

Name: _____ Date: _____ Period: _____

Unit 6 Exam Review

You should be able to:

- Define polynomial vocabulary.
- Classify polynomials by degree and number of terms.
- Add and subtract polynomials
- Multiply i) monomial x binomial/trinomial ii) binomial x binomial iii) binomial x trinomial
- Divide a polynomial by a monomial or linear binomial.
- Solve a polynomial equations.
- Classify the roots of a polynomial as rational, irrational, or imaginary.
- Identify the parts on the graph of a polynomial: zero, turning point (maximum or minimum), y-intercept.
- State the maximum number of turning points for an nth degree polynomial or the smallest possible degree based on the number of turning points.
- State the end behavior of a polynomial.
- Find the relative maxima and minima on the graph of a polynomial.

Old units

- Factor a quadratic.
- Factor a cubic (4 terms) by grouping.
- Multiply or divide fractions.
- Simplify a cube root.
- Change from log form to exponential form and/or vice versa.

Concept 1: Classifying Polynomials

Write the polynomial in standard form, then classify the polynomials by degree and number of terms. Use the box of terms to help you but you will need to memorize these.

biggest exponent

Degree	# of Terms
0 - constant	1 - monomial
1 - linear	2 - binomial
2 - quadratic	3 - trinomial
3 - cubic	4+ - multinomial
4 - quartic	
5 - quintic	

1. $5x^3$

cubic monomial

2. $x + 3x^2 - 7$

quadratic trinomial

3. $4 - x^4$

quartic binomial

4. 10

constant monomial

Concept 2: Operations with Polynomials

Perform the indicated operations. Write your final answer in standard form.

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

$-7x^3 + 8x^2 - 6x - 6$

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

$-10x^3 + 3x^2 + 4$

<p>7. $(8x + 5 - 8x^3) + (8x^3 + 7 + 3x)$ $=$ $11x - 2$</p>	<p>8. $(x + 1 + 3x^2) - (x^3 + 4 - 2x^2)$ $=$ $-x^3 + 5x^2 + x - 3$</p>
<p>9. $(x + 2)(3x - 3)$ $3x^2 + 3x - 6$</p>	<p>10. $(8x + 1)(5x^2 - 5x + 1)$ $40x^3 - 35x^2 + 3x + 1$</p>
<p>11. $\frac{2x^3 + 30x^2 + 30x}{6x^3}$ $\frac{2x^3}{6x^3} + \frac{30x^2}{6x^3} + \frac{30x}{6x^3}$ $\frac{1}{3} + \frac{5}{x} + \frac{5}{x^2}$</p>	<p>12. $\frac{20x^4 + x^3 + 4x^2}{10x}$ $2x^3 + \frac{x^2}{10} + \frac{2x}{5}$</p>

$x \cdot x = x^2$
 $x \cdot x^2 = x^3$

Concept 3: Dividing Polynomials Using Synthetic Division FR

Use synthetic division to divide the polynomial by the linear binomial. Pay attention to any missing terms. Make sure your answer is in the correct format.

<p>13. $\frac{x^3 - 13x^2 + 40x + 42}{x - 9}$ $x^2 - 4x + 4 + \frac{-6}{x-9}$</p>	<p>14. $\frac{2x^3 - 56x - 24}{x + 5}$ $-5 \mid \begin{array}{cccc} 2 & 0 & -56 & -24 \\ \downarrow & -10 & 50 & 30 \\ \hline 2 & -10 & -6 & 6 \end{array}$ $2x^2 - 10x - 6 + \frac{6}{x+5}$</p>
<p>15. $\frac{4x^4 - 7x^3 - 24x^2 + 31x - 19}{x - 3}$ $4x^3 + 5x^2 - 9x + 4 + \frac{-7}{x-3}$</p>	<p>16. $\frac{5x^4 - 15x^3 + 6x - 13}{x - 3}$ $5x^3 + 6 + \frac{5}{x-3}$</p>

Concept 4: Solving Polynomial Equations

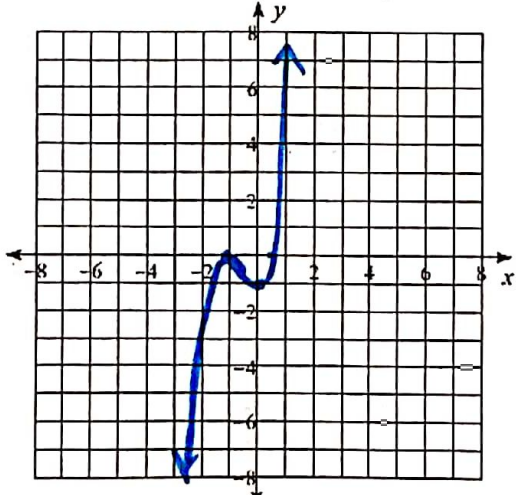
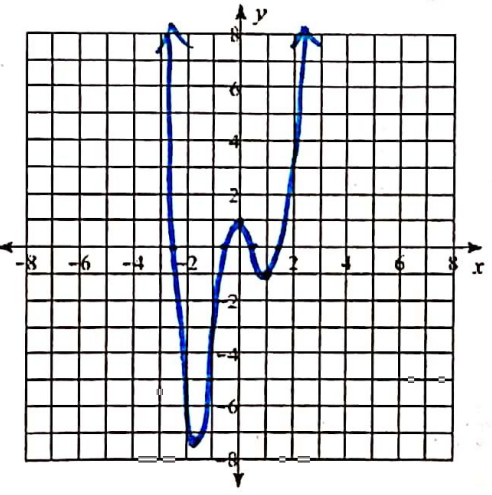
State the number of roots the polynomial will have.

Use the calculator (Plsmlt2 app) to solve the polynomial equations below (list all of the roots). Classify each root as rational (can be written as a fraction), irrational (cannot be written as a fraction) or imaginary (includes i).

<p>17. $x^4 - x^3 - 2x^2 - 4x - 24 = 0$</p> <p># of roots: <u>4</u></p> <p>3 rational -2 rational 2i imaginary -2i imaginary</p>	<p>18. $x^3 - 4x^2 - 8x + 8 = 0$</p> <p># of roots: <u>3</u></p> <p>-2 rational 5.24 irrational 0.76 irrational</p>
<p>19. $3x^3 - 7x^2 + 8x - 2 = 0$</p> <p># of roots: <u>3</u></p> <p>$\frac{1}{3}$ rational 1+i imaginary 1-i imaginary</p>	<p>20. $x^4 - 4x^3 + x^2 + 6x = 0$</p> <p># of roots: <u>4</u></p> <p>0 1 -2 3 } all rational</p>

Concept 5: The Graphs of Polynomial Functions

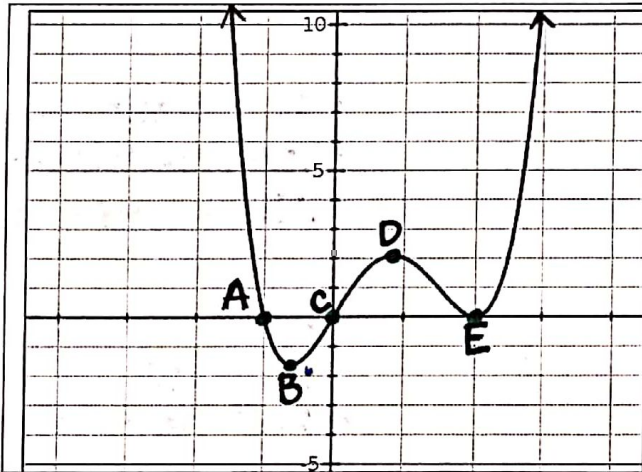
For the functions, below, find the real zeros (x-intercepts), turning points (classify as maxima or minima), and state the end behavior. Then sketch the function.

<p>21. $y = 2x^3 + 3x^2 - 1$</p> <p>zeros: <u>$\frac{1}{2}, -1$</u></p> <p>turning points: <u>(-1, 0) max</u> <u>(0, -1) min</u></p> <p>end behavior: <u>As $x \rightarrow -\infty, y \rightarrow -\infty$</u> <u>As $x \rightarrow \infty, y \rightarrow \infty$</u></p>	<p>22. $y = x^4 + x^3 - 4x^2 + 1$</p> <p>zeros: <u>-2.5, 1.4, 0.6, -0.5</u></p> <p>turning points: <u>(1.1, -1.0) min</u> <u>(0, 1) max (-1.8, -7.3) min</u></p> <p>end behavior: <u>As $x \rightarrow -\infty, y \rightarrow \infty$</u> <u>As $x \rightarrow \infty, y \rightarrow \infty$</u></p>
	

FR

23. For the graph given below, identify the characteristic that corresponds to each letter. Then answer the follow-up questions.

Word Bank: zero, turning point: maximum, turning point: minimum, y-intercept



- A. zero
- B. TP: min
- C. zero / y-int
- D. TP: max
- E. zero / TP: min

24. Use the graph from question 23 to answer the following questions.

- a) How many turning points does the polynomial have? 3
- b) What is the degree of the polynomial? 4

Units 1-5 Review

Please review and know how to do these problems from previous units.

<p>25. Factor using any method. $5x^2 - 59x + 90$</p> <p>$(5x-9)(x-10)$</p>	<p>26. Factor by grouping. Unit 3 FR $(12x^3 - 14x^2) + (42x - 49)$</p> <p>$(2x^2+7)(6x-7)$</p>
<p>27. Multiply.</p> <p>$\frac{2}{5} \cdot \frac{7}{9}$</p> <p>$\frac{14}{45}$</p>	<p>28. Divide.</p> <p>$\frac{2}{13} \div \frac{3}{5}$</p> <p>$\frac{10}{39}$</p>
<p>29. Simplify.</p> <p>$\sqrt[3]{64x^7y^3}$</p> <p>$4x^2y \sqrt[3]{x}$</p>	<p>30. Change to exponential form. $\log_5 170 = m$</p> <p>$5^m = 170$</p>