

Simplification

VBODMAS

'VBODMAS' (Vinculum - Bracket - Of - Division - Multiplication - Addition - Subtraction) rule should be applied for solving problems involving one or more mathematical operations like multiplication, division, addition, subtraction etc. Such problems are solved in the order of vinculum, bracket, of, division, multiplication, addition and subtraction. Remember 'Of' in VBODMAS means multiplication.

Solved Examples

1. $45 - 4 \times 6 - 5 + 14 \div 7 = ?$

$$45 - 4 \times 6 - 5 + 14 \div 7 = 45 - 24 - 5 + 2 = 18$$

2. $21 \div 3 (10 - 3) - 20 + 1 = ?$

$$= 21 \div 3 \times 7 - 20 + 1$$

$$= 7 \times 7 - 20 + 1$$

$$= 49 - 20 + 1 = 30$$

3. $3 \text{ of } \frac{4}{5} \div \frac{4}{5} + \frac{1}{6} = ?$

$$3 \text{ of } \frac{4}{5} \div \frac{4}{5} + \frac{1}{6} = \frac{12}{5} \div \frac{4}{5} + \frac{1}{6}$$

$$= \frac{12}{5} \times \frac{5}{4} + \frac{1}{6} = 3 + \frac{1}{6} = 3\frac{1}{6}$$

$$3 \div \left[(8 - 5) \div \left\{ (4 - 2) \div \left(2 + \frac{8}{13} \right) \right\} \right] = ?$$

4. $= 3 \div \left[3 \div \left\{ 2 \div \frac{34}{13} \right\} \right]$

$$= 3 \div \left[3 \div \left\{ 2 \times \frac{13}{34} \right\} \right] =$$

$$3 \div \left[3 \div \frac{13}{7} \right] = 3 \div \left[\frac{3 \times 17}{13} \right]$$

$$= \frac{3 \times 13}{3 \times 17} = \frac{13}{17}$$

5. $\frac{(4 + 4 + 4) \div 4}{6 + 6 + 6 \div 6} = ?$

$$\frac{(4 + 4 + 4) \div 4}{6 + 6 + 6 \div 6} = \frac{12 \div 4}{6 + 6 + 1} = \frac{3}{13}$$

SIMPLIFICATION USING IDENTITIES

1. $a \times (b + c) = a \times b + a \times c$

2. $(a + b)^2 = a^2 + 2ab + b^2$

3. $(a - b)^2 = a^2 - 2ab + b^2$
4. $(a + b)^2 = (a - b)^2 + 4ab$
5. $(a - b)^2 = (a + b)^2 - 4ab$
6. $(a - b)(a + b) = a^2 - b^2$
7. $(a + b)^2 = a^3 + 3ab(a + b) + b^3$
8. $(a - b)^3 = a^3 - 3ab(a - b) - b^3$
9. $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
10. $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

11. $\frac{a^3 - b^3}{a^2 + ab + b^2} = a - b$

12. $\frac{a^3 + b^3}{a^2 - ab + b^2} = a + b$

13. $\frac{a^2 - ab + b^2}{a^3 + b^3} = \frac{1}{a + b}$

14. $\frac{a^2 + ab + b^2}{a^3 - b^3} = \frac{1}{a - b}$

15. $(a + b)^2 + (a - b)^2 = 2(a^2 + b^2)$
16. $(a + b)^2 - (a - b)^2 = 4ab$