

Mathematician: _____ Date _____

Read and answer all questions accordingly. All work and problems must be done on your own paper and work must be shown. No work = No Credit = NO EXCEPTIONS.

Chapter 6: Polynomials

1) Divide using synthetic division: $(5x^2 - 6x - 8) \div (x - 2)$

2) Divide using long division: $(2x^3 - 7x^2 + 9x - 4) \div (2x - 1)$

3) Define polynomial. What makes an equation, a polynomial?

Solve each polynomial by any method of factoring and state all multiplicity roots. Then, identify end behavior for these equations.

4) $-x(x^2 - 6x + 5) = 0$

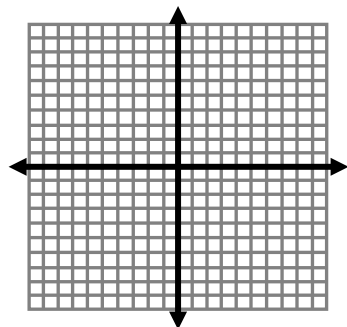
5) $x^4 + 6x^2 - 27 = 0$

6) List **ALL POSSIBLE** rational zeros for $f(x) = -2x^3 + 4x^2 - 10x + 9$.7) The volume of a rectangular solid is 675 cubic centimeters. The width is 4 centimeters less than the height, and the length is 6 centimeters more than the height. $V = lwh$

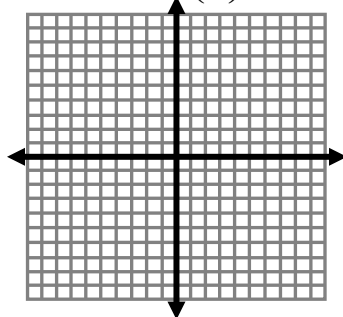
8) Write the polynomial with the roots of -5, 1, and 4.

Tell whether the function shows growth or decay. Then graph.

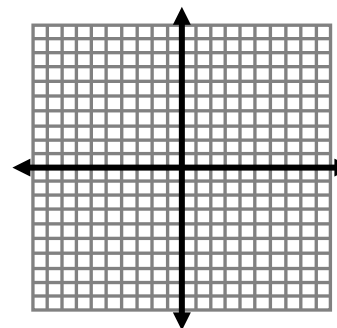
9) $f(x) = 0.4^x$



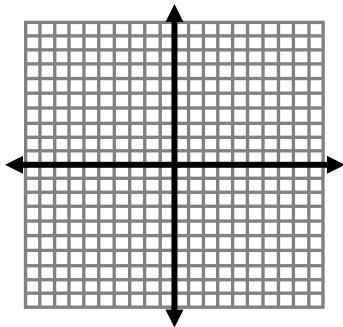
10) $f(x) = 1.2\left(\frac{6}{5}\right)^x$

11) Determine $f(g(x))$ given $f(x) = 1 - 2x$ and $g(x) = 3x + 2$ **Chapter 8: Rational Expressions**1) If y varies directly as x , and $y = 15$ when $x = 10$, find y when $x = 14$.2) If y is directly proportional to the square of x , and $y = 12$ when $x = 14$, find y when $x = 6$.3) If c is inversely proportional to d , and $c = 2$ when $d = 3.6$, find c when $d = 4.5$.4) Suppose r varies jointly as t and n and inversely as the square of v . When $t = 3$, $n = 18$, and $v = 5$, then $r = 3.78$. Find r when $t = 4$, $n = 12$, and $v = 4$.

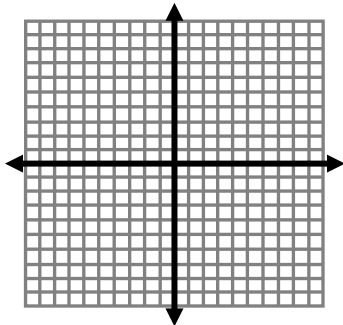
5) Simplify, $\frac{5x^2 + 5x + 3x + 3}{5x^2 - 27x - 18}$.

6) Simplify, $f(x) = \frac{x^2 - x - 6}{x^2 - 4x + 3}$. Identify any x -values for which the expression is undefined.7) Sketch the graph of $f(x) = \frac{1}{x+2}$ and label all asymptotes and transformation from the parent function.

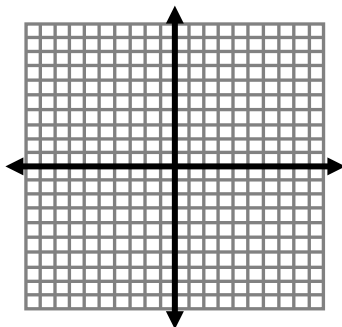
8) Label all asymptotes and holes of $f(x) = \frac{x+2}{x^2-4}$ and graph.



9) Label all asymptotes and holes of $f(x) = \frac{x^2+1}{x-2}$ and graph.



10) Identify the zeros and asymptotes of $f(x) = \frac{3x+3}{x+2}$ and graph.



Multiply or divide. Assume that all expressions are defined.

11) $\frac{x^2}{3y^4} \cdot \frac{12y}{8x^4}$ 12) $\frac{x-9}{2x-10} \cdot \frac{x-5}{x^2-81}$ 13) $\frac{3x^3-9x^2}{x^2-16} \div \frac{2x-6}{x^2-8x+16}$

14) $\left(\frac{4}{x}\right) \left(\frac{2}{xy}\right)$

15) $\left(\frac{3+\frac{2}{y}}{\frac{5-6}{x-y^2}}\right)$

Add or subtract. Identify any x-values which the expression is defined.

16) $\frac{5}{x-5} + \frac{x}{2x-10}$

17) $\frac{5x}{x-7} - \frac{9x-6}{x+3}$

18) Lorraine averaged 62 words per minute when typing the first 3 pages of a 6-page report. Her average typing speed for the last 3 pages was 45 words per minute. To the nearest word per minute, what was Lorraine's average typing speed for the entire report?

Solve each equation.

19) $2 + \frac{3}{x-1} = 10$ 20) $\frac{x}{x-1} + \frac{x}{3} = \frac{5}{x-1}$ 21) $\frac{30}{x+1} + x = 10$

Chapter 7: Logarithms

1) Define Exponential Growth and Decay. What makes the graph growth or decay?

Write in the alternative form.

2) $16^{1/4} = 2$ 3) $16^{-0.5} = \frac{1}{4}$ 4) $a^b = x$ 5) $\log_{81} \frac{1}{3} = -\frac{1}{4}$

6) Condense, $5\log_4 2 - (7\log_4 x + 4\log_4 y)$

7) Condense and solve, $\ln 40 + 2\ln \frac{1}{2} + \ln x = 2$

8) Condense and Solve, $\log_4(-x) + \log_4(x+10) = 2$

9) Expand, $\ln \frac{(x-3)^2}{y^4}$

Simplify:

$$10) \frac{4e^x}{e^{4x}} \quad 11) \frac{1}{e^{4x}} \quad 12) (3e^{5x})^2 \quad 13) \frac{e^{6x}}{2e^{-2x}}$$

Solve. List all extraneous solutions.

$$14) 3^{x-1} = 729^{x/2} \quad 15) \ln \frac{x-1}{2} = 6 \quad 16) e^{2x} - 7e^x + 12 = 0$$

$$17) \log x + \log(x-9) = 1 \quad 18) \ln e - 2 \quad 19) \log_2(x-4) = 6$$

20) If \$2,200 is deposited in an account at the bank and earns 3% interest compounded quarterly, what is the amount in the account, after 4 years?

21) If \$5,300 is deposited in an account at the bank and earns 7% annual interest, compounded continuously, what is the amount in the account, after 9 years?

22) A thermometer is taken from a room where the temperature is 20°C to the outdoors, where the temperature is 5°C . After one minute, the thermometer reads 12°C . Use Newton's Law of Cooling, what will the reading on the thermometer be after one more minute?

Chapter 10: Conics

1) The transmission of a radio signal can be received at the locations $(1, -10)$ and $(-11, 6)$. Write an equation for the range of the signal if a line between the locations represents a diameter of the range.

2) Find the center, vertices, co-vertices, and foci of the ellipse with equation, $49(x+4)^2 + 16(y-2)^2 = 784$. Then graph.

3) A shelter for a patch of young strawberry plants is constructed in the form of an ellipse. If the shelter is 4.5 feet high at its highest point and the patch is 19 feet wide, write an equation for the ellipse.

4) Find the center, vertices, co-vertices, foci, and asymptotes of $\frac{x^2}{25} - \frac{y^2}{144} = 1$. Then graph.

5) Find the center, vertices, co-vertices, foci, and asymptotes of $\frac{(x-2)^2}{4} - \frac{(y+5)^2}{12} = 1$. Then graph.

6) Write the equation of the hyperbola with vertices $(0, 7)$ and $(0, -7)$ and conjugate axis length is 28.

7) Find the vertex, value of p , axis of symmetry, focus, and directrix of the parabola with equation: $y + 4 = \frac{1}{24}(x-2)^2$. Then graph.

8) Find the equation of the parabola with vertex at $(-3, 1)$, and focus $(-1, 1)$.

9) Find an equation of the ellipse with vertices at $(-2, 2)$ and $(4, 2)$, and co-vertices at $(1, 4)$ and $(1, 0)$.

10) Find the equation of the hyperbola with vertices $(2, 2)$ and $(2, 8)$, and foci $(2, 0)$ and $(2, 10)$.

11) Find the equation whose center is $(1, -3)$, length of transverse axis is 7 units long on the x -axis. Length of the conjugate axis is 4 units.

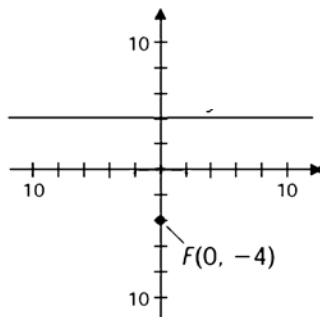
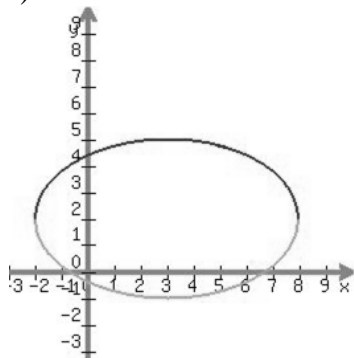
12) Find a hyperbola equation whose vertices are $(6, -6)$ and $(0, -6)$ and focus at $(3 + \sqrt{13}, -6)$

14) What is the discriminant and type of conic section of $x^2 + 4y^2 - 6x - 7y = 0$?

15) Convert $\frac{(y-3)^2}{16} - \frac{(x+4)^2}{9} = 1$ into general form. Show all steps.

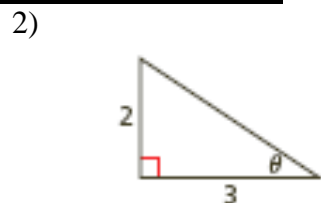
16) What are the equations for the graphs below?

A) B) Each point is worth 2.



Chapter 13-Trigonometry

Find the values of the six trigonometric functions for θ .



3) A man who is 2 m tall stands on horizontal ground 30 m from a tree. The angle of elevation of the top of the tree from his eyes is 28° . Estimate the height of the tree.

Draw an angle with the given measure in standard position.

- 4) 100° 5) -210° 6) $-\frac{11\pi}{20}$

P is a point on the terminal side of θ in standard position. Find the exact value of the six trigonometric functions of θ .

- 7) $P(-32, 24)$ 8) $P(-3, -7)$

Convert each measure from degrees to radians or from radians to degrees. Then, identify one positive and negative coterminal angle.

- 9) 310° 10) -36° 11) $2\pi/9$ 12) $-5\pi/6$

Use the unit circle to find the exact value of each trigonometric function. Then, identify the reference angle of the original degree/radian.

- 13) $\cos 210^\circ$ 14) $\tan 11\pi/6$ 15) $\csc 315^\circ$
 16) $\sec \pi/3$ 17) $\sin 2\pi$ 18) $\cot 4\pi$

19) List 3 ways you will do to help you study for the final exam.