07

Mathematical Operations

- Mathematical Operations can be defined as the simplification of an expression containing numbers and different mathematical signs. Mathematical operations involve basic arithmetic operations such as addition (+), subtraction (–), multiplication (x) and division (÷) but here, the signs are not given as such but in a coded form and the candidates are required to replace the coded symbols with the actual signs, according to the question and then answer the question that is asked.
- To solve such questions we need to follow the VBODMAS rule for simplification of mathematical operations.

V	–	Vinculum	(– or bar)
B	–	Brackets	( ), { }, [ ]
O	–	Of	×
D	–	Division	÷
M	–	Multiplication	×
A	–	Addition	+
S	–	Subtraction	–

Example 1 If '×' stands for '+', '÷' stands for '-', '–' stands for '×' and '+' stands for '÷', then find the value of following equation.

$$54 \div 16 - 3 \times 6 + 2 = ?$$

(a) 9 (b) 12 (c) 8 (d) 15

Sol. (*a*) According to the question,

$$? = 54 \underset{-}{\overset{\div}{\downarrow}} 16 \underset{\times}{\overset{-}{\downarrow}} 3 \underset{+}{\overset{\times}{\downarrow}} 6 \underset{\div}{\overset{+}{\downarrow}} 2$$

$= 54 - 16 \times 3 + 6 \div 2$

$= 54 - 16 \times 3 + 3$ [using VBODMAS rule]

$= 54 - 48 + 3 = 57 - 48 = 9$

Example 2 If P denotes '÷', Q denotes '×', R denotes '+' and S denotes '–', then

$$18 Q 12 P 4 R 5 S 6 = ?$$

(a) 95 (b) 53
(c) 51 (d) 57

Sol. (*b*) After changing the letters into signs as per the given question, we have

$$= 18 \times 12 \div 4 + 5 - 6$$

$$= 18 \times \frac{12}{4} + 5 - 6$$

By applying VBODMAS rule $= 18 \times 3 + 5 - 6$

$= 54 + 5 - 6$

$\Rightarrow \quad 59 - 6 = 53$

Example 3 Select the correct combination of mathematical signs to replace '*' signs and to balance the given equation.

$$24 * 34 * 2 * 5 * 12$$

(a) $+ \div \times =$

(b) $= \div + -$

(c) $= \div - +$

(d) $+ \div = \times$

Sol. (*c*) From option (c),

$24 = 34 \div 2 - 5 + 12$

$\Rightarrow \quad 24 = 17 - 5 + 12 \quad \Rightarrow \quad 24 = 29 - 5$

$\Rightarrow \quad 24 = 24$

LHS = RHS

Example 4 If $9 \times 5 \times 2 = 529$ and $4 \times 7 \times 2 = 724$, then $3 \times 9 \times 8 = ?$

(a) 983 (b) 839

(c) 938 (d) 893

Sol. (*a*) As, $9 \times 5 \times 2 = 529$

and $4 \times 7 \times 2 = 724$

Similarly, $3 \times 9 \times 8 = 983$

$\therefore \quad ? = 983$

Example 5 Which of the following interchange of signs would make given equation correct?

$$5 + 6 \div 3 - 12 \times 2 = 17$$

(a) $\div$ and $\times$ (b) + and $\times$ (c) + and $\div$ (d) + and –

Sol. (*a*) We have, $5 + 6 \div 3 - 12 \times 2 = 17$

From option (a),

after interchanging of signs

$5 + 6 \times 3 - 12 \div 2 = 17$

$\Rightarrow \quad 5 + 18 - 6 = 17 \quad \Rightarrow \quad 17 = 17$

LHS = RHS

Practice Exercise

1. If '+' means '÷', '–' means '+', '×' means '–' and '÷' means '×', then what is the value of $24 \div 12 - 18 + 9$?
   (a) – 25 (b) 0.72 (c) 15.30 (d) 290

2. If + means ÷, ÷ means –, – means × and × means +, them value of $12 + 3 \div 1 - 5 \times 2$ is
   (a) 5 (d) –3
   (c) 1 (d) –1

3. If A means '×', B means '÷', C means '–' and D means '+', then
   4 D 16 A 5 B 8 C 5 = ?
   (a) 9 (b) 16 (c) 13 (d) 7.5

4. If 'Q denotes addition, J denotes multiplication, T denotes subtraction and K denotes division, then
   30 K 2 Q 3 J 6 T 5 = ?
   (a) 18 (b) 28 (c) 31 (d) 6

5. If '+' means '–', '–', means '×', '÷' means '+' and '×' means '÷', then
   $10 \times 5 \div 3 - 2 + 3 = ?$
   (a) 5 (b) $\frac{53}{3}$ (c) 21 (d) 36

6. If 'a' represents '÷' 'b' represent '+', 'c' represents '–', and 'd' represent '×', then
   24 a 6 d 4 b 9 c 8 = ?
   (a) 20 (b) 19
   (c) 6 (d) 17

7. If 'P' means '+', 'Q' means '×', 'R' means '÷' and 'S' means '–', then
   44 Q 9 R 12 S 6 Q 4 P 16 = ?
   (a) 36 (b) 124
   (c) 25 (d) 112

8. If the mathematical signs interchange from – to +, + to ÷, × to – and ÷ to ×, then find out the correct answer of the given equation $6 \div 8 + 2 \times 5 - 8 = ?$

(a) 27 (b) 18 (c) 6 (d) 8

9. Select the correct combination of mathematical signs to replace '★' signs and to balance the following equation.

$$6 \bigstar 4 \bigstar 12 \bigstar 12$$

(a) +,–,= (b) +,–,+

(c) =,–,+ (d) ×,–,=

10. Select the correct combination of mathematical signs to replace '★' signs and to balance the given equation.

$$24 \bigstar 34 \bigstar 2 \bigstar 5 \bigstar 12$$

(a) + ÷ ×= (b) = ÷ + –

(c) = ÷ – + (d) + ÷ = ×

11. $7 - 4 - 1 = 714, 9 - 2 = 3 = 932, \ 8 - 0 - 4 = ?$

(a) 804 (b) 840

(c) 408 (d) 480

12. Which of the following interchange to signs would make the given equation correct?

$$5 + 3 \times 8 - 12 \div 4 = 3$$

(a) + and ÷ (b) + and –

(c) – and ÷ (d) + and ×

13. Interchanging + and ÷ and also the numbers 2 and 5, find the value of $8 + 4 \times 5 \div 2 - 3$

(a) 2 (b) 4

(c) 6 (d) 8

Directions (Q. Nos. 14 and 15) *Correct the following equations by interchanging the two signs.*

14. $4 \times 2 + 6 \div 2 - 12 = 2$

(a) ÷ and ×

(b) + and –

(c) × and +

(c) ÷ and –

15. $5 \times 15 \div 7 - 20 + 4 = 77$

(a) – and + (b) × and ÷

(c) + and ÷ (d) + and ×

Answers

1	*(d)*	2	*(c)*	3	*(a)*	4	*(b)*	5	*(a)*	6	*(d)*	7	*(c)*	8	*(a)*	9	*(d)*	10	*(c)*
11	*(b)*	12	*(c)*	13	*(c)*	14	*(a)*	15	*(c)*										

Hints & Solutions

1. (d) Given, $24 \div 12 - 18 + 9$

Using the proper symbols, we have

$$= 24 \times 12 + 18 \div 9 = 288 + 2 = 290$$

2. (c) Given equation, $12 + 3 \div 1 - 5 \times 2$

Changing the sings as per the question,

$$12 \div 3 - 1 \times 5 + 2 = \frac{12}{3} - 5 + 2 = 4 - 5 + 2$$

$$= 6 - 5 = 1$$

3. (a) Using the correct symbol, we have,

$$4 \ D \ 16 \ A \ 5 \ B \ 8 \ C \ 5 = 4 + 16 \times 5 \div 8 - 5$$

$$= 4 + 16 \times \frac{5}{8} - 5$$

$$= 4 + 10 - 5 \Rightarrow 9$$

4. (b) Using correct symbols, we have,

$$30 \ K \ 2 \ Q \ 3 \ J \ 6 \ T \ 5 = 30 \div 2 + 3 \times 6 - 5 \Rightarrow 15 + 18 - 5$$

$$= 33 - 5 = 28$$

5. (a) $10 \times 5 \div 3 - 2 + 3$

By changing signs, we have, $10 \div 5 + 3 \times 2 - 3$

$$= 2 + 6 - 3 = 8 - 3 = 5$$

6. (d) By interchanging signs

$$24 \div 6 \times 4 + 9 - 8 = 4 \times 4 + 9 - 8$$

$$= 16 + 9 - 8 = 25 - 8 \Rightarrow 17$$

7. (c) $44 \times 9 \div 12 - 6 \times 4 + 16 = ?$

$$\Rightarrow \quad 44 \times 9 \times \frac{1}{12} - 24 + 16 = ?$$

$$\Rightarrow \quad 33 - 24 + 16 = ?$$

$$\Rightarrow \quad 49 - 24 = ?$$

$$\therefore \quad ? = 25$$

8. (a) $6 \div 8 + 2 \times 5 - 8$

$$\Rightarrow 6 \times 8 \div 2 - 5 + 8 \Rightarrow 6 \times 4 - 5 + 8$$

$$= 24 - 5 + 8 = 32 - 5 = 27$$

9. (d) $6 \star 4 \star 12 \star 12$

From option (d), $6 \times 4 - 12 = 12$

$\Rightarrow \quad 24 - 12 = 12$

10. (c) From option (c), $24 = 34 \div 2 - 5 + 12$

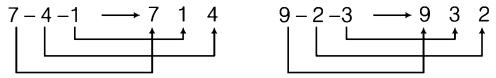
$24 = 17 - 5 + 12$

$\Rightarrow \quad 24 = 29 - 5$

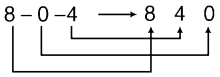
$\Rightarrow \quad 24 = 24$

$\Rightarrow \quad$ LHS = RHS

11. (b) As,



Similarly



12. (c) By interchanging – and ÷,

$5 + 3 \times 8 \div 12 - 4 = 3$

$\Rightarrow \quad 5 + \dfrac{3 \times 8}{12} - 4 = 3$

$\Rightarrow \quad 5 + 2 - 4 = 3 \Rightarrow 3 = 3$

13. (c) After interchanging the signs and numbers

$8 + 4 \times 5 \div 2 - 3 = 8 \div 4 \times 2 + 5 - 3$

$= 2 \times 2 + 5 - 3 = 4 + 5 - 3$

$= 9 - 3 = 6$

14. (a) If we interchange signs ÷ and ×, then we get

$= 4 \div 2 + 6 \times 2 - 12$

$= 2 + 12 - 12 = 2$

15. (c) If we interchange signs + and ÷, then we get

$= 5 \times 15 + 7 - 20 \div 4$

$= 5 \times 15 + 7 - 5$

$= 75 + 7 - 5 \Rightarrow 77$