Name:_________________________________ Date:____________________________

**HW M12P Section 3.3 Factor Theorem and Remainder Theorem**

1. In your own words, explain what the remainder theorem is

2. In your own words, explain what the factor theorem is

3. Given the polynomial function, according to the Rational Root Theorem, what values should we check as factors

4. What is the difference between a "root" and a "Factor"? Explain

5. Given that a polynomial function has roots at 2, -3, and 3/7, what are the corresponding factors?

6. When factoring a polynomial function, why are we dividing it with a divisor? Explain.

7. When testing a divisor, what should the remainder equal? What is the purpose of the quotient? Explain:

8. According to the Rational Root theorem, what values should you test as roots given the polynomial function? $y = 2x^3 - 3x^2 - 8x + 12$. Explain

9. Given the polynomial function $2x^3 - 19x^2 + 32x + 21$, which of the following are factors? Explain:
$(x-3)$, $(x+3)$, $(x+2)$, $(2x-1)$, $(2x+1)$, $(x+7)$, $(x-7)$

10. Find the remainder when the polynomial is divided by each divisor:

| | |
|---|---|
| a) $2x^3+3x^2-17x-30$ is divided by $x-2$ | b) $x^3+6x^2-4x+2$ is divided by $x+1$ |
| c) $2x^3+11x^2-23x-14$ is divided by $2x+1$ | d) $x^4-x^3-3x^2+4x+2$ is divided by $x+2$ |
| e) $4x^3-12x^2-67x-30$ is divided by $x+4$ | f) $x^3+2x^2-111x+108$ is divided by $5x-1$ |

11. Factor and solve the polynomial functions:

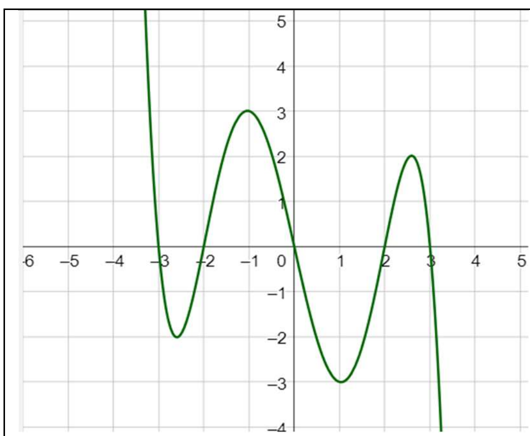
| | |
|---|---|
| $0=x^3-15x^2+71x+105$ | b) $0=x^3+9x^2+26x+24$ |

| | |
|---|---|
| c) $0=2x^3-3x^2-8x-3$ | d) $0=2x^3+x^2-25x+12$ |
| e) $x^3+3x^2-88x+240=0$ | f) $15x^3+53x^2-58x-120=0$ |
| g) $0=2x^4-15x^3+36x^2-35x+12$ | h) $0=2x^4-7x^3+9x^2-5x+1$ |

12. Solve for the missing constant "k"

| | |
|---|---|
| a) When $x^3 + kx^2 + 2x - 3$ is divided by x+2, the remainder is 1. | b) When $x^4 - kx^3 - 2x^2 + x + 4$ is divided by x-3, the remainder is 16. |
| c) When $2x^3 - 3x^2 + kx - 1$ is divided by x-1, the remainder is 1. | d) When $2x^4 + kx^2 - 3x + 5$ is divided by x-2, the remainder is 3. |
| e) When $x^3 + kx^2 - 2x - 7$ is divided by x+1, the remainder is 5. | f) When $kx^3 + 2x^2 - x + 3$ is divided by x+1, the remainder is 4. |

13. Given the graph of the polynomial function f(x), what is the remainder when f(x) is divided by the following divisors?




a) $(x+3)$

b) $(x+1)$

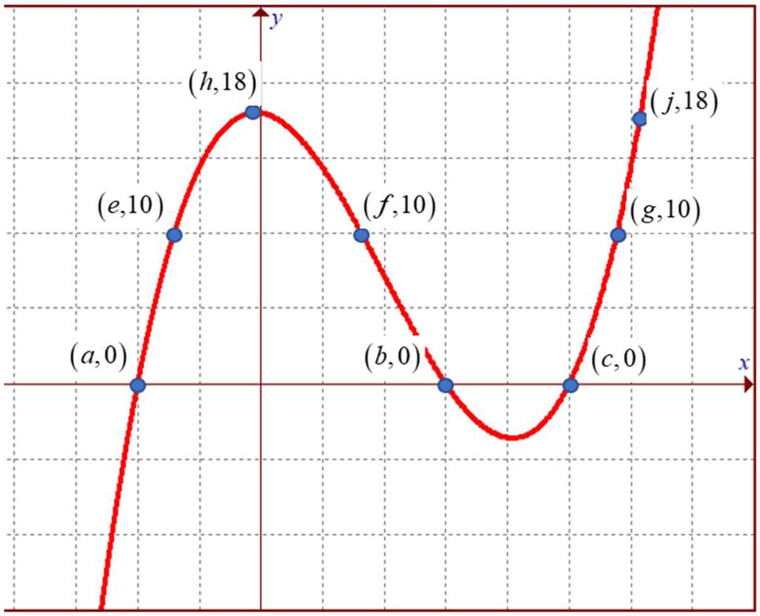
c) $(x-1)$

d) $(x-3)$

e) $(2x+1)$

f) $(2x-5)$

14. Given that "$k_n$" is a rational number, which of the following are possible equations of the cubic function shown? Explain which equation would not work?




$i)\ y=(x-a)(x-b)(x-c)$

$ii)\ y=k_1(x-a)(x-b)(x-c)$

$iii)\ y=k_2(x-e)(x-f)(x-g)$

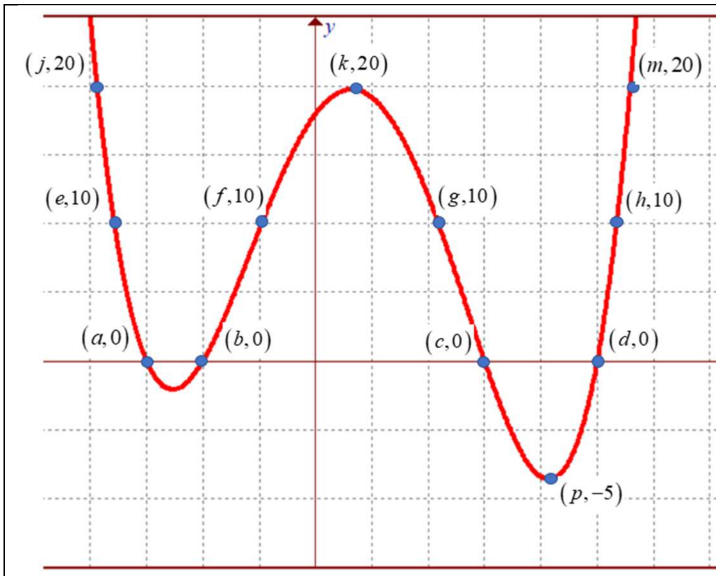
$iv)\ y=k_3(x-e)(x-f)(x-g)-10$

$v)\ y=k_4(x-e)(x-f)(x-g)+10$

$vi)\ y=k_5(x-h)(x-j)+18$

$vii)\ y=k_6(x-h)^2(x-j)+18$

15. Given that "$k_n$" is a rational number, which of the following are possible equations of the quartic function shown? Explain which equation would not work?




$i)\ y=(x-a)(x-b)(x-c)(x-d)$

$ii)\ y=k_1(x-a)(x-b)(x-c)(x-d)$

$iii)\ y=k_2(x-e)(x-f)(x-g)$

$iv)\ y=k_3(x-e)(x-f)(x-g)(x-h)+10$

$v)\ y=k_4(x-j)(x-k)(x-m)+20$

$vi)\ y=k_5(x-j)(x-k)^2(x-m)+20$

$vii)\ y=k_6(x-p)^2-5$