

Honors Unit 3 Test Review: Polynomials

NAME: _____

U3 L1: I can solve polynomial equations using any method. (___ / 20)

Solve the following polynomial functions using any method. SHOW ALL WORK!!!

1. $21x^2 = -7x$

Solutions/Zeros: $x = 0$ $x = -1/3$

$21x^2 + 7x = 0$

$7x(3x+1) = 0$

$x = 0$ $x = -1/3$

2. $x^2 - 4x = 32$

Solutions/Zeros: $x = 8$ $x = -4$

$x^2 - 4x - 32 = 0$

$-8 + 4 = -4$
 $(x-8)(x+4)$
 $x = 8$ $x = -4$

3. $-6x^2 = -x - 12$

Solutions/Zeros: $x = 3/2$ $x = -4/3$

$0 = 6x^2 - x - 12$

$a = 6$ $b = -1$ $c = -12$

$\frac{1 \pm \sqrt{(-1)^2 - 4(6)(-12)}}{2(6)} = \frac{1 \pm \sqrt{289}}{12} = \frac{1 \pm 17}{12}$
 $\frac{18}{12} = 3/2$
 $\frac{-16}{12} = -4/3$

4. $0 = 3x^2 - 4x - 11$

Solutions/Zeros: $x = \frac{2+\sqrt{37}}{3}$ $x = \frac{2-\sqrt{37}}{3}$

$a = 3$ $b = -4$ $c = -11$

$\frac{4 \pm \sqrt{(-4)^2 - 4(3)(-11)}}{2(3)} = \frac{4 \pm \sqrt{148}}{6} = \frac{4 \pm 2\sqrt{37}}{6} = \frac{2 \pm \sqrt{37}}{3}$

5. $2x^2 + 11x = -18$

Solutions/Zeros: $x = \frac{-11+i\sqrt{23}}{4}$ $x = \frac{-11-i\sqrt{23}}{4}$

$2x^2 + 11x + 18$

$a = 2$ $b = 11$ $c = 18$

$\frac{-11 \pm \sqrt{(11)^2 - 4(2)(18)}}{2(2)} = \frac{-11 \pm \sqrt{-23}}{4} = \frac{-11 \pm i\sqrt{23}}{4}$

6. $8x^3 + 27 = 0$

Solutions/Zeros: $x = -3/2$ $x = \frac{3+3i\sqrt{3}}{4}$ $x = \frac{3-3i\sqrt{3}}{4}$

$(2x+3)(4x^2 - 6x + 9) \rightarrow a = 4$ $b = -6$ $c = 9$
 $x = -3/2$
 $\frac{6 \pm \sqrt{(-6)^2 - 4(4)(9)}}{2(4)} = \frac{6 \pm \sqrt{-108}}{8} = \frac{6 \pm 6i\sqrt{3}}{8}$

U3 L2: I can use the Remainder Theorem to determine if a given factor is a solution of a polynomial.

(___/15)

Determine if a given solution a factor of a polynomial. SHOW ALL WORK!!!

7. $x^3 + 0x^2 - 86x - 45$
 $(x^3 - 86x - 45) \div (x + 9)$

Factor? Yes or No

$f(-9) = 0$

Factored form: $x^2 - 9x - 5$

$$\begin{array}{r|rrrr} -9 & 1 & 0 & -86 & -45 \\ & \downarrow & -9 & 81 & +45 \\ \hline & 1 & -9 & -5 & 0 \end{array}$$

8. $f(x) = (x^3 - 91x - 88)$. Find $f(x) \div (x - 9)$

$x^3 + 0x^2 - 91x - 88$

Factor? Yes or No

$f(9) = -178$

Factored form: $x^2 + 9x - 10 - \frac{178}{x-9}$

$$\begin{array}{r|rrrr} 9 & 1 & 0 & -91 & -88 \\ & \downarrow & 9 & 81 & -90 \\ \hline & 1 & 9 & -10 & -178 \end{array}$$

Use synthetic division to find all the zeros. SHOW ALL WORK!!!

9. $x^3 + 3x^2 + 7x - 11$

Solutions/Zeros: $x = 1$ $x = -2 + i\sqrt{7}$ $x = -2 - i\sqrt{7}$

$x = 1$ (calculator)

$$\begin{array}{r|rrrr} 1 & 1 & 3 & 7 & -11 \\ & \downarrow & 1 & 4 & 11 \\ \hline & 1 & 4 & 11 & 0 \end{array}$$

$x^2 + 4x + 11$
 $a = 1$ $b = 4$ $c = 11$
 $\frac{-4 \pm \sqrt{(4)^2 - 4(1)(11)}}{2(1)} = \frac{-4 \pm \sqrt{-28}}{2} = \frac{-4 \pm 2i\sqrt{7}}{2} = -2 \pm i\sqrt{7}$

10. $(x - 5)$ is a factor $6x^3 - 25x^2 - ax + 30$. What is the value of a? SHOW ALL WORK!!!

$a = 31$

$a = 31$

$$\begin{array}{r|rrrr} 5 & 6 & -25 & -a & 30 \\ & \downarrow & 30 & 25 & -30 \\ \hline & 6 & 5 & -6 & 0 \end{array}$$

11. $(x+6)$ is a factor of $x^3 + kx^2 - 30x + 36$. What is the value of k?

$k = 0$

$$\begin{array}{r|rrrr} -6 & 1 & k & -30 & 36 \\ & \downarrow & -6 & 36 & -36 \\ \hline & 1 & -6 & 6 & 0 \end{array}$$

U3 L3: I can write a polynomial function given its zeros. (___/20)

Write the following polynomials in standard form

12. $x = -\frac{3}{5}$ and $x = 2$

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

$5x^2 - 10x + 3x - 6$

$5x^2 - 7x - 6$

Factored Form: $(5x+3)(x-2)$

Standard Form: $5x^2 - 7x - 6$

13. X-intercepts: $x=0$, $x=4$, and $x=\frac{1}{3}$

$x(x-4)(3x-1)$

$x(3x^2 - x - 12x - 4)$

$x(3x^2 - 13x - 4)$

$3x^3 - 13x^2 - 4x$

Factored Form: $x(x-4)(3x-1)$

Standard Form: $3x^3 - 13x^2 + 4x$

14. Solutions of $x = -4 \pm 2i$

$(x+4+2i)(x+4-2i)$

$x^2 + 4x - 2xi + 4x + 16 - 8i + 2xi + 8i - 4i^2$

$x^2 + 8x + 16 + 4$

Standard Form: $x^2 + 8x + 20$

15. A solution of $x = 2 \pm 3i$

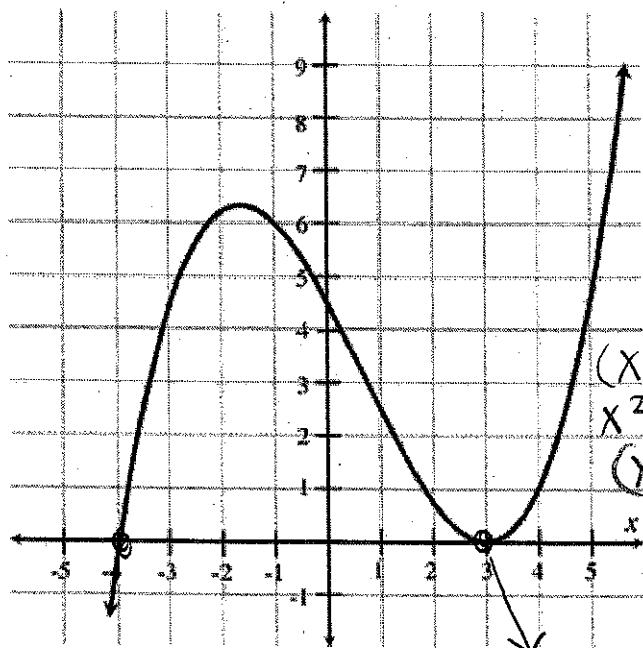
$(x-2+3i)(x-2-3i)$

$x^2 - 2x - 3xi - 2x + 4 + 6i + 3xi - 6i - 9i^2$

$x^2 - 4x + 4 + 9$

Standard Form: $x^2 - 4x + 13$

16. Given the graph, identify the solutions, then write a polynomial in standard form to match the graph.



Solutions: $x = -4, x = 3, x = 3$

Factored Form: $(x+4)(x-3)^2$

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

$x^3 - 6x^2 + 9x + 4x^2 - 24x + 36$

$(x^2 - 6x + 9)(x+4)$

Standard Form: $x^3 - 2x^2 - 15x + 36$

double root @ $x=3$

U3 L4: I can identify key features of polynomial functions, including end behavior (___/20)

Identify the key features of the following polynomial function.

17. $f(x) = 3x^6 + 7x^4 - 12x^2 + 4$

$x \rightarrow -\infty, f(x) \rightarrow -\infty$ or ∞

$x \rightarrow \infty, f(x) \rightarrow -\infty$ or ∞

Y-Intercept @ 4

Max Real Zeros = 6

Max # of Turns = 5

18. $g(x) = -x(x+4)^2(x-2)$

$x \rightarrow -\infty, g(x) \rightarrow -\infty$ or ∞

$x \rightarrow \infty, g(x) \rightarrow -\infty$ or ∞

Y-Intercept @ 0

Max Real Zeros = 4

Max # of Turns = 3

19. $y = 2x^5 + 4x^2 + 11x - 4$

$x \rightarrow -\infty, y \rightarrow -\infty$ or ∞

$x \rightarrow \infty, y \rightarrow -\infty$ or ∞

Y-Intercept @ -4

Max Real Zeros = 5

Max # of Turns = 4

20. $y = -4x(x-1)(x+3)^3$

$x \rightarrow -\infty, y \rightarrow -\infty$ or ∞

$x \rightarrow \infty, y \rightarrow -\infty$ or ∞

Y-Intercept @ 0

Max Real Zeros = 5

Max # of Turns = 4

U3 L5: I can determine the possible number and nature of zeros of a polynomial by the Fundamental Theorem of Algebra. (___/10)

Using the graph given, identify a possible degree for the polynomial.

21. Degree must be: EVEN ODD

Leading Coefficient: + -

How many real solutions? 7

Number of Turns: 6

Lowest possible Degree = 7

Other possible degree = 9

22. Degree must be: EVEN ODD

Leading Coefficient: + -

How many real solutions? 4

Number of Turns: 3

Lowest possible Degree = 4

Other possible degree = 6

