MATHEMATICAL OPERATIONS

This section deals with question on simple mathematical operations. Here, the four fundamental operations---addition, subtraction, multiplication and division and also statements such as 'less than', 'greater than', equal to', 'not equal to', etc. are represented by symbols, different from the usual ones. The questions involving these operations are set using artificial symbols. The candidate has to substitute the real signs and solve the questions accordingly, to get the answer.

TYPE-1: PROBLEMS SOLVING BY SUBSTITUTION

In this type of, you are provided with substitute for various mathematical symbols or numbers, followed by a questions involving calculations of an expression or choosing the correct/incorrect equation. The candidate is required to put in the real signs or numerals in the given equation and then solve the questions as required.

'BODMAS 'Rule:

This rule depicts the correct sequence in which the operations are to be executed, so as to find out the value of a given expression.

Here, '**B**' stands for '**Bracket**' , '**O**' for 'of' '**Division**', '**M**' for ' **Multiplication**', '**A**' for '**Addition**' and 'S' for '**Subtraction**'.

Thus, in simplifying an expression, first of all the brackets must be removed, strictly in the order

( ) , { } , [ ]

After removing the brackets, we must use the following operations strictly in the order:

(i). Of (ii) division (iii) Multiplication
(iv) addition (v) subtraction.

Virnaculum (or Bar): when an expression contains virnaculum, before applying the 'BODMAS' rule, we simplify the expression under the virnaculum.

Ex.1. If '+' means 'minus', '×' means 'divided by', '÷' means 'plus' and '-' means 'multiplied by', then which of the following will be the value of the expression 252 × 9 – 5 + 32 ÷ 92?
a) 95 b) 168 c) 192 d) **200**

Ex.2. If '+' means '×', '×' means '-', '-' means '÷' and '÷' means '+', then which of the following will be the value of the expression 175 – 25 ÷ 5 + 20 × 3 + 10?
a) **77** b) 160 c) 240 d) 2370

Ex.3. If L stands for +, M stands for -, N stands for ×, P stands for ÷, then 14 N 10 L 42 P 2 M 8 = ?
a) **153** b) 216 c) 248 d) 251

EX.4. If 20 – 10 means 200, 8 ÷ 4 means 12, 6 × 2 means 4, then 100 – 10 × 1000 ÷ 100 × 10 = ?
a) **0** b) 20 c) 1090 d) 1900

Ex.5. If × stand for -, ÷ stands for +, + stands for ÷ and – stands for ×, which one of the following equations is correct?
a) 15 -5 ÷ 5 × 20 + 10 = 6 b) **8 ÷ 10 – 3 + 5 × 6 = 8**
c) 6 × 2 + 3 ÷ 12 – 3 = 15 d) 3 ÷ 7 – 5 × 10 + 3 = 10

Ex.6. It being given that: > denotes +, < denotes -, + denotes ÷, - denotes =, = denotes less than' and ' × denotes ' greater than', which one of the following equations is correct?
a) 3 + 2 > 4 = 9 + 3 < 2 b) 3 > 2 > 4 = 18 + 3 <1
c) **3 > 2 < 4 × 8 + 4 <2** d) 3 + 2 < 4 × 9 +3 <3

EXERCISE-13A

Q1. If '<' means 'minus', '>' means 'plus', '=' means 'multiplied by' and '$' means 'divided by', then what would be the value of 27 > 81 $ 9 < 6?
a) 6 b) 33 c) 36 d) None

Q2. If '×' means 'minus', '-' means 'plus', '÷' means 'multiplied by' and '+' means 'divided by', then what would be the value of 24 ÷ 12 – 18 + 9?
a) -25 b) 0.72 c) 290 d) 15.30

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Q3. If '$' means '+', '#' means '-', '@' means '×' and '*' means '÷', then which of the following will be the value of the expression 16 $ 4 @ 5 # 72 * 8?
a) 25 b) 27 c) 29 d) 36

Q4. If '÷' means '×', '×' means '+', '+' means '-' and '-' means '÷', then which of the following will be the value of the expression 16 × 3 + 5 – 2 ÷ 4?
a) 9 b) 10 c) 19 d) None

Q5. If '+' means '÷', '÷' means '-', '-' means '×' and '×' means '+', then 12 + 6 ÷ 3 – 2 × 8 =?
a) -2 b) 2 c) 4 d) 8

Q6. If Q stands for +, T stands for -, J stands for ×, K stands for ÷, then 30 K 2 Q 3 J 6 T 5 = ?
a) 18 b) 28 c) 31 d) 103

Q7. If R stands for +, S stands for -, Q stands for ×, P stands for ÷, then 18 Q 12 P 4 R 5 S 6 = ?
a) 53 b) 59 c) 63 d) 65

Q8. If P stands for division, T stands for addition, M stands for subtraction, D stands for multiplication, then 12 M 12 D 28 P 7 T 15 = ?
a) -30 b) -15 c) 15 d) None

Q9. If P stands for ×, R stands for +, S stands for ×, - stands for ÷, then 28 B 7 P 8 T 6 M 4 = ?
a) $-1\frac{1}{3}$ b) $\frac{2}{3}$ c) 46 d) None

Q10. If B stands for division, M stands for addition, T stands for subtraction, P stands for multiplication, then 28 B 7 P 8 T 6 M 4 = ?
a) -3/2 b) 30 c) 32 d) 34

Q11. If '-' stands for division, '+' stands for 'multiplication, '×' stands for subtraction, '-' stands for 'addition' which one of the following equations is correct?
a) **4 × 5 + 9 – 3 ÷ 4 = 15** b) 4 × 5 × 9 + 3 ÷ 4 = 11
c) 4 – 5 ÷ 9 × 3 – 4 = 17 d) 4 ÷ 5 + 9 – 3 + 4 = 18

Q12. If '+' stands for division, '÷' stands for 'multiplication, '×' stands for subtraction, '-' stands for 'addition' which one of the following equations is correct?
a) 18 ÷ 6 × 7 + 5 – 2 = 22 b) 18 × 6 + 7 ÷ 5 – 2 = 16
c) 18 ÷ 6 - 7 + 5 × 2 = 20 d) 18 + 6 ÷ 7 × 5 – 2 = 18

Q13. If '-' stands for division, '+' stands for 'multiplication, '÷' stands for subtraction, '×' stands for 'addition' which one of the following equations is correct?
a) 6 + 20 – 12 ÷ 7 – 1 = 38 b) 6 - 20 ÷ 12 × 7 + 2 = 16
c) 6 + 20 – 12 ÷ 7 × 1 = 62 d) 6 ÷ 20 × 12 + 7 – 1 = 70

Q14. If P stands for +, Q stands for ×, R stands for ×, S stands for ÷, which one of the following equations is correct?
a) 36 R 4 S 8 Q 7 P 4 = 1 b) 16 R 12 P 49 S 7 Q 9 = 200
c) 32 S 8 R 9 = 160 Q 12 R 12 d) 68 R 8 P 8 S 8 Q 8 = 57

Q15. If L denotes ÷, M denotes ×, P denotes + and Q denotes '-', then which one of the following equations is correct?
a) 32 P 8 L 16 Q 4 = $-\frac{3}{2}$ b) 6 M 18 Q 26 L 13 P 7 = $\frac{173}{13}$
c) 11 M 34 L 17 q 8 L 3 = $\frac{38}{3}$ d) 9 P 9 L 9 M 9 = -71

Directions (Questions 16 to20): If > denotes +, < denotes _, + denotes ÷, ^ denotes ×, - denotes =, × denotes > and = denotes <, choose the correct statement in each of the following questions.

Q 16.
a) 6 + 3 > 8 = 4 + 2 < 1 b) 4 > 6 + 2 × 32 + 4 < 1
c) 8 < 4 + 2 = 6 > 3 d) 14 + 7 > 3 = 6 + 3 > 2

Q17.
a) 14 > 18 + 9 = 16 + 4 < 1 b) 4 > 3 ^ 8 < 1 – 6 + 2 > 24
c) 3 < 6 ^ 4 > 25 = 8 + 4 > 1 d) 12 > 9 + 3 < 6 × 25 + 5 >24

Q18.
a) 13 > 7 < 6 + 2 = 3 ^ 4 b) 9 > 5 > 4 – 18 + 9 > 16
c) 9 < 3 < 2 > 1 × 8 ^ 2 d) 9 > 5 > 4 – 18 + 9 > 16

Q19.
a) 29 < 18 + 6 = 36 + 6 ^ 4 b) 18 > 12 + 4 × 7 > 8 ^ 2
c) 32 > 6 + 2 = 6 < 7 ^ 2 d) 31 > 1 < 2 = 4 > 6 ^ 7

Q20.
a) 7 > 7 < 7 + 7 = 14 b) 7 ^ 7 > 7 + 7 = 7 ^ 7 > 1
c) 7 < 7 + 7 = 6 d) 7 + 7 > 7 = 8

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TYPE-2: INTERCHANGE OF SIGNS AND NUMBERS

Ex.1. If the given interchange namely: signs + and ÷ and numbers 2 and 4 are made in signs and numbers, which one of the following four equations would be correct?

a) 2 + 4 ÷ 3 = 3 b) 4 + 2 ÷ 6 = 1.5
c) 4 ÷ 2 + 3 = 4 d) **2 + 4 ÷ 6 = 8**

Ex.2. Which one of the four interchanges in signs and numbers would make the given equations correct? 3 + 5 – 2 = 4

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

EXERCISE-13B

Q1. After inter changing ÷ and +, 12 and 18, which one of the following equations becomes correct?

a) (90 × 18) +18 = 60 b) (18 + 6) ÷ 12 = 2
c) (72 ÷ 18) × 18 = 72 d) (12 + 6) × 18 = 36

Q2. After inter changing ÷ and =, 2 and 3, which one of the following equations becomes correct?

a) 15 = 2 ÷ 3 b) 5 ÷ 15 =2
c) 2 = 15 ÷ 3 d) 3 = 2 ÷ 15

Q3. Which one of the four interchanges in signs and numbers would make the given equations correct?

(12 ÷ 6) + 3 × 7 = 42
a) + and × b) 6 and 7
c) ÷ and + d) 12 and 3

Q4. Which one of the four interchanges in signs and numbers would make the given equations correct?

35 + 7 × 5 ÷ 5 – 6 = 24
a) + and - b) ÷ and +
c) × and + d) - and ÷

Q5. Which one of the four interchanges in signs and numbers would make the given equations correct?

24 + 6 × 3 ÷ 3 – 1 = 14
a) + and × b) × and -
c) ÷ and + d) - and ÷

Q6. Which one of the four interchanges in signs and numbers would make the given equations correct?

(5 + 2) × 2 – 10 = 16
a) + and - b) 5 and 10
c) × and + d) 5 and 2

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

30 – 6 ÷ 4 + 2 × 3 = 7
a) + and - b) ÷ and +
c) × and + d) **- and ÷**

Q8. Which one of the four interchanges in signs and numbers would make the given equations correct?

30 + 6 ÷ 3 - 12 × 2 = 17
a) + and - b) ÷ and +
c) × and + d) × and ÷

Q9. Which one of the four interchanges in signs and numbers would make the given equations correct?

(7 + 2) × 3 × 4 -1 = 20
a) × and - b) 2 and 3
c) × and + d) 7 and 3

Q10. Which one of the four interchanges in signs and numbers would make the given equations correct?

(16 – 4) × 6 ÷ 2 + 8 = 30
a) ÷ and - b) 2 and 4
c) - and + d) 16 and 6

Q11. Which one of the following is correct?

a) ÷, =, > b) ÷, >, + c) >, ÷, + d) +, >, ÷

Q12. In the following question * stands for any of the mathematical signs at different places, which are given as choices under each question. Select the choice with the correct sequence of signs which when substituted makes the question as a correct equation.

24 * 4 * 5 * 4
a) × + = b) = × + c) + × = d) = + ×

Q13. 25 * 2 * 6 = 4 * 11 * 0
Which set of symbols can replace *?

a) × - × + b) + - × + c) × + × - d) × + + ×

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Q14. Which one of the following responses is correct?
8 * 5 * 27 * 3 * 16
a) × = - + b) - = × + c) × = + - d) + - = ×

Q15. Which one of the following responses is correct?
96 * 6 * 8 *2
a) ÷ = × b) × = ÷ c) = ÷ × d) = × ÷

TYPE-3: DERIVING THE APPROPRIATE CONCLUSIONS

In this type of questions, certain relations between different sets of elements is given (in terms of 'less than', greater than' or equal to') using either the real symbols or substituted symbols. The candidate is required to analyse the given statements and then decide which of the relation given as alternatives follows from those given in the statements.

Ex.1. If A + B > C + D and B + C > A + D, then it is definite that
a) D > B b) C > D c) A > D d) **B > D**

Directions (Questions 2 to 8): In the following questions, the symbols @, ©, %, * and $ are used with the following meanings as illustrated bellow:
'P @ Q' means 'P is either greater than or equal to Q';
'P © Q' means 'P is either smaller than or equal to Q';
'P % Q' means 'P is greater than Q';
'P * Q' means 'P is smaller than Q';
'P$Q means P is neither greater than or smaller than Q

Now in the each of the following questions, assuming the given statements to be true, find which of the two conclusions I and II given bellow them is/are definitely true?
Given answer (a) If only conclusion I is true;
(b) If only conclusion II is true;
(c) If either conclusion I or II is true;
(d) If neither conclusion I nor II is true;
(e) If both conclusions I & II are true.

Ex.2. **Statements:** M @ R, R % T, T $ K **(e)**
Conclusions: I. K * M II. T * M

Ex.3. **Statements:** H % J, B © J, B @ F **(c)**
Conclusions: I. F $ J II. J % F

EX.4. **Statements:** D $ M, M 5 W, W @ R **(a)**
Conclusions: I. R * D II. W © D

Ex.5. **Statements:** A © N, N * V, V $ J **(d)**
Conclusions: I. J @ N II. A © V

Ex.6. Statements: K * T, T @ B, B © M **(d)**
Conclusions: I. M % T II. K © B

Ex.7. Statements: B @ H, H * M, M $ N **(b)**
Conclusions: I. B @ N II. N % H

Ex.8. **Statements:** W © R, J @ R, J * K **(e)**
Conclusions: I. J @ W II. K % R

Directions (Questions 9 to 15): In the following questions, the symbols @, *, %, # and $ are used with the following meanings as illustrated bellow:

P @ Q' means 'P is neither greater than nor equal to Q
'P * Q' means P is neither smaller than nor equal to Q
'P $ Q' means 'P is not greater than Q';
'P % Q' means 'P is not smaller than Q';
P # Q means P is neither greater than or smaller than Q
Now in the each of the following questions, assuming the given statements to be true, find which of the two conclusions I, II and III given bellow them is/are definitely true?

Ex.9. Statements: D$K, H * B, K @ H **(e)**
Conclusions: I. B % K II. B @ K III.H * D
(a) Only I and II true (b) only either I or II true
(c) Only either I or II, III true (d) none of these

Ex.10. Statements: T @ R, R $ G, G * B **(a)**
Conclusions: I. T @ B II. B * R III.T $ G
(a) Only I and II true (b) only either I or III true
(c) Only I and III true (d) none of these

Ex.11. Statements: F # M, M * J, P % F **(a)**
Conclusions: I. P * J II. P % J III. P # M

(a) Only I is true (b) only I and III true
(c) Only I and II true (d) none of these

Ex.12. Statements: L % J, L @ K, J * F **(e)**
Conclusions: I. F @ K II. K * J III. F @ L
(a) Only I & III true (b) only I and II true
(c) Only II and III true (d) All I, II & III are true

Ex.13. Statements: N $ P, P @ Q, H % Q **(b)**
Conclusions: I. H % N II. N @ H III. N # H
(a) Only I is true (b) only II is true
(c) Only II and III true (d) All I, II & III are true

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