

CLASS 8 · HOTS · OLYMPIAD PREPARATION · SHORT NOTES

Chapter 9: HOTS: We Distribute, Yet Things Multiply (Class 8)

Topic-wise short notes with solved examples

Higher order thinking questions on algebraic expressions and identities for Class 8: multiplying brackets, the identities for squares, quick calculations and factorising, each with a full solution.

1 Solved HOTS questions

- Identities: $(a + b)^2 = a^2 + 2ab + b^2$, $(a - b)^2 = a^2 - 2ab + b^2$ and $a^2 - b^2 = (a - b)(a + b)$. Multiply two brackets by distributing every term of the first over every term of the second. Use identities to calculate squares and products quickly.

Example 1.1 Expand $(3x + 2)(x - 5)$.

SOLUTION

$$3x \times x + 3x \times (-5) + 2 \times x + 2 \times (-5) = 3x^2 - 15x + 2x - 10.$$

$$3x^2 - 13x - 10$$

Example 1.2 Expand $(2a + 3b)^2$.

SOLUTION

$$(2a)^2 + 2 \times 2a \times 3b + (3b)^2.$$

$$4a^2 + 12ab + 9b^2$$

Example 1.3 Use an identity to find 103^2 and 98×102 .

SOLUTION

$$103^2 = (100 + 3)^2 = 10\,000 + 600 + 9 = 10\,609.$$

$$98 \times 102 = (100 - 2)(100 + 2) = 100^2 - 2^2 = 10\,000 - 4.$$

10 609 and 9996

Example 1.4 If $a + b = 7$ and $ab = 10$, find $a^2 + b^2$ and $(a - b)^2$.

SOLUTION

$$a^2 + b^2 = (a + b)^2 - 2ab = 49 - 20 = 29.$$

$$(a - b)^2 = a^2 + b^2 - 2ab = 29 - 20 = 9.$$

29 and 9

Example 1.5 Factorise $x^2 - 14x + 49$ and $25y^2 - 16$.

SOLUTION

$$x^2 - 14x + 49 = x^2 - 2 \times 7 \times x + 7^2 = (x - 7)^2.$$

$$25y^2 - 16 = (5y)^2 - 4^2 = (5y - 4)(5y + 4).$$

$$(x - 7)^2 \text{ and } (5y - 4)(5y + 4)$$

MathSetu