Factorisation – Difference of Two Squares

Review: **Common factors**

Factorisation of algebraic expression often involves taking out common factors.

Ask yourself what is common to all terms ?

This may be a number, a letter or both or multiple factors.

Examples:

1. $4a + 8b \rightarrow 4(a + 2b)$

2. $2ab + 6ac \rightarrow 2a(b + 3c)$

3. $3x^2 + 6x \rightarrow 3x(x + 2)$

Try these:

1. $6xy - 12yz$

2. $5x^2 - 15xy$

3. $3x^2 y - 12xy^2$

4. $9pq + 6p^2 q$

Difference of Two Squares

Recall using FOIL:

$(x + 2)(x - 2) \rightarrow x^2 + 2x - 2x - 4 \rightarrow x^2 - 4$

Notice that the middle terms will always cancel out

whenever you have brackets of the form: $\boxed{(a + b)(a - b)} \rightarrow a^2 + 2ab - 2ab - b^2 \boxed{\rightarrow a^2 - b^2}$

Try these in your head:

1. $(p - 4)(p + 4)$

2. $(x - y)(x + y)$

3. $(a + 3)(a - 3)$

4. $(2x + 1)(2x - 1)$

5. $(3y + 2)(3y - 2)$

6. $(4y + 3)(4y - 3)$

Factorisation – Difference of Two Squares

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Factorising the difference of two squares

We can use this result to factorise expressions of the form: $(\quad)^2 - (\quad)^2$

Examples:

$$x^2 - 9 \rightarrow (x+3)(x-3)$$

$$p^2 - 25 \rightarrow (p+5)(p-5)$$

$$y^2 - 49 \rightarrow (y+7)(y-7)$$

$$x^2 - 16 \rightarrow (x+4)(x-4)$$

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Try these:

1. $a^2 - 4$
2. $x^2 - 64$
3. $p^2 - q^2$
4. $z^2 - 9$

We can even deal with slightly more complex expressions:

Examples:

$$4x^2 - 9 \rightarrow (2x+3)(2x-3)$$

$$9p^2 - 16 \rightarrow (3p+4)(3p-4)$$

$$16y^2 - 9z^2 \rightarrow (4y+3z)(4y-3z)$$

$$9a^2 - 4b^2 \rightarrow (3a+2b)(3a-2b)$$

Try these

1. $4p^2 - 25$
2. $9x^2 - 4$
3. $9p^2 - 25q^2$
4. $25a^2 - 16b^2$

Factorisation – Difference of Two Squares

Try these

1. $8p^2 - 32$

2. $12x^2 - 27$

3. $50p^2 - 32q^2$

Now for some all mixed up:

Factorise:

1. $30 - 3p^2q$

2. $6x^2 - 9x$

3. $4a^2 - 9b^2$

4. $9x^2 - y^2$

5. $a^2 - 9b^2$

6. $x^2 - 9$

7. $25x^2 - 9$

8. $9x^2 - 16$

9. $2x^2 - 6x$