Accelerated Geometry CC
Polynomial Graphs Test Review

Name: KEY
Date: _____ Period: ___

**Solve each polynomial equation by factoring.**

1. $-3x^4 + 6x^3 + 105x^2 = 0$

$-3x^2(x^2 - 2x - 35) = 0$
$-3x^2(x-7)(x+5) = 0$
$x = 0,\ x = 7,\ x = -5$

2. $8x^7 - 56x^6 + 96x^5 = 0$

$8x^5(x^2 - 7x + 12) = 0$
$8x^5(x-4)(x-3) = 0$
$x = 0,\ x = 4,\ x = 3$

**Identify the roots of each equation. State the multiplicity of each root.** *Look at graph

3. $x^3 + 6x^2 + 12x - 8 = 0$

OMIT

4. $x^3 + 10x^2 + 32x + 32 = 0$

$x = -4$ mult. of 2 $x = -2$ mult. of 1

**Identify all the real roots of each equation.**

5. $x^3 + 2x^2 - 48x = 0$

$x(x^2 + 2x - 48) = 0$
$x(x+8)(x-6) = 0$

$x = 0, -8, 6$

6. $x^4 - 13x^3 + 55x^2 - 81x + 18 = 0$ From graph: 3 + 6

| | | | | | |
|---|---|---|---|---|---|
| 3 | 1 | -13 | 55 | -81 | 18 |
| | | 3 | -30 | 75 | -18 |
| 6 | 1 | -10 | 25 | -6 | 0 ✓ |
| | | 6 | -24 | 6 | |
| | 1 | -4 | 1 | 0 ✓ | |

$x^2 - 4x + 1$

$x = \frac{4 \pm \sqrt{16 - 4(1)(1)}}{2(1)}$

$x = 2 \pm \sqrt{3}$

$x = 3, 6, 2 \pm \sqrt{3}$

7. $6x^3 + 12x^2 - 18x = 0$

$6x(x^2 + 2x - 3) = 0$
$6x(x+3)(x-1) = 0$

$x = 0, -3, 1$

8. $x^4 + 8x^3 + 7x^2 - 22x + 6 = 0$ From graph: $-3, 1$

| | | | | | |
|---|---|---|---|---|---|
| -3 | 1 | 8 | 7 | -22 | 6 |
| | | -3 | -15 | 24 | -6 |
| 1 | 1 | 5 | -8 | 2 | 0 ✓ |
| | | 1 | 6 | -2 | |
| | 1 | 6 | -2 | 0 ✓ | |

$x^2 + 6x - 2$

$x = \frac{-6 \pm \sqrt{36 - 4(1)(-2)}}{2(1)}$

$x = -3 \pm \sqrt{11}$

$x = -3, 1, -3 \pm \sqrt{11}$

**Write the simplest polynomial function with the given roots.**

9. $-\frac{3}{4}$, 6, and $-1$

$(x + 3/4)(x-6)(x+1)$
$x^2 - 6x + 3/4x - 9/2$
$(x^2 - 21/4x - 9/2)(x+1)$
$f(x) = x^3 - 21/4x^2 - 9/2x + x^2 - 21/4x - 9/2$
$f(x) = x^3 - 17/4x^2 - 39/4x - 9/2$

10. $-5i$, 2, and 7, $5i$

$(x+5i)(x-5i)(x-2)(x-7)$
$(x^2 + 25)(x^2 - 9x + 14)$
$f(x) = x^4 - 9x^3 + 14x^2 + 25x^2 - 225x + 350$
$f(x) = x^4 - 9x^3 + 39x^2 - 225x + 350$

11. $-i$, $-3$, and $-1$, $i$

$(x+i)(x-i)(x+3)(x+1)$
$(x^2 + 1)(x^2 + 4x + 3)$
$f(x) = x^4 + 4x^3 + 3x^2 + x^2 + 4x + 3$
$f(x) = x^4 + 4x^3 + 4x^2 + 4x + 3$

12. $2i$, 4, and $\sqrt{6}$, $-2i$, $-\sqrt{6}$

$(x-2i)(x+2i)(x-\sqrt{6})(x+\sqrt{6})(x-4)$
$(x^2 + 4)(x^2 - 6)(x-4)$
$(x^4 - 2x^2 - 24)(x-4)$
$f(x) = x^5 - 2x^3 - 24x - 4x^4 + 8x^2 + 96$
$f(x) = x^5 - 4x^4 - 2x^3 + 8x^2 - 24x + 96$

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**Solve each equation by finding all roots.**

13. $4x^4 - 8x^3 - 3x^2 - 18x - 27 = 0$ $-1, 3$

| | 4 | −8 | −3 | −18 | −27 |
|---|---|---|---|---|---|
| −1 | | −4 | 12 | −9 | 27 |
| | 4 | −12 | 9 | −27 | 0 ✓ |
| 3 | | 12 | 0 | 27 | |
| | 4 | 0 | 9 | 0 ✓ | |

$4x^2 + 9 = 0$
$4x^2 = -9$
$x^2 = -\frac{9}{4}$
$x = -1, 3, \pm\frac{3i}{2}$

14. $x^4 + 3x^3 - x^2 + 9x - 12 = 0$ $-4, 1$

| | 1 | 3 | −1 | 9 | −12 |
|---|---|---|---|---|---|
| −4 | | −4 | 4 | −12 | 12 |
| | 1 | −1 | 3 | −3 | 0 ✓ |
| 1 | | 1 | 0 | 3 | |
| | 1 | 0 | 3 | 0 ✓ | |

$x^2 + 3 = 0$
$x^2 = -3$
$x = \pm i\sqrt{3}$
$x = -4, 1, \pm i\sqrt{3}$

15. $x^4 - 3x^3 - 8x^2 + 22x - 24 = 0$ $-3, 4$

| | 1 | −3 | −8 | 22 | −24 |
|---|---|---|---|---|---|
| −3 | | −3 | 18 | −30 | 24 |
| | 1 | −6 | 10 | −8 | 0 ✓ |
| 4 | | 4 | −8 | 8 | |
| | 1 | −2 | 2 | 0 | |

$x^2 - 2x + 2$
$x = \frac{2 \pm \sqrt{4 - 4(1)(2)}}{2(1)}$
$x = -3, 4, 1 \pm i$

16. $x^3 + 6x^2 + 4x + 24 = 0$ $-6$

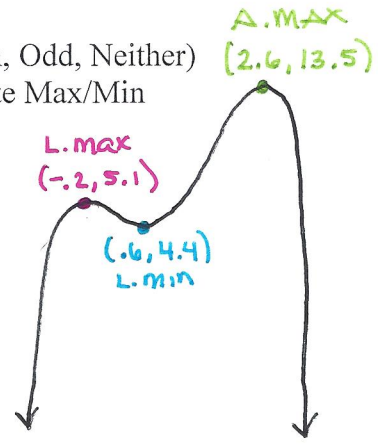
| | 1 | 6 | 4 | 24 |
|---|---|---|---|---|
| −6 | | −6 | 0 | −24 |
| | 1 | 0 | 4 | 0 ✓ |

$x^2 + 4 = 0$
$x^2 = -4$
$x = \pm 2i$
$x = -6, \pm 2i$

**For each of the following equations, answer A-F:**

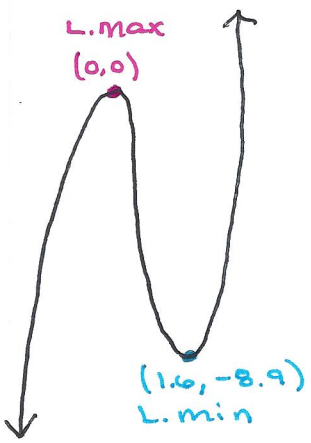
A) Domain/Range
B) Name by degree & number of terms
C) Increasing/Decreasing
D) End Behavior
E) Symmetry (Even, Odd, Neither)
F) Local or Absolute Max/Min

17. $P(x) = -x^4 + 4x^3 - 2x^2 - x + 5$




A) Domain: $\mathbb{R}$ Range: $y \leq 13.5$
B) Quartic Polynomial
C) Increase: $(-\infty, -.2)(.6, 2.6)$ Decrease: $(-.2, .6)(2.6, \infty)$
D) $x \to -\infty \quad f(x) \to -\infty$
$x \to \infty \quad f(x) \to -\infty$
E) Neither
F) L.max (-.2, 5.1) L.min (.6, 4.4) A.max (2.6, 13.5)

18. $P(x) = x^5 - x^4 - 5x^2$




A) Domain: $\mathbb{R}$ Range: $\mathbb{R}$
B) Quintic Trinomial
C) Increase: $(-\infty, 0)(1.6, \infty)$ Decrease: $(0, 1.6)$
D) $x \to -\infty \quad f(x) \to -\infty$
$x \to \infty \quad f(x) \to \infty$
E) Neither
F) L.max (0, 0) L.min (1.6, −8.9)