

Name \_\_\_\_\_

Period \_\_\_\_\_

**Spring 2018 Final Exam Review Show all work and answers on SEPARATE PAPER!**

The review for the final must be completed by the date of the original final exam in order to be eligible for a retest in the event of a failing final exam grade.

1. Determine which binomial is *not* a factor of  $4x^4 - 21x^3 - 46x^2 + 219x + 180$ .

a.  $x + 4$

c.  $x - 5$

b.  $x + 3$

d.  $4x + 3$

**DIVIDE:**2.  $-4x^3 + x^2 - 4x + 2$  by  $x + 4$ .

3.  $(x^4 - 14x^3 + 30x^2 + 86x - 55) \div (x - 5)$

4. Use synthetic division to find  $P(-1)$  for  $P(x) = x^4 - 5x^3 + x^2 + 2x - 3$ .5. One of the factors of  $g(x) = 42x^2 - 11x - 3$  is  $(6x + 1)$ . What is another factor?6. The volume of Link's treasure chest in cubic feet can be expressed as the polynomial  $2x^3 - 23x^2 + 86x - 105$ . Each dimension of the box (length, width and height) can be expressed as a linear expression with integer coefficients. If  $x - 5$  is one of those dimensions, find the other two.7. Use the Rational Root Theorem to list all possible rational roots of the polynomial equation  $x^3 + 7x^2 + 8x + 7 = 0$ . Do not find the actual roots.**(#8-9) Find all the roots of the polynomial equation.**

8.  $2x^3 + 2x^2 - 19x + 20 = 0$

9.  $x^3 + x^2 - 8x - 8 = 0$

**(#10-11) Find the real-number root.**

10.  $\sqrt[3]{-\frac{216}{343}}$

11. Simplify  $\sqrt[3]{24a^{10}b^{15}}$ .

**(#12-13) Divide and simplify. Assume that all variables are positive. Rationalize the denominator of the expression if necessary.**

12.  $\frac{\sqrt[3]{270x^{20}}}{\sqrt[3]{5x}}$

13.  $\frac{\sqrt{5x^8y^{10}}}{\sqrt{7x^2y^3}}$

14. A garden has width  $\sqrt{6}$  and length  $5\sqrt{6}$ . What is the perimeter of the garden in simplest radical form?**(#15-17) Simplify.**

15.  $-\sqrt{6} + 4\sqrt{36} + 5\sqrt{6}$

16.  $6^{\frac{1}{2}} \cdot 6^{\frac{1}{2}}$

17.  $27^{\frac{2}{3}}$

18. Write  $(27a^{-9})^{\frac{2}{3}}$  in simplest form.**(#19-20) Solve the equation.**

19.  $\sqrt{x+6} + 4 = 8$

20.  $(x-9)^{\frac{3}{5}} = 8$

21. Multiply  $(-5 - \sqrt{2})(2 + \sqrt{2})$

22. An initial population of 250 quail increases at an annual rate of 17%. Write an exponential function to model the quail population.

23. Write an exponential function  $y = ab^x$  for a graph that includes (0, 5) and (2, 45).

24. The half-life of a certain radioactive material is 83 hours. An initial amount of the material has a mass of 179 kg. Write an exponential function that models the decay of this material. Find how much radioactive material remains after 22 hours. Round your answer to the nearest thousandth.

25. Suppose you invest \$1700 at an annual interest rate of 7.3% compounded continuously. How much will you have in the account after 2 years?
26. Mrs. Camden wants to save some money for new furniture. She puts \$900 in a savings account that earns 5.3% interest compounded quarterly. Calculate how much money she would have after 3 years.
27. The amount of money in an account with continuously compounded interest is given by the formula  $A = Pe^{rt}$ , where  $P$  is the principal,  $r$  is the annual interest rate, and  $t$  is the time in years. Calculate to the nearest hundredth of a year how long it takes for an amount of money to double if interest is compounded continuously at 2.8%.

28. Write the equation in logarithmic form:  $3^7 = 2,187$

29. Write the equation  $\log_{64} 16 = \frac{2}{3}$  in exponential form.

**(#30-31) Evaluate the logarithm.**

30.  $\log_6 \frac{1}{216}$

31.  $\log_7 343$

**(#32-34) Write the expression as a single logarithm.**

32.  $6 \log_8 v + 7 \log_8 q$

33.  $\log_6 64 - \log_6 8$

34.  $3 \ln 8 + 6 \ln a$

**(#35) Expand the logarithmic expression.**

35.  $\log_9 8m^5$

36. Use the properties of logarithms to evaluate  $\log_3 9 + \log_3 36 - \log_3 4$ .

**(#37-40) Solve for x. Round to the nearest ten-thousandth.**

37.  $6e^{4x} - 2 = 3$

38.  $3^{8x} = 117$

39.  $\log(4x + 4) = 3$

40.  $\ln(2x + 7) = 6$

41. Write an equation for the translation of  $y = \frac{7}{x}$  that has the asymptotes  $x = 5$  and  $y = 6$ .

**(#42) Identify the points of discontinuity: are they holes or vertical asymptotes AND horizontal asymptote.**

42.  $y = \frac{x + 8}{x^2 - 9x + 18}$

43. Describe the vertical asymptote(s) and hole(s) for the graph of  $y = \frac{(x - 2)(x + 4)}{(x + 4)(x + 5)}$ .

**(#44) Simplify the rational expression. State any restrictions on the variable.**

44.  $\frac{m^2 - m - 42}{m^2 - 2m - 48}$

**(#45-46) Multiply or divide. State any restrictions on the variables.**

45.  $\frac{x + 5}{x + 3} \div \frac{x + 6}{x^2 + 9x + 18}$

46.  $\frac{a^2}{a + 2} \cdot \frac{a^2 + 3a + 2}{a^2 + 5a}$

**(#47-48) Add or subtract. Simplify if possible.**

47.  $\frac{b^2 + 7b + 10}{b^2 + 10b + 16} - \frac{6}{b + 8}$

48.  $\frac{6}{k + 7} + \frac{5}{k^2 - 49}$

**(#49-50) Simplify the complex fraction.**

$$49. \frac{\frac{3}{3k} - \frac{1}{5k}}{\frac{3}{5k} + \frac{1}{4k}}$$

$$50. \frac{\frac{m+1}{m^2+11m+30}}{\frac{m+4}{m+6}}$$

**(#51-52) Solve the equation. Check the solution.**

$$51. \frac{7}{3d} + \frac{6}{5d} = -5$$

$$52. \frac{-1}{x-4} = \frac{2}{x-5}$$

53. Alicia can row 8 miles downstream in the same time it takes her to row 4 miles upstream. She rows downstream 5 miles/hour faster than she rows upstream. Find Alicia's rowing rate each way. Round your answers to the nearest tenth, if necessary.
54. An initial population of 895 armadillos increases at an annual rate of 7%. Write an exponential function to model the armadillo population. How long will it take for the armadillo population to reach 1,100?
55. Mr. Brown bought himself a new blue Lexus convertible. The cost of this brand new auto is \$49,950.00. It is estimated to depreciate in value at an annual rate of 14%. What will the value of his car be when it is 4 years old?
56. A group of college students are volunteering for Help the Homeless during their spring break. They are putting the finishing touches on a house they built. Working alone, Irina can paint a certain room in 7 hours. Paulo can paint the same room in 6 hours. Write an equation that can be used to find how long it will take them working together to paint the room. How many hours will it take them to paint the room? If necessary, round your answer to the nearest hundredth.
57. Use a calculator to determine the quadratic equation that best models the data.

$x$	50	100	150	200
$y$	200	350	675	1425

58. Use a calculator to determine the exponential equation that best models the data.

$x$	1	5	10	15	20
$y$	3500	4750	3200	8525	10,450

**(#59-65) Factor the expression.**

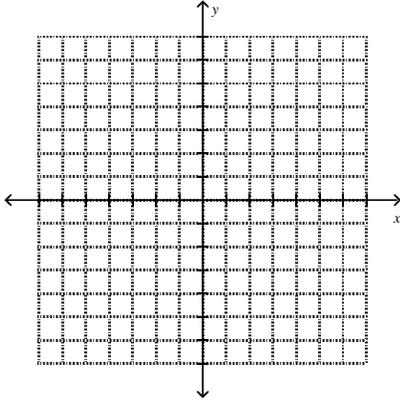
$$59. x^2 + x - 20 \quad 60. x^2 - x - 6 \quad 61. 3x^2 + 14x + 15 \quad 62. c^3 - 512$$

$$63. 27x^3 + 343 \quad 64. x^4 - 52x^2 + 576 \quad 65. x^4 - 45x^2 + 324.$$

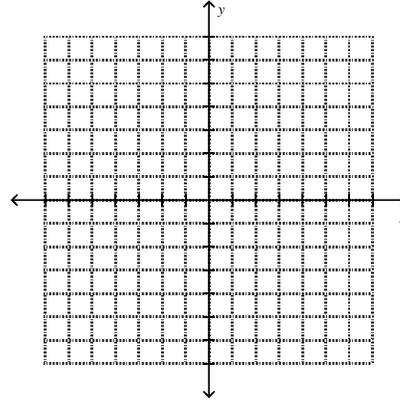
66. Write an equation for a graph that is the set of all points in the plane that are equidistant from the point  $F(-9, 0)$  and the line  $x = 9$ .
67. Write an equation of a parabola with a vertex at the origin and a focus at  $(-3, 0)$ .
68. Write an equation of a parabola with a vertex at the origin and a directrix at  $y = 5$ .



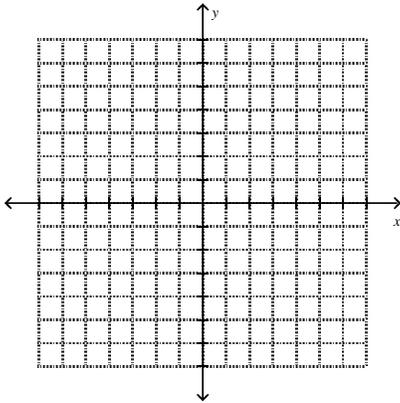
78.  $4x^2 - 16y^2 = 64$



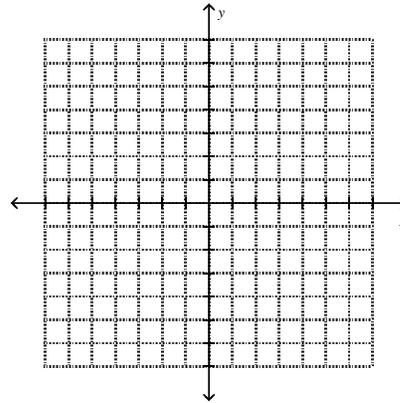
79.  $\frac{x^2}{36} + \frac{y^2}{16} = 1$



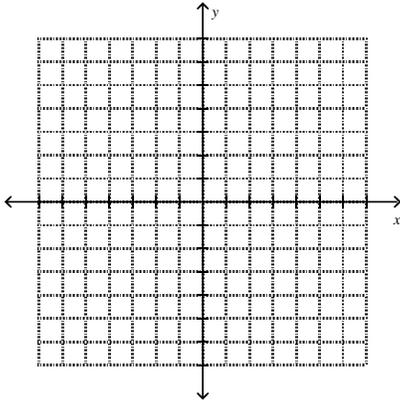
80.  $(x - 5)^2 + (y - 5)^2 = 4$



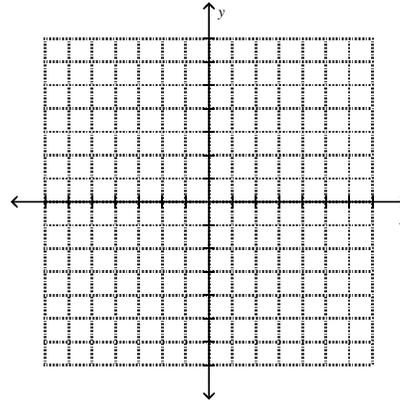
81.  $8(y - 4) = (x + 5)^2$



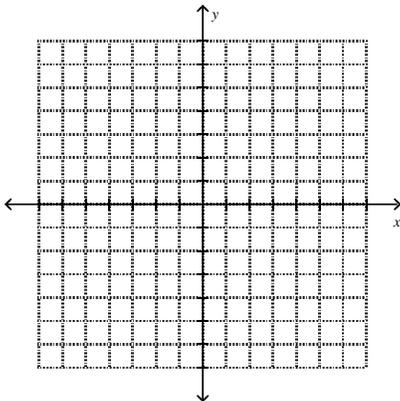
82.  $y = (4)^x$



83.  $y = 2(4)^x$



84.  $y = \log_4 x$



85.  $y = \frac{1}{x - 3} + 3$

