Name _____ Date _____ Period _____

Mr. Cox's Algebra 2 Spring Final Exam

I.   Polynomials

Factor the following completely.

1. $4x^2 - 25$ 　　　　　　　　　2. $8x^3 + 27$ 　　　　　　　　　3. $x^3 - x^2 - 4x + 4$

Use long division to determine that the given polynomial is a factor of f(x). Use the result to factor f(x) completely.

4. $f(x) = (x^3 + x^2 - 4x - 4) \div (x - 2)$

Perform the requested operations on the functions.

$f(x) = 2x - 5$ 　　　　　　　$g(x) = x - 3$

5. $(fg)(x)$ 　　　　　　　　　　　　6. $(g + f)(x)$

II.   Graphing Polynomials

For each polynomial below, determine the degree, end behavior, and type of roots. If the polynomial is not factored, factor it first.

7. $f(x) = (x-2)(x+3)$	8. $f(x) = x(x-4)^2$
Degree: _____	Degree: _____
Leading coefficient: _____	Leading coefficient: _____
Roots: _____	Roots: _____

9. $f(x) = -(x-2)^3$ Degree: _____ Leading coefficient: _____ Roots: _____	10. $f(x) = -x^2(x-4)^2$ Degree: _____ Leading coefficient: _____ Roots: _____

Use the information given to write the polynomial function.

11. A cubic equation with x-intercepts at -1, 1, and -2.

_____

III.   Rational Functions

Find the domain, vertical asymptotes, and horizontal asymptotes for the following rational functions.

12. $f(x) = \dfrac{6}{x-4}$

Domain:_____

VA:_____

HA:_____

13. $f(x) = \dfrac{-2x+7}{x}$

Domain:_____

VA:_____

HA:_____

14. $f(x) = \dfrac{5x^2+1}{x+3}$

Domain:_____

VA:_____

HA:_____

15. $f(x) = \dfrac{x^3-4}{2x^2+11x-6}$

Domain:_____

VA:_____

HA:_____

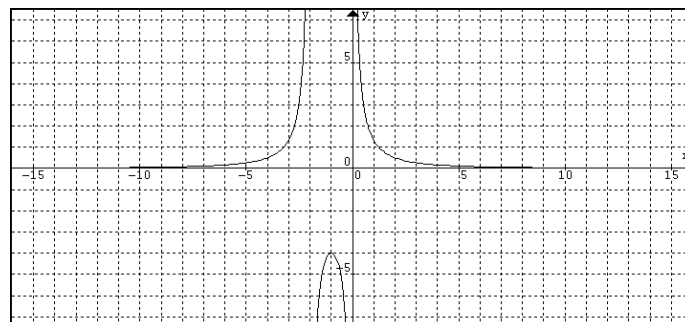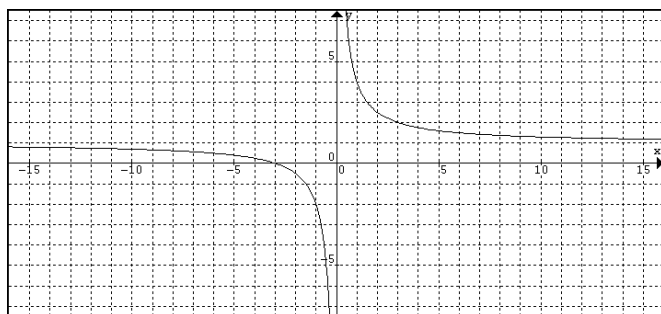Match the rational function with its graph.

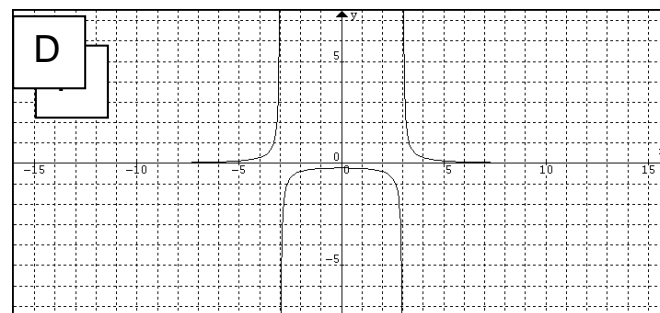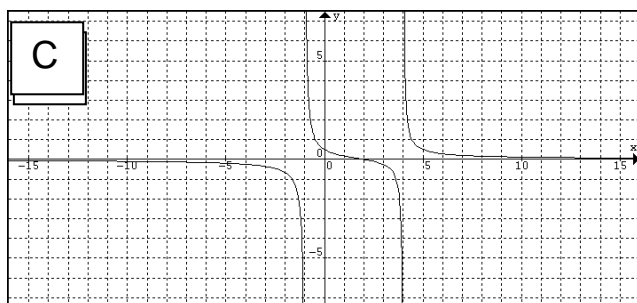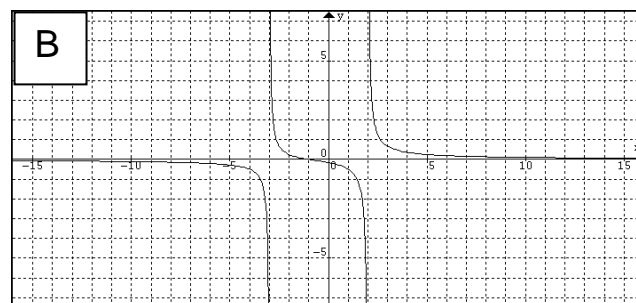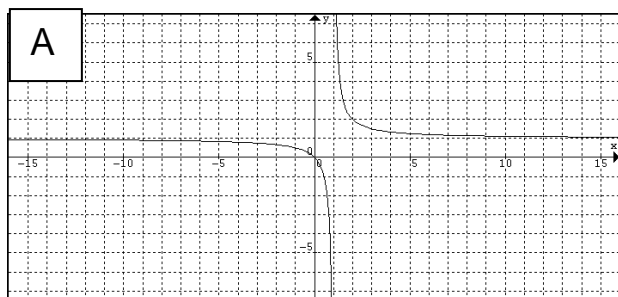16. $f(x) = \dfrac{x}{x-1}$ _____

17. $f(x) = \dfrac{2}{x^2-9}$ _____

18. $f(x) = \dfrac{x+1}{(x-2)(x+3)}$ _____

19. $f(x) = \dfrac{x+3}{x}$ _____

20. $f(x) = \dfrac{x-2}{(x+1)(x-4)}$ _____

21. $f(x) = \dfrac{4}{x(x+2)}$ _____

A

B

C

D

IV.   Rational Expressions

Simplify the following.

22. $\dfrac{x^2-8x+12}{x^2+3x-10}$

23. $\dfrac{x^2-7x-8}{3x^2-24x} \cdot \dfrac{4x^3}{x^2-1}$

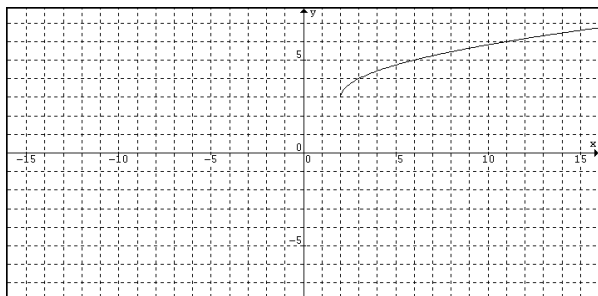|	
24. $\dfrac{5x^2 - 20}{25x^2} \div \dfrac{x^2 + 6x + 8}{x^2 + 10x + 24}$	25. $\dfrac{3x}{4yz} + \dfrac{6}{24y^2}$

V. Graphing Quadratics, Square Roots, Cubics, and Cube Roots

<u>Write the equation of the following.</u>

26. Start with $y = \sqrt{x}$. Shift it 1 unit left, 2 units down, and reflect it across the x-axis.
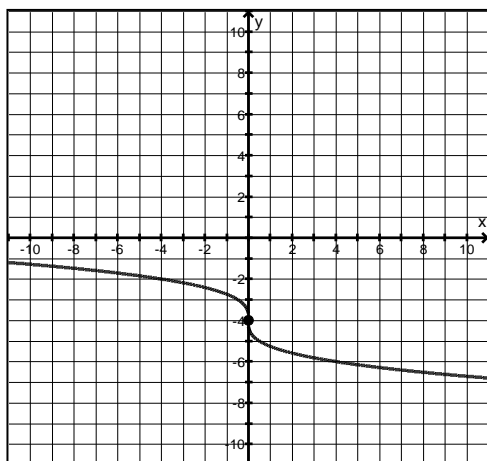
y = _____

27. y = _____

<u>Write the equation of the following.</u>

28. Start with $f(x) = x^3$. Vertically stretch it by a factor of 3 and shift it down 6.

_____

29. y = _____

VI. Radicals and Rational Exponents

<u>Simplify the following radical expression</u>.

30. $\sqrt[3]{32} + \sqrt[3]{108}$ _____

31. $\sqrt{200} - 3\sqrt{32} + 2\sqrt{98}$ _____

<u>Rewrite each expression using rational (Fractions) exponents.</u>

32. $\sqrt[6]{82}$ _____

33. $\sqrt[5]{3^3}$ _____

<u>Rewrite each expression using radicals.</u>

34. $25^{\frac{1}{4}}$ _____

35. $6^{\frac{3}{7}}$ _____

Solve for x.

36. $2x^{\frac{5}{3}} = -64$

37. $3(x+1)^{3/2} + 4 = 28$

VII.   Exponents

Simplify the following.

38. $\dfrac{x^3y^4}{4} \cdot \dfrac{6x}{y^{-1}}$	39. $\dfrac{2ef^8g^{-2}}{e^2fg^6}$

Solve the following:

40. $\left(3^x\right)^2 3^4 = 3^8$	41. $8^3 8^x = 8^5$

42. $3^x = 81$	43. $2^{2x-3} = 32$

Use these formulas to set up the following problems.

$$A = P\left(1 + \frac{r}{n}\right)^{nt} \qquad\qquad A = P\left(1 - \frac{r}{n}\right)^{nt}$$

44. If a person deposits $5000 into an account that pays 10.25% compounded semiannually, how much will they have after 8 years?
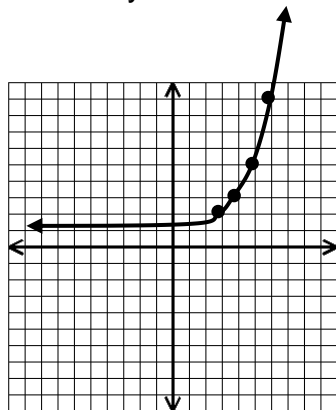
45. If a person deposits $5100 into an account that pays 8.5% compounded quarterly, how much will they have after 25 years?

VIII.   Connecting Exponentials and Logarithms
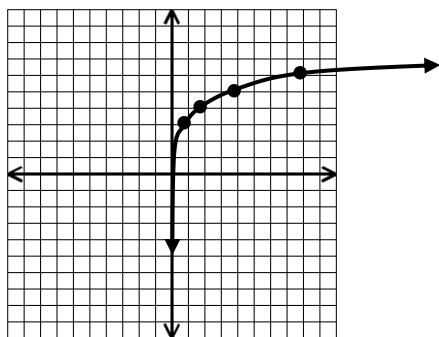
Write the equation of each of the following.

46. Start with $y = 2^x$. Shift left 1, down 7, and shrink by a factor of .5 _____

47.

_____

48. Start with $y = \log_2 x$. Reflect across the x-axis, stretch by a factor of 2, shift right 4, and down 3. _____

49.

_____

Express each logarithmic equation in exponential form.

50. $\log_4 64 = 3$ _____

51. $\log_8 2 = \dfrac{1}{3}$ _____

Express each exponential equation in logarithmic form.

52. $2^5 = 32$ _____

53. $64^{-\frac{1}{3}} = \dfrac{1}{4}$ _____

Evaluate the following logarithmic expressions.

54. $\log_5 125 = $ _____

55. $\log_{64} 4 = $ _____

IX. Logarithms

Expand each expression.

56. $\log_5 xy^2$ _____

57. $\log_3 \dfrac{(ab)^4}{c}$ _____

Solve each of the following.

58. $\log_3 x + \log_3 5 = 2\log_3 10$	59. $3\log_2 x - 8 = 4$
60. $\log_3(1-8v) = 2$	**_Bonus_**. $10^{2x} = 57$