Name KEY Date ______________ Accelerated Geometry CC

10.5 Factoring Polynomials

Use the Factor Theorem to verify that each linear binomial is a factor of the given polynomial. Then use synthetic division to write the polynomial as a product (factor).

1. $(x + 5)$; $P(x) = 2x^2 + 6x - 20$

   $2(x+5)(x-2)$

2. $(x - 1)$; $P(x) = x^4 - 6x^3 + 4x^2 + 1$

   $(x-1)(x^3-5x^2-x-1)$

3. $(x + 2)$; $P(x) = 3x^3 + 12x^2 + 17x + 10$

   $(x+2)(3x^2+6x+5)$

4. $(x - 8)$; $P(x) = x^4 - 8x^3 - 4x^2 + 33x - 8$

   $(x-8)(x^3-4x+1)$

Factor each expression.

5. $16x^3 - 12x^2 + 20x - 15$

   $(4x-3)(4x^2+5)$

6. $3x^6 + 54x^4 + 243x^2$

   $3x^2(x^2+9)(x^2+9)$

7. $x^6 - 10x^5 + 25x^4$

   $x^4(x-5)^2$

8. $6x^3 + 12x^2 + 4x + 8$

   $2(3x^2+2)(x+2)$

9. $250x^4 + 54x$

   $2x(5x+3)(25x^2-15x+9)$

10. $-3x^5 + 24x^2$

    $-3x^2(x-2)(x^2+2x+4)$

Solve.

11. The voltage generated by an electrical circuit changes over time according to the polynomial $V(t) = t^3 - 4t^2 - 25t + 100$, where V is in volts and t is in seconds. Factor the polynomial to find the times when the voltage is equal to zero.

4	1	−4	−25	100
	↓	4	0	−100
	1	0	−25	0

→ $x^2 - 25 = 0$ → $x^2 - 25$

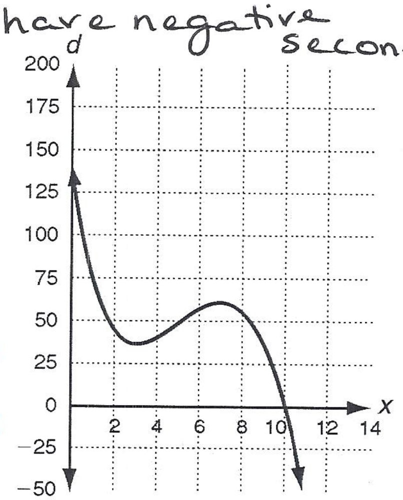
$x^2 = 25$ $(x-5)(x+5)$

$x = \pm 5$ 5 ~~−5~~

Voltage equals zero @ 4s + 5s (can't have negative seconds)

12. Since 2006, the water level in a certain pond has been modeled by the polynomial $d(x) = -x^3 + 16x^2 - 74x + 140$, where the depth d, is measured in feet over x years. Identify the year that the pond will dry up. Use the graph to factor $d(x)$.

    2016



10	−1	16	−74	140
	↓	−10	60	−140
	−1	6	−14	0

→ $(x-10)(-x^2+6x-14)$

$-(x-10)(x^2-6x+14)$