MATHEMATICAL APTITUDE

10
CHAPTER

This section deals with questions 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', 'note 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 question accordingly, to get the answer.

Ex.1 $\frac{5}{?} = \frac{?}{1.25}$

(a) 0.0025 (b) 0.025
(c) 0.025 (d) 2.5

Sol. The answer is (d), i.e. 2.5,

because $\frac{5}{2.5} = 2$ and $\frac{2.5}{1.25} = 2$

Alternately, put X in both blank spaces so that

$X \times X = 1.25 \times 5 \quad \therefore \quad X = 2.5$

Ex.2 $\frac{\sqrt{1296}}{?} = \frac{?}{2.25}$

(a) 6 (b) 7 (c) 8 (d) 9

Sol. The answer is (d) i.e. 9, because

$\frac{\sqrt{1296}}{9} = 4$ and $\frac{9}{2.25} = 4$

or, put X in both blank spaces, sothat

$X^2 = \sqrt{1296} \times 2.25$

$\therefore \quad X = 9$

Problem solving by substitution

(i) In this type, you are provided with substitutes for various mathematical symbols, followed by a question involving calculation of an expression or choosing the correct / incorrect equation. The candidate is required to put in the real signs in the given equation and then solve the question as required.

Note : While solving a mathematical expression, proceed according to the rule BODMAS – i.e. Brackets, Of, Division, Multiplication, Addition, Subtraction.

e.g., $(36 - 12) \div 4 + 6 \div 2 \times 3$

$= 24 \div 4 + 6 \div 2 \times 3$ (Solving Bracket)

$= 6 + 3 \times 3$ (Solving Division)

$= 6 + 9$ (Solving Multiplication)

$= 15$ (Solving Addition)

Ex.3 If '+' means 'divided by', '–' means 'multiplied by', '×' means 'minus' and '÷' means 'plus', which of the followig will be the value of the expression $16 \div 8 - 4 + 2 \times 4$?

(a) 16 (b) 28 (c) 32 (d) 44

Sol. Putting the proper signs in the given expression, we get :

$16 + 8 \times 4 \div 2 - 4 = 16 + 16 - 4$

$= 32 - 4 = 28.$

So, the answer is (b),

Ex.4 If + means ÷, – means ×, ÷ means + and × means –, then $36 \times 12 + 4 \div 6 + 2 - 3 = ?$

(a) 2 (b) 18 (c) 42 (d) $6\frac{1}{2}$

Sol. Using the proper signs, we get :

$36 - 12 \div 4 + 6 \div 2 \times 3 = 36 - 3 + 3 \times 3$

$= 36 - 3 + 9 = 45 - 3 = 42$

So, the correct answer is (c)

Ex.5 If A means 'plus', B means 'minus', C means 'divided by' and D means 'multiplied by', then 18 A 12 C 6 D 2 B 5 = ?

(a) 15 (b) 25
(c) 27 (d) None

Sol. Using the proper signs, we get :

Given expression $= 18 + 12 \div 6 \times 2 - 5$

$= 18 + 2 \times 2 - 5 = 18 + 4 - 5 = 22 - 5 = 17$

So, the answer is (d).

Ex.6 If × stands for –, ÷ stands for +, + stands for ÷ and – stands for ×, which one of the following equation is correct ?

(a) $15 - 5 \div 5 \times 20 + 10 = 6$

(b) $8 \div 10 - 3 + 5 \times 6 = 8$

(c) $6 \times 2 + 3 \div 12 - 3 = 15$

(d) $3 \div 7 - 5 \times 10 + 3 = 10$

Sol. Using the proper signs, we get :

Expression in (a) $= 15 \times 5 + 5 - 20 \div 10$

$= 15 \times 5 + 5 - 2$

$= 75 + 5 - 2 = 78$

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

$= 8 + 10 \times \frac{3}{5} - 6$

$= 8 + 6 - 6 = 8$

Expression in (c)$= 6 - 2 \div 3 + 12 \times 3$

$= 6 - \frac{2}{3} + 36$

$= 42 - \frac{2}{3} = \frac{124}{3}$

Expression in (d) $= 3 + 7 \times 5 - 10 \div 3$

$= 3 + 7 \times 5 - \frac{10}{3}$

$= 3 + 35 - \frac{10}{3} = \frac{104}{3}$

$\therefore$ Statement (b) is true.

Ex.7 It being given that : > denotes +, < denotes –, + denotes ÷, – denotes =, = denotes 'less than' and × 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) $3 + 2 < 4 \times 9 + 3 < 3$

Sol. Using proper notations, we have :

(a) Given statement is $3 \div 2 + 4 < 9 \div 3 - 2$

or $\frac{11}{2} < 1$, 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 $\frac{5}{2} - > 0$, which is not true.

So, the statement (c) is true.

(i) Interchange of signs and numbers

(ii) Deriving the appropriate conclusion.

Ex.8 If the given interchanges 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) $2 + 4 \div 3 = 3$ (B) $4 + 2 \div 6 = 1.5$

(C) $4 \div 2 + 3 = 4$ (D) $2 + 4 \div 6 = 8$

Sol. Interchanging + and ÷ and 2 and 4, we get:

(A) $4 \div 2 + 3 = 3$ or $5 = 3$, which is false.

(B) $2 \div 4 + 6 = 1.5$ or $6.5 = 1.5$, which is false.

(C) $2 + 4 \div 3 = 4$ or $\frac{10}{3} = 4$, which is false

(D) $4 \div 2 + 6 = 8$ or $8 = 8$, which is true.

Ex.9 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

Sol. By making the interchanges given in (A), we get the equation as $2 - 5 + 3 = 4$

or $0 = 4$, which is false.

Ex.10 It being given that × denotes 'greater than', ϕ denotes 'equal to', < denotes 'not less than', $\perp$ denotes 'not equal to', Δ denotes 'less than' and + denotes 'not greater than',

choose the correct statement from the following:

If $a \times b \Delta c$, it follows that

(A) $a \phi c \Delta b$ (B) $b < a \times c$

(C) $a < b + c$ (D) $b < a \phi c$

Sol. Using the usual notations, we have :

(A) The statement is $a > b < c \Rightarrow a = c < b$,

which is false. [Θ c > b]

(B) The statement is $a > b < c \Rightarrow b \not< a > c$,

which is false. [Θb < a]

(C) The statement is $a > b < c \Rightarrow a \not< b \not> c$,

which is false . [b < a]

(D) The statement is $a > b < c \Rightarrow c \not> b \not< a$,

which is false. [Θ b < a]

Hence, the statement (C) is true.

Ex.11 In the following questions, the symbols $*, \underline{*}, =, @$ are $\underline{@}$ used with the following meanings:

'A $*$ B' means 'A is greater than B';

'A $\underline{*}$ B' means 'A is either greater than or equal to B';

'A = B' means 'A is equal to B';

'A @ B' means 'A is smaller than B';

'A $\underline{@}$ B' means 'A is either smaller than or equal to B'.

Now, in each of the following questions, assuming the given statements to be true, find which of the conclusions I and II given below them is/are definitely true ?

Give answer (A) if only conclusion I is true; (B) if only conclusion II is true; (C) if either I or II is true; (D) if neither I nor II is true and (e) if both I and II are true.

1. Statements : M = T, T @ Z, S $*$ M

   Conclusions : I. Z * M II. Z = M

2. Statements : R $\underline{@}$ M, M $*$ P, R $\underline{*}$ L

   Conclusions : I. M = L II. P = L

3. Statements : L @ C, C * Z, Z $\underline{@}$ F

   Conclusions : I. C * F II. F = C

4. Statements : Z @ B, N $\underline{*}$ S, B @ N

   Conclusions : I. B = Z II. S $\underline{@}$ B

5. Statements : T $\underline{*}$ P, P @ S, P = M

   Conclusions : I. S * M II. T @ S

Sol. Given statements : M = T, T ≤ Z, S > M

Now, to verify conclusions I and II, we need to find a relation between Z and M.

Z ≥ T, T = M ⇒ Z ≥ M

⇒ Z > M or Z = M i.e., Z * M

or Z = M.

So, either I or II follows.

Hence, the answer is (C)

2. Given statements : R ≤ M, M > P, R ≥ L

   (I) Relation between M and L :

   M ≥ R, R ≥ L ⇒ M ≥ L i.e., M $\underline{*}$ L.

   So, I is not true.

   (II) Relation between P and L.

   P < M, M ≥ R, R ≥ L ⇒ no definite conclusion.

   So, (II) is also not true.

   Hence, the answer is (D).

3. Given statements : L < C, C > Z, Z ≤ F.

   Clearly, we find a relation between C and F.
   C > Z, Z ≤ F ⇒ no definite conclusion.

   So, neither I nor II is true.

   Hence, the answer is (D).

4. Given statements : Z < B, N ≥ S, B < N

   (I) Relation between B and Z :

   Clearly, B > Z i.e., B * Z.

   So, (I) is not true.

   (II) Relation between S and B :

   S ≤ N, N > B ⇒ no definite conclusion.

   So, (II) is also not true.

   Hence, the answer is (D)

5. Given statements : T ≥ P, P < S, P = M

   (I) Relation between S and M :

   S > P, P = M ⇒ S > M i.e., S * M

   So, I is true.

   (II) Relation between T and S :

   T ≥ P, P < S ⇒ no definite conclusion.

   So, II is not true, Hence the answer is (A).

Ex.12 Given interchanges : Signs – and ÷ and numbers 4 and 8

(A) $6 - 8 \div 4 = -1$ (B) $8 - 6 \div 4 = 1$

(C) $4 \div 8 - 2 = 6$ (D) $4 - 8 \div 6 = 2$

Sol. On interchanging – and ÷ and 4 and 8 in (C), we get the equation as $8 - 4 \div 2 = 6$

or $8 - 2 = 6$ or $6 = 6$, which is true.

Ex.13 Given interchanges : Signs + and × and numbers 4 and 5

(A) $5 \times 4 + 20 = 40$ (B) $5 \times 4 + 20 = 85$

(C) $5 \times 4 + 20 = 104$ (D) $5 \times 4 + 20 = 95$

Sol. On interchanging + and × and 4 and 5 in (C), we get the equation as $4 + 5 \times 20 = 104$

or $104 = 104$, which is true.

Ex.14 $5 + 6 \div 3 - 12 \times 2 = 17$

(A) ÷ and × (B) + and ×

(C) + and ÷ (D) + and –

Sol. On interchanging ÷ and ×, we get :

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

$= 5 + 6 \times 3 - 6$

$= 5 + 18 - 6 = 17$

Ex.15 $2 \times 3 + 6 - 12 \div 4 \equiv 17$

(A) × and + (B) + and –

(C) + and ÷ (D) – and ÷

Sol. On interchanging × and +, we get :

Given expression $= 2 + 3 \times 6 - 12 \div 4$

$= 2 + 3 \times 6 - 3 = 2 + 18 - 3 = 17$

Ex.16 Which of the following two signs need to be interchanged to make the given equation correct?

$10 + 10 \div 10 - 10 \times 10 = 10$

(A) + and – (B) + and ÷

(C) + and × (D) ÷ and +

Sol. On interchanging + and ×, we get the equation as

$10 \times 10 \div 10 - 10 + 10 = 10$

or $10 \times 1 - 10 + 10 = 10$

or $10 = 10$, which is true.

Exercise

Q.1 If + means ×, – means + and × means ÷ find the value of 5 + 4 – 18 × 3 -
(A) 26 (B) 6 (C) 14 (D) 15

Q.2 If '+' means '÷', '÷' means '×', '×' means '–' and '–' means '+' then 24 + 6 2 ÷ 3 – 4 = ?
(A) 6 (B) 4 (C) 8 (D) 2

Directions :
In each of the questions from 3 – 5.
> stand for =
< stands for ≠
× stands for >
+ stands for <
= stands for ≯
– stands for ≮

Q.3 If α – β × γ, it does not imply that :
(A) α – β < γ (B) α × β > γ
(C) α + β × γ (D) α × β > γ

Q.4 If α > β × γ, it implies that -
(A) α – β – γ (B) α < β – γ
(C) α = β = γ (D) α = β > γ

Q.5 If α × β – γ, if does not imply that -
(A) α = β × γ (B) α × β + γ
(C) α < β + γ (D) α < β × γ

Directions :
In each of the questions (6 – 10)
Δ means ≠
÷ means ≥
⇂ means ≤
= means <
+ means >
× means =
Find the correct answer for each question.

Q.6 If a b and b = c, then -
(A) c + a (B) a + c
(C) c a (D) c × a

Q.7 If c a and a × b, then -
(A) c ÷ b (B) b c
(C) c b (D) b = c

Q.8 If a + b and b + c then -
(A) c ÷ a (B) a = c
(C) a c (D) c = a

Q.9 If a Δ c and b × c then -
(A) a ÷ b (B) a Δ b
(C) a × b (D) a + b

Q.10 If ac + bc, then -
(A) a ÷ b (B) a × b
(C) a + b (D) a b

Directions :
In each of the questions from 11 to 14 :
α means greater than
β means equal to
θ means not less than
γ means less than
δ means not equal to
and η means not greater than
Which one of the following could be a correct or proper inference given the following :

Q.11 a α 2b and 2b θ r -
(A) a β r (B) a γ r
(C) a η r (D) a α r

Q.12 p η 3q and 3q β 2r -
(A) p γ 3r (B) p α 2r
(C) p θ 2r (D) p β 3r

Q.13 2x η y and x α o -
(A) 2x γ o (B) y β o
(C) x δ z (D) o γ y

Q.14 3x θ 2y and 2y β 3z -
(A) 3x β z (B) 2y δ 3x
(C) 2x η 3z (D) 2x δ 3z
(E) None

Q.15 If 'a' means '+', 'b' means '–', 'c' means '÷' and 'd' means '×' then the expression 16a 4b 3c 4d2 = ?
(A) 10 (B) 17 (C) 18.5 (D) $\frac{21}{2}$

Q.16 If ⊓ stands for +
⊏ stands for –
⊐ stands for ×
⊔ stands for ¸
|| stands for =
← stands for <
→ stands for >
Which one of the following expression is true ?
(A) (10 ⊓ 2) ⊐ (2 || 2) ← (10 ⊔2)
(B) (20 ⊏ 8) ⊔ (4 ⊏ 1) || (4 ⊓1)
(C) (12 ⊏ 4) ⊐ (5 ⊐ 1) ← (10 ⊓ 20)
(D) (10 ⊓ 2) ⊐ (2 ⊔ 2) → (10 ⊔ 2)
(E) (18 ⊔ 3) ⊏ (2 ⊓ 1) ⊓ (5 || 20)

Q.17 If '→' means '×', '↑', means '–', '←' means '+', '↓' means '+' '↗ ' means '=' and ' ↖' means '>' then which one of the answers is not correct ?
(A) 10 → 5 ↑ 2 ← 8↓ 4 ↗ 6 → 8
(B) 10 → 3 ↓ 3 ↑ 5 ← 9 ↖ 6 → 2
(C) 10 ← 7 → 6 ↓ 3 ↑ 8 ↖ 4 → 4
(D) 10 → 6 ↓ 2 ← 7 ↑ 5 ↖ 10 → 4 ↑ 9

Q.18 If □ means '×', Δ means '+', ▭ means '+', ⚲ means '–', ▯ means '=', ⬯ means 'more' and ⬡ means 'less', then which one of the answers is correct ?
(A) 10 □ 3 ▯ 7 ⚲ 4 Δ 2 ▭ 5 □ 5
(B) 10 □ 3 ⬡ 15 Δ 3 □ 5 ⚲ 7 ▭ 9 □ 2
(C) 10 ▭ 7 ⚲ 5 □ 9 Δ 3 ⬡ 4 □ 2 ⚲ 8 ▭ 2
(D) 10 ⚲ 4 □ 8 Δ 4 ▭ 7 ⬯ 8 □ 2 ⚲ 5

Q.19 If '–' stands for addition, '+' for multiplication, '÷' for subtraction and '×' for division, which one of the following equations is wrong ?
(A) 5 – 2 + 12 × 6 ÷ 2 = 27
(B) 5 + 2 – 12 ÷ 6 × 2 = 13
(C) 5 + 2 – 12 × 6 ÷ 2 = 10
(D) 5 ÷ 2 + 12 × 6 – 2 = 13

Q.20 If T means '–', R means '+', P means '×', M means '÷', S means '=', Q means '>' and N means '<', then which one of the answer is correct ?
(A) 5 P 6 M 10 R 8 T 7 N 10 T 7
(B) 2 R 6 T 8 P 3 Q 7 R 2 P 3
(C) 35 M 5 T 2 R 12 N 6 P 3
(D) 35 R 8 P 2 M 4 T 10 S 10 P 3 T 7

Direction (Q. 21-23)
'A' means greater than, 'B' means equal to, 'C' means not less than, 'D' means less than, 'E' means not equal to and 'F' means not greater than

Q.21 Premises : (a A 2 b) and (2 b C r)
(A) a B r (B) a F r
(C) a A r (D) a D r

Q.22 Premises : (x F y) and (x A o)
(A) y D o (B) y A o
(C) y F o (D) y B o

Q.23 Premises : (2 x E y) and (2 y F 3 z)
(A) 2 x F 3 y (B) y B 6 x
(C) y D 3 z (D) 3 z B 3 y

Q.24 If III stands for 2, IIII for 3 and II for 1, solve the following : II – IIII + III + IIIII = ?
(A) IIIIIII (B) IIIIIIII
(C) IIIII (D) IIII

Q.25 Insert proper arithmetical signs between the figures in the following sum.
7 ……. 3……2 = 13
(A) –, × (B) +, ×
(C) ×, ÷ (D) –, +

Q.26 If '+' means 'divided by', '–' means 'multiplied by', '×' means 'minus' and '÷' means 'plus'; then 8 + 6 – 2 ÷ 4 × 4 = ?
(A) 12 (B) $\frac{8}{3}$
(C) $-\frac{52}{9}$ (D) $1\frac{1}{2}$

Q.27 If 3 × 6 = 18; 4 × 7 = 22; 9 × 1 = 20, then 5 × 2 = ? Find the value of ? from the following
(A) 7 (B) 10
(C) 14 (D) 3

Q.28 If a, b means '÷' or '+', c, d means '–' or '×'; b, c means '+' or '–' and a, c means '÷' or '–' then 10a 2b 4c 8d 6 = ?
(A) 6 (B) 57
(C) 39 (D) None of these

ANSWER KEY

Q.No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	A	D	C	A	D	A	C	D	B	C	D	A	C	E	C	D	A	D	B	C
Q.No	21	22	23	24	25	26	27	28												
Ans.	C	B	C	C	B	B	C	D												