Day 9

Factor completely, if possible.

1. $x^2 - 25$

2. $x^2 + 25$

Factor completely.

1. $49m^2 - 81n^2$

2. $32x^5y^2 - 8x^5$

3. $x^2 - 64x$

Factor completely.

$16x^4 - 1$

Perfect Squares	Perfect Squares
$1^2 = 1$	$(x^1)^2 = x^2$
$2^2 = 4$	$(x^2)^2 = x^4$
$3^2 = 9$	$(x^3)^2 = x^6$
$4^2 = 16$	$(x^4)^2 = x^8$
$5^2 = 25$	
$6^2 = 36$	
$7^2 = 49$	
$8^2 = 64$	
$9^2 = 81$	
$10^2 = 100$	
$11^2 = 121$	
$12^2 = 144$	
$13^2 = 169$	

Factoring the Sum or Difference of Cubes

Difference of Cubes: $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

Sum of Cubes: $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

SOAP = Same Opposite Always Positive

Difference of Cubes:	$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
Sum of Cubes:	$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

SOAP = Same Opposite Always Positive

Factor completely. $8x^3 - 27$

Perfect Cubes	Perfect Cubes
$1^3 = 1$	$(x^1)^3 = x^3$
$2^3 = 8$	$(x^2)^3 = x^6$
$3^3 = 27$	$(x^3)^3 = x^9$
$4^3 = 64$	$(x^4)^3 = x^{12}$
$5^3 = 125$	$(x^5)^3 = x^{15}$

Factor completely.

1. $x^3 - y^6$

$\boxed{\text{SUMMARY}}$ Factoring Binomials

1. $a^2 - b^2 = (a + b)(a - b)$ Difference of squares
2. $a^2 + b^2$ is prime Sum of squares
3. $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$ Difference of cubes
4. $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$ Sum of cubes

2. $98 - 2t^2$

3. $p^4 + p$

4. $81y^4 - 16$

SUMMARY **Factoring Strategy**

1. Factor out the GCF.

2. If the polynomial has 4 terms,
   Factor by grouping 2 terms with 2 terms
   Factor by grouping 3 terms with 1 term

3. If the polynomial has 3 terms,
   Determine if the trinomial is a perfect square trinomial.
   $a^2 + 2ab + b^2 = (a + b)^2$
   $a^2 - 2ab + b^2 = (a - b)^2$
   Otherwise factor by
   the trial-and-error method
   the ac-method

4. If the polynomial has 2 terms, determine if it fits one of these patterns:
   Difference of squares: $a^2 - b^2 = (a + b)(a - b)$
   Sum of squares: $a^2 + b^2$ is prime
   Difference of cubes: $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
   Sum of cubes: $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

*With any of the above techniques, sometimes substitution can also be used.