



Name _____ Period _____ Date _____

NON-CALCULATOR SECTION

Vocabulary: Define each word and give an example.

1. Polynomial Function
2. Multiplicity
3. Local Maximum

Short Answer:

4. What is the Remainder Theorem?
5. What is the 6th row of Pascal's Triangle?

Review:

6. Solve the equation. Check your solution(s): $-3|x+1|-6 = -24$
7. What is the discriminant of the quadratic equation $ax^2 + bx + c = 0$? Describe what it means if the discriminant is negative, positive, or zero.
8. Write an equation in standard form for the line perpendicular to $-3x + 2y = -5$ that passes through the point $(2, -1)$.
9. Simplify: $\sqrt{-80}$



Problems:

Be sure to show all work used to obtain your answer. Circle or box in the final answer.

10. Complete the chart.

Example	Degree	Name by degree	No. of terms	Name by # of terms
$5x + 3$				
$3x^5 - 4x + 2$				
$-x^3$				
$x^4 + 3x^2 + 6x + 1$				

11. Perform the indicated operation:

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

b. $(2x + y)(x^2 + xy + y^2)$

c. $(7x^4 - 5x^2 - 8 + 12x) + (x^3 - 4x^2 + 5x^4 + 3 - 6x)$

d. $(3x - 2)^3$

12. Use long division:

$(2x^4 + 3x^3 - x + 1) \div (x^2 + x - 1)$

13. Use synthetic division:

$(2x^3 - 2x^2 + x - 9)$ divided by $(x - 3)$

14. Factor the polynomial:

a. $16x^4 - 4y^4$

b. $8y^3 - 125$

c. $4c^3 + 8c^2d - 4cd^2 - 8d^3$

15. Use synthetic substitution to evaluate the polynomial function at $x = -2$.



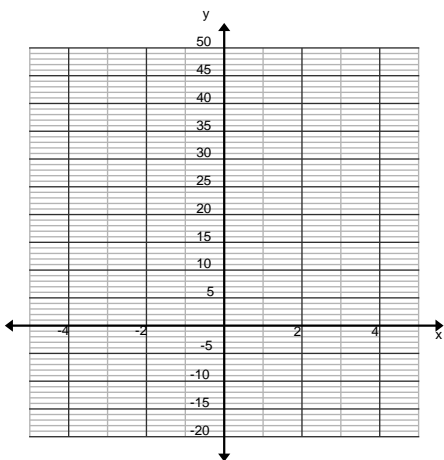
$$f(x) = -x^4 + 3x^2 + x - 8$$

16. Determine if $n + 2$ is a factor of $n^4 + 10n^3 + 21n^2 + 6n - 8$ without dividing.

17. Describe the end behavior of the polynomial function $f(x) \rightarrow \underline{\hspace{2cm}}$ as $x \rightarrow -\infty$

$$f(x) = -3x^6 - 4x^4 - 7x^3 + 3x^2 + 8x - 5. \quad f(x) \rightarrow \underline{\hspace{2cm}} \text{ as } x \rightarrow \infty$$

18. State the degree and list the zeros of the polynomial function. State the multiplicity of each zero and whether the graph crosses the x-axis at the corresponding x-intercept. Then, sketch the graph of the polynomial function by hand. $f(x) = -x^2(x + 4)(x - 2)$



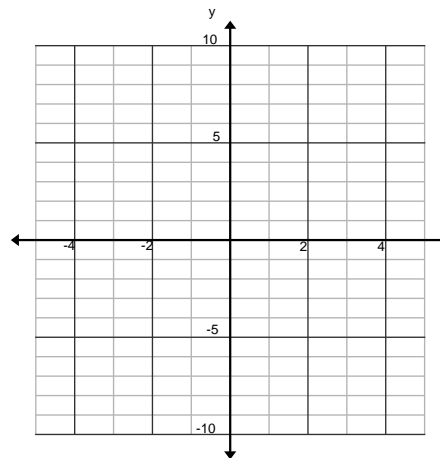
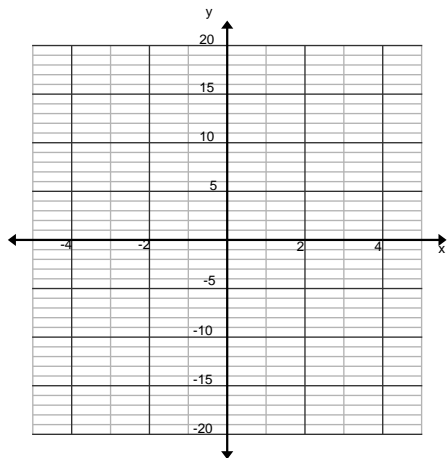
degree =

zeros, multiplicity and whether it crosses:

19. Graph the polynomial functions.

a. $y = x^3 - x^2 - 8x + 12$, given $x + 3$ is a factor.

b. $y = -(x - 2)(x + 1)(x - 3)$





20. Factor the polynomial $x^4 - 8x^2 - 9$ completely.

- A. $(x-1)(x+1)(x^2+9)$
- B. $x^2(x^2-8)-9$
- C. $(x-3)(x+3)(x^2+1)$
- D. $(x+1)^2(x-3)(x+3)$

21. According to the *Remainder Theorem*, which of the following is the remainder when the polynomial $3x^3 - 4x + 8$ is divided by $x - 3$?

- A. -59
- B. -31
- C. 23
- D. 77

22. Which of the following describes the end behavior of the graph of $f(x) = -x^4 + 4x - 7$ as $x \rightarrow +\infty$?

- A. $f(x) \rightarrow +\infty$
- B. $f(x) \rightarrow -\infty$
- C. $f(x) \rightarrow -7$
- D. $f(x) \rightarrow 0$

23. A pyramid-shaped sculpture has a volume of 18 cubic inches. The length of a side of the square base of the pyramid is 3 inches less than the height of the pyramid. What equation could model this situation?

Recall: $\left(V = \frac{lwh}{3} \right)$

- A. $x^3 - 3x^2 = 18$
- B. $x^3 - 3x^2 = 54$
- C. $x^3 - 6x^2 + 9x = 18$
- D. $x^3 - 6x^2 + 9x = 54$

