Mixed operations involving +, −, ×, and ÷

Till now we have solved problems involving only one type of operation, that is, one of the following: addition, subtraction, division, and multiplication. But what do we do if a problem involves two or more operations together? Consider the following problem:

Mixed operations

1st Case	2nd Case
16 − 6 + 2 − 3	16 − 6 + 2 − 3
= 10 + 2 − 3	= 16 − 8 − 3
= 12 − 3	= 8 − 3
= 9	= 5

When a problem involves all the operations namely, +, − , × , and ÷, then there is an agreed formula denoted by 'DMAS', which mathematicians follow. In 'DMAS', D stands for division, M for multiplication, A for addition, and S for subtraction. DMAS represents the order of operations.

For example, consider the following cases

(a) Simplify: 5 + 4 × 3 − 9 ÷ 3

In the above example, all the four operations are there, so we must use DMAS rule, as shown below: 5 + 4 × 3 − 9 ÷ 3
= 5 + 4 × 3 − 3 (Division: 9 ÷ 3 = 3)
= 5 + 12 − 3 (Multiplication: 4 × 3 = 12)
= 17 − 3 (Addition: 5 + 12 = 17)
= 14 (Subtraction: 17 − 3 = 14)

(b) Simplify: 7 × 3 − 4 + 60 ÷ 10

In this example too, all the four operations are there, hence, to simplify this we must use DMAS rule. 7 × 3 − 4 + 60 ÷ 10
= 7 × 3 − 4 + 6 (Division: 60 ÷ 10 = 6)
= 21 − 4 + 6 (Multiplication: 7 × 3 = 21)
= 27 − 4 (Addition: 21 + 6 = 27)
= 23 (Subtraction: 27 − 4 = 3)

(c) Simplify: 7 + 3 × 4 – 3

In the above example, the three operations involved are +, – , and ×. To solve this problem, we first multiply the numbers, then we go for addition, and at the end we subtract.

7 + 3 × 4 – 3
= 7 + 12 – 3 (Multiplication: 3 × 4 = 12)
= 19 – 3 (Addition: 7 + 12 = 19)
= 16 (Subtraction: 19 – 3 = 16)

(d) Simplify: 16 – 6 ÷ 2 + 8

In the above example, the three operations involved are +, – , and ÷. To solve this problem, we first divide, then add, and at the end subtract the number. 16 – 6 ÷ 2 + 8
= 16 – 3 + 8 (Division: 6 ÷ 2 = 3)
= 24 – 3 (Addition: 16 + 8 = 24)
= 21 (Subtraction: 24 – 3 = 21)

(e)Simplify: 24 - 4 ÷ 2 x 3

24 - 4 ÷ 2 x 3
= 24 - 2 x 3 [Performing division - 4 ÷ 2 = -2]
= 24 - 6 [Performing multiplication 2 x 3 = 6]
= 18. [Performing subtraction 24 – 6 = 18]

(f) Simplify: 48 ÷ 8 x 3 + 2

48 ÷ 8 x 3 + 2
= 6 x 3 + 2 [Performing division 48 ÷ 8 = 6]
= 18 + 2 [Performing multiplication 6 x 3 = 18]
= 20. [Performing addition 18 + 2]

(g) Simplify: (-20) + (-8) ÷ (-2) x 3

(-20) + (-8) ÷ (-2) x 3
= (-20) + 4 x 3 [Performing division (-8) ÷ (-2) = 8 ÷ 2 = 4]
= (-20) + 12 [Performing multiplication 4 x 3 = 12]
= - 8. [Performing subtraction -20 + 12 = -8]

(h) Simplify: 52 - (2 x 6) + 17

52 - (2 x 6) + 17
= 52 – 12 + 17
= 52 + 17 - 12
= 57

(i) Simplify: (-5) - (-48) ÷ (-16) + (-2) x 6

(-5) - (-48) ÷ (- 16) + (-2) x 6
= (-5) - 3 + (-2) x 6 [Performing division (-48) ÷ (- 16) = 48 ÷ 16 = 3]
= (-5) - 3 + (-12) [Performing multiplication (-2) x 6 = -12]
= -5 - 3 -12
= -8 - 12. [Performing addition -5 - 3 = -8]
= -20 [Performing addition -8 - 12 = -20]

(j) 42 ÷ 2 + a × 3 − 22 = 8

42 ÷ 2 + a × 3 − 22 = 8
Using DMAS, we will first work on the division
21 + a × 3 – 22 = 8
Next, we will do the rearrangement of terms, followed by subtraction
a 3 – 22 + 21 = 8
a × 3 – 1 = 8
Taking -1 to the other side
a × 3 = 8 + 1
a × 3 = 9
a = 9/3
a = 3

The BODMAS Hierarchy

Letter	Operation	Description
B	**Brackets**	Solve everything inside ( ), { }, or [ ] first.
O	**Orders**	Solve exponents, powers, or roots (e.g., 3^2, $\sqrt{16}$).
D	**Division**	Perform division.
M	**Multiplication**	Perform multiplication.
A	**Addition**	Perform addition.
S	**Subtraction**	Perform subtraction.

Crucial Tips for Success

- **Equal Priority:** Division and Multiplication hold the *same* level of importance. When you have both in an expression, solve them **from left to right**, exactly as they appear.
- **The Same for A and S:** Similarly, Addition and Subtraction have the same priority. Solve them **from left to right**.
- **Other Acronyms:** You may hear of **BIDMAS** (where 'I' stands for Indices) or **PEMDAS** (used in the US, where 'P' stands for Parentheses and 'E' for Exponents). These follow the exact same mathematical logic; only the terminology differs.

1) 2 x (9 x 4 – 35) + 27
a) 29 b) 31
c) 23 d) 23

2) (8 x 5) + 21 + 9 x 6
a) 116 b) 113
c) 115 d) 117

3) 12 + 39 x (5 x 1) – 3
a) 206 b) 204
c) 209 d) 207

4) 7 x 4 +(26 + 29) x 7
a) 213 b) 214
c) 413 d) 432

5) 31 – 20 + (35 + 6) x 7
a) 228 b) 342
c) 256 d) 298

6) 1 x 9 x 10 – 16 + 5
a) 79 b) 39
c) 89 d) 45

7) 10 + (4 x 4 + 39) -38
a) 23 b) 35
c) 27 d) 34

8) 28 + 13 x 3 – (25 + 10)
a) 33 b) 32
c) 34 d) 35

9) 40 + 26 +11 – (4 – 1)
a) 34 b) 74
c) 35 d) 54

10) 28 – 15 + 4 x (5 x 7)
a) 143 b) 134
c) 153 d) 155

11) 7 x 4 x (8 x 5 – 27)
a) 364 b) 356
c) 357 d) 266

12) 35 – 11 + 3 x (9 + 36)
a) 129 b) 139
c) 159 d) 169

13) (16 + 5) + 18 x 4 x 10
a) 746 b) 741
c) 756 d) 743

14) 10 x 8 (1 + 40) – 34
a) 3246 b) 3456
c) 3420 d) 3244

15) (6 x 3) x 7 x 9 + 4
a) 1138 b) 1143
c) 1156 d) 1178

16) 9 x 1 x (6 + 4) + 11
a) 109 b) 201
c) 190 d) 101

17) $\sqrt{12 \times 145 \div 6 + 34}$
a) 12 b) 13
c) 18 d) 19

18) 78 – [5 + 3 of (25 – 2 x 10)]
a) 58 b) 68
c) 78 d) 48

19) 25 – 48 ÷ 6 + 12 x 2
a) 44 b) 41
c) 34 d) 32

20) 6 + 3 of 6 ÷ 3 x 7 – 5
a) 43 b) 34
c) 45 d) 38

21) 6 + 18 of 3 ÷ 9
a) 13 b) 16
c) 12 d) 15

22) 6 + 3 of 7 – 5
a) 33 b) 44
c) 66 d) 22

23) 20 + 21 ÷ 3 x 2
a) 64 b) 34
c) 54 d) 4

24) 7 (105 ÷ 225 ÷ 15)
a) 0.217 b) 0.215
c) 0.213 d) 0.210

25) – 16 + 14 – 18 + 12

a) - 3 b) - 9
c) 0 d) - 8

26) - 84 ÷ 12 ÷ 3 + 24

a) $\frac{65}{3}$ b) $\frac{65}{4}$
c) $\frac{65}{2}$ d) $\frac{65}{6}$

27) -16 ÷ 4 x 2 + 2 – 2

a) - 8 b) - 5
c) - 4 d) - 1

28) 13 x 28 + 38 ÷ 19 – 3

a) 345 b) 365
c) 366 d) 363

29) 21 x 13 + 16 x 18

a) 661 b) 461
c) 561 d) 331

30) 45 + 3 {34 - $\overline{18 - 14}$} ÷ 3

a) 78 b) 75
c) 57 d) 34

31) (4 + 7) x 3

a) 33 b) 55
c) 44 d) 77

32) 25 + (3 x 8)

a) 89 b) 0
c) 49 d) 59

33) 12 – (2 x 5)

a) - 2 b) 2
c) 3 d) - 3

34) 10 ÷ (17 – 15)

a) 6 b) 5
c) 7 d) - 5

35) 3 x (12 – 4)

a) 23 b) 24
c) 34 d) 54

36) 9 – (2 x 7)

a) - 5 b) - 6
c) - 4 d_ - 1

37) (24 ÷ 6) – 10

a) - 8 b) - 4
c) - 6 d) - 10

38) (60 ÷ 10) – 8

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

39) ½ x (12 - 4)

a) 5 b) 7
c) 4 d) 2

40) (9x 6) – 42

a) 12 b) 14
c) 13 d) 19

41) 50 – (4 x 9)

a) 15 b) 17
c) 16 d) 14

42) 27 ÷ (81 ÷ 9)

a) 3 b) - 3
c) 4 d) - 4

43) (5 x 11) – (3 x 20)

a) 5 b) 6
c) - 5 d) - 6

44) (16 + 11) – (5 x 6)

a) 126 b) 156
c) -3 d) 177

45) (30 – 12) x (20 ÷ 10)

a) 26 b) 56
c) 67 d) 36

46) (8 x 6) ÷ (1.5 + 2.5)

a) 11 b) 12
c) 14 d) 13

47) (2^3 + 5 x 8)

a) 48 b) 38
c) 58 d) 98

48) (2 x 6^3 + 6^3 + 1^2 + 2)

a) 751 b) 451
c) 651 d) 771

49) (4 ÷ 1) x 1

a) 5 b) 4
c) 5 d) 9

50) (6 x 3) x 7

a) 116 b) 136
c) 126 d) 146

51) (6 – 5^2) + 3^3 x 2

a) 33 b) 35
c) 56 d) 59

52) (1 – 6 – 3)

a) - 9 b) - 8
c) - 5 d) - 4

53) 5^2 + 9 + (2^2 x 1^3 x 5)

a) 67 b) 67
c) 54 d) 69

54) (7^2 ÷ 1 – 8) + 7^3 + 4

a) 688 b) 488
c) 788 d) 388

55) (9^2 – 3) + 9

a) 87 b) 47
c) 37 d) 57

56) (3^3 + 9) x (1 + 9 – 2)

a) 288 b) 980
c) 345 d) 278

57) 9 + 9 + (6^2 -6) x 4

a) 128 b) 138
c) 148 d) 137

58) 5 –(3 – 3) + 6^3 ÷ 1

a) 235 b) 761
c) 221 d) 561

59) 6 + 1 x (9 – 4) + 6

a) 12 b) 17
c) 14 d) 16

60) (6 ÷ 6) x (2^2 + 8) ÷ 1

a) 15 d) 17
c) 13 d) 12

61) 12 (4 + 12)

a) 192 b) 243
c) 165 d) 167

62) 5 x 2 + (37 + 3 x 5) + 37

a) 56 b) 99
c) 55 d) 89

63) (20 + 30 + 14) + 21 + 1 x 2

a) 87 b) 57
c) 55 d) 28

64) (31 – 6 – 16) + 14 x 5 + 6

a) 56 b) 78
c) 57 d) 85

65) (30 – 11) – 16 + 30 +17 – 22

a) 22 b) 28
c) 39 d) 37

66) (18 – 7) + 20 -8 + 24 x 1

a) 88 b) 47
c) 67 d) 38

67) 5 + 26 x 2 + (40 x 5 + 14)

a) 277 b) 271
c) 684 d) 621

68) 9 x 8 x 10 – (37 + 4) + 2

a) 681 b) 342
c) 177 d) 955

69) 29 + 37 + (24 x 3 + 37) + 40

a) 217 b) 176
c) 215 d) 351

70) 7 x 1 x (8 x 6) + 14 x 8

a) 449 b) 448
c) 567 d) 388

71) 4 + (25 x 1 – 25) + 18 + 24

a) 36 b) 28
c) 27 d) 46

72) 34 – 10 x 2 + 23 x (4 + 5)

a) 276 b) 265
c) 221 d) 216

73) 7 x (7 + 12 x 7 + 27 + 28)

a) 9810 b) 1088
c) 1765 d) 1022

74) 15 + (26 – 12) – 8

a) 11 b) 21
c) 31 d) 90

75) (12 + 4) – 17 + 5

a) 4 b) 3
c) 2 d) 9

76) 76 + [15 ÷ (6 ÷ 2 + 2) + 1]

a) 80 b) 48
c) 47 d) 10

77) 6 x {3 + [(9 x 3 – 22) + 2]}

a) 56 b) 60
c) 37 d) 20

78) {12 + [8 x (19 – 5) – 10]}

a) 244 b) 543
c) 176 d) 114

79) 15 + {– [(3 x 8 – 21) + 2]}

a) 20 b) 65
c) 26 d) 35

80) 54 + {16 – [(4 x 4 – 10) + 3]}

a) S44 b) 34
c) 54 d) 61

81) [49 – (6 x 6 – 15) + 7]

a) 22 b) 71
c) 31 d) 35

82) (47 -2 + 5) ÷ (16 ÷ 8)

a) 22 b) 45
c) 25 d) 27

83) 17 + {[26 – (15 -8) + (8 – 4)] – 9}

a) 33 b) 26
c) 44 d) 32

84) 45 + {42 – [18 + (9 – 5) + 5]}

a) 60 b) 50
c) 40 d) 90

85) 10 – {[(5 + 5) – 3] – 2}

a) 7 b) 3
c) 5 d) 0

86) {[(50 – 20) – 30] – 20} + 10

a) - 10 b) - 13
c) - 20 d_ - 17

87) {76 – [42 + (12 – 6) + 3] – 10} – 2

a) 14 b) 13
c) 16 d) 17

88) 32 – [(12 – 6) + 8]

a) 18 d) 28
c) 37 d) 27

89) 25 + [12 + (8 – 5) + 2]

a) 76 b) 38
c) 89 d) 42

90) (9 + 8) + (16 – 9)

a) 22 b) 24
c) 78 d) 37

91) 5 of 4(3) ÷ 2 X 5 – 4 + 3(2)

a) 231 b) 156
c) 231 d) 152

92) 2 – [3 – {6 – { (5 – $\overline{4 - 3}$)}]

a) 0 b) 1
c) 2 d) 5

93) 10 ½ - [8 ½ + {6 – (7 – $\overline{6 - 4}$)}]

a) 0 b) 2
c) 1 d) 9

94) 118 – [121 ÷(11×11) – (- 4) – {3 – $\overline{9 - 2}$}]

a) 109.9 b) 108.5
c) 102.5 d) 107.3

95) 36 – [18 – {14 – (15 – 4 ÷ 2 X 2)}]

a) 22 b) 34
c) 21 d) 23

96) 222 - $\frac{1}{3}$ of {42 + 56 – $\overline{8 + 9}$)} + 108

a) 280 b) 703
c) 303 d) 90

97) 27 - [38- {46 – (15 –$\overline{13 - 2}$)}

a) 41 b) 31

c) 51 d) 91

98) 48 – [18- {16 – (5 – $\overline{4 - 1}$)}]

a) 55 b) 66

c) 33 d) 44

99) 54 ÷ 66 ÷ 33

a) 0.034 b) 0.024

c) 0.056 d) 0.067

100) $(2^3 + 5 \times 8)$

a) 48 b) 67

c) 44 d) 89