Factoring Special Cases

- There is a special type of trinomial with no middle term, i.e. $x^2 + 0x - 4$, or usually $x^2 - 4$.
- This occurs because the values for MAN are the same numbers, but opposite signs
- These binomials are called a difference of squares.

Ex/ Factor.

a) $x^2 + 0x - 4$ $m = -4$, $A = 0$, $N = 2, -2$
$= (x-2)(x+2)$

b) $x^2 - 0x - 36$ $m = -36$, $A = 0$, $N = 6, -6$
$= (x-6)(x+6)$

c) $x^2 - 100$ $m = -100$, $A = 0$, $N = -10, 10$
$= (x-10)(x+10)$

d) $x^2 - 400$ $m = -400$, $A = 0$, $N = 20, -20$
$= (x-20)(x+20)$

e) $x^2 - 49$ $m = -49$, $A = 0$, $N = -7, 7$
$= (x-7)(x+7)$

f) $4x^2 - 25$
$= (2x-5)(2x+5)$

A Short Cut!

- A difference of squares can be identified by:
  1) There are only two terms.
  2) Can take the square root of both terms.
  3) There is a minus sign separating the terms.

- The factored form will be $(\sqrt{a} - \sqrt{c})(\sqrt{a} + \sqrt{c})$.

g) $9x^2 - 64$ $\sqrt{9x^2} = 3x$, $\sqrt{64} = 8$
$= (3x+8)(3x-8)$

h) $16x^2 - 9$ $\sqrt{16x^2} = 4x$, $\sqrt{9} = 3$
$= (4x-3)(4x+3)$

i) $x^2 - 625$
$= (x-25)(x+25)$

j) $\frac{-3x^2}{-3} + \frac{27}{-3}$ can't square root -3 eg.
Common factor First!
$= -3(x^2 - 9)$
$= -3(x-3)(x+3)$

k) $\frac{288x^2}{2} - \frac{2}{2}$
$= 2(144x^2 - 1)$
$= 2(12x-1)(12x+1)$

l) $\frac{3x^2}{3} - \frac{12}{3}$
$= 3(x^2 - 4)$
$= 3(x-2)(x+2)$

Ex/ For the relation $y = x^2 - 9$

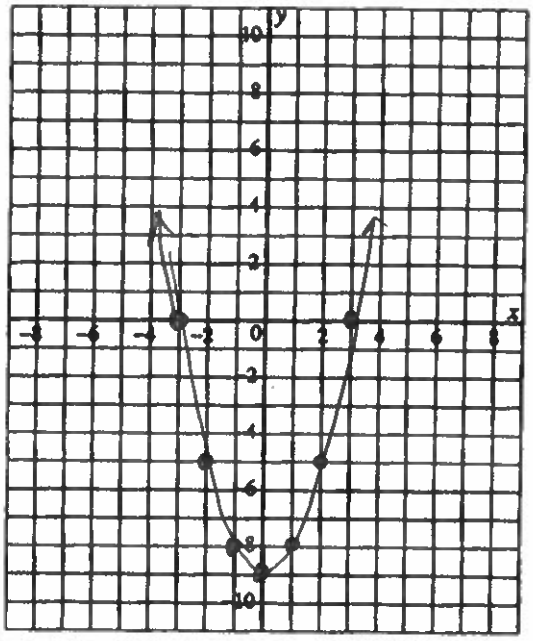
a) Make a table of values and graph the relation.

b) Identify its key characteristics.

c) Factor the expression.

d) What do you notice about the zeros?

x	y	
-3	0	$(-3)^2 - 9 = 0$
-2	-5	$(-2)^2 - 9 = -5$
-1	-8	$(-1)^2 - 9 = -8$
0	-9	$0^2 - 9 = -9$
1	-8	$1^2 - 9 = -8$
2	-5	$2^2 - 9 = -5$
3	0	$3^2 - 9 = 0$



Vertex: $(0, -9)$

Zeros: $(-3, 0), (3, 0)$

Y-intercept: $(0, -9)$

AoS: $x = 0$

Direction of Opening: up

c) $y = (x - 3)(x + 3)$

The zeros are 3 and -3