

Mathematical Operations

Questions on Mathematical operations will first start with either defining a new meaning to existing symbols or define a new symbol and its mathematical meaning.

You are then required to evaluate the value of an expression by assuming the meaning of the symbols as defined in the question. The following questions will make this question type clear to you.

Illustration 1: If ‘+’ means ‘−’, ‘−’ means ‘¥’, ‘¥’ means ‘[]’, and ‘[]’ means ‘+’ then which of the following will be the value of the expression?

$$32 + 8 ¥ 2 - 3 [] 4$$

(a) 12

(b) 20

(c) 0

(d) 24

Answer and Explanation: Putting the changed signs, the expression can be rewritten as

$$32 - 8 [] 2 ¥ 3 + 4$$

Using BODMAS rule, we have

$$= 32 - 4 ¥ 3 + 4$$

$$= 32 - 12 + 4 = 24$$

Hence, the correct option is (d).

Illustration 2: If A implies ‘+’, B implies ‘−’, C implies ‘¥’, D implies ‘[]’, then calculate the value of the expression $2A3B4C5D1$.

(a) 15

(b) 0

(c) −15

(d) −12

Answer and Explanation: Using the proper signs, the above expression can be written as

$$2 + 3 - 4 ¥ 5 [] 1$$

$$= 5 - 20 = -15$$

Hence, option (c) is correct.

Illustration 3: Which of the following changes would make the given expression correct?

$$4 + 4 \nmid 4 - 4 \sqcap 4 = 4$$

(a) ‘+’ and ‘ $\nmid$ ’

(b) ‘-’ and ‘ $\sqcap$ ’

(c) ‘+’ and ‘ $\sqcap$ ’

(d) both ‘b’ and ‘c’

Answer and Explanation: By making inter-changes given in ‘a’ we get the expression as:

$$4 \nmid 4 + 4 - 4 \sqcap 4 = 4 \text{ which is false.}$$

By making interchanges given in ‘b’, we get expression as

$$4 + 4 \nmid 4 \sqcap 4 - 4 = 4 \text{ which is true.}$$

By making interchanges given in option ‘c’, we get the expression as

$$4 \sqcap 4 \nmid 4 - 4 + 4 = 4 \text{ which is also true.}$$

Hence, option (d) is correct.

Illustration 4: If $A''B$ means add B to A , $A'B$ implies subtract B from A , $A@B$ implies divide A by B , $A*B$ means multiply A with B .

If a train travels with a speed of S_1 from point A to B and returns with a speed of S_2 . The average speed will be represented using the above explained notations?

(a) $(2*S_1''S_2)/(S_1''S_2)$

(b) $(2*S_1*S_2)/(S_1''S_2)$

(c) $(2*S_1''S_2)/(S_1'S_2)$

(d) $(2*S_1@S_2)/(S_1'S_2)$

Answer and Explanation: We know that the formula for average speed is given by

$$2S_1S_2/(S_1 + S_2)$$

Hence the correct option is (b).

Illustration 5: If (l, m, n) is represented as $v [(l + 1)(m + 1)/(n + 1)]$:

What is the value of $(48, 63, 80)$?

(a) $56/9$

(b) $55/9$

(c) 6

(d) 7

Answer and Explanation: Putting the value in the above equation we get

$$\div [(48 + 1)(63 + 1)/(80 + 1)]$$

$$=\div (49 \nmid 64/81) = (7 \nmid 8)/9 = 56/9$$

Hence, the correct option is (a).

EXERCISE

Directions for Questions 1 to 5: If $a + b$ implies $a - b$

$a - b$ implies $a \nmid b$

$a \nmid b$ implies $a \sqcap b$

$a \sqcap b$ implies $a + b$

1. Calculate $5 + 8 - 25 \div 5 \sqcap 40$
(a) 5 (b) -5
(c) 0 (d) 10
2. With which statement can you find the value of 8?
(a) $1 + 2 - 6 \div 3 \sqcap 8$ (b) $1 - 2 + 6 \div 3 \sqcap 8$
(c) $1 - 2 \div 6 + 3 \div 8$ (d) none of these
3. Which of the following is true?
(a) $6 + 2 - 3 \div 1 \sqcap 4 = 12$
(b) $10 + 4 - 3 \div 1 \sqcap 2 = 5$
(c) $6 + 4 - 2 \div 2 \sqcap 1 = 3$
(d) none of these
4. Which of the following is true?
 $(1 + 2 - 3 \div 1 \sqcap 4) / (4 + 5 - 4 \div 2 \sqcap 1) =$
(a) -1/5 (b) 1/5
(c) 1 (d) none of these
5. Find the value of
 $(4 + 3 - 5 \div 1 \sqcap 4) \div (5 + 2 - 3 \div 1 \sqcap 4)$
(a) -7/3 (b) -8/3
(c) 1 (d) none of these

Directions for Questions 6 to 8: If 'a' means +, 'b' means -, 'c' means $\div$ and 'd' means $\sqcap$

6. Calculate the value of $6a7b8c8d2$
(a) -17 (b) 12
(c) -19 (d) none of these
7. Calculate $(8c7)c(7a5)b(6d3)d(3b2)$
(a) 650 (b) 375
(c) 670 (d) none of these
8. What is the value of $9a10b11c15d0$
(a) 1 (b) 2
(c) 3 (d) undefined

Directions for Questions 9 to 12: In each of the following questions if the given interchanges are made in signs and numbers, which one of the four equations would be correct?

9. Given interchanges, signs '–' and '÷' and numbers 4 and 8 (on the LHS)
- (a) $4 - 8 \div 12 = -23/4$ (b) $4 \div 8 - 2 = 8$
(c) $8 \div 2 - 4 = -15/4$ (d) none of these
10. Given interchanges: 3 and 2, ÷ and –
- (a) $1 + 3 \div 4 - 2 \div 1 = 5$
(b) $1 + 2 - 3 \div 8 \div 4 = 9$
(c) $3 - 1 \div 4 + 2 \div 1 = 11$
(d) none of these
11. Given interchanges: 0.4 and 0.04,
- (a) $1 + 2 - 0.04 \div 0.4 = 1$
(b) $0.4 + 0.04 - 2 \div 2 = 1.76$
(c) $0.04 \div 0.4 - 1 = 0.18$
(d) none of these
12. Given interchanges, ÷ and +, 10, 1
- (a) $5 \div 1 + 10 - 2 = 5$
(b) $8 + 8 - 10 \div 1 = 75$
(c) $4 - 6 \div 10 + 1 = 6$
(d) $3 + 4 - 12 \div 1 \div 10 = 10$
13. Find out the two signs to be interchanged for making the following equation to be correct:
 $5 + 3 - 5 \div 5 \div 1 = 15$
- (a) ÷ and – (b) ÷ and +
(c) ÷ and – (d) + and –
14. Which of the following two signs need to be interchanged to make the given equation correct?
 $4 + 2 - 5 \div 7 \div 12 = -21$
- (a) ÷ and – (b) ÷ and +
(c) ÷ and + (d) ÷ and –
15. Insert proper arithmetical signs between the figures in the following equation
 $12_4_2_1 = 24$
- (a) –, ÷, ÷ (b) ÷, ÷, ÷
(c) +, ÷, ÷ (d) none of these
16. If 'a' implies '+', 'b' implies '–', 'c' implies '÷' and 'd' implies '÷', insert proper letter between the figures in the following equation
 $40_20_30_6 = 55$

(a) a, b, c

(b) b, c, d

(c) a, b, d

(d) d, b, a

17. If '+' implies '-', '-' implies '×', '×' implies '÷' and '÷' implies '+', then insert the proper signs between the figures in the given equation

$$12 _ 8 _ 4 _ 2 _ 1 = 15$$

(a) ×, ÷, -, +

(b) ×, -, +, ÷

(c) +, -, ÷, ×

(d) -, +, ×, ÷

18. If $a = +$, $b = -$, $g = \times$, $d = \div$

Insert the proper notations between the figures in the following sum

$$10 _ 8 _ 6 _ 4 _ 2 = 6$$

(a) b, a, d, g

(b) a, b, g, d

(c) b, d, g, a

(d) none of these

Directions for Questions 19 to 21: If

$$12 + 2 = 6$$

$$27 + 9 = 3$$

and $15 + 5 = 3$

19. Calculate the value of $182 + 13$

(a) 14

(b) 1.4

(c) 0.14

(d) none of these

20. Calculate the value of $50 + [50 + 10]$

(a) 10

(b) 100

(c) 110

(d) 5

21. Calculate $(10 + (6 + (3 + (2 + 1))))$

(a) 4

(b) 5

(c) 8

(d) none of these

Directions for Questions 22 to 25: If

$$3 \div 4 = 5$$

$$5 \div 12 = 13$$

Then solve the following question.

22. Calculate the value of $7 \div 24$

(a) 12

(b) 48

(c) 10

(d) none of these

23. Calculate the value of $8 \div 9$

(a) 145

(b) $\sqrt{145}$

(c) 12

(d) 12.5

24. $9 \div ? = 41$

(a) 35

(b) 30

(c) 40

(d) none of these;

25. Obtain $\{3 \div (5 \div 6)\} = ?$

(a) 5

(b) $\sqrt{70}$

(c) $5\sqrt{3}$

(d) none of these

Directions for Questions 26 to 30: If

M means greater than

N means equal to

O means not less than

P means less than

Q means not equal to

and R means not greater than

26. If yPz and zNa , then which of the following is true?

(a) yMa

(b) yPa

(c) yOa

(d) none of these

27. If $10aM6b$ and $12bM20c$

(a) $5aMc$

(b) $aM5c$

(c) aNc

(d) none of these

28. If $aP0$ and $b+2Pa$, then which of the following is true?

(a) $bM-2$

(b) $bN-2$

(c) $bP-2$

(d) none of these

29. If sOt , tRu and tRv then which of the following could be true about s and u/v or u and v ?

(a) sMu

(b) sPv

(c) uNv

(d) can't be determined

30. If $|t-u| M0$, then which of the following is/are true

(a) sMt

- (b) tMs
- (c) sNt
- (d) (a), (b) and (c) could be true

Directions for Questions 31 to 33: If

aAb implies $a + b$

aMb implies $a - b$

aPb implies $a \neq b$

aQb implies $a \cap b$

31. Which of the following equations is correct?

- (a) $30Q10A4P2M2 = 15$
- (b) $5P2A4Q2P2 = 14$
- (c) $2Q3B5P6A7 = -5$
- (d) none of these

32. Calculate $5A6M3P4Q8$

- (a) 10
- (b) 9
- (c) 9.5
- (d) 10.5

33. Calculate $(2A3M4P5)P(5M6P8Q4)$

- (a) -105
- (b) -120
- (c) 120
- (d) none of these

Directions for Questions 34 to 36:

A''B implies $A + B$

A'b implies $A - B$

A@B implies $A \cap B$

A*B implies $A \neq B$

34. A man travels with a speed of f from A to B and returns from B to A with speed h . What is the average speed of the man over the entire journey?

- (a) $2f'h/f'h$
- (b) $2f@h/f'h$
- (c) $2f*h/f@h$
- (d) none of these

35. Jadugar has a jadoo box which has a length, breadth and height which can be represented by ' x ', ' a ', ' c ' respectively. What is the formula for its total surface area?

- (a) $2[(x'a)*(a''c)*(x''c)]$
- (b) $2[(x*a)''(a*c)''(x*c)]$
- (c) $2[(x'a)*(a*c)*(x*c)]$
- (d) none of these

36. At the Wave cinemas in Sector 18 in Noida, charges for parking are as follows

1. For cycles Rs 2
2. For scooters Rs 5
3. For cars Rs 20

On a particular day there were '25' cycles, '40' scooters and '100' cars parked at the stand, what was the amount collected in that particular day?

- (a) $(25 \times 2) \times (40 \times 5) \times (100 \times 20)$
- (b) $(25 \times 2) @ (40 \times 5) @ (100 \times 20)$
- (c) $(25 \times 2) \times (40 \times 5) \times (100 \times 20)$
- (d) none of these

Directions for Questions 37 to 41: If

AXB implies $A^2 + B^2$

AYB implies $A^2 - B^2$

AZB implies $(A + B)^2$

AMB implies $(A - B)^2$

37. Calculate the value of $(4X5)Y(6X7)$

- | | |
|----------|-------------------|
| (a) 5544 | (b) -5544 |
| (c) 500 | (d) none of these |

38. Calculate the value of $(373)M(413)$

- | | |
|----------|----------|
| (a) 1600 | (b) 900 |
| (c) 400 | (d) 2500 |

39. If $(AMB) = (AZB)$ then which of the following is true.

- | | |
|-----------------|-----------------|
| (a) $A - B = 0$ | (b) $A^2 = B^2$ |
| (c) $A.B = 0$ | (d) $A = 0$ |

40. Calculate $(3Z4) - (5M5)$

- | | |
|--------|-------------------|
| (a) 49 | (b) 25 |
| (c) 64 | (d) none of these |

41. Calculate the value of $(2Z2)M(4Y4)$

- | | |
|--------|-------------------|
| (a) 16 | (b) 256 |
| (c) 25 | (d) none of these |

Directions for Questions 42 and 43: If '*' indicates either '+' or '×', solve the following questions.

42. What is the maximum value of

$$1*2*3*4*5*6*7$$

- (a) 5040 (b) 5041
(c) $7!/2$ (d) none of these

43. What is the minimum value of

$$1*2*3*4$$

- (a) 10 (b) 9
(c) 11 (d) 14

Directions for Questions 44 to 46: If

A indicates $>$

B indicates $<$

C indicates $=$

D indicates π

E indicates $+$

F indicates $-$

G indicates $*$

H indicates $[]$

44. Which of the following is false?

- (a) $(5E7)A(4E3)A(1E2)$
(b) $(5E6)A(6E12)A(13E6)$
(c) $(12H3)C(40H10)C(60H15)$
(d) all of these are false

45. Calculate $(32H(2H(6H3)))$

- (a) 16 (b) 32
(c) 8 (d) none of these

46. Calculate $5E3F4G6H2$

- (a) 1.5 (b) 1
(c) -4 (d) none of these

Answer Key

- | | | | |
|--------|---------|---------|---------|
| 1. (a) | 2. (b) | 3. (c) | 4. (b) |
| 5. (a) | 6. (c) | 7. (c) | 8. (d) |
| 9. (d) | 10. (b) | 11. (d) | 12. (d) |

13. (a)	14. (b)	15. (b)	16. (c)
17. (a)	18. (b)	19. (a)	20. (a)
21. (a)	22. (d)	23. (b)	24. (c)
25. (b)	26. (b)	27. (d)	28. (c)
29. (d)	30. (d)	31. (b)	32. (c)
33. (d)	34. (d)	35. (b)	36. (c)
37. (b)	38. (a)	39. (c)	40. (a)
41. (b)	42. (b)	43. (b)	44. (b)
45. (b)	46. (c)		

Solutions

- The expression will become $5 - 8 \div 25 \div 5 + 40$. Using the BODMAS rule we will get:
 $5 - 40 + 40 = 5$. Hence, option (a) is correct.
- Looking at option (b), we will get, $1 - 2 + 6 \div 3 \div 8$ becomes $1 \div 2 - 6 \div 3 + 8 = 8$. Hence, option (b) is the correct answer.
- Option (c) gives us $6 - 4 \div 2 \div 2 + 1 = 3$. Hence, this is correct.
- $(1 + 2 - 3 \div 1 \div 4) / (4 + 5 - 4 \div 2 \div 1) \div (1 - 2 \div 3 \div 1 + 4) / (4 - 5 \div 4 \div 2 + 1) = -1/-5 = 1/5$. Hence, (b) is the answer.
- $(4 + 3 - 5 \div 1 \div 4) \div (5 + 2 - 3 \div 1 \div 4) = (4 - 3 \div 5 \div 1 + 4) \div (5 - 2 \div 3 \div 1 + 4) = -7/3$. Hence, option (a) is the answer.
- $6a7b8c8d2 = 6 + 7 - 8 \div 8 \div 2 = -19$. Hence, (c) is the answer.
- $(8c7)c(7a5)b(6d3)d(3b2)$ becomes $56 \div 12 - 2 \div 1 = 670$. Option (c) is the answer.
- The expression contains a division by 0, hence is undefined. Option (d) is the answer.
- None of these, i.e. option (d) is correct.
- The given expression will become $1 + 3 \div 2 \div 8 - 4 = 9$. Option (b) is the answer.
- Checking each of the four options we will get none of these the answer. Hence, option (d) is the answer.
- Option (d) becomes correct.
- If the signs are changed according to the first option the equation is satisfied. Hence, option (a) is correct.
- If the signs are changed according to the second option the equation is satisfied. Hence, option (b) is correct.
- Insertion of $\div, \div, \div$ in that order will make $12 \div 4 \div 2 \div 1 = 24$. Hence, option (b) is correct.
- $40 + 20 - 30 \div 6 = 60 - 5 = 55$. Hence, a, b, d. Option (c) is correct.
- $12 \div 8 \div 4 - 2 + 1$ would mean $12 + 8 \div 4 \div 2 - 1 = 12 + 4 - 1 = 15$. Hence, the order given

in option (a) is correct.

18. Option (b) is correct.

Solutions 19 to 21:

It is clear that the + sign means $\square$. Hence,

19. $182 + 13$ would give us a value of 14. Hence, (a) is the answer.

20. $50/5 = 10$. Hence, (a) is the answer.

21. $10/2.5 = 4$. Hence, correct option is (a).

Solutions 22 to 25:

The relationship that is defined through $a \nless b = \sqrt{(a^2 + b^2)}$

Thus, $3 \nless 4 = \sqrt{25} = 5$ and $5 \nless 12 = \sqrt{(25 + 144)} = 13$.

22. $7 \nless 24 = \sqrt{625} = 25$. Hence, option (d) is the answer.

23. $8 \nless 9 = \sqrt{(64 + 81)} = \sqrt{145}$. Hence, option (b) is the answer.

24. The required value will be got by the square root of the difference between 41^2 and 9^2 $\nless$ $1681 - 81 = 1600$. Hence, the required answer is 40. Correct answer is option (c).

25. The required value would be square root of $61 + 9 = \sqrt{70}$. Hence, option (b) is the answer.

26. yPz means that y is less than z and zNa means $z = a$. Thus, y is less than a $\nless$ yPa . Option (b) is correct.

27. $10a$ is greater than $6b$. and $12b$ is greater than $20c$ $\nless$ $6n$ is greater than $10c$. Thus $10a$ is greater than $10c$ or a is greater than c . Option (d) is correct.

28. a is negative and $b + 2$ is less than a implies that b must be below -2 . Hence, option (c) is correct.

29. Nothing can be said about the relationships between s , u or v or for that matter about u and v . Hence, cannot be determined. The correct answer is option (d).

30. Since the modulus value is always positive, all the three, i.e. the first, second and third relationships are possible. Hence, option (d) is correct.

31. Option (b) is correct since we will get $10 + 4 = 14$.

32. $11 - 1.5 = 9.5$. Option (c) is correct.

33. $(-15)(-7) = 105$. Hence, option (d) is correct.

34. It can be seen that none of these is correct. Hence, (d) is the answer.

35. The surface area of a cuboid box is equal to twice the areas of each of the sides. Hence, option (b) is correct.

36. The correct answer is option (c).

37. $41^2 - 85^2 = 1681 - 7225 = -5544$. Hence, option (b) is correct answer.

38. $(-40)^2 = 1600$. Hence, option (a) is correct answer.
39. The given expression tells us that $(A - B)^2 = (A + B)^2$. This can only occur when $2AB = -2AB = 0$. Hence, option (c) is correct.
40. $7^2 = 49$. Hence, correct answer is option (a).
41. $16^2 = 256$. Hence, correct answer is option (b).
42. The maximum value will be obtained when we use multiplication between 2 to 7 and addition between 1 and 2. Hence, option (b) is the answer.
43. The minimum value will be got if we use a multiplication between 1 and 2 and addition between 2, 3, and 4. The value will be $1 \times 2 + 3 + 4 = 9$. Hence, option (b) is the answer.
44. It can be seen that options 1 and 3 are correct, but option (b) is wrong. Hence, option (b) is the correct answer.
45. $32/1 = 32$. Hence, option (b) is correct.
46. $5 + 3 - 12 = -4$. Hence, option (c) is correct.