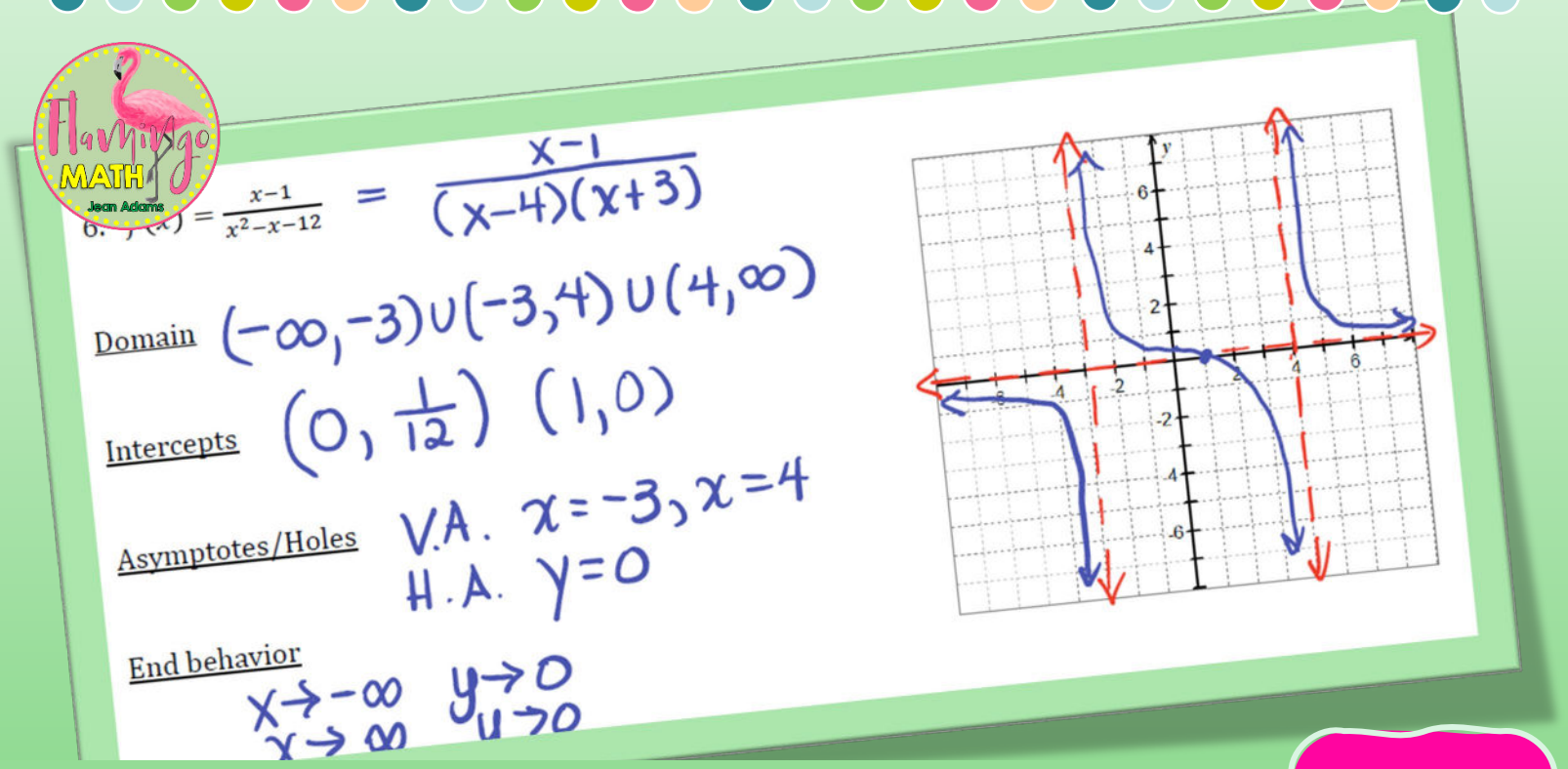
Precalculus Honors

Polynomial Power & Rational Functions



Homework 2

Completely Editable

PRECALCULUS CURRICULUM

Scope and Sequence

Unit 2: Polynomials, Power & Rational Functions

Lesson	Skills & Learning Objectives
[2.1] Linear & Quadratic Functions	▪ Recognize and graph linear and quadratic functions ▪ Describe qualities and characteristics of linear and quadratic functions ▪ Graph linear and quadratic functions by recognition of equations ▪ Choose, write and analyze an algebraic model given real-world scenarios
[2.2] Power Functions	▪ Graph and use power functions to solve real-world problems ▪ Describe the basic characteristics of power functions, including power and constant of variation ▪ Determine relative rates of growth, concavity, and more for power functions
[2.3] Polynomial Functions and Their Graphs	▪ Graph and use the leading term test to sketch the general shape of a polynomial ▪ Describe the basic characteristics of a polynomial from the equation (increase, decrease, constant, concavity, inflection points) ▪ Find zeros, multiplicity of zeros, extrema, and end behavior ▪ Use the Intermediate Value Theorem to find zeros ▪ Estimate points of inflection
[2.4] Real Zeros of Polynomial Functions	▪ Apply the Remainder Theorem, Factor Theorem, and Rational Zeros Theorem ▪ Use the Remainder and Factor Theorems ▪ Divide polynomials using long division and synthetic division. ▪ Find both real zeros and rational zeros of polynomials. ▪ Explain the connections of characteristics such as roots, zeros, factors, and x-intercepts

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Scope and Sequence

Unit 2: Polynomials, Power & Rational Functions

Lesson	Skills & Learning Objectives
[2.5] Complex Zeros & the Fundamental Theorem of Algebra	▪ Use the Fundamental Theorem of Algebra to factor polynomials ▪ Write polynomials in standard form given zeros, degree, multiplicity, and factors ▪ Find all zeros both real and complex using the Fundamental Theorem of Algebra ▪ Write a linear factorization of polynomials given equations, zeros, and other key characteristics.
[2.6] Graphs of Rational Functions	▪ Graph transformations of the reciprocal function, by finding vertical and horizontal asymptotes and intercepts. ▪ Factor and simplify rational expressions ▪ Find removable and non-removable points of discontinuity ▪ Analyze rational functions completely, including using limit notation to describe behavior at both horizontal and vertical asymptotes
[2.7] Analyzing Rational Functions	▪ Analyze rational functions completely, including using limit notation to describe behavior at both horizontal and vertical asymptotes ▪ Use test intervals to establish function behavior for analysis ▪ Solve applied problems for rational functions
[2.8] Solving Rational Equations & Inequalities	▪ Solve equations involving fractions using both algebraic and graphical techniques ▪ Find where rational functions are zero and the intervals where the polynomial is positive or negative by using a sign chart. ▪ Solve polynomial and rational inequalities, identify extraneous solutions ▪ Model and predict real-world scenarios with given parameter values

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UNIT 2 :
POLYNOMIAL, POWER, & RATIONAL FUNCTIONS

	Lesson Topic	STANDARDS
1	Linear & Quadratic Functions	**BEST:** MAFS.912.F-IF.2.6; MAFS.912.F-IF.3.8.a; MAFS.912.F-IF.2.4; MAFS.912.F-IF.3.7 **CCSS:** HSF.1F.A.1, HSF.1F.B.4, HSF.1F.C.7 **TEKS:** 1.D, 2.D.4, 3.D.2
2	Power Functions	**BEST:** MAFS.912.F-LE.1.3; MAFS.912.F-IF.3.7.e **CCSS:** HSF.IF.C.7.E; HSF.LE.A.3 **TEKS:** 2.F, 2.G 2I, 2.J, 2.N, 5.J, 2.D.2, 4.C.1
3	Polynomial Functions and Their Graphs	**BEST:** MAFS.912.F-IF.3.7.c; MAFS.912.F-IF.2.4; MAFS.912.F-IF.3.7 **CCSS:** HSF.IF.B.4, HSF.IF.C.7, HSF.IF.C.7.C **TEKS:** 2.F, 2.G 2I, 2.J, 2.N, 5.J, 2.D.2, 4.C.1
4	Real Zeros of Polynomial Functions	**BEST:** MAFS.912.F-IF.3.7.c; MAFS.912.A-APR.2.3; MAFS.912.A-APR.2.2 **CCSS:** HSA.APR.B.2, HSA.APR.B.3, HSF.IF.C.7.C **TEKS:** 2.F, 2.G 2I, 2.J, 2.N, 5.J, 2.D.2, 4.C.1
5	Complex Zeros & the Fundamental Theorem	**BEST:** MAFS.912.N-CN.3.7; MAFS.912.N-CN.3.9; MAFS.912.N-CN.3.8; ;MAFS.912.A-APR.2.2 **CCSS:** HSA.APR.B.2, HSA.APR.B.3, HSN.CN.C.7, HSN.CN.C.8, HSN.CN.C.9 **TEKS:** 1.G, 2.I, 1.D
6	Graphs of Rational Functions	**BEST:** MAFS.912.F-IF.3.7.d **CCSS:** HSF.IF.C.7.D **TEKS:** 2.F, 2.G, 2.J, 2.K, 2.N, 3.B.3, 3.G.2
7	Analyzing Rational Functions	**BEST:** MAFS.912.F-IF.3.7.d **CCSS:** HSF.IF.C.7.D **TEKS:** 2.F, 2.G, 2.J, 2.K, 2.N, 3.B.3, 3.G.2
8	Solving Rational Equations & Inequalities	**BEST:** MAFS.912.A-CED.1.1; MAFS.912.A-REI.1.2; MAFS.912.A-REI.2.3 **CCSS:** HSA.CED.A.1, , HSA.REI.A.2, HSA.REI.B.3 **TEKS:** 1.C, 1.D, 5.K, 5.L, 1.A.1, 4.F.7, 4.F.8

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2.1 Linear and Quadratic Functions Homework

Name _____

Date _____ Period _____

Problems 1 – 2, Determine which are polynomial functions and state the degree and leading coefficient. For those that are not, explain why not.

1. $y = -5 + 3.2x$

Degree: _____

Leading Coefficient: _____

Is this a polynomial? Yes No

2.. $h(x) = \sqrt{5x^4 - x^2}$

Degree: _____

Leading Coefficient: _____

Is this a polynomial? Yes No

Problems 3 – 4, Write an equation, in the form specified, for the linear function satisfying the given information.

3. Slope-Intercept Form

$f(-4) = 14$ and $f(4) = -4$

4. Point-Slope Form

$f(-1) = 11$ and $f(6) = -10$

Problems 5 – 8, Find the vertex and axis of symmetry. Then rewrite the equation in vertex form.

5. $f(x) = 4x^2 - 2x + 6$

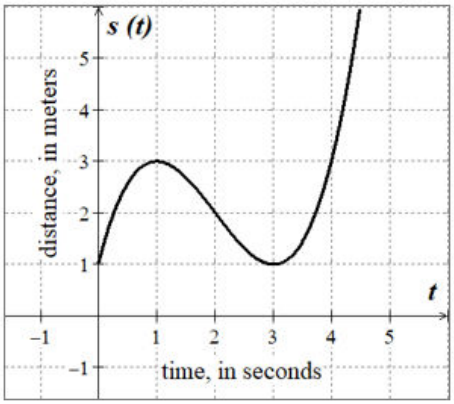
6. $g(x) = 2x^2 + 7x - 2$

7. $h(x) = 8x - 3 - x^2$

8. $f(x) = 3x^2 - 9x + 4$

Free Response Question

18. The **position vs time graph** below (Figure A), shows the distance an object travels on the interval $0 \le t \le 5$ seconds.



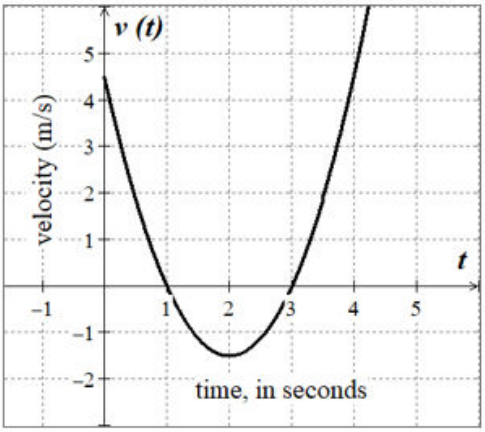
[Figure A]

a) When is the particle at rest?

b) When is the particle moving left?

c) When does the particle change directions?

19. The **velocity vs time graph** below (Figure B), shows the velocity of an object on the interval $0 \le t \le 5$ seconds.



[Figure B]

a) When is the particle at rest?

b) When is the particle moving left?

c) When does the particle change directions?

20. Looking at the two examples above, what similarities do you notice between the graphs? In other words, how do they relate to each other?

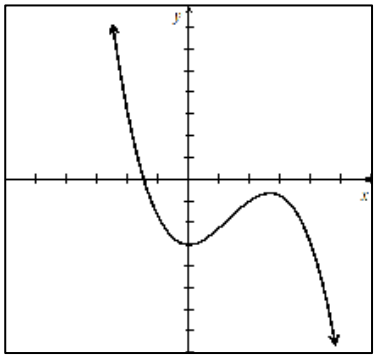
2.3 Polynomials of Higher Degree Homework

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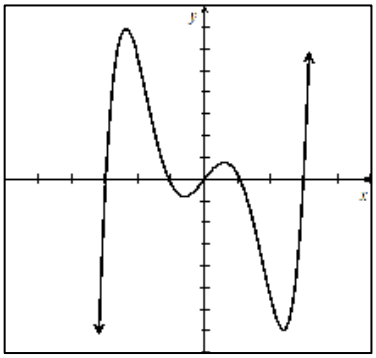
Date _____ Period _____

Problems 1 – 6, match the polynomial function with its graph.

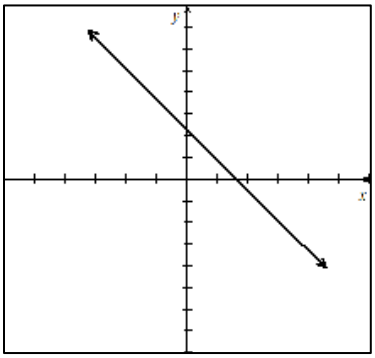
A.



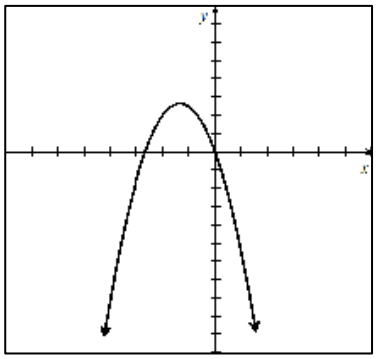
B.



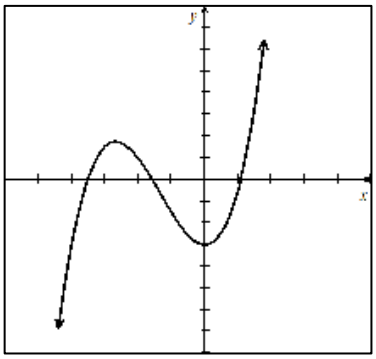
C.



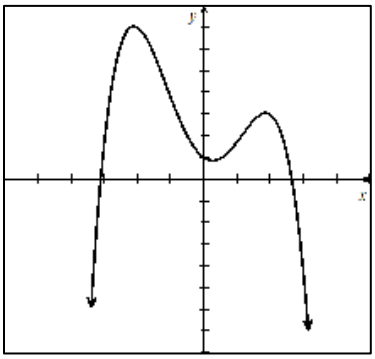
D.



E.



F.



1. $f(x) = -1.4x + 2.3$

2. $f(x) = -\frac{3}{2}x^2 + 4x$

3. $f(x) = \frac{1}{2}x^3 + 2x^2 - 3$

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

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

6. $f(x) = -\frac{1}{4}x^3 + x^2 - 3$

Problems 7 – 10, Use the Leading Coefficient Test to describe the right-hand and left-hand behavior of the graph of the polynomial function. Use a graphing utility to check your results.

7. $g(x) = -3x^4 + 2x^2 + 1$

8. $h(x) = 4$

9. $f(x) = 4 - 3.2x^2 - 1.5x^3$

10. $s(t) = 9.4t^2 + 42t + 150$

Free Response Question

Given $f(x) = ax^3 + x^2 + 12x + c$. A table of values for the function is shown below. Use the equation of $f(x)$ and the table of values to answer the following question.

x	-4	-3	-2	-1	0	1	2	3	4
$f(x)$	105	36	5	??	9	20	21	0	-55

A.) Can you determine the end behavior of $f(x)$ using the table? Give a reason.

B.) Can the multiplicity of the zero at $x = 3$ be determined from the table of values? Give a reason why or why not.

C.) What is the value of c? How do you know.

D.) Use the zero from the table to find the value of a. Show your work.

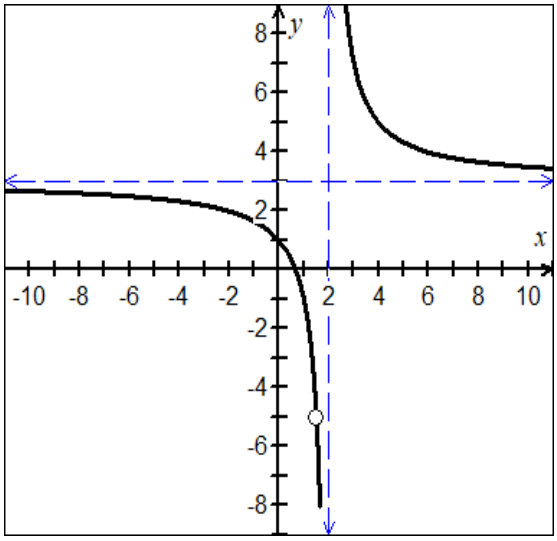
E.) Use synthetic division to find the other zeros for $f(x)$. Show your work.

F.) Find $f(-1)$

Problems 9 – 14, The graph of the rational function, $g(x)$ is shown below. There is a removable discontinuity at the point $\left(\frac{3}{2}, -5\right)$ and the x-intercept is $\left(\frac{2}{3}, 0\right)$.

9. State the domain and range of the function $g(x)$.

10. Use proper notation to describe the behavior of the function as x approaches the infinite discontinuity from the left and from the right.



Graph of $g(x)$

11. What factor(s) will be common to both the numerator and denominator? How do you know?

12. Describe the end-behavior of the function. How is this represented on the graph of $g(x)$?

13. Name the missing factor of the numerator. How is this represented on the graph?

14. Write the equation for the function $y = g(x)$ in factored form, and in expanded form.

2.7 Analyzing Rational Functions Homework

Name _____

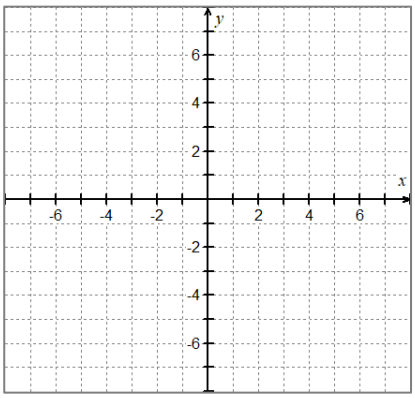
Date _____ Period _____

Problems 1 – 2, Given the rational functions below, complete the table of information.

Function	1. $G(x) = \frac{x^2+x-12}{x^2-x-6}$	2. $H(x) = \frac{2x^2-3x-9}{x^2+x-12}$
Factored form		
Domain		
Zeros of the function		
***y*-intercept**		
Horizontal asymptote		

Problems 3 – 7, Analyze and graph each of the following.

3. $f(x) = \frac{2x+4}{x-2}$



4. $g(x) = \frac{-2}{x^2-4}$

