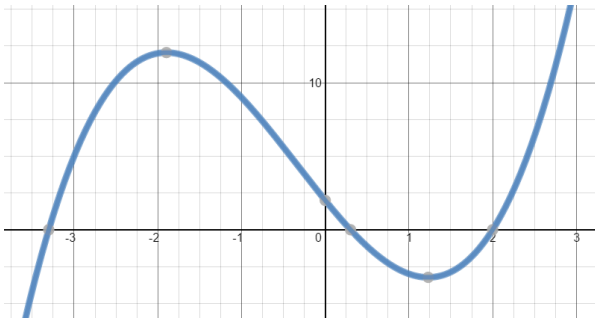## (H)Further Examples

1. Which binomials are factors of $P(x) = 2x^3 - x^2 - 7x + 6$?   (a) $x + 3$ (b) $2x - 3$

2. Which binomials are factors of $P(x) = -2x^4 - 7x^3 + 22x^2 + 63x - 36$?   (a) $x - 1$ (b) $x - 3$

3. Given the polynomial $P(x) = x^3 - 2x^2 - 21x - 18$, is $x = 6$ a zero of $P(x)$?   is $x = -2$ a zero of $P(x)$?

4. Given the polynomial $P(x) = x^4 - 3x^3 + 3x^2 - 3x + 2$, is $x = 2$ a root of $P(x)$?   is $x = -2$ a root of $P(x)$?

5. Given the polynomial $g(x) = 2x^3 + x^2 - 27x - 35$, one factor of $x + 3$ is given. Determine the other factors.

6. Factor $P(x) = x^4 - 6x^3 + 22x^2 - 30x + 13$ given that $x = 1$ is a double root.

7. Given the polynomial $h(x) = x^4 + 3x^3 - x - 3$, one of the roots is $x = -3$. Determine the other roots.

8. Determine all roots of the polynomial $A(x) = x^3 + x^2 - 7x + 2$, given the following graph of $A(x)$

9. Factor using the Factor Theorem: $f(x) = x^3 - 3x^2 - 10x + 24$

10. Factor using the Factor Theorem: $f(x) = x^4 + 2x^3 - 23x^2 - 24x + 144$

11. Sketch the function $g(x) = 6 + 5x - 2x^2 - x^3$

12. Sketch the function $f(x) = 3x^3 + x^2 - 22x - 24$ & label all intercepts.

13. Sketch the function $f(x) = x^4 + x^3 - 7x^2 - x + 6$ & label all intercepts.

Name_____

More on Factors, Zeros, and Dividing

Date_____ Period____

Factor each and find all zeros. One factor has been given.

1) $f(x) = x^3 + 9x^2 + 23x + 15; \ x + 5$

2) $f(x) = x^3 - x^2 - 14x + 24; \ x - 3$

3) $f(x) = x^4 + 3x^3 - 13x^2 - 15x; \ x - 3$

4) $f(x) = x^3 - 12x^2 + 47x - 60; \ x - 3$

5) $f(x) = x^3 - 7x^2 + 2x + 40; \ x - 5$

6) $f(x) = x^3 - 3x^2 - 9x + 27; \ x - 3$

7) $f(x) = 10x^3 + 37x^2 + 37x + 6; \ 5x + 1$

8) $f(x) = 25x^3 + 150x^2 + 131x + 30; \ 5x + 3$

9) $f(x) = 5x^3 + 21x^2 - 21x - 5; \ x + 5$

10) $f(x) = 3x^3 - 4x^2 - 9x + 10; \ x - 2$

Name_____

More on Factors, Zeros, and Dividing

Date_____ Period_____

Factor each and find all zeros. One factor has been given.

1) $f(x) = x^3 + 9x^2 + 23x + 15$; $x + 5$

Factors to: $f(x) = (x + 1)(x + 3)(x + 5)$
Zeros: $\{-1, -3, -5\}$

2) $f(x) = x^3 - x^2 - 14x + 24$; $x - 3$

Factors to: $f(x) = (x - 2)(x + 4)(x - 3)$
Zeros: $\{2, -4, 3\}$

3) $f(x) = x^4 + 3x^3 - 13x^2 - 15x$; $x - 3$

Factors to: $f(x) = x(x + 1)(x + 5)(x - 3)$
Zeros: $\{0, -1, -5, 3\}$

4) $f(x) = x^3 - 12x^2 + 47x - 60$; $x - 3$

Factors to: $f(x) = (x - 4)(x - 5)(x - 3)$
Zeros: $\{4, 5, 3\}$

5) $f(x) = x^3 - 7x^2 + 2x + 40$; $x - 5$

Factors to: $f(x) = (x + 2)(x - 4)(x - 5)$
Zeros: $\{-2, 4, 5\}$

6) $f(x) = x^3 - 3x^2 - 9x + 27$; $x - 3$

Factors to: $f(x) = (x + 3)(x - 3)^2$
Zeros: $\{-3, 3 \text{ mult. } 2\}$

7) $f(x) = 10x^3 + 37x^2 + 37x + 6$; $5x + 1$

Factors to: $f(x) = (2x + 3)(x + 2)(5x + 1)$
Zeros: $\left\{-\dfrac{3}{2}, -2, -\dfrac{1}{5}\right\}$

8) $f(x) = 25x^3 + 150x^2 + 131x + 30$; $5x + 3$

Factors to: $f(x) = (5x + 2)(x + 5)(5x + 3)$
Zeros: $\left\{-\dfrac{2}{5}, -5, -\dfrac{3}{5}\right\}$

9) $f(x) = 5x^3 + 21x^2 - 21x - 5$; $x + 5$

Factors to: $f(x) = (5x + 1)(x - 1)(x + 5)$
Zeros: $\left\{-\dfrac{1}{5}, 1, -5\right\}$

10) $f(x) = 3x^3 - 4x^2 - 9x + 10$; $x - 2$

Factors to: $f(x) = (3x + 5)(x - 1)(x - 2)$
Zeros: $\left\{-\dfrac{5}{3}, 1, 2\right\}$