9.7 Notes - Factoring Special Cases

Special Case #1: Factor. Can you see a pattern?

1) \( x^2 - 10x + 25 \)
\[
= (x - 5)(x - 5)
\]
or\[
= (x - 5)^2
\]

2) \( 9x^2 - 6x + 1 \)
\[
= (3x - 1)(3x - 1)
\]
or\[
= (3x - 1)^2
\]

3) \( 9x^2 - 12x + 4 \)
\[
= (3x - 2)(3x - 2)
\]
or\[
= (3x - 2)^2
\]

4) \( 4x^2 + 20x + 25 \)
\[
= (2x + 5)(2x + 5)
\]
or\[
= (2x + 5)^2
\]

PERFECT SQUARE TRINOMIAL PATTERN

5) What is the Pattern?

* 1st and Last terms are perfect squares
* Last term (c) is positive
* Take SQ root (a) times SQ root (c) AND DOUBLE IT to match the middle term.

Special Case #2: Factor. Can you see a pattern?

6) \( x^2 - 25 \)
\[
= (x + 5)(x - 5)
\]
or\[
= (x - 5)(x + 5)
\]

7) \( 9x^2 - 4 \)
\[
= (3x + 2)(3x - 2)
\]

DIFFERENCE OF TWO SQUARES

8) What is the Pattern?

* ONLY 2 TERMS
* FIRST AND LAST TERMS ARE PERFECT SQUARES
  and MUST BE SEPERATE WITH (-) SIGN.
Solve each equation by factoring. Check ALL SOLUTIONS.

9) \(25x^2 + 40x + 16 = 0\)

\[
(5x + 4)(5x + 4) = 0
\]

\[
5x + 4 = 0 \quad \frac{-4}{5} \quad x = \frac{-4}{5}
\]

\[
C: 25 \left(\frac{-4}{5}\right)^2 + 40 \left(\frac{-4}{5}\right) + 16 = 0
\]

\[
\text{Use Calculator}
\]

\[
O = 0 \checkmark
\]

10) \(16x^2 - 25 = 0\)

\[
(4x + 5)(4x - 5) = 0
\]

\[
4x + 5 = 0 \quad 4x - 5 = 0
\]

\[
\frac{-5}{4} \quad \frac{5}{4}
\]

\[
C: 16 \left[\frac{-5}{4}\right]^2 - 25 = 0
\]

\[
C: 16 \left[\frac{5}{4}\right]^2 - 25 = 0
\]

\[
0 = 0 \checkmark
\]

11) \(4x^2 + 12x + 9 = 0\)

\[
(2x + 3)(2x + 3) = 0
\]

\[
2x + 3 = 0 \quad \frac{-3}{2} \quad x = \frac{-3}{2}
\]

\[
C: 4 \left(\frac{-3}{2}\right)^2 + 12 \left(\frac{-3}{2}\right) + 9 = 0
\]

12) \(25x^2 - 4 = 0\)

\[
(5x + 2)(5x - 2) = 0
\]

\[
5x + 2 = 0 \quad 5x - 2 = 0
\]

\[
\frac{-2}{5} \quad \frac{2}{5}
\]

\[
C: 25 \left(\frac{-2}{5}\right)^2 - 4 = 0
\]

\[
C: 25 \left(\frac{2}{5}\right)^2 - 4 = 0
\]

\[
0 = 0 \checkmark
\]

Solve by completely factoring and check all solutions.
(1st step is to always factor out any GCF - COMMON FACTOR)

13) \(6x^3 + 30x^2 - 36x = 0\)

\[
6x(x^2 + 5x - 6) = 0
\]

\[
6x(x + 6)(x - 1) = 0
\]

\[
6x = 0 \quad \frac{6}{6} \quad x = 0
\]

\[
C: 0 = 0 \checkmark
\]

\[
C: 6(-6)^3 + 30(-6)^2 - 36(-6) = 0
\]

\[
-1296 + 1080 + 216 = 0
\]

\[
0 = 0 \checkmark
\]

\[
C: 6(1)^3 + 30(1)^2 - 36(1) = 0
\]

\[
6 + 30 - 6 = 0
\]

\[
0 = 0 \checkmark
\]