4.1.3 - Factorisation I

4.1 - Algebra - Expressions

Leaving Certificate Mathematics

Higher Level & Ordinary Level

Example 1

Q. Factorise the following expression:

$$6x^2 + 12x$$

Example 1

Q.   Factorise the following expression:

$$6x^2 + 12x$$

Answer:

Example 1

Q. Factorise the following expression:

$$6x^2 + 12x$$

Answer:

$$6x^2 + 12x$$

Example 1

Q. Factorise the following expression:

$$6x^2 + 12x$$

Answer:

$$6x^2 + 12x \;=\; 6x(x$$

Example 1

Q.   Factorise the following expression:

$6x^2 + 12x$

Answer:

$$6x^2 + 12x \quad = \quad 6x(x+2)$$

Difference of Two Squares

The numbers $1, 4, 9, 16, ...$ are called **perfect squares** or just **squares**

Difference of Two Squares

The numbers $1, 4, 9, 16, ...$ are called **perfect squares** or just **squares** because: $1 = 1^2$, $4 = 2^2$, $9 = 3^2$ etc.

Difference of Two Squares

The numbers $1, 4, 9, 16, ...$ are called **perfect squares** or just **squares** because: $1 = 1^2$, $4 = 2^2$, $9 = 3^2$ etc.

Likewise, $4x^2 = (2x)^2$ and $9y^2 = (3y)^2$,

Difference of Two Squares

The numbers $1, 4, 9, 16, ...$ are called **perfect squares** or just **squares** because: $1 = 1^2$, $4 = 2^2$, $9 = 3^2$ etc.

Likewise, $4x^2 = (2x)^2$ and $9y^2 = (3y)^2$, so we say $4x^2$ and $9y^2$ are also **squares**.

Notice:

Notice:

$$(x + y)(x - y)$$

Notice:

$$(x + y)(x - y) \;=\; x(x - y) + y(x - y)$$

Notice:

$$\begin{aligned}
(x+y)(x-y) &= x(x-y) + y(x-y) \\
&= x^2 - xy + xy - y^2
\end{aligned}$$

Notice:

$$
\begin{aligned}
(x + y)(x - y) &= x(x - y) + y(x - y) \\
&= x^2 - xy + xy - y^2 \\
&= x^2 - y^2
\end{aligned}
$$

Notice:

$$\begin{aligned}
(x + y)(x - y) &= x(x - y) + y(x - y) \\
&= x^2 - xy + xy - y^2 \\
&= x^2 - y^2
\end{aligned}$$

In reverse: $x^2 - y^2 = (x + y)(x - y)$

Notice:

$$
\begin{aligned}
(x+y)(x-y) &= x(x-y) + y(x-y) \\
&= x^2 - xy + xy - y^2 \\
&= x^2 - y^2
\end{aligned}
$$

In reverse: $x^2 - y^2 = (x+y)(x-y)$ **The Difference of Two Squares**

Example 2

Q. Factorise the following expression:

$$25x^2 - 16y^2$$

Example 2

Q. Factorise the following expression:

$$25x^2 - 16y^2$$

Answer:

Example 2

Q. Factorise the following expression:

$$25x^2 - 16y^2$$

Answer:

$$25x^2 - 16y^2$$

Example 2

Q. Factorise the following expression:

$$25x^2 - 16y^2$$

Answer:

$$25x^2 - 16y^2 \;=\; (5x)^2$$

Example 2

Q. Factorise the following expression:

$$25x^2 - 16y^2$$

Answer:

$$
\begin{aligned}
25x^2 - 16y^2 &= (5x)^2 - (4y)^2 \\
&= (5x + 4y)(5x - 4y)
\end{aligned}
$$