[XBit Labs](https://xbitlabs.com) - Software Training Institute

code.xbitlabs.in - Free Coding Tutorials

Live Training Sessions

Date :	Oct-19-2024	**Board / STD**	CBSE / 8
Subject :	Mathematics	**Topic :**	Factorization

Doubts:

$$ax + bx - ay - by$$

$$x(a+b) - y(a+b)$$

$$(a+b)(x - y).$$

$$15pq + 15 + 9q + 25p$$

$15pq + 9q + 15 + 25p$

$3q(5p+3) + 5(3+5p)$

$15 \to 3 \times 5$
$9 \to 3 \times 3$

$(5p+3)(3q+5)$

$z - 7 + 7xy - xyz$

$1(z-7) + xy(7-z)$

$1(z-7) - xy(z-7)$

$(z-7)(1-xy)$

1) c ii)

No workers	Time (days)
5	10
20	x

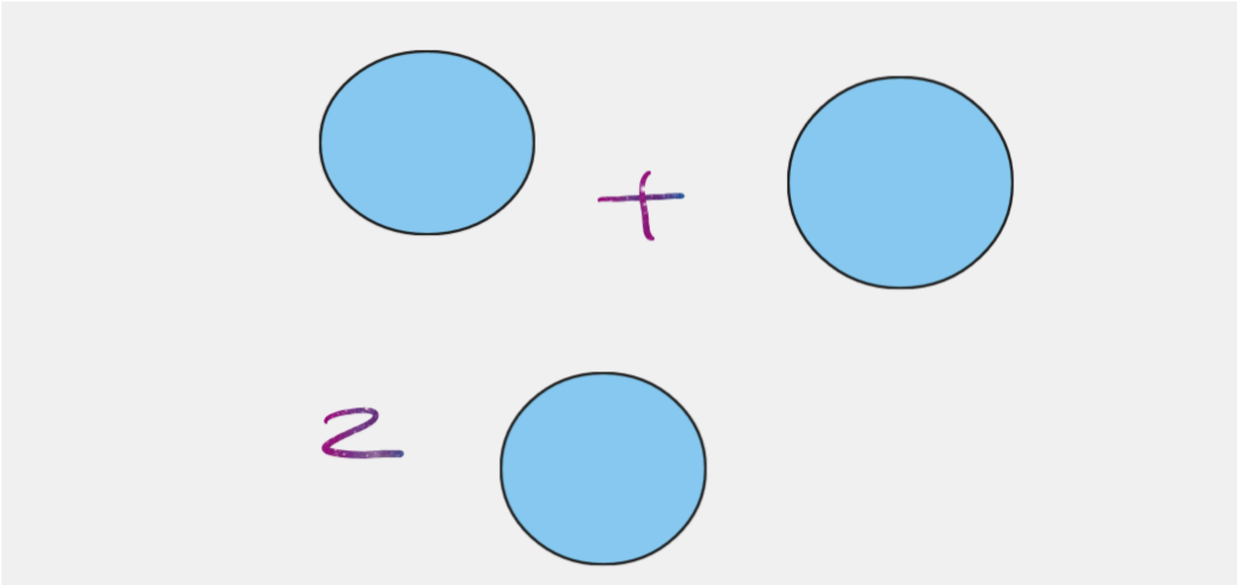
Time (hr)	distance (km)
5	500 km
3	x

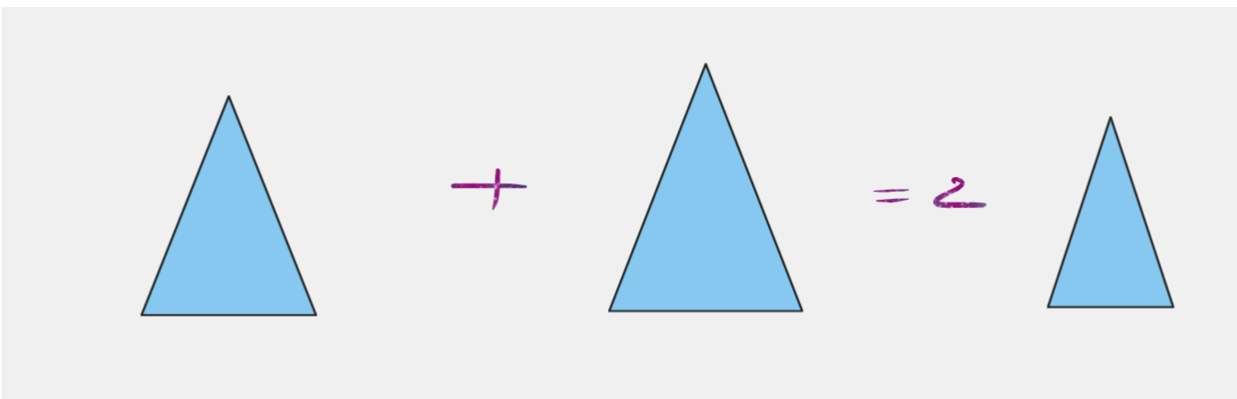
Factorization is the process of expressing an algebraic expression as the product of its factors. The three identities $(a+b)^2$, $(a-b)^2$, and $(a+b)(a-b)$ help simplify quadratic expressions into factored forms. Let's break down how factorization works with these identities.

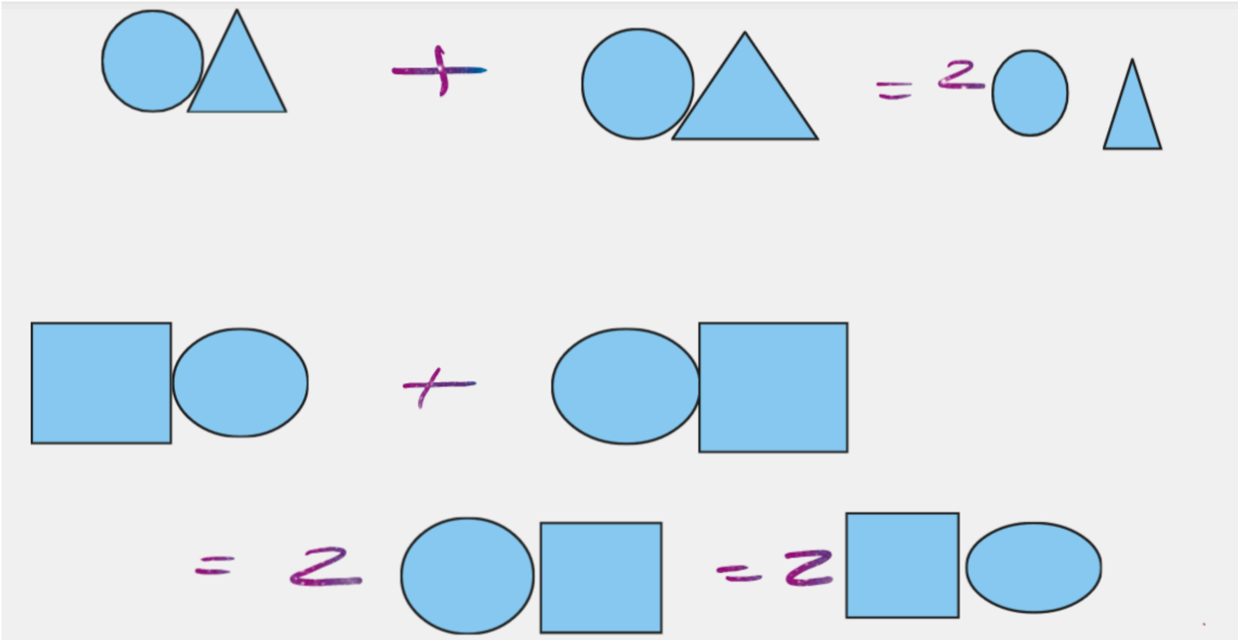
Identities:

- $(a+b)^2$ helps factor perfect square trinomials of the form $a^2+2ab+b^2$.
- $(a-b)^2$ helps factor perfect square trinomials of the form $a^2-2ab+b^2$.
- $(a+b)(a-b)$ helps factor the difference of squares of the form a^2-b^2.

$$(a+b)^2 = (a+b)\times(a+b)$$
$$= a\times(a+b) + b(a+b)$$
$$= a^2 + ab + ba + b^2$$
$$= a^2 + ab(1+1) + b^2$$
$$a^2 + ab\times 2 + b^2$$
$$= a^2 + 2ab + b^2$$


+
2


+
= 2



$$ab + ba = 2ab$$

$$ba + ab = 2ab$$

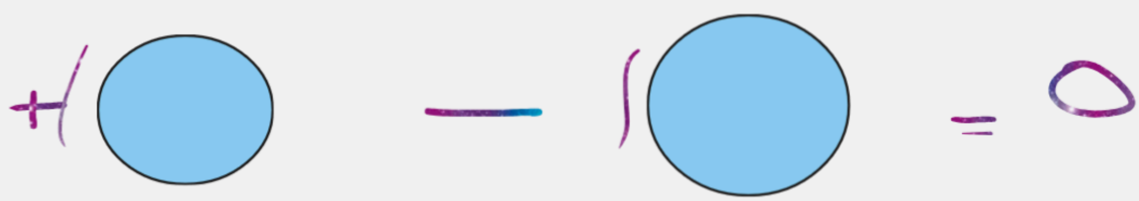
$$ab + ab = 2ab$$

$$ba + ba = 2ab.$$

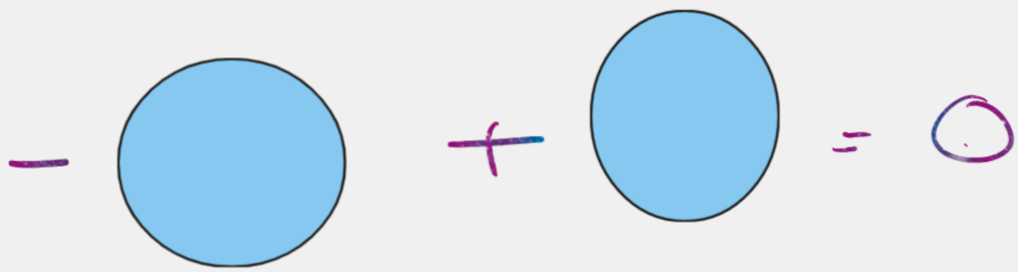
$$(a+b)^2 = a^2 + b^2 + 2ab.$$

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

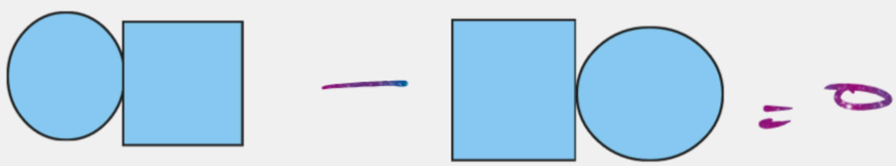
$$(a+b)\times(a-b)$$
$$\Rightarrow a(a-b) + b\times(a-b)$$
$$\Rightarrow a^2 - ab + ba - b^2$$
$$\Rightarrow a^2 + ab(-1+1) - b^2$$
$$\Rightarrow \boxed{a^2 - b^2}$$



$$3 - 3 = 0$$
$$1 - 1 = 0$$
$$2 - 2 = 0$$
$$x - x = 0$$
$$x(1 - 1)$$
$$x \times 0 = 0$$



$$-x+x$$
$$x(-1+1)=0$$



$$ab - ba = 0$$
$$ab(1-1)=0$$

$$x^2+4x+4 \qquad a^2+b^2+2ab$$
$$(a+b)^2$$
$$(x)^2+2\times x\times 2+(2)^2$$
$$\Rightarrow (x+2)^2$$
$$\boxed{(x+2)\times(x+2)}$$

$$x^2 + 6x + 9.$$

$$x^2 + 2 \times 3 \times x + 3^2$$

$$\downarrow$$

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

$$(x+3)^2$$

$$(x+3)(x+3)$$

$$x^2 + 16 - 8x$$

$$x^2 + (4)^2 - \underline{2 \times 4 \times x}$$

$$(a-b)^2$$

$$(x-4)^2$$

$$x^2 - 81$$

$$\Rightarrow x^2 - (9)^2$$

$$\Rightarrow \boxed{(x+9)(x-9)}$$

Now Test your Knowledge:

Based on the identity $(a+b)^2 = a^2 + 2ab + b^2$:

1. Factorize: $x^2 + 6x + 9$
2. Factorize: $4y^2 + 12y + 9$
3. Factorize: $z^2 + 8z + 16$
4. Factorize: $25a^2 + 20a + 4$
5. Factorize: $49m^2 + 14m + 1$

Based on the identity $(a-b)^2 = a^2 - 2ab + b^2$:

1. Factorize: $x^2 - 10x + 25$
2. Factorize: $9y^2 - 12y + 4$
3. Factorize: $z^2 - 14z + 49$
4. Factorize: $16a^2 - 24a + 9$
5. Factorize: $100m^2 - 20m + 1$

Based on the identity $(a+b)(a-b) = a^2 - b^2$:

1. Factorize: $x^2 - 25$
2. Factorize: $9y^2 - 16$
3. Factorize: $z^2 - 64$
4. Factorize: $36a^2 - 1$
5. Factorize: $49m^2 - 81$

END