## Factorising Algebraic Expressions - "The Difference of Two Squares"

When expanding brackets, we discovered that .... $(a-b)(a+b) = a^2 + ab - ab - b^2 = a^2 - b^2$.

In reverse, when we factorise $a^2 - b^2$ we obtain the answer $(a+b)(a-b)$.

An algebraic expression of the form $a^2 - b^2$ is known as "**a Difference of Two Squares**" - obviously because both terms are **squares** and also the appearance of a **minus** sign.

**Examples :-**

Factorise :-

1. $x^2 - 9$
   $= (x-3)(x+3)$

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

3. $4x^2 - 25y^2$
   $= (2x)^2 - (5y)^2$
   $= (2x-5y)(2x+5y)$

## Exercise 9·6

1. Factorise, using the difference of two squares :-

(a) $x^2 - 4$ (b) $a^2 - 16$ (c) $b^2 - 25$ (d) $x^2 - 1$

(e) $1 - k^2$ (f) $49 - w^2$ (g) $64 - h^2$ (h) $100 - x^2$

(i) $a^2 - b^2$ (j) $w^2 - v^2$ (k) $4a^2 - 1$ (l) $x^2 - 25y^2$

(m) $36 - 49p^2$ (n) $81a^2 - 4b^2$ (o) $121v^2 - 100w^2$ (p) $64p^2 - 81q^2$

(q) $1 - 16a^2$ (r) $25 - 81x^2$ (s) $49 - 4k^2$ (t) $1 - 144y^2$

Consider this **example :-**

Factorise $3x^2 - 48$ It is a "difference", but NOT of two squares !

$= 3(x^2 - 16)$ By **removing the common factor**,

$= 3(x-4)(x+4)$ we now have a **difference of two squares**.

2. Factorise these fully :- (*difficult !*)

(a) $2x^2 - 18$
$= 2(x^2 - 9)$
$=$ ............

(b) $3p^2 - 3$
$= 3(p^2 - ...)$
$=$ ............

(c) $5a^2 - 80$
$= 5(...^2 - ...)$
$=$ ............

(d) $6v^2 - 24$
$= 6(... - ...)$
$=$ ............

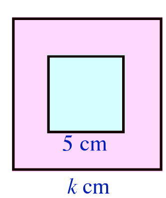
(e) $4g^2 - 16$ (f) $7x^2 - 7y^2$ (g) $6v^2 - 150u^2$ (h) $10a^2 - 90b^2$

(i) $19x^2 - 19y^2$ (j) $aw^2 - av^2$ (k) $\pi m^2 - \pi n^2$ (l) $kp^2 - 36kq^2$

(m) $kp^2 - 9kq^2$ (n) $d^3 - 4d$ (o) $27x^3 - 48x$ (p) $a^4 - 1$

(q) $1 - k^4$ (r) $p^4 - q^4$ (s) $1 - 16y^4$ (t) $3d^4 - 48$

3. Shown is a square with side 5 centimetres inside a square of side $k$ centimetres.




(a) Prove that the **pink** area can be expressed as :- $(k-5)(k+5)$ cm$^2$.

(b) Find the area when $k = 8{\cdot}5$.