, b, c we have:* $a \times (b + c) = (a \times b) + (a \times c)$.

EXAMPLE Consider the whole numbers 16, 9 and 8.

$16 \times (9 + 8) = (16 \times 17) = 272$.

$(16 \times 9) + (16 \times 8) = (144 + 128) = 272$.

$\therefore$ $16 \times (9 + 8) = (16 \times 9) + (16 \times 8)$.

(vii) DISTRIBUTIVE LAW OF MULTIPLICATION OVER SUBTRACTION *For any whole numbers a, b, c we have:* $a \times (b - c) = (a \times b) - (a \times c)$.

EXAMPLE Consider the whole numbers 11, 6 and 4.

$11 \times (6 - 4) = (11 \times 2) = 22$.

$(11 \times 6) - (11 \times 4) = (66 - 44) = 22$.

$\therefore$ $11 \times (6 - 4) = (11 \times 6) - (11 \times 4)$.

SOLVED EXAMPLES

EXAMPLE 1. *Multiply 197 by 54.*

Solution We have:

$197 \times 54 = 197 \times (50 + 4)$

$= 197 \times 50 + 197 \times 4$ (by distributive law)

$= 9850 + 788 = 10638$.

$$= (1000 \times 2995) = 2995000.$$

EXAMPLE 9. Find the product $37256 \times 25 \times 40$.

Solution We have:

$$37256 \times 25 \times 40 = 37256 \times (25 \times 40)$$
$$= 37256 \times 1000 = 37256000.$$

EXAMPLE 10. Find each of the following products:
(i) 30674×9 (ii) 4578×99 (iii) 23756×999

Solution We have:

(i) $30674 \times 9 = 30674 \times (10 - 1)$
$$= (30674 \times 10) - (30674 \times 1)$$
$$= (306740 - 30674) = 276066.$$

(ii) $4578 \times 99 = 4578 \times (100 - 1)$
$$= (4578 \times 100) - (4578 \times 1)$$
$$= (457800 - 4578) = 453222.$$

(iii) $23756 \times 999 = 23756 \times (1000 - 1)$
$$= (23756 \times 1000) - (23756 \times 1)$$
$$= (23756000 - 23756) = 23732244.$$

EXERCISE 3D

1. Fill in the blanks to make each of the following a true statement:
   (i) $246 \times 1 = \ldots\ldots$ (ii) $1369 \times 0 = \ldots\ldots$
   (iii) $593 \times 188 = 188 \times \ldots\ldots$ (iv) $286 \times 753 = \ldots\ldots \times 286$
   (v) $38 \times (91 \times 37) = \ldots\ldots \times (38 \times 37)$
   (vi) $13 \times 100 \times \ldots\ldots = 1300000$
   (vii) $59 \times 66 + 59 \times 34 = 59 \times (\ldots\ldots + \ldots\ldots)$
   (viii) $68 \times 95 = 68 \times 100 - 68 \times \ldots\ldots$

2. State the property used in each of the following statements:
   (i) $19 \times 17 = 17 \times 19$ (ii) (16×32) is a whole number
   (iii) $(29 \times 36) \times 18 = 29 \times (36 \times 18)$ (iv) $1480 \times 1 = 1480$
   (v) $1732 \times 0 = 0$ (vi) $72 \times 98 + 72 \times 2 = 72 \times (98 + 2)$
   (vii) $63 \times 126 - 63 \times 26 = 63 \times (126 - 26)$

3. Find the value of each of the following using various properties:
   (i) $647 \times 13 + 647 \times 7$ (ii) $8759 \times 94 + 8759 \times 6$
   (iii) $7459 \times 999 + 7459$ (iv) $9870 \times 561 - 9870 \times 461$
   (v) $569 \times 17 + 569 \times 13 + 569 \times 70$ (vi) $16825 \times 16825 - 16825 \times 6825$

4. Determine each of the following products by suitable rearrangements:
   (i) $2 \times 1658 \times 50$ (ii) $4 \times 927 \times 25$ (iii) $625 \times 20 \times 8 \times 50$
   (iv) $574 \times 625 \times 16$ (v) $250 \times 60 \times 50 \times 8$ (vi) $8 \times 125 \times 40 \times 25$

5. Find each of the following products, using distributive laws:
   (i) 740×105 (ii) 245×1008 (iii) 947×96
   (iv) 996×367 (v) 472×1097 (vi) 580×64
   (vii) 439×997 (viii) 1553×198

6. Find each of the following products, using distributive laws:
   (i) 3576×9 (ii) 847×99 (iii) 2437×999

7. Find the products:

(i) $\begin{array}{r} 458 \\ \times\ 67 \\ \hline \end{array}$

(ii) $\begin{array}{r} 3709 \\ \times\ 89 \\ \hline \end{array}$

(iii) $\begin{array}{r} 4617 \\ \times\ 234 \\ \hline \end{array}$

(iv) $\begin{array}{r} 15208 \\ \times\ 542 \\ \hline \end{array}$

8. Find the product of the largest 3-digit number and the largest 5-digit number.

Hint. $999 \times 99999 = 999 \times (100000 - 1)$. *Now, use distributive law.*

9. A car moves at a uniform speed of 75 km per hour. How much distance will it cover in 98 hours?

10. A dealer purchased 139 VCRs. If the cost of each set is ₹ 24350, find the cost of all the sets together.

11. A housing society constructed 197 houses. If the cost of construction for each house is ₹ 450000, what is the total cost for all the houses?

12. 50 chairs and 30 blackboards were purchased for a school. If each chair costs ₹ 1065 and each blackboard costs ₹ 1645, find the total amount of the bill.

13. There are six sections of Class VI in a school and there are 45 students in each section. If the monthly charges from each student be ₹ 1650, find the total monthly collection from Class VI.

14. The product of two whole numbers is zero. What do you conclude?

15. Fill in the blanks:

(i) Sum of two odd numbers is an ...... number.

(ii) Product of two odd numbers is an ...... number.

(iii) $a \neq 0$ and $a \times a = a \Rightarrow a = ?$
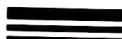
DIVISION IN WHOLE NUMBERS

Division is the inverse operation of multiplication.

Let a and b be two whole numbers. Dividing a by b means finding a whole number c such that $b \times c = a$ *and we write,* $a \div b = c$.

Thus, $a \div b = c \Rightarrow \dfrac{a}{b} = c \Rightarrow a = b \times c$.

EXAMPLES   Dividing 48 by 8 is the same as finding a whole number which when multiplied by 8 gives 48.

Clearly, such a number is 6, as $8 \times 6 = 48$.

Similarly, we have:

$63 \div 9 = 7, \quad 84 \div 14 = 6$, etc.

DIVISION ALGORITHM   Suppose 75 is divided by 9, then the quotient is 8 and the remainder is 3.

Clearly, $75 = (9 \times 8) + 3$.

$$\begin{array}{r} 9\,)\,\overline{75}\,(\,8 \\ -72 \\ \hline 3 \\ \hline \end{array}$$

In general, *let a and b be two given whole numbers such that* $a > b$. *On dividing a by b, let q be the quotient and r be the remainder.*

Then, we have: $a = bq + r$, *where* $0 \leq r < b$.

This result is known as **division algorithm**.

Thus, **dividend = (divisor × quotient) + remainder.**