

CLASS NOTES

Class: VIII

Topic: CH – 14, "FACTORISATION"

Subject: MATHEMATICS

** Methods of Factorisations of Algebraic Expressions:

- 1) Factorisation by common factors
- 2) Factorisation by regrouping terms
- 3) Factorisation by algebraic identities: Let's understand this –

<ul style="list-style-type: none"> • Algebraic identities can be used for factorisation : • $(a + b)^2 = a^2 + 2ab + b^2$ • $(a - b)^2 = a^2 - 2ab + b^2$ • $(a + b)(a - b) = a^2 - b^2$ • $(x + a)(x + b) = x^2 + (a + b)x + ab$ 	<ul style="list-style-type: none"> • Examples : • $(2x + 3)^2 = (2x)^2 + 2(2x)(3) + (3)^2 = 4x^2 + 12x + 9$ • $(2x - 3)^2 = (2x)^2 - 2(2x)(3) + (3)^2 = 4x^2 - 12x + 9$ • $(2x + 3)(2x - 3) = (2x)^2 - (3)^2 = 4x^2 - 9$
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EXERCISE – 14.2

Q1. SOLUTION:

<p>(i) $a^2 + 8a + 16$ $= a^2 + 2 \times a \times 4 + 4^2$ $= (a + 4)^2$ $= (a + 4)(a + 4)$</p> <p>[Using: $a^2 + 2ab + b^2 = (a + b)^2$]</p>	<p>(ii) $p^2 - 10p + 25$ $= (p)^2 - 2 \times p \times 5 + (5)^2$ $= (p - 5)^2$ $= (p - 5)(p - 5)$</p> <p>[$(a - b)^2 = a^2 - 2ab + b^2$]</p>	<p>(iii) $25m^2 + 30m + 9$ $= (5m)^2 + 2 \times 5m \times 3 + (3)^2$ $= (5m + 3)^2$ $= (5m + 3)(5m + 3)$</p> <p>[Using: $a^2 + 2ab + b^2 = (a + b)^2$]</p>
<p>(vi) $121b^2 - 88bc + 16c^2$ $= (11b)^2 - 2(11b)(4c) + (4c)^2$ $= (11b - 4c)^2$ $(a - b)^2 = a^2 - 2ab + b^2$</p>	<p>(vii) $(l + m)^2 - 4lm$ $= l^2 + 2lm + m^2 - 4lm$ $= l^2 - 2lm + m^2$ $= (l - m)^2$ $= (l - m)(l - m)$</p> <p>$(a - b)^2 = a^2 - 2ab + b^2$</p>	<p>(viii) $a^2 + 2a^2b^2 + b^2$ $= (a^2)^2 + 2(a^2)(b^2) + (b^2)^2$ $= (a^2 + b^2)^2$</p> <p>Using: $a^2 + 2ab + b^2 = (a + b)^2$</p>

Q2. SOLUTION:

<p>(i) $4p^2 - 9q^2$ $= (2p)^2 - (3q)^2$ $= (2p - 3q)(2p + 3q)$ $\therefore a^2 - b^2 = (a + b)(a - b)$</p>	<p>(ii) $63a^2 - 112b^2$ $= 7(9a^2 - 16b^2)$ $= 7[(3a)^2 - (4b)^2]$ $= 7(3a - 4b)(3a + 4b)$</p>	<p>(iii) $49x^2 - 36 = (7x)^2 - (6)^2$ $= (7x - 6)(7x + 6)$ $\therefore a^2 - b^2 = (a + b)(a - b)$</p>
<p>(iv) $16x^5 - 144x^3 =$ $16x^3(x^2 - 9)$ $= 16x^3[(x)^2 - (3)^2]$</p>	<p>(vi) $9x^2y^2 - 16 = (3xy)^2 - (4)^2$ $= (3xy - 4)(3xy + 4)$</p>	<p>(viii) $25a^2 - 4b^2 + 28bc - 49c^2$ $= 25a^2 - (4b^2 - 28bc + 49c^2)$</p>

$= 16x^3(x - 3)(x + 3)$ $[\because a^2 - b^2 = (a + b)(a - b)]$ (v) $(l + m)^2 - (l - m)^2$ $= (l + m) - (l - m) [(l + m) + (l - m)]$ $[\because a^2 - b^2 = (a + b)(a - b)]$ $= (l + m - l + m)(l + m + l - m)$ $= (2m)(2l) = 4ml$	$[\because a^2 - b^2 = (a + b)(a - b)]$ (vii) $(x^2 - 2xy + y^2) - z^2$ $= (x - y)^2 - z^2$ $= (x - y - z)(x - y + z)$	$= (5a)^2 - (2b - 7c)^2$ $= [5a - (2b - 7c)][5a + (2b - 7c)]$ $= (5a - 2b + 7c)(5a + 2b - 7)$
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Q3. SOLUTION:

(i) $ax^2 + bx = x(ax + 5)$ (ii) $7p^2 + 21q^2 = 7(p^2 + 3q^2)$	(v) $(lm + l) + m + 1$ $= l(m + 1) + (m + 1)$ $= (m + 1)(l + 1)$	(viii) $10ab + 4a + 5b + 2$ $= 2a(5b + 2) + 1(5b + 2)$ $= (5b + 2)(2a + 1)$
(iii) $2x^3 + 2xy^2 + 2xz^2 = 2x(x^2 + y^2 + z^2)$	(vi) $y(y + z) + 9(y + z) = (y + z)(y + 9)$	(ix) $6xy - 4y + 6 - 9x$ $= 6xy - 4y - 9x + 6$ $= 2y(3x - 2) - 3(3x - 2)$ $= (3x - 2)(2y - 3)$
(iv) $am^2 + bm^2 + bn^2 + an^2$ $= m^2(a + b) + n^2(a + b)$ $= (a + b)(m^2 + n^2)$	(vii) $5y^2 - 20y - 8z + 2yz$ $= 5y^2 - 20y + 2yz - 8z$ $= 5y(y - 4) + 2z(y - 4)$ $= (y - 4)(5y + 2z)$	

Q4. SOLUTION:

(i) $a^2 - b^2$ $= (a^2)^2 - (b^2)^2$ $= (a^2 + b^2)(a^2 - b^2)$ $= (a^2 + b^2)(a + b)(a - b)$ Using: $(a^2 - b^2) = (a + b)(a - b)$	(ii) $p^2 - 81$ $= (p^2)^2 - (9)^2$ $= (p^2 - 9)(p^2 + 9)$ $= [(p)^2 - (3)^2](p^2 + 9)$ $= (p - 3)(p + 3)(p^2 + 9)$ Using: $(a^2 - b^2) = (a + b)(a - b)$	(iii) $x^2 - (y + z)^2$ $= (x^2)^2 - [(y + z)^2]^2$ $= [x^2 - (y + z)^2][x^2 + (y + z)^2]$ $= (x - y - z)(x + y + z)[x^2 + (y + z)^2]$ $= (x - y - z)(x + y + z)[x^2 + y^2 + z^2 + 2yz]$ Using: $(a^2 - b^2) = (a + b)(a - b)$
(iv) $x^2 - (x - z)^2$ $= (x^2)^2 - [(x - z)^2]^2$ $= [x^2 - (x - z)^2][x^2 + (x - z)^2]$ $= [x - (x - z)][x + (x - z)]$ $[x^2 + (x - z)^2]$ $= z(2x - z)(x^2 + x^2 - 2xz + z^2)$ $= z(2x - z)(2x^2 - 2xz + z^2)$ $= z(2x - z)(2x^2 - 2xz + z^2)$	(v) $a^2 - 2ab + b^2$ $= (a^2)^2 - 2 \times a^2 \times b^2 + (b^2)^2$ $= (a^2 - b^2)^2$ $= (a^2 - b^2) \times (a^2 - b^2)$ Using: $(a^2 - b^2) = (a + b)(a - b)$ $= [(a + b)(a - b)][(a + b)(a - b)]$ $= (a + b)^2(a - b)^2$ $= (a + b)(a + b)(a - b)(a - b)$	

Q5. SOLUTION:

$(i) p^2 + 6p + 8$ $= p^2 + (4 + 2)p + 8$ $= p^2 + 4p + 2p + 8$ $= p(p + 4) + 2(p + 4)$ $= (p + 4)(p + 2)$	$(ii) q^2 - 10q + 21$ $= q^2 - (7 + 3)q + 21$ $= q^2 - 7q - 3q + 21$ $= q(q - 7) - 3(q - 7)$ $= (q - 7)(q - 3)$	$(iii) p^2 + 6p - 16$ $= p^2 + (8 - 2)p - 16$ $= p^2 + 8p - 2p - 16$ $= p(p + 8) - 2(p + 8)$ $= (p + 8)(p - 2)$
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NOTE: The students are advised to write this content in their Maths fair notebook.

ASSIGNMENT: Practice similar sums from Reference books.

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“ CONTENT ABSOLUTELY PREPARED AT HOME’

