

MATHEMATICAL OPERATIONS

Mathematical Operation is an important concept of reasoning that is usually asked in various competitive exams. This topic is asked to test the analytical abilities of the candidates. It shows how good you are at observing things and then implying it to solve the questions. To score full marks on this topic, you must practice enough questions and get acquainted with the concept behind it.

How to solve questions based on Mathematical Operations?

The type of questions based on Mathematical operations are:

- Whether the given equations are correct
- Based on Symbols equivalent to signs
- Interchanging the signs
- Balancing the equation
- Solve the equation

For every type of Mathematical operations question, you must know only one rule i.e., **BODMAS**. It is "**B**rackets, **O**rders, **D**ivision, **M**ultiplication, **A**ddition, and **S**ubtraction. It means you must solve any equation in the BODMAS order. First, open the brackets, then solve the powers or roots, then perform Division followed by multiplication, Addition and subtraction.

B	O	D	M	A	S
Brackets (...)	Orders powers, roots	Division ÷	Multiplication x	Addition +	Subtraction —

Solved Examples

Q1. If \times stands for $-$, \div stands for $+$, $+$ stands for \div and $-$ stands for \times , which one of the following equations is correct?

- (a) $15 - 5 \div 5 \times 20 + 16 = 6$
(b) $8 \div 10 - 3 + 5 \times 6 = 8$
(c) $6 \times 2 + 3 \div 12 - 3 = 15$
(d) $3 \div 7 - 5 \times 10 + 3 = 10$

Answer: (b)

Solution: Using the proper signs, we get:

$$\text{Expression in (a)} = 15 \times 5 + 5 - 20 \div 10 = 15 \times 5 + 5 - 2 = 75 + 5 - 2 = 78$$

$$\text{Expression in (b)} = 8 + 10 \times 3 \div 5 - 6 = 8 + 10 \times 3/5 - 6 = 8 + 6 - 6 = 8$$

$$\text{Expression in (c)} = 6 - 2 \div 3 + 12 \times 3 = 6 - 2/3 + 36 = 42 - 2/3 = 124/3$$

$$\text{Expression in (d)} = 3 + 7 \times 5 - 10 \div 3 = 3 + 7 \times 5 - 10/3 = 3 + 35 - 10/3 = 104/3$$

∴ Statement (b) is true.

Q2. If '<' means 'minus', '>' means 'plus', '=' means 'multiplied by' and '\$' means 'divided by', then what would be the value of $31 > 81 \$ 9 < 7$?

- (a) 32
- (b) 33
- (c) 36
- (d) None of these

Answer: (b)

Solution: Using the correct symbols we have:

$$\text{Given expression} = 31 + 81 \div 9 - 7 = 31 + 9 - 7 = 33$$

Q3. If \times means \div , $-$ means \times , \div means $+$ and $+$ means $-$, then $(4 - 15 \div 12) \times 8 + 9 = ?$

- (a) -1
- (b) 2
- (c) 0
- (d) 1

Answer: (c)

Solution: Using the correct symbols, we have:

$$\text{Given expression} = (4 \times 15 + 12) \div 8 - 9 = 72 \div 8 - 9 = 9 - 9 = 0$$

Q4. If Q means 'add to', J means 'multiply by', T means 'subtract from' and K means 'divide by', then $26 K 2 Q 3 J 6 T 4 = ?$

- (a) 10
- (b) 28
- (c) 30
- (d) 27

Answer: (d)

Solution: Using the correct symbols, we have:

$$\text{Given expression} = 26 \div 2 + 3 \times 6 - 4 = 13 + 18 - 4 = 27$$

Q5. If '-' stands for 'division', '+' for 'multiplication', '÷' for 'subtraction' and '×' for 'addition', which one of the following equations is correct?

- (a) $6 + 20 - 12 \div 7 - 1 = 38$
- (b) $6 - 20 \div 12 \times 7 + 1 = 57$
- (c) $6 + 20 - 12 \div 7 \times 1 = 62$
- (d) $6 \div 20 \times 12 + 7 - 1 = 70$

Answer: (d)

Solution: Using the proper notations in (d), we get the statement as:

$$6 - 20 + 12 \times 7 \div 1 = 6 - 20 + 84 = 90 - 20 = 70$$

Q6. If L denotes ÷, M denotes ×, P denotes + and Q denotes -, then which of the following statements is true?

- (a) $32 P 8 L 16 Q 4 = -2/3$
- (b) $6 M 18 Q 26 L 13 P 7 = 173/13$
- (c) $11 M 34 L 17 Q 8 L 3 = 38/3$
- (d) $9 P 9 L 9 Q 9 M 9 = -71$

Answer: (d)

Solution: Using the proper notations in (d), we get the statement as:

$$9 + 9 \div 9 - 9 \times 9 = 9 + 1 - 9 \times 9 = 9 + 1 - 81 = 10 - 81 = -71.$$

Q7. Which one of the four interchanges in signs and numbers would make the given equation correct?

$$3 + 5 - 2 = 4$$

- (a) + and -, 2 and 3
- (b) + and -, 2 and 5
- (c) + and -, 3 and 5
- (d) None of these

Answer: (c)

Solution: By making the interchanges given in (a)

$$2 - 5 + 3 = 4 \text{ or } 0 = 4, \text{ which is false.}$$

By making the interchanges given in (b)

$$3 - 2 + 5 = 4 \text{ or } 6 = 4, \text{ which is false.}$$

By making the interchanges given in (c)

$$5 - 3 + 2 = 4 \text{ or } 4 = 4, \text{ which is true.}$$

So, the answer is (c).

Directions (8): In this question, Δ means 'is greater than', $\%$ means 'is lesser than', \ast means 'is equal to', $=$ means 'is not equal to', $+$ means 'is a little more than', \times means 'is a little less than'. Choose the correct alternative.

Q8. If $a \Delta b$ and $b + c$, then

- (a) $a \% c$
- (b) $c + a$
- (c) $c \% a$
- (d) Can't say

Answer: (c)

Solution: $a \Delta b \rightarrow a > b$ and
 $b + c \rightarrow b$ is a little more than c
 $\Rightarrow a > c \Rightarrow c < a$ i.e. $c \% a$

Directions (9-10): In each of the following questions, the Greek letters standing for arithmetical operations are given. Find the relationship which can definitely be deduced from the two relationships given at the top.

Operations: α is 'greater than', β is 'less than', γ is 'not greater than', δ is 'not less than', θ is 'equal to'.

Q9. If $A \alpha 2C$ and $2A \theta 3B$, then

- (a) $C \beta B$
- (b) $C \delta B$
- (c) $C \alpha B$
- (d) $C \theta B$

Answer: (a)

Solution: $A \alpha 2C \Rightarrow A > 2C$
and $2A \theta 3B \Rightarrow 2A = 3B$
 $\Rightarrow 2A > 4C$ and $2A = 3B$
 $\Rightarrow 3B > 4C \Rightarrow C < B$ i.e. $C \beta B$

Q10. If $B \theta 2C$ and $3C \gamma A$, then

- (a) $B \delta 2A$
- (b) $B \theta A$
- (c) $3B \alpha 2A$
- (d) $B \beta A$

Answer: (d)

Solution: $B \theta 2C \Rightarrow B = 2C$
and $3C \gamma A \Rightarrow 3C \neq A$
 $\Rightarrow B = 2C$ and $3C \leq A$
 $\Rightarrow B = 2C < 3C \leq A \Rightarrow B < A$ i.e. $B \beta A$

Directions (11): In this question, α stands for 'equal to'; β for 'greater than'; γ for 'less than' and δ for 'not equal to'.

Q11. If $6x \alpha 5y$ and $2y \beta 3z$, then

- (a) $2x \beta 3z$
- (b) $4x \beta 3z$
- (c) $2x \gamma z$
- (d) $4x \alpha 3z$

Answer: (b)

Solution: $6x \alpha 5y \Rightarrow 6x = 5y$
and $2y \beta 3z \Rightarrow 2y > 3z$
 $\Rightarrow 6x = 5y$ and $y > 3z/2$
 $\Rightarrow 6x = 5y$ and $5y > 15z/2 \Rightarrow 6x > 15z/2$
 $\Rightarrow 12x > 15z \Rightarrow 4x > 5z$
 $\Rightarrow 4x > 3z$ i.e. $4x \beta 3z$

Directions (12): In this question, if the given interchanges are made in signs and numbers, which one of the four equations would be correct?

Q12. Given interchanges : Signs + and – and number 4 and 8

- (a) $4 \div 8 - 12 = 16$
- (b) $4 - 8 + 12 = 0$
- (c) $8 \div 4 - 12 = 24$
- (d) $8 - 4 \div 12 = 8$

Answer: (b)

Solution: On interchanging + and – and 4 and 8 in (b), we get the equation as:
 $8 + 4 - 12 = 0$ or $12 - 12 = 0$ or $0 = 0$, which is true

Q13. If \div implies =, \times implies <, + implies >, – implies \times , $>$ implies \div , $<$ implies +, = implies -, identify the correct expression.

- (a) $1 - 3 > 2 + 1 - 5 = 3 - 1 < 2$
- (b) $1 - 3 > 2 + 1 \times 5 = 3 \times 1 > 2$

(c) $1 \times 3 > 2 + 1 \times 5 \times 3 - 1 > 2$

(d) $1 - 3 > 2 + 1 \times 5 + 3 - 1 > 2$

Answer: (d)

Solution: Using the proper notations in (d), we get the statement as:

$$1 \times 3 \div 2 > 1 < 5 > 3 \times 1 \div 2 \text{ or } 3/2 > 1 < 5 > 3/2, \text{ which is true.}$$

Q14. If $>$ denotes $+$, $<$ denotes $-$, \div denotes \times , $-$ denotes $=$, $=$ denotes 'less than' and \times denotes 'greater than', find which of the following is a correct statement.

(a) $3 + 2 > 4 = 9 + 3 < 2$

(b) $3 > 2 > 4 = 18 + 3 < 1$

(c) $3 > 2 < 4 \times 8 + 4 < 2$

(d) $3 + 2 < 4 \times 9 + 3 < 3$

Answer: (c)

Solution: Using proper notations, we have:

(a) Given statement is $3 \div 2 + 4 < 9 \div 3 - 2$ or $11/2 < 1$, which is not true

(b) Given statement is $3 + 2 + 4 < 18 \div 3 - 1$ or $9 < 5$, which is not true

(c) Given statement is $3 + 2 - 4 > 8 \div 4 - 2$ or $1 > 0$, which is true

(d) Given statement is $3 \div 2 - 4 > 9 \div 3 - 3$ or $-5/2 > 0$, which is not true

So, the statement (c) is true.

Q15. If $+$ means \times , \times means $-$, \div means $+$ and $-$ means \div , then which of the following gives the result of $625 - 25 \div 5 + 20 \times 3 + 10$?

(a) 77

(b) 95

(c) 88

(d) 137

Answer: (b)

Solution: Using the proper signs in the given expression, we get:

$$625 \div 25 + 5 \times 20 - 3 \times 10 = 25 + 5 \times 20 - 3 \times 10 = 25 + 100 - 30$$

$$= 125 - 30 = 95$$