Monday, November 18, 2014 ~ Day 6

**Aim:**

YWBA T factor perfect square trinomials and binomials that are the difference of two squares.

**Do Now:**
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**HW:**
Packet Pg. 11-12
Test Tues 11/25
Homework: Simplify each expression

1) \((w + 9)^2\)
\[
\frac{(w+9)(w+9)}{w^2 + 18w + 81}
\]

2) \((2x + 4)^2\)
\[
4x^2 + 16x + 16
\]

3) \((5y + 2)^2\)
\[
25y^2 + 20y + 4
\]

4) \((k - 10)^2\)
\[
k^2 - 20k + 100
\]

5) \((3m - 4)^2\)
\[
9m^2 - 24m + 16
\]

6) \((4n - 3)^2\)
\[
16n^2 - 24n + 9
\]

7) \((x + 7)(x - 7)\)
\[
x^2 - 49
\]

8) \((b - 9)(b + 9)\)
\[
b^2 - 81
\]

9) \((8 + y)(8 - y)\)
\[
64 - y^2
\]

10) \((m + 1)(m - 1)\)
\[
m^2 - 1
\]

11) \((5 + g)(5 - g)\)
\[
25 - g^2
\]

12) \((f + 18)(f - 18)\)
\[
(f^2 - 324)
\]

13) \((m + 4n)^2\)
\[
m^2 + 8mn + 16n^2
\]

14) \((6x - y)^2\)
\[
36x^2 - 12xy + y^2
\]

15) \((x^2 - 8y^2)^2\)
\[
x^{10} - 8x^6y^3 - 64y^6
\]

16) \((6p^2 + 2q)(6p^2 - 2q)\)
\[
36p^4 - 4q^2
\]

17) Describe and correct the error:

\[
(2x + 7)(2x - 7) = 4x^2 - 28x - 49
\]
These are Conjugates
their product should be
*Nope* \[4x^2 - 49\]
The figures drawn below are squares. Find an expression for the area of each shaded region. Write your answer to each question as a polynomial in standard form.

18) \(x + 6\)
\[
(y+6)^2 - (y+1)^2
\]
\[
(x^2+12x+36) - (x^2+2x+1)
\]
\[
x^2+12x+36 - x^2 - 2x - 1
\]
\[
(10y + 35) \text{ Square Units}
\]

18) \(x + 2\)
\[
(y+2)^2 - (y-1)^2
\]
\[
x^2+4x+4 - (x^2-2x+1)
\]
\[
x^2+4x+4 - x^2 + 2x - 1
\]
\[
(6y + 3) \text{ Square Units}
\]

19) A square red placemat has a gold square in the center. The side length of the gold square is represented by \(x\) inches and the uniform width of the red region is 4 inches. What is the area of the red part of the placemat?

Draw a Picture

Represent each of the following:

Area of the entire placemat: \(x^2+16x+64\)

Area of the gold center: \(x^2\)

Area of red region: \(\frac{(16x+64)x}{4} \text{ in}^2\)
Factoring: Special Cases

Aim: YWBAf factor perfect square trinomials and the difference of perfect squares.

Do Now:
1. Simplify: \((x - 11)^2\) \(= (x-11)(x-11)\)
2. Simplify: \((3x + 5)^2\) \(= (3x+5)(3x+5)\)
   \(9x^2 + 30x + 25\)
   \(x^2 - 22x + 121\)

3. What is the product of \((3x - 2)\) and its conjugate?
   \((3x-2)(3x+2)\)
   \(9x^2 - 4\)

You can factor some trinomials by "reversing" the rules for multiplying special case binomials.

**Difference of Perfect Squares (DoPS)**

Remember: \((a + b)(a - b) = a^2 - b^2\)
Factors of \(a^2 - b^2\) are \((a + b)(a - b)\)

**How to recognize the Difference of Perfect Squares (DoPS)**
- Polynomial with two terms (binomial)
- Terms must be connected with subtraction (difference)
- Both the first term and last term are perfect squares.

Examples: \(x^2 - 64 = (x + 8)(x - 8)\)
\(25x^2 - 36 = (5x + 6)(5x - 6)\)

Practice Problems: Factor

1. \(x^2 - 100\) \((x+10)(x-10)\)
2. \(q^2 - 16\) \((q+4)(q-4)\)
3. \(p^2 - 36\) \((p+6)(p-6)\)
4. \(16x^2 - 81\) \((4x+9)(4x-9)\)
5. \(25d^2 - 64\) \((5d+8)(5d-8)\)
Day 3 Factoring Special Cases

ATM: YWBBAT factor perfect square trinomials and the difference of perfect square.

Now:

1. Simplify: \((x - 11)^2\)
   \[x^2 - 22x + 121\]

2. Simplify: \((3x + 5)^2\)
   \[9x^2 + 30x + 25\]

3. What is the product of \((3x - 2)\) and its conjugate?
   \[(3x - 2)(3x + 2) = 9x^2 - 4\]

You can factor some trinomials by "reversing" the rules for multiplying special case binomials.

**Differential of Perfect Squares (DoPS)**

Remember: 
\[(a + b)(a - b) = a^2 - b^2\]

Factors of \(a^2 - b^2\) are \((a + b)(a - b)\)

**How to recognize the Differential of Perfect Squares (DoPS)**
- Polynomial with two terms (binomial)
- Terms must be connected with subtraction (difference)
- Both the first term and last term are perfect squares.

Examples:

1. \(x^2 - 64 = (x + 8)(x - 8)\)
2. \(25x^2 - 36 = (5x + 6)(5x - 6)\)

Practice Problems: Factor

1. \(x^2 - 100\)
   \[(x + 10)(x - 10)\]

2. \(q^2 - 16\)
   \[(q + 4)(q - 4)\]

3. \(p^2 - 36\)
   \[(p + 6)(p - 6)\]

4. \(16x^2 - 81\)
   \[(4x + 9)(4x - 9)\]

5. \(25d^2 - 64\)
   \[(5d + 8)(5d - 8)\]
PERFECT SQUARE TRINOMIALS (PST)

Remember: \((a + b)^2 = a^2 + 2ab + b^2\)  
\((a - b)^2 = a^2 - 2ab + b^2\)

Factors of \(a^2 + 2ab + b^2\) are \((a + b)(a + b)\)  
Factors of \(a^2 - 2ab + b^2\) are \((a - b)(a - b)\)

How to recognize a Perfect Square Trinomial (PST)
- Polynomial with 3 terms (trinomial)
- First term and last term are perfect squares.
- The middle term is twice the product of the square root of the first term and the square root of the last term.

How to factor a Perfect Square Trinomial (PST)
Step 1: Write first and last terms as squares
Step 2: Identify a-(square root of the first term) and b-(square root of the last term)
Step 3: Find the value of 2ab. Is 2ab equal to the absolute value of the middle term?
   - If yes then it is a PST—proceed to step 4. If no you cannot use this method.
Step 4: Factors are \((a + b)(a + b)\) if middle term is positive
   - Factors are \((a - b)(a - b)\) if middle term is negative.

Sample Problem:
What is the factored form of \(x^2 - 12x + 36\)?
\(x^2 - 12x + 36 = x^2 - 12x + 6^2\)
\(a = x\)  \(b = 6\)  \(2ab = 12x\)
Factors \((x - 6)(x - 6) = (x - 6)^2\)

Practice Problems:
Example 1: What is the factored form of \(x^2 + 8x + 16\)?
\(a = x\)  \(b = 4\)
\(2ab = 8x\)
\((X+4)(X+4) \Rightarrow (x+4)^2\)

Example 2: What is the factored form of \(4x^2 - 12x + 9\)?
\(a = 2x\)  \(b = \frac{3}{2}\)
\(2ab = 12x\)
\((2x-3)(2x-3) \Rightarrow (2x-3)^2\)

For each of the following identify as DoPS, PST or neither. If it is one of the special cases express it in factored form.

<table>
<thead>
<tr>
<th></th>
<th>PST</th>
<th>Neith</th>
<th>PST</th>
<th>Neith</th>
<th>PST</th>
<th>PST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ((y - 8)^2)</td>
<td>(y^2 - 16y + 64)</td>
<td>Neith</td>
<td>((K + (\frac{15}{2}))^2)</td>
<td>PST</td>
<td>(K^2 + 15)</td>
<td>PST</td>
</tr>
<tr>
<td>2. ((x + 5x + 6))</td>
<td>(x^2 + 5x + 6)</td>
<td>PST</td>
<td>((3h + 8)^2)</td>
<td>PST</td>
<td>((9r - 5)^2)</td>
<td></td>
</tr>
<tr>
<td>3. ((h^2 - 82)</td>
<td>Neith</td>
<td>PST</td>
<td>((K + (\frac{15}{2}))^2)</td>
<td>PST</td>
<td>(K^2 + 15)</td>
<td>PST</td>
</tr>
<tr>
<td>4. ((K + 15)(K - 15))</td>
<td>(K^2 - 225)</td>
<td>PST</td>
<td>((3h + 8)(3h - 8))</td>
<td>PST</td>
<td>((9r - 5)^2)</td>
<td></td>
</tr>
<tr>
<td>5. ((K^3 + 6)^2)</td>
<td>((K^3 + 6)(K^3 + 6))</td>
<td>PST</td>
<td>((9r - 5)^2)</td>
<td>PST</td>
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</tr>
<tr>
<td>6. ((K^2 + 12K + 36))</td>
<td>(K^2 + 12K + 36)</td>
<td>PST</td>
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<td></td>
</tr>
<tr>
<td>7. ((9h^2 - 64))</td>
<td>Neith</td>
<td>PST</td>
<td>((3h + 8)(3h - 8))</td>
<td>PST</td>
<td>((9r - 5)^2)</td>
<td></td>
</tr>
<tr>
<td>8. ((81r^2 - 90r + 25))</td>
<td>(81r^2 - 90r + 25)</td>
<td>PST</td>
<td>((9r - 5)^2)</td>
<td>PST</td>
<td>((9r - 5)^2)</td>
<td></td>
</tr>
</tbody>
</table>
PERFECT SQUARE TRINOMIALS (PST)

Remember: 
(a + b)^2 = a^2 + 2ab + b^2 
(a - b)^2 = a^2 - 2ab + b^2

Factors of a^2 + 2ab + b^2 are (a + b)(a + b) 
Factors of a^2 - 2ab + b^2 are (a - b)(a - b)

How to recognize a Perfect Square Trinomial (PST)

- Polynomial with 3 terms (trinomial)
- First term and last term are perfect squares
- The middle term is twice the product of the square root of the first term and the square root of the last term.

How to factor a Perfect Square Trinomial (PST)

Step 1: Write first and last terms as squares
Step 2: Identify a (square root of the first term) and b (square root of the last term)
Step 3: Find the value of 2ab. Is 2ab equal to the absolute value of the middle term?
   If yes then it is a PST—proceed to step 4. If no you cannot use this method.
Step 4: Factors are (a + b)(a + b) if middle term is positive
   Factors are (a - b)(a - b) if middle term is negative.

Sample Problem:
What is the factored form of x^2 - 12x + 36?

x^2 - 12x + 36 = (x - 6)^2

a = x  b = 6  2ab = 12x  Factors (x - 6)(x - 6) = (x - 6)^2

Practice Problems:
Example 1: What is the factored form of x^2 + 8x + 16?

a = x  b = 4  2ab = 8x  (x + 4)^2

Example 2: What is the factored form of 4x^2 - 12x + 9?

a = 2x  b = 3  2ab = 6x  (2x - 3)^2

For each of the following identify as DoPS, PST or neither. If it is one of the special cases express it in factored form.

1. y^2 - 16y + 64
   (y - 8)^2
   DoPS

2. x^2 + 5x + 5
   (x + 0.5)^2
   Ne

3. h^2 - 32
   DoPS

4. k^2 - 225
   (k - 15)(k + 15)
   PST

5. y^2 + 25
   (y + 5)^2
   Ne

6. k^3 + 12k^2 + 36
   (k + 3)^2
   PST

7. 9h^2 - 64
   DoPS

8. 81r^2 - 90r + 25
   (9r - 5)^2
   PST
Homework: Factor each expression.

1) $x^2 + 10x + 25$
2) $y^2 - 14y + 49$

3) $d^2 - 22d + 121$
4) $m^2 + 4m + 4$

5) $m^2 - 49$
6) $x^2 - 16$

7) $x^2 - 625$
8) $n^2 - 100$

9) $36x^2 + 60x + 25$
10) $4x^2 - 9$

11) The area of a square is represented by $100w^2 + 20w + 1$. Write an expression that represents the length of one side of the square.
Identify as PST, DoPS or neither. If it is one of the special cases express it in factored form.

12) $x^2 + 6x + 9$  
13) $y^2 - 24y + 144$

14) $y^2 - 36$  
14) $x^2 + 25$

16) $49n^2 + 14n + 1$  
17) $9x^2 - 24x - 16$

18) $25x^2 + 8x + 9$  
19) $81y^2 - 10$

20) $81y^4 + 144y^2 + 64$  
21) $4a^{16} - 36a^4 + 81$

22) $64x^4 - 1$  
23) $25x^{10} - 169$

24) Can an expression that is the Difference of Perfect Squares represent the area of a square? Why or why not?