

The following examples illustrate the concept of one billion:

Example 1

Read the following numbers and write them in words:

- i. 13,560,435
- ii. 435,714,901
- iii. 231,732,786
- iv. 131,234,500
- v. 1,000,000,000

Solution

- i. 13,560,435 Thirteen million, five hundred sixty thousand, four hundred thirty five.
- ii. 435,714,901 Four hundred thirty five million, seven hundred fourteen thousand, nine hundred one.
- iii. 231,732,786 Two hundred thirty one million, seven hundred thirty two thousand, seven hundred eighty six.
- iv. 131,234,500 One hundred thirty one million, two hundred thirty four thousand, five hundred.
- v. 1,000,000,000 One billion.

1.1.2 Write numbers upto 1,000,000,000 (one billion) in numerals and in words

Example 2

Write the following numbers in figures:

- i. Twenty five million, three hundred twenty five thousand, one hundred fifteen.
- ii. Four hundred sixty one million, one hundred thousand, seven hundred eighty two.
- iii. Six hundred twenty one million, two hundred thirty four thousand, five hundred one.
- iv. Seven hundred eighty six million, four hundred forty four thousand, one hundred eleven.
- v. One billion.

Solution

- | | | |
|------|---|---------------|
| i. | Twenty five million, three hundred twenty five thousand, one hundred fifteen. | 25,325,115 |
| ii. | Four hundred sixty one million, one hundred thousand, seven hundred eighty two. | 461,100,782 |
| iii. | Six hundred twenty one million, two hundred thirty four thousand, five hundred one. | 621,234,501 |
| iv. | Seven hundred eighty six million, four hundred forty four thousand, one hundred eleven. | 786,444,111 |
| v. | One billion | 1,000,000,000 |

Exercise 1.1**1. Read the following numbers and write them in words.**

- | | | | |
|------|-------------|-----|---------------|
| i. | 23,123,405 | ii. | 340,365,901 |
| iii. | 231,700,321 | iv. | 987,212,907 |
| v. | 975,000,864 | vi. | 1,000,000,000 |

2. Write the following numbers in figures.

- i. Seventy five million, four hundred twenty thousand, seven hundred fourteen.
- ii. Five hundred sixteen million, two hundred eighty four thousand, seven hundred.
- iii. Nine hundred twelve million, five hundred one.
- iv. Two hundred fifty million, three hundred seventy four thousand, six hundred eleven.
- v. Five hundred million.
- vi. Nine hundred ninety nine million, nine hundred ninety nine thousand, nine hundred ninety nine.
- vii. One billion.

1.2 Addition and subtraction

1.2.1 Addition of numbers of complexity and of arbitrary size

Addition of numbers upto 7, 8 or 9-digit is similar to the addition of numbers upto 6-digit. The placement of hundreds, thousands and millions should be under hundreds, thousands and millions respectively. Commas should also be under respective commas.

IMPORTANT NOTE:

Numbers of complexity means a number composed of more than one or of many parts. Arbitrary means not bound by rule.

Consider the following examples:

Example 3

Add 31,700,621 and 3,923,405.

Solution

$$\begin{array}{r}
 \textcircled{1} \qquad \qquad \qquad \textcircled{1} \\
 31,700,621 \\
 + 3,923,405 \\
 \hline
 35,624,026
 \end{array}$$

Example 4

Add 671,508,628 and 29,423,232.

Solution

$$\begin{array}{r}
 \textcircled{1} \quad \textcircled{1} \qquad \qquad \qquad \textcircled{1} \qquad \qquad \qquad \textcircled{1} \\
 671,508,628 \\
 + 29,423,232 \\
 \hline
 700,931,860
 \end{array}$$

Example 5

Add 543234567 and 382946578.

Solution

$$\begin{array}{r}
 \textcircled{1} \quad \textcircled{1} \quad \textcircled{1} \quad \textcircled{1} \quad \textcircled{1} \quad \textcircled{1} \\
 543234567 \\
 + 382946578 \\
 \hline
 926181145
 \end{array}$$

Exercise 1.2

Solve the following:

- | | | |
|---|---|---|
| <p>1. $\begin{array}{r} 7,212,907 \\ + 325,115 \\ \hline \end{array}$</p> | <p>2. $\begin{array}{r} 4,678,478 \\ + 325,115 \\ \hline \end{array}$</p> | <p>3. $\begin{array}{r} 12,601,504 \\ + 8,527,319 \\ \hline \end{array}$</p> |
| <p>4. $\begin{array}{r} 87,444,568 \\ + 8,027,313 \\ \hline \end{array}$</p> | <p>5. $\begin{array}{r} 103907212 \\ + 41115325 \\ \hline \end{array}$</p> | <p>6. $\begin{array}{r} 294,458,198 \\ + 48,165,305 \\ \hline \end{array}$</p> |
| <p>7. $\begin{array}{r} 1,787,092 \\ + 774,884 \\ \hline \end{array}$</p> | <p>8. $\begin{array}{r} 444,333,777 \\ + 41,347,081 \\ \hline \end{array}$</p> | <p>9. $\begin{array}{r} 896092787 \\ + 84884674 \\ \hline \end{array}$</p> |

Add the following:

- | | |
|--------------------------------|--------------------------------|
| 10. 10,234,781 and 832,412 | 11. 634780315 and 1304203 |
| 12. 563,191,782 and 42,564,760 | 13. 564,710,410 and 14,219,216 |
| 14. 786890326 and 3265816 | 15. 672,678,016 and 52,782,153 |

1.2.2 Subtraction of numbers of complexity and of arbitrary size

Subtraction of numbers upto 7, 8 or 9-digit is similar to the subtraction of numbers upto 6-digit. The placement of hundreds, thousands and millions should be under hundreds, thousands and millions respectively. Commas should also be under respective commas.

Consider the following examples:

Example 6

Subtract 4,700,621 from 25,623,805.

Solution

$$\begin{array}{r}
 \begin{array}{ccccccc}
 & 4 & \textcircled{10} & & 7 & \textcircled{10} & \\
 2 & \cancel{5} & , & 6 & 2 & 3 & , & \cancel{8} & 0 & 5 \\
 - & & 4 & , & 7 & 0 & 0 & , & 6 & 2 & 1 \\
 \hline
 2 & 0 & , & 9 & 2 & 3 & , & 1 & 8 & 4
 \end{array}
 \end{array}$$

Example 7

Subtract 29423232 from 671508628.

Solution

$$\begin{array}{r}
 \begin{array}{cccccccc}
 & 6 & \textcircled{10} & 4 & \textcircled{10} & & 5 & \textcircled{10} \\
 6 & \cancel{7} & 1 & \cancel{5} & 0 & 8 & \cancel{6} & 2 & 8 \\
 - & 2 & 9 & 4 & 2 & 3 & 2 & 3 & 2 \\
 \hline
 6 & 4 & 2 & 0 & 8 & 5 & 3 & 9 & 6
 \end{array}
 \end{array}$$

Exercise 1.3

Solve the following:

$$\begin{array}{r}
 1. \quad 6,424,907 \\
 - \quad 325,015 \\
 \hline
 \hline
 \end{array}$$

$$\begin{array}{r}
 2. \quad 4,678,478 \\
 - \quad 725,615 \\
 \hline
 \hline
 \end{array}$$

$$\begin{array}{r}
 3. \quad 29,661,747 \\
 - \quad 8,527,319 \\
 \hline
 \hline
 \end{array}$$

$$\begin{array}{r}
 4. \quad 45,470,561 \\
 - \quad 8,027,313 \\
 \hline
 \hline
 \end{array}$$

$$\begin{array}{r}
 5. \quad 674,526,266 \\
 - \quad 46,175,325 \\
 \hline
 \hline
 \end{array}$$

$$\begin{array}{r}
 6. \quad 257,708,198 \\
 - \quad 4,816,805 \\
 \hline
 \hline
 \end{array}$$

$$\begin{array}{r}
 7. \quad 8,556,875 \\
 - \quad 774,884 \\
 \hline
 \hline
 \end{array}$$

$$\begin{array}{r}
 8. \quad 346240317 \\
 - \quad 41347081 \\
 \hline
 \hline
 \end{array}$$

$$\begin{array}{r}
 9. \quad 597092787 \\
 - \quad 54884664 \\
 \hline
 \hline
 \end{array}$$

Subtract the following:

10. 832,412 from 10,234,781

11. 63,780,315 from 972,678,016

12. 7,165,816 from 42,564,760

13. 14,219,216 from 786,890,326

14. 34710410 from 563191782

15. 4304203 from 52782153

1.3 Multiplication and division

1.3.1 Multiplication of numbers upto 6-digit by 10, 100 and 1000

Product of a number i.e., 214455 by 10, 100 and 1000 is illustrated as under:

$$\begin{aligned} 214455 \times 10 &= 2144550 \\ 214455 \times 100 &= 21445500 \\ 214455 \times 1000 &= 214455000 \end{aligned}$$

We can simply place as many zeros on the right of the product as there are in the multiplier.

1.3.2 Multiplication of numbers upto 6-digit by 2-digit and 3-digit numbers

Example 8

Multiply 254268 by 45

Solution

$$\begin{array}{r} 254268 \\ \times 45 \\ \hline 1271340 \\ 10170720 \\ \hline 11442060 \end{array}$$

Example 9

Multiply 154205 by 241

Solution

$$\begin{array}{r} 154205 \\ \times 241 \\ \hline 154205 \\ 6168200 \\ 30841000 \\ \hline 37163405 \end{array}$$

Exercise 1.4

Multiply:

1. 345,627 by 10
2. 245,842 by 100
3. 258,961 by 1000
4. 346,758 by 45
5. 546,738 by 65
6. 534,070 by 60
7. 243,798 by 231
8. 234,587 by 403
9. 349,876 by 806
10. 454,776 by 342

1.3.3 Division of numbers upto 6-digit by 2-digit and 3-digit numbers

Example 10

Divide 876986 by 24. Write quotient and remainder.

Solution: $876986 \div 24$

$$\begin{array}{r}
 36541 \\
 24 \overline{) 876986} \\
 \underline{-72} \\
 156 \\
 \underline{-144} \\
 129 \\
 \underline{-120} \\
 98 \\
 \underline{-96} \\
 26 \\
 \underline{-24} \\
 2
 \end{array}$$

Quotient = 36541

Remainder = 2

Example 11

Divide 453674 by 125. Write quotient and remainder.

Solution: $453674 \div 125$

$$\begin{array}{r}
 3629 \\
 125 \overline{) 453674} \\
 \underline{-375} \\
 786 \\
 \underline{-750} \\
 367 \\
 \underline{-250} \\
 1174 \\
 \underline{-1125} \\
 49
 \end{array}$$

Quotient = 3629

Remainder = 49

Exercise 1.5

Divide, write quotient and remainder also.

1. 345673 by 13
2. 267893 by 15
3. 234561 by 26
4. 346758 by 45
5. 546738 by 65
6. 535570 by 231
7. 243798 by 231
8. 675321 by 403
9. 349876 by 215
10. 454776 by 342

1.3.4 Use mixed operations of addition & subtraction and multiplication & division

- **Mixed operations of addition & subtraction**

In mixed operations of addition and subtraction we always do addition first and then subtraction.

Let us solve (i) $92 + 35 - 62$ (ii) $92 - 62 + 35$

In mixed operations of addition and subtraction, we can simplify as follows:

$$\begin{aligned} \text{(i)} \quad & 92 + 35 - 62 \\ & = 127 - 62 && \text{(because } 92 + 35 = 127\text{)} \\ & = 65 \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 92 - 62 + 35 \\ & = 92 + 35 - 62 && \text{(re-arranging numbers)} \\ & = 127 - 62 && \text{(because } 92 + 35 = 127\text{)} \\ & = 65 \end{aligned}$$

Example 12

Simplify (i) $78 + 20 - 43$ (ii) $89 - 50 + 27$

Solution

$$\begin{aligned} \text{(i)} \quad & 78 + 20 - 43 \\ & = 98 - 43 && \text{(because } 78 + 20 = 98\text{)} \\ & = 55 \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 89 - 50 + 27 \\ & = 89 + 27 - 50 && \text{(re-arranging numbers)} \\ & = 116 - 50 && \text{(because } 89 + 27 = 116\text{)} \\ & = 66 \end{aligned}$$

• Mixed operations of multiplication & division

Let us solve $92 \div 4 \times 7$

$$\begin{aligned} & 92 \div 4 \times 7 \\ & = 23 \times 7 \text{ (because } 92 \div 4 = 23\text{)} \\ & = 161 \end{aligned}$$

The above example cannot be simplified as:

$$\begin{aligned} & 92 \div 4 \times 7 \\ & = 92 \div 28 \\ & = 92 \times \frac{1}{28} \end{aligned}$$

Note: In mixed operations of multiplication and division, always take division first and then multiplication.

Example 13

Simplify **i.** $75 \div 15 \times 8$ **ii.** $25 \times 15 \div 3$

<p>Solution</p> $\begin{aligned} & 75 \div 15 \times 8 \\ & = \underline{75 \div 15} \times 8 \\ & = 5 \times 8 \\ & = 40 \end{aligned}$	$\begin{aligned} & 25 \times 15 \div 3 \\ & = 25 \times \underline{15 \div 3} \\ & = 25 \times 5 \\ & = 125 \end{aligned}$
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Exercise 1.6

Solve:

- | | | |
|---------------------------|-----------------------------|--------------------------|
| 1. $72 - 50 + 12$ | 2. $45 + 44 - 28$ | 3. $56 - 22 + 21$ |
| 4. $76 - 44 + 27$ | 5. $78 - 70 + 27$ | 6. $89 + 40 - 20$ |
| 7. $98 + 23 - 10$ | 8. $24 \div 4 \times 6$ | 9. $56 \div 7 \times 9$ |
| 10. $12 \times 32 \div 8$ | 11. $3 \times 44 \div 4$ | 12. $72 \div 9 \times 8$ |
| 13. $99 \div 11 \times 4$ | 14. $15 \times 100 \div 10$ | 15. $28 \div 4 \times 8$ |

1.3.5 Solution of real life problems involving mixed operations of addition, subtraction, multiplication and division

Example 14

Ali received Rs. 30 as Eidi from his parents and Rs. 20 from his uncle. How much total money did he receive?

Solution

$$\begin{aligned} \text{Eidi from parents} &= \text{Rs. } 30 \\ \text{Eidi from uncle} &= \text{Rs. } 20 \\ \text{Total amount of Eidi} &= 30 + 20 = \text{Rs. } 50 \end{aligned}$$

Example 15

If price of 1 book is Rs. 25, then find the price of 6 books.

Solution

$$\begin{aligned} \text{Price of 1 book} &= \text{Rs. } 25 \\ \text{Price of 6 books} &= 25 \times 6 \\ &= \text{Rs. } 150 \end{aligned}$$

Exercise 1.7

1. Monthly income of Aslam is Rs. 12,000 and the income of his father is Rs. 21,000. Find their total income.
2. Shoaib got Rs. 100 as Eidi from his parents and Rs. 70 from his elder brother. How much total money did he receive?
3. A shop keeper bought 320 pencils and sold 250 out of them. How many pencils are left?
4. Calculate the amount of electricity bill if a consumer consumed 160 units in a month at a rate of Rs. 7 per unit.
5. If the price of 15 balls is Rs. 300, then find the price of one ball.
6. If a book can be bought for Rs. 45, find the price of 5 such books.

1.4 Order of operation, BODMAS rule

1.4.1 Recognition of BODMAS rule, using only parenthesis ()

BODMAS is a useful acronym that tells us which mathematical operation is to be performed first. BODMAS rule helps us to find the correct answer.

The BODMAS rule;

B	Stands for	Brackets	()
O	Stands for	Of	Of
D	Stands for	Division	÷
M	Stands for	Multiplication	×
A	Stands for	Addition	+
S	Stands for	Subtraction	–

Order of operation is as under:

(), of, ÷, ×, +, –

Example 16

Solve $(20 - 12) \div 4 \times 5$

Solution

$$\begin{aligned}
 & (20 - 12) \div 4 \times 5 \\
 &= 8 \div 4 \times 5 && \text{(remove the brackets)} \\
 &= 2 \times 5 && \text{(perform division)} \\
 &= 10 && \text{(perform multiplication)}
 \end{aligned}$$

1.4.2 Carryout combined operations using BODMAS rule

Example 17

Solve **i.** $(3 + 2)$ of $4 \div 2 \times 4$

ii. $10 + 20 \div 5 \times (8 - 5)$

Solution **i.** $(3 + 2)$ of $4 \div 2 \times 4$
 $= 5$ of $4 \div 2 \times 4$
 $= 20 \div 2 \times 4$
 $= 10 \times 4$
 $= 40$

ii. $10 + 20 \div 5 \times (8 - 5)$
 $= 10 + 20 \div 5 \times 3$
 $= 10 + 4 \times 3$
 $= 10 + 12$
 $= 22$

Exercise 1.8

Solve:

1. $20 \times 12 \div 8$

2. $24 \div 4 + 10$ of $5 - 2$

3. $98 \div 7 + 26$

4. $(18 \times 5) \div 15 + 5$

5. $(36 + 8) \times 12 \div 4 - 18$

6. $(30 \div 3)$ of $8 + 6 - 12$

7. $(3 \times 44) \div 4$

8. $3 \times (44 \div 4) - 6$

9. $9 + (64 \div 16) \times 3 - 21$

10. $(12 \times 5) \div 5 + 4$

11. $(65 \div 5) \times 2 + 15 - 20$

12. $12 + (18 \div 6) \times 5 - 5$

1.4.3 Verification of distributive laws

Let us verify the distributive laws with the help of following examples:

Example 18

Verify the distributive law from each of the following.

i. $4 \times (7 + 3) = (4 \times 7) + (4 \times 3)$

ii. $(8 + 6) \times 5 = (8 \times 5) + (6 \times 5)$

iii. $11 \times (5 - 2) = (11 \times 5) - (11 \times 2)$

Solution

$$\text{i. } 4 \times (7 + 3) = (4 \times 7) + (4 \times 3)$$

$$\begin{aligned} \text{L.H.S.} &= 4 \times (7 + 3) \\ &= 4 \times 10 \\ &= 40 \dots\dots\dots(a) \end{aligned}$$

$$\begin{aligned} \text{R.H.S.} &= (4 \times 7) + (4 \times 3) \\ &= 28 + 12 \\ &= 40 \dots\dots\dots(b) \end{aligned}$$

From (a) and (b)

$$\text{L.H.S.} = \text{R.H.S.}$$

$$\text{Thus, } 4 \times (7 + 3) = (4 \times 7) + (4 \times 3)$$

$$\text{ii. } (8 + 6) \times 5 = (8 \times 5) + (6 \times 5)$$

$$\begin{aligned} \text{L.H.S.} &= (8 + 6) \times 5 \\ &= 14 \times 5 \\ &= 70 \dots\dots\dots(a) \end{aligned}$$

$$\begin{aligned} \text{R.H.S.} &= (8 \times 5) + (6 \times 5) \\ &= 40 + 30 \\ &= 70 \dots\dots\dots(b) \end{aligned}$$

From (a) and (b)

$$\text{L.H.S.} = \text{R.H.S.}$$

$$\text{Thus, } (8 + 6) \times 5 = (8 \times 5) + (6 \times 5)$$

$$\text{iii. } 11 \times (5 - 2) = (11 \times 5) - (11 \times 2)$$

$$\begin{aligned} \text{L.H.S.} &= 11 \times (5 - 2) \\ &= 11 \times 3 \\ &= 33 \dots\dots\dots(a) \end{aligned}$$

$$\begin{aligned}
 \text{R.H.S.} &= (11 \times 5) - (11 \times 2) \\
 &= 55 - 22 \\
 &= 33 \dots\dots\dots(b)
 \end{aligned}$$

From (a) and (b)

$$\text{L.H.S.} = \text{R.H.S.}$$

$$\text{Thus, } 11 \times (5 - 2) = (11 \times 5) - (11 \times 2)$$

Exercise 1.9

Verify distributive laws:

1. $4 \times (5 + 2) = (4 \times 5) + (4 \times 2)$
2. $(2 + 6) \times 3 = (2 \times 3) + (6 \times 3)$
3. $11 \times (2 + 7) = (11 \times 2) + (11 \times 7)$
4. $(9 - 3) \times 4 = (9 \times 4) - (3 \times 4)$
5. $12 \times (5 - 4) = (12 \times 5) - (12 \times 4)$
6. $(8 + 2) \times 10 = (8 \times 10) + (2 \times 10)$
7. $6 \times (7 + 10) = (6 \times 7) + (6 \times 10)$
8. $(22 - 8) \times 5 = (22 \times 5) - (8 \times 5)$
9. $(17 + 3) \times 5 = (17 \times 5) + (3 \times 5)$
10. $20 \times (6 - 2) = (20 \times 6) - (20 \times 2)$

Review Exercise 1

1. Four possible options have been given. Encircle the correct one.
 - i. In international place value system commas are placed after how many digits from right digit?
(a) one (b) two (c) three (d) four
 - ii. Which is the smallest 9-digit number?
(a) 999,999,999 (b) 100,000,000
(c) 900,000,000 (d) 888,888,888
 - iii. Which one of the following is one billion?
(a) 100,000 (b) 1,000,000
(c) 10,000,000 (d) 1,000,000,000

- iv. $3 \times (44 \div 4) - 6$ in simplified form is:
(a) 27 (b) 30 (c) 36 (d) 72
2. Read the following numbers and write them in words:
- i. 12,321,150 ii. 201,421,200
3. Write the following numbers in figures:
- i. Eight hundred thirteen million, four hundred two.
ii. Two hundred sixty million, five hundred sixty five thousand, six hundred twenty.
4. Add:
- i. 11,123,222 and 932,253
ii. 652,425,100 and 10,115,965
5. Subtract:
- i. 52,524,105 from 61,932,253
ii. 215,142,100 from 305,965,115
6. Multiply:
- i. 24105 by 253 ii. 42188 by 965
7. Divide, write quotient and remainder also:
- i. 524105 by 25 ii. 725012 by 12
8. Evaluate:
- i. $56 + 25 - 24$ ii. $36 \div 4 \times 8$
9. Evaluate:
- i. $(12 \times 5) \div 12 + 5$ ii. $(20 \div 4) \times 8 + 6 - 16$

10. Verify the distributive laws:

i. $5 \times (7 + 10) = (5 \times 7) + (5 \times 10)$

ii. $(12 - 2) \times 4 = (12 \times 4) - (2 \times 4)$

SUMMARY

- In international place value system commas are placed after every three digits from the right.
- When we add '1' in the largest 9-digit number we get 'One billion'.

$$\text{One billion} = 1,000,000,000$$

$$\text{Similarly, one billion} = \text{One thousand million}$$

$$1,000,000,000 = 1,000 \text{ million}$$

- In addition and subtraction placement of hundreds, thousands and millions should be under hundreds, thousands and millions respectfully. Commas should also be under respective commas.
- In mixed operations of addition and subtraction we re-arrange the numbers (if needed) and then do addition before subtraction.
- In mixed operations of multiplication and division, always take division first and then multiplication.
- According to BODMAS rule, order of operation is:
(), of, \div , \times , $+$, $-$
- $(8 + 6) \times 5 = (8 \times 5) + (6 \times 5)$ and $11 \times (5 - 2) = (11 \times 5) - (11 \times 2)$ are examples of distributive laws.