

# QUADRATIC RELATIONS: Difference of Squares

Date: Notes

## Perfect Squares

Examples: Which of the following are perfect squares?

- a) 9 ✓  $3 \times 3 = 9$   
 $3^2 = 9$
- b) 24 ✗
- c) 36 ✓  $6 \times 6 = 36$   
 $6^2 = 36$
- d)  $x^2$  ✓  $x \times x = x^2$
- e)  $16y^2$   
 $4y \times 4y = 16y^2$   
 $(4y)^2 = 16y^2$

Let's expand the following!

- a)  $(x+5)(x-5)$   
 $= x^2 - 5x + 5x - 25$   
 $= x^2 - 25$
- b)  $(2m+3)(2m-3)$   
 $= 4m^2 - 6m + 6m - 9$   
 $= 4m^2 - 9$
- c)  $(4y+2)(4y-2)$   
 $= 16y^2 - 8y + 8y - 4$   
 $= 16y^2 + 0 - 4$   
 $= 16y^2 - 4$

Do you see a pattern?

- There only two terms (no middle term)
- The resulting expression is a difference (it is subtraction between the terms)
- The terms are perfect squares. Ex: e.g.  $4x^2 - 49$  can be written as  $(2x)^2 - (7)^2$

Examples: Which of the following are Difference of Squares? Explain why or why not.

- a)  $4x^2 + 9$  NO  
↑  
no subtraction sign!
- b)  $y^2 - 25$  Yes!  
 $= (y-5)(y+5)$
- c)  $36 - 5x$  No  
↑  
don't know  
 $\sqrt{5}$
- d)  $x^2 - 28$  No  
↑  
don't know  
 $\sqrt{28}$

## Finding the Difference of Squares:

1. Find the square root of the first term and the last term.
2. Write 2 sets of brackets containing the square root of each term. One bracket will have a + sign, and the other will have a - sign.

Examples: Factor the following

- a)  $x^2 - 16$   
check  
 $(x+4)(x-4)$   
 $= x^2 - 4x + 4x - 16$   
 $= x^2 - 16$
- b)  $b^2 - 25$   
 $= (b+5)(b-5)$
- c)  $49 - 4y^2$   
 $= (7-2y)(7+2y)$
- d)  $3m^2 - 27$   
+ common factor first!  
 $= 3(m^2 - 9)$   
 $= 3(m+3)(m-3)$