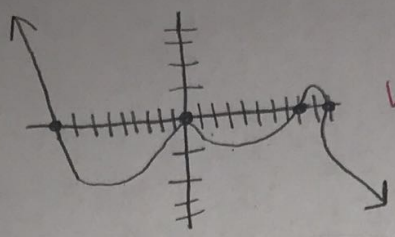
Unit 3 Test Algebra II

Key

1. Sketch the graph. Name the appropriate parts.

a. $f(x) = -5x^2(x-10)^3(x+9)(x-8)$



Zeros = 0, 10, -9, 8

Multiplicity = 2, 3, 1, 1

Degree = 7

# of Turning points = ~~6~~ 4

End of Behavior = $x \to \infty\ f(x) \to -\infty$, $x \to -\infty\ f(x) \to \infty$

b. The zeros are -7, 5, -2. Write the polynomial.

$(x+7)(x-5)(x+2)$

$x^2-5x+7x+2$

$x^2+2x+2(x+2)$

$x^3+2x^2+2x^2+4x+2x+4$

x^3+4x^2+6x+4

$x^3+4x^2-31x-70$

2. Perform the indicated operations

a. What is the result of $(f+g)(x)$ if $f(x) = -8x^2 + x - 9$ and $g(x) = 11x^2 + 6x$? $3x^2+7x-9$

b. What is the product of $(-5x + 6)(6x - 8)$ $-30x^2+40x+36x-48$

$-30x^2+76x-48$

3. Factor the following Polynomial completely.

a. $-40x^2 + 80x$ $-40x(x-2)$

$20x(-2x+4)$

b. $x^2 - 15x + 50$ $(x-5)(x-10)$

4. *Use synthetic division to simplify the following*

a. $(2x^3 + 5x^2 - 3x - 7) \div (x - 2)$?

$2x^2+9x+15+\frac{23}{x-2}$

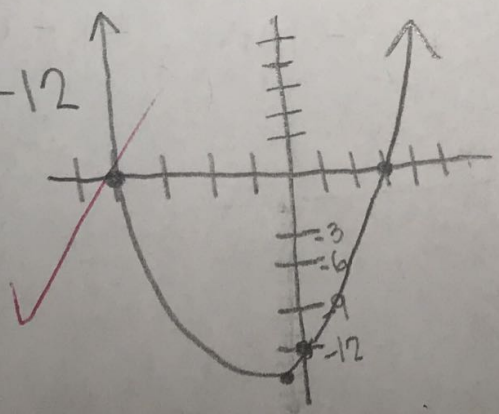
2	2	5	-3	-7
		4	18	30
	2	9	15	23

$2x^2+9x+15+\frac{23}{x-2}$

5. Sketch the graph and label the parts.

$y = x^2 + x - 12$ $(x-3)(x+4)$ $\frac{-1}{2}$ $-.5$

$(-.5)^2+(-.5)-12$



x-intercepts (3, 0)(-4, 0)

y-intercepts (0, -12)

vertex (-0.5, -12.25)

Unit 3 Test Algebra II

$\frac{5}{3}$, $1+\sqrt{3}$, $1-\sqrt{3}$

6. Find the zeros to the following polynomial.

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

$0 = -3x + 5$

$-5 \quad -5$

$\frac{-3}{-3} = \frac{-5}{-3}$

$x = -5/-3, 1-\sqrt{2}, 1+\sqrt{2}$

$\frac{2 \pm \sqrt{(-2)^2 - 4(1)(-2)}}{2}$ $\quad \frac{2 \pm \sqrt{4+8}}{2}$

$2 \pm \sqrt{\frac{4}{2}}$ $\quad \frac{2 \pm \sqrt{12}}{2} = \frac{2 \pm 2\sqrt{3}}{2}$

1 ± 3

7. Simplify

a. $\sqrt[5]{131250x^{10}}$

13125
$5 \wedge 26250$
$5 \wedge 5250$
$5 \wedge 1050$
$5 \wedge 210$
$5 \wedge 42$

$5x^2\sqrt[5]{42}$

b. $\sqrt[3]{56x^{21}y^7}$

56
$2 \wedge 28$
$2 \wedge 14$
$2 \wedge 7$

$x^3 \cdot x^3 \cdot x$

$2x^7y^2\sqrt[3]{7y}$

c. $\frac{8(3x^4y^{-7})^{-2}}{7(2^{-1}x^{-3}y^5)^4}$

$\frac{8 \cdot 3^{-2} x^{-8} y^{14}}{7 \cdot 2^{-4} x^{-12} y^{20}}$

$\frac{8 \cdot 2^4 x^{12} y^{14}}{7 \cdot 3^2 x^{-20}}$

$\frac{128 x^{32} y^{14}}{63}$

$\frac{128x^4}{63y^6}$ $\quad \frac{8 \cdot 2^4 x^{12} y^{14}}{7 \cdot 3^2 x^8 y^{20}} =$

d. $\frac{(5x^3y^2)^{-2}}{4(3x^{-3}y^5)^{-3}}$

$\frac{5^{-2} \cdot x^{-6} y^{-4}}{4 \cdot 3^{-3} \cdot x^9 y^{-15}}$

$\frac{3^3 \cdot x^9 \cdot y^{15}}{4 \cdot 5^{-2} \cdot x^{-6} \cdot y^{-4}}$

$\frac{27y^{11}}{100x^{15}}$

$\frac{27x^{15}}{-100y^{19}}$

$\frac{3^3 y^{15}}{4 \cdot 5^2 x^9 x^6 y^4}$

8. Find all zeros

b. $x^3 - 11x^2 + 36x - 26 = 0$

$1, 5-i, 5+i$

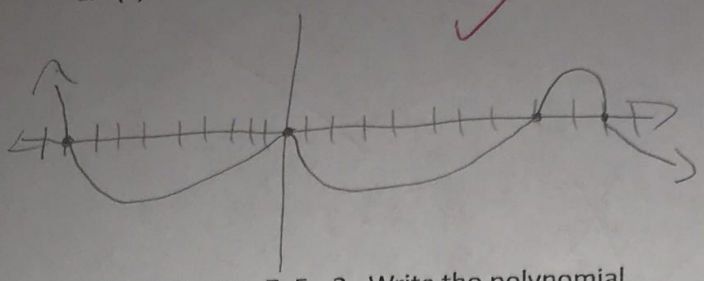
c. $x^4 + 2x^3 - 2x^2 - 8x - 8 = 0$

$-2, 2, -1+i, -1-i$

Unit 3 Test Algebra II Key

1. **Sketch the graph. Name the appropriate parts.**

a. $f(x) = -5x^2(x-10)^3(x+9)(x-8)$



Zeros = 0, 10, -9, 8

Multiplicity = 2, 3, 1, 1

Degree = 7

# of Turning points = 4

End of Behavior = $x \to \infty$ f(x) $\to -\infty$
$x \to -\infty$ f(x) $\to \infty$

b. The zeros are -7, 5, -2. Write the polynomial.

$(x+7)(x-5)(x+2)$

$(x^2-5x+7x-35)(x+2)$

$(x^2+2x-35)(x+2)$

$x^3+2x^2-35x+2x^2+4x-70$

$x^3+4x^2-31x-70$

2. **Perform the indicated operations**

a. What is the result of $(f+g)(x)$ if $f(x) = -8x^2 + x - 9$ and $g(x) = 11x^2 + 6x$?

$3x^2+7x-9$

b. What is the product of $(-5x + 6)(6x - 8)$

$-30x^2+76x-48$ $-30x^2+40x+36x-48$

3. **Factor the following Polynomial completely.**

a. $-40x^2 + 80x$

$-10 \times (4x-8)$ 1/2

b. $x^2 - 15x + 50$

$(x-5)(x-10)$

4. ***Use synthetic division to simplify the following***

a. $(2x^3 + 5x^2 - 3x - 7) \div (x - 2)$?

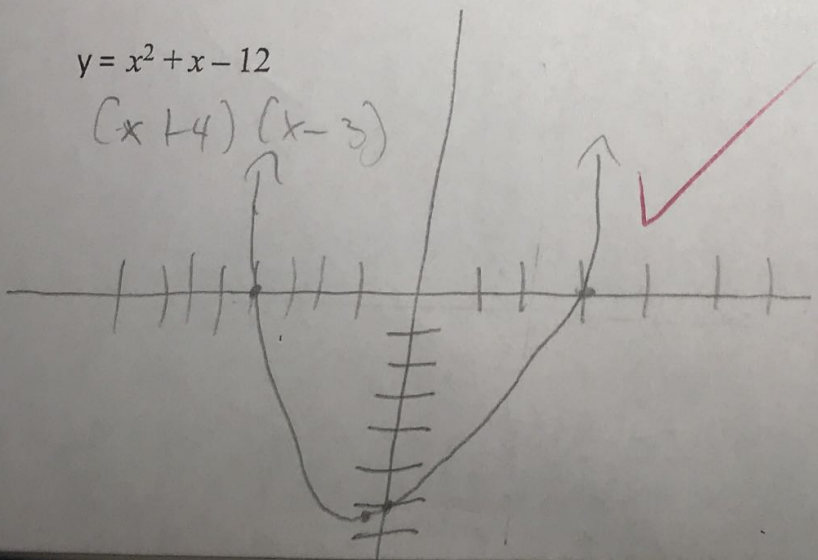
$2x^2+9x+15+\frac{23}{x-2}$

$\frac{-b}{2a}$

5. **Sketch the graph and label the parts.**

$y = x^2 + x - 12$

$(x+4)(x-3)$



x-intercepts -4, 3

y-intercepts -12

vertex $-\frac{1}{2}$, -12.25

$\frac{-1}{2(1)} = -\frac{1}{2}$

y axis goes by 2's

Unit 3 Test Algebra II

6. Find the zeros to the following polynomial.
   a. $f(x) = (-3x + 5)(x^2 - 2x - 2)$

$-3x + 5 = 0$
$-3x = -5$
$x = \frac{5}{3}$

$2 \pm \sqrt{(-2)^2 - 4(1)(-2)}$
$2 \pm \sqrt{4 - (-8)}$
$\frac{2 \pm \sqrt{12}}{2} = \frac{2 \pm 2\sqrt{3}}{2} = 1 \pm \sqrt{3}$

$\sqrt{12}$
$\sqrt{6} \cdot 2$
$\sqrt{3} \cdot 2$

$x = \frac{5}{3}, 1 \pm \sqrt{3}$

7. Simplify

a. $\sqrt[5]{131250x^{10}}$

$5x^2\sqrt[5]{+2}$

b. $\sqrt[3]{56x^{21}y^7}$

$2x^6y^2\sqrt[3]{7x^3y}$

c. $\dfrac{8(3x^4y^{-7})^{-2}}{7(2^{-1}x^{-3}y^5)^4}$

$\frac{128x^4}{63y^6}$

d. $\dfrac{(5x^3y^2)^{-2}}{4(3x^{-3}y^5)^{-3}}$

$\frac{27y^{11}}{100x^{15}}$

8. Find all zeros

b. $x^3 - 11x^2 + 36x - 26 = 0$

$zeros = 1, 5-i, 5+i$

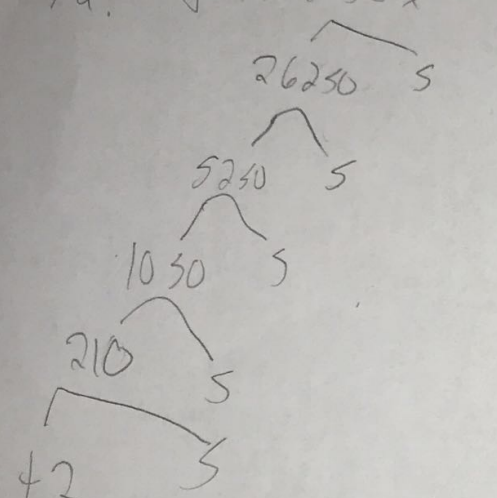
c. $x^4 + 2x^3 - 2x^2 - 8x - 8 = 0$

$zeros = -2, 2, -1+i, -1-i$

$$2 \mid \begin{array}{cccc} 2 & 5 & -3 & -7 \\ & 4 & 18 & 30 \\ \hline 2 & 9 & 15 & 23 \end{array}$$

$$2x^2 + 9x + 15 + \frac{23}{(x-2)}$$

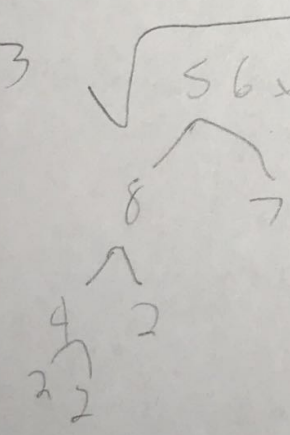
7a. $\sqrt[5]{131250 x^{10}}$



$x^2 \cdot x^2 \cdot x^2 \cdot x^2 \cdot x^2$

$x^6 \cdot x^6 \cdot x^6$

7b. $\sqrt[3]{56 x^{21} y^7}$



$= 2x^6 y^2 \sqrt[3]{7 x^3 y}$

C. $\frac{8(3x^4y^{-7})^{-2}}{7(2^{-1}x^{-3}y^5)^4}$ → $\frac{8(3^{-2}x^{-8}y^{14})}{7(2^4x^{12}y^{20})}$

↓

$\frac{8(2^4x^{12}y^{14})}{7(3^2x^8y^{20})}$ ←

$\frac{8 \cdot 16x^4}{7 \cdot 9y^6}$

↓

$\frac{128x^4}{63y^6}$

D. $\frac{(5x^3y^2)^{-2}}{4(3x^{-3}y^5)^{-3}}$ → $\frac{(5^{-2}x^{-6}y^{-4})}{4(3^{-3}x^9y^{-15})}$

↓

$\frac{3^3y^{15}}{4(5^2x^6x^9y^4)}$ ←

$\frac{27y^{15}}{4(25x^{15}y^4}$

↓

$\frac{27y^{11}}{100x^{15}}$

8 b. $x^3 - 11x^2 + 36x - 26$

$$\begin{array}{c|cccc} 1 & 1 & -11 & 36 & -26 \\ & & 1 & -10 & 26 \\ \hline & 1 & -10 & 26 & 0 \end{array}$$

$x^2 - 10x + 26$

$$10 \pm \sqrt{(-10)^2 - 4(1)(26)}$$

$10 \pm \sqrt{100 - 104}$

$10 \pm \sqrt{-4}$

$\frac{10 \pm 2i}{2} = 5 \pm i$

C. $x^4 + 2x^3 - 2x^2 - 8x - 8$

$$\begin{array}{c|ccccc} -2 & 1 & 2 & -2 & -8 & -8 \\ & & -2 & 0 & 4 & 8 \\ \hline & 1 & 0 & -2 & -4 & 0 \end{array}$$

$x^3 + 0x^2 - 2x - 4$

$$\begin{array}{c|cccc} 2 & 1 & 0 & -2 & -4 \\ & & 2 & 4 & 4 \\ \hline & 1 & 2 & 2 & 0 \end{array}$$

$= x^2 + 2x + 2$

$-2 \pm \sqrt{(2)^2 - 4(1)(2)}$

$-2 \pm \sqrt{4 - 8}$

$-2 \pm \sqrt{-4}$

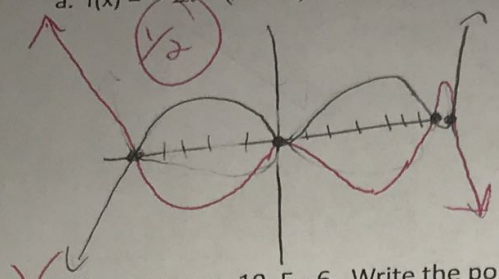
$\frac{-2 \pm 2i}{2}$

$-1 \pm i$

Unit 3 Test Algebra II

1. **Sketch the graph. Name the appropriate parts.**

a. $f(x) = -2x^2(x-7)^3(x+5)(x-8)$



Zeros = 0, 7, -5, 8

Multiplicity = 2, 3, 1, 1

Degree = 7

# of Turning points = 4

End of Behavior = $x \to \infty$ $f(x) \to \infty$; $x \to -\infty$ $f(x) \to -\infty$

b. The zeros are -10, 5, -6. Write the polynomial.

$(x+10)(x-5)(x+6)$

$x^2 - 5x + 10x - 50$

$x^2 + 5x - 50$

$x^3 + 11x^2 - 20x - 300$

2. **Perform the indicated operations**

a. What is the result of $(f+g)(x)$ if $f(x) = -8x^2 + x - 9$ and $g(x) = 11x^2 + 6x$?

$-8x^2 + x - 9 + 11x^2 + 6x = 3x^2 + 7x - 9$

b. What is the product of $(-5x + 6)(2x - 8)$

$-10x^2 + 40x + 12x - 48 = -10x^2 + 52x - 48$

3. **Factor the following Polynomial completely.**

a. $-40x^2 + 80x$

$40x(-x+2)$

b. $x^2 - 15x + 50$

$(x-10)(x-5)$

4. ***Use synthetic division to simplify the following***

a. $(2x^3 + 5x^2 - 3x - 7) \div (x - 2)$?

2	2	5	-3	-7
		4	18	30
	2	9	15	23

$2x^2 + 9x + 15 + \frac{23}{x-2}$

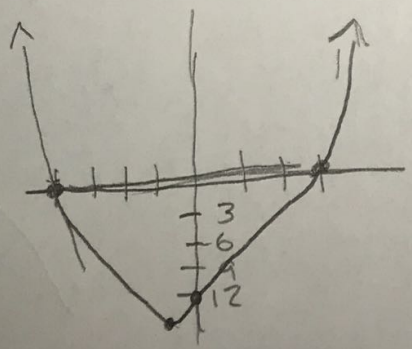
5. **Sketch the graph and label the parts.**

$y = x^2 + x - 12$

$-\frac{1}{2}^2 + \frac{1}{2} - 2$

$(x+4)(x-3)$

$\frac{-b}{2a}$ $\frac{-1}{2}$



x-intercepts (-4, 0) (3, 0)

y-intercepts (0, -12)

vertex $(-\frac{1}{2}, -12.25)$

Unit 3 Test Algebra II

6. Find the zeros to the following polynomial.

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

$-3x+5=0$, $-5\ -5$, $\frac{-3x}{-3} = \frac{-5}{-3}$, $x = \frac{5}{3}$

$\frac{2 \pm \sqrt{-2^2 - 4(1)(-2)}}{2(1)} = \frac{2 \pm \sqrt{4+8}}{2} = \frac{2 \pm \sqrt{12}}{2} = 1 \pm \sqrt{3}$

12 → 6, 2 → 3, 2

Zeros $= \frac{5}{3}, 1+\sqrt{3}, 1-\sqrt{3}$

7. Simplify

a. $\sqrt[5]{131250x^{17}}$

65625 | 2, 13125 | 5, 2625 | 5, 525 | 5, 105 | 5, 21 | 3, 7

$x^5 x^5 x^5 x^2$

$5x^3\sqrt[5]{42x^2}$

b. $\sqrt[3]{56x^{21}y^{13}}$

28 | 2, 14 | 2, 7 | 7

$2x^7y^4\sqrt[3]{7y}$

c. $\frac{2(3x^4y^{-7})^{-2}}{7(2^{-1}x^{-3}y^5)^4}$

$\frac{2(3^{-2}x^{-8}y^{14})}{7(2^{-4}x^{-12}y^{20})} = \frac{2(2^4x^{12}y^{14})}{7(3^2x^8y^{20})} = \frac{2(16x^4)}{7(9y^6)} = \frac{32x^4}{63y^6}$

d. $\frac{(5x^3y^2)^{-2}}{7(3x^{-3}y^5)^{-3}}$

$\frac{(5^{-2}x^{-6}y^{-4})}{7(3^{-3}x^9y^{-15})} = \frac{(3^3y^{15})}{7(5^2x^6y^4)}$

$\frac{(9y^{15})}{7(25x^{15}y^4)} = \frac{9y^{11}}{175x^{15}}$

$\frac{27y^{11}}{175x^{15}}$

8. Find all zeros

b. $x^3 - 2x^2 - 11x - 6 = 0$

Zeros $= -2, 2+\sqrt{7}, 2-\sqrt{7}$

$-2 \mid 1 \ -2 \ -11 \ -6$, $\quad -2 \ \ 8 \ \ 6$

$1 \ -4 \ -3 \ \ 0$

x	y
-2	0

$x^2 - 4x - 3$

$\frac{4 \pm \sqrt{-4^2 - 4(1)(-3)}}{2(1)} = \frac{4 \pm \sqrt{16+12}}{2}$

$\frac{4}{2} \pm \frac{\sqrt{28}}{2}$

28 | 2, 14 | 2, 7 | 7

$2 \pm \sqrt{7}$

c. $x^4 + 2x^3 - 2x^2 - 8x - 8 = 0$

$-2 \mid 1 \ \ 2 \ -2 \ -8 \ -8$, $\quad -2 \ \ 0 \ \ 4 \ \ 8$

$1 \ \ 0 \ -2 \ -4 \ \ 0$

x	y
-2	0
2	0

$x^3 + 0x^2 - 2x - 4$

$2 \mid 1 \ \ 0 \ -2 \ -4$, $\quad 2 \ \ 4 \ \ 4$

$1 \ \ 2 \ \ 2 \ \ 0$

$x^2 + 2x + 2$

$\frac{-2 \pm \sqrt{2^2 - 4(1)(2)}}{2(1)} = \frac{-2 \pm \sqrt{4-8}}{2} = \frac{-2 \pm \sqrt{-4}}{2} = -1 \pm i$

Zeros $= -2, 2, -1+i, -1-i$