ALGEBRA 2 CP **2014 – 2015 FINAL REVIEW**

NAME: _____ DATE: _____

Solve each equation below. Be sure to show all process steps.

1. $3x^2 = 10x - 3$

2. $\frac{x}{x+3} + \frac{1}{x-1} = \frac{4}{x^2+2x-3}$

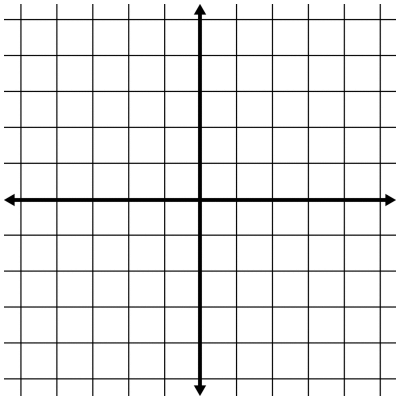
For questions 3 and 4, let $f(x) = \frac{x+4}{2}$ and $g(x) = 2x - 4$. Find the following:

3. $f(g(4))$

4. $g(f(x))$

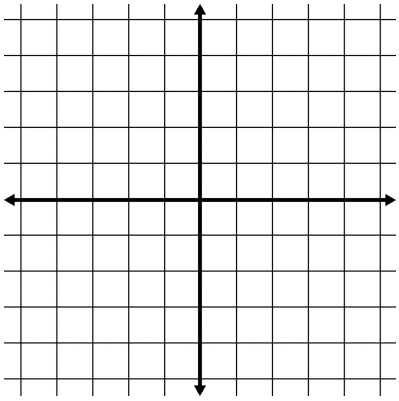
5. Graph the following function:

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



6. Graph the following function:

$f(x) = -(x+1)^2(x-4)^3(x-2)^4$



Use any method to solve:

7. x + 5y = 2

3x – 10y = 11

8. -8x + 3y = 3

16x – 9y = -8

Factor completely.

9. $x^3 - 125$

10. $6x^2 - 7x - 3$

11. $18x^2 - 8$

12. $8mn - 10n + 12m - 15$

13. $27z^3 - 8$

14. $8y^4 + y$

Write a quadratic equation, then solve.

15. A painter decreases the size of a square piece of canvas by cutting 3 cm from the length and 5 cm from the width. The resulting rectangular piece of canvas has an area of $120\,\text{cm}^2$. Find the length of the original piece of canvas.

16. Simplify: $\dfrac{4x^2+6x+2}{4x^2-4}$

17. Simplify: $\left(\dfrac{x^3}{y^{-1}}\right)^{-2}\left(\dfrac{y^3}{x^{-2}}\right)^{2}$

18. Simplify: $\left(\frac{3pq^{-1}}{p^{-2}q}\right)^{-1}$

19. Simplify: $(\sqrt{6}-2\sqrt{5})^2$

20. Simplify: $(5+2\sqrt{3})(4-3\sqrt{3})$

21. Simplify: $\frac{8\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$

22. Find the real roots of the equation: $3x^2 = 49$.

23. Find the real roots of the equation $0 = 1 + 4x^2$.

24. Solve. Check for extraneous solution(s): $\sqrt{2x-3}-\sqrt{x+7}=-2$.

25. Simplify: $(6 - 3i)(4 + 3i)$

26. Simplify: $\frac{2+3i}{4-5i}$

For questions 26 – 27: Solve by completing the square.

26. $x^2 - 4x + 1 = 0$

27. $2x^2 + 2x + 4 = 0$

28. Solve: $2x^2 - 3x - 7 = 0$

29. Solve: $3x^2 = 2x - 8$

30. Solve: $(2x + 1)^2 + 7(2x + 1) + 6 = 0$

31. Solve: $2x^2 + 16 = 0$

32. Determine the value of the discriminant, then state the nature of the roots for each quadratic equation.

a) $2m^2 - 5m + 3 = 0$

b) $4y^2 - 4y + 1 = 0$

For questions 33 – 34: Divide by using polynomial long division.

33. $\dfrac{25n^3 - 20n^2 - 12n}{5n + 2}$

34. $\dfrac{6r^3 + 2r^2s - 16s^3 + 20rs^2}{6r - 4s}$

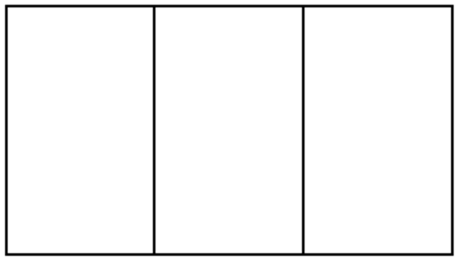
For questions 35 – 36: Divide by using synthetic division.

35. $\dfrac{3x^3 + x + 2x^2}{x + 1}$

36. $\dfrac{6x^4 - 5x^3 + 4x^2 + 6x + 1}{2x + 1}$

37. A picture frame of uniform width measures 14 cm by 20 cm and surrounds a picture whose area is 160 square cm. Find the width of the frame.

38. A rancher has 200 feet of fencing to enclose three identical adjacent rectangular sections (see diagram). Find the dimensions that will produce that maximum area.



39. Use synthetic substitution to find *P(c)* for the given polynomial *P(x)* and number *c*.

$P(x) = 3x^3 + x^2 - 4x - 3;$ c = -3

For questions 40 – 41: Use the factor theorem to determine whether the binomial is a factor of the given polynomial.

40. $x + 3;\ P(x) = 2x^3 + 11x^2 + 16x + 6$

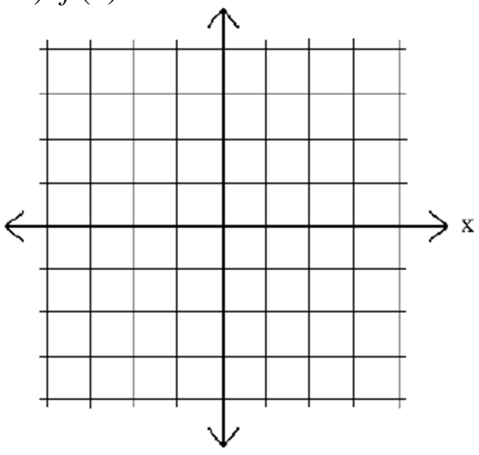
41. $x - 4;\ P(x) = 3x^3 - 15x^2 + 10x + 8$

42. Find a cubic equation with integral coefficients that has 2 and $3 - i$ as roots.

For questions 43 – 44:

a) Graph the function using the coordinate grid provided, **b)** find the vertex, **c)** find the equation of the line of symmetry, **d)** the minimum or maximum value, **e)** domain, and **f)** range

43. a) $f(x) = 4x^2 + 8x + 1$



b) _____

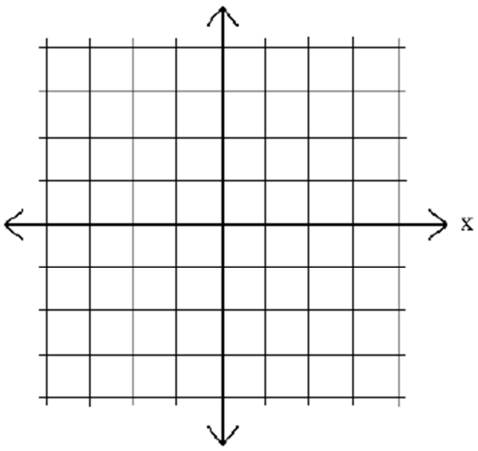
c) _____

d) _____

e) _____

f) _____

44. b) $f(x) = -2(x+1)^2 + 4$



b) _____

c) _____

d) _____

e) _____

f) _____

For questions 45 – 46: Find all *x*- and *y*-intercepts.

45. $f(x) = 9x^2 - 12x + 4$

46. $f(x) = 3x^2 - 6x + 1$

For questions 47 – 48: Find an equation for the parabola that has the following properties:

47. Has vertex (2, -3) and contains (-2, -35)

48. Has vertex (-1, -5) and contains (1, 3)

For questions 49 – 50: Find a quadratic equation having the following roots:

49. $3 - \sqrt{3}$ and $3 + \sqrt{3}$

50. $1 - 4i$ and $1 + 4i$

51. Find the equation of variation when *y* varies jointly as *x* and *w* and inversely as the square of *z*, and y=9 when x=3, w=6, and z=2.

52. If *t* varies inversely as the cube of *z* and directly as the square of *r*, and t=4 when z=3 and r=6, find *t* when z=6 and r = 9.

53. Consider the following sequence: 11, 21, 31, 41, …

a) Find the common difference/ratio.

b) Find the next three terms.

c) Find t_{34} .

54. Find the missing terms of the following arithmetic sequence: 20, _____, _____, _____, 28.

55. Consider the following sequence: 2, -12, 72, -432, …

a) Find the common difference/ratio.

b) Find the next three terms.

c) Find t_8.

56. Find the missing terms of the following geometric sequence: 2, _____, _____, _____, 2592.

57. Given: $\sum_{n=1}^{5}(5n-3)$

a) Write the following series in expanded form.

b) Find its sum.

58. Given: $1+5+9+13+17+21+25$

a) Find the common difference *d* of the arithmetic series above.

b) Write the arithmetic series using sigma notation.

59. Given: $\sum_{k=1}^{6} 3^{k+2}$

a) Find the common ratio *r* of the geometric series below. b) Find its sum.

60. Find the sum of the infinite geometric series, if it exists: $\frac{1}{12}+\frac{1}{9}+\frac{4}{27}+\ldots$

61. Find the sum of the infinite geometric series, if it exists: $t_1 = 7,\ r = \frac{2}{3}$

62. Using the definition of inverses, show that f(x) and g(x) are inverse functions:

$$f(x)=\frac{7x+18}{2}\ ,\ g(x)=\frac{2x-18}{7}$$

63. Solve for x: $7\sqrt{7} = 49^{3x-1}$

64. Solve for x: $8^{-(x-1)} = \left(\frac{1}{32}\right)^{2x+1}$

65. Simplify:

a) $\log_{\frac{1}{3}} 81$ b) $\log_3 9\sqrt[3]{3}$ c) $\log 100$

66. Express in terms of $\log_6 A$ and $\log_6 B$ (expand) : $\log_6\left(\frac{\sqrt{A}}{B^3}\right)$

67. Express as a log of a single number or expression (condense): $\log_5 10x + 3\log_5 x^3$

68. Compute the value of (using an appropriate formula):

a) ${}_{11}P_7$ **b)** ${}_9C_7$ **c)** ${}_7C_7$ **d)** ${}_4P_4$

69. Find the number of ways the letters of the word SUBSTITUTE can be arranged?

70. How many positive integers less than 100 can be represented using the digits 1, 3, 7 and 9?

71. Tim made 14 ceramic statues for the craft show. In how many ways may he display them in a row if only 5 may be displayed at a time?

72. The freshmen and sophomore class councils each have 10 members. In how many ways can a dance committee be formed if it is to consist of 3 sophomores and 2 freshmen selected from the two class councils?

73. How many ordered 4-digit numerical codes can be formed from the numbers 1, 2, 3, 4, 5, 6 if:

a) the digits are not repeated?

b) the digits are repeated?

c) the digits are not repeated but must begin with the number 1

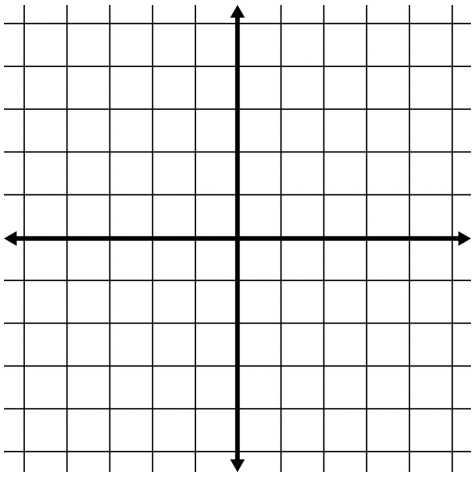
74. Solve each equation:

a) $\log_5 x = \frac{3}{2}\log_5 9 + \log_5 2$

b) $\log_3(x+2) - \log_3 6 = 2$

75. Graph each function and state the intercepts and asymptotes:

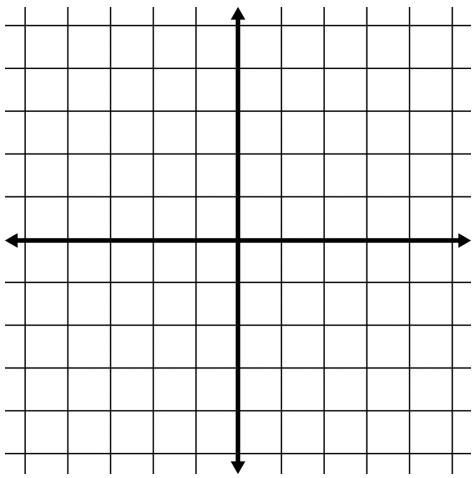
a) $f(x) = \frac{1}{x} + 2$



Intercepts: _____

Asymptotes: _____

b) $f(x) = \frac{1}{x-3}$



Intercepts: _____

Asymptotes: _____