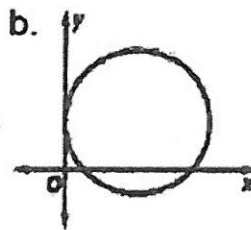
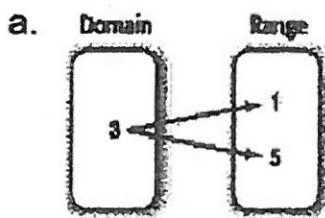


Algebra II
Final Review

Name _____

Non-calculator problems are indicated.

1. (No calculator) Graph the function: $y = |x - 3| + 2$
2. (No calculator) Given the function $y = -2|x + 3| - 1$ and the value $x = -5$, find the corresponding y -value.
3. Determine whether each relation is a function.



c.

x	y
1	2
2	4
3	6

4. (No calculator) Evaluate each function at the given value.
 - a. $f(x) = 2x - 1$; find $f(-2)$
 - b. $g(x) = 2 - x^2$; find $g(4)$
5. Find the x and y intercepts of the equation $2x + 5y = 10$
6. Find the slope of the line that passes through each pair of points.
 - a. $(1, 5)$ $(-1, -3)$
 - b. $(-3, 5)$ $(-3, -1)$
 - c. $(5, 2)$ $(-3, 2)$
7. Graph the line $4x + 3y = 12$
8. Given the point $(6, 5)$ and $(1, y)$ and the slope $\frac{7}{5}$, find the value of y .
9. Given the point $(2, -3)$ and $(x, -7)$ and the slope $\frac{1}{2}$, find the value of x .
10. Graph the line that passes through the point $(-3, -5)$ and has a slope of 2.

11. Given the equation $2x - y = 5$, state the slope and the y-intercept.
12. Write the equation of the line that passes through the points $(-1, -2)$ and $(-3, 1)$.
13. Given the line $y = 4x - 3$, find
- The slope of a line perpendicular to $y = 4x - 3$
 - The slope of a line parallel to $y = 4x - 3$
14. Write the equation of the line that passes through $(3, -1)$ and is perpendicular to the line given by the equation $y = -\frac{1}{5}x - 4$.
15. Write the equation of:
- A horizontal line passing through the point $(-2, 3)$
 - A vertical line passing through the point $(4, -6)$
16. Solve each system of inequalities by graphing.
- $$\begin{cases} x < 1 \\ y \geq -1 \end{cases}$$
 - $$\begin{cases} x - y \geq -1 \\ 3x - y \leq 4 \end{cases}$$
17. (No calculator) For each quadratic function, find the y-intercept, the x-intercepts and the vertex.
- $f(x) = -2x^2$
 - $f(x) = x^2 - 4x + 4$
 - $f(x) = x^2 - 6x + 8$
18. (No calculator) Find the minimum or maximum of each function. Then state the domain and range.
- $f(x) = -6x^2$
 - $f(x) = x^2 + 2x + 15$
 - $f(x) = -x^2 - 2x + 3$

19. Solve each equation.

a. $x^2 - 4 = 60$

b. $2x^2 - 9 = 20$

c. $x^2 - 3x - 10 = 0$

d. $2x^2 + 5x - 3 = 0$

20. (No calculator) Simplify

a. $(3i)(-2i)(5i)$

b. $(10 - 4i) - (7 + 3i)$

c. $(7 - 6i)(2 - 3i)$

21. Find the value of the discriminant and determine the number of real solutions for each equation.

a. $x^2 - 8x + 16 = 0$

b. $x^2 - x + 1 = 0$

c. $x^2 + 8x + 13 = 0$

22. (No calculator) Graph each function.

a. $y = (x - 3)^2 - 1$

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

23. Describe the transformations to each function below from $g(x)$

a. $g(x + 2)$

b. $g(x) + 2$

c. $g(x - 2)$

d. $g(x) - 2$

e. $-g(x)$

24. (No calculator) Graph the solutions to the polynomial inequality on a number line and/or xy-axis

a. $x^2 - 3x - 10 < 0$

b. $x^4 + 7x^3 + 6x^2 \geq 0$

c. $-x^2 - 64 \leq -16x$

25. Simplify

a. $\frac{-6a^4b^{-8}}{36a^7b^{-2}c^{-1}}$

b. $\left(\frac{x^4y^{-2}}{5x^3y^2} \cdot \frac{10x^2}{3y^{-8}}\right)^2$

26. Divide. Write any remainders in fraction form.

a. $(2x^2 + 13x + 15) \div (x + 5)$

b. $(2x^3 - x^2 - 19x + 15) \div (x - 2)$

c. $(x^3 - x^2 - 6) \div (x + 2)$

27. What is the remainder when

a. $x^3 - 10$ is divided by $x + 2$

b. $(2x^3 - 5x^2 + 8x - 4) \div (2x - 1)$

28. Factor completely

a. $21x^3 - 18x^2 + 24x$

b. $x^3 - 125$

c. $x^2 + 18x + 81$

29. (No Calculator) Find the remaining factors of each polynomial.

a. $x^3 + 3x^2 - 4x - 12$ given one factor is $(x + 3)$

b. $x^3 - 6x^2 + 32$ given one factor is $(x - 4)$

30. Find the real zeros (the solutions) of each function.

a. $f(x) = x^3 - 5x^2 + 5x + 3$

b. $f(x) = x^4 - 3x^3 - 5x^2 + 3x + 4$

31. A shoe company found that the annual sales of their company, in millions, could be modeled by the equation $A = -0.3t^3 + 5t^2 - 15t + 101$ from the years 1995 to 2007, where $t = 0$ in 1995. How much money did the company make in sales in 2001?

32. Given $f(x) = x^2 - 3$ and $g(x) = 3x + 1$, find

- a. $f(x) + g(x)$
- b. $f(x) - g(x)$
- c. $f(g(x))$
- d. $g(f(x))$
- e. $f(-2)$
- f. $f^{-1}(x)$

33. Find the inverse of each function.

- a. $y = x + 2$
- b. $y = 8x - 10$

34. Rewrite the expression in radical form.

- a. $5^{\frac{1}{3}}$
- b. $12^{\frac{2}{7}}$

35. Rewrite the expression in exponential form.

- a. $\sqrt[8]{x^2}$
- b. $\sqrt[4]{x^3}$

36. (No Calculator) Evaluate each expression.

- a. $32^{\frac{1}{5}}$
- b. $16^{\frac{3}{2}}$

37. Solve each equation.

- a. $\sqrt{3x+1} = 5$
- b. $2 + \sqrt{3x+7} = 6$

38. Multiply and/or divide.

- a. $\frac{5x^2}{x^2-4} \cdot \frac{x+2}{10x^5}$
- b. $\frac{x^2-5x-24}{x+1} \cdot \frac{x^2-6x-7}{x+3}$
- c. $\frac{x^2+19x+84}{4x-4} \div \frac{x^2+9x+14}{2x-2}$

39. Find the domain and the zeros of each function.

a. $f(x) = \frac{x+12}{x^2-4x+3}$

b. $f(x) = \frac{x^2+8x+12}{x-3}$

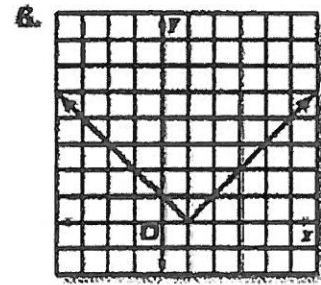
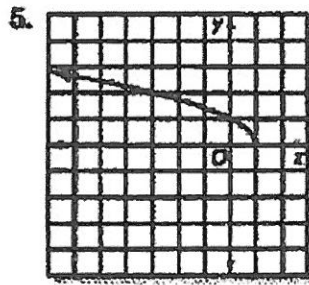
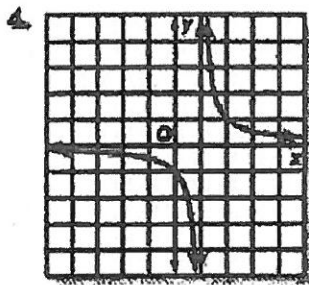
c. $g(x) = \frac{x^2+10x-24}{x^2+8x+16}$

40. (No Calculator) Match each graph with its equation.

A. $y = |x - 1|$

B. $y = \frac{1}{x-1}$

C. $y = \sqrt{1-x}$



41. Solve: $\frac{x-2}{x+4} = \frac{x+1}{x+10}$

42. Solve: $\frac{x}{2} = \frac{9}{x-3}$

43. A classic car that was bought for \$52,000 increases in value 2.5% each year. Write an exponential model that describes its value after t years.

44. A new computer bought for \$1,500 decreases in value by 1% each year. How much will the computer be worth in 10 years?

45. If \$7,500 is deposited into a bank account that pays 6.5% compounded continuously, write an equation that represents how much money you will have after t years. Then calculate how much money will you have after 12 years.

46. Write each equation in logarithmic form.

a. $2^3 = 8$

b. $8^{-2} = \frac{1}{64}$

c. $e^x = 3$

d. $e^4 = 8x$

47. Write each equation in exponential form.

a. $\log_3 243 = 5$

b. $\log_5 \frac{1}{25} = -2$

c. $\ln 15 = x$

d. $\ln x = 0.6931$

48. Write an equivalent expression for $\log_2 9$ using the change of base formula.

49. (No Calculator) Evaluate each expression.

a. $\log_5 25$

b. $\log_9 3$

c. $\log_5 \frac{1}{125}$

d. $\log_8 8^3$

e. $e^{\ln 3}$

f. $\ln e^{-2.5}$

50. (No Calculator) Solve each equation.

a. $\log_3 x = 5$

b. $\log_{\frac{1}{4}} x = 3$

c. $\log_x 3 = \frac{1}{2}$

d. $\log_5(3x) = 2$

51. Simplify each expression.

a. $3e + 5e - (2e + 1)(3e - 1)$

b. $e\left(\frac{e^2}{5}\right)^2$

c. $4e^{2x} \cdot \frac{1}{2}e^{-8x}$

52. Graph the equations $y = 2^x$ and $y = \log_2 x$. What do you notice about the graphs compared to one another?

53. Solve each equation

a. $5^{3x} = 106$

b. $2^{x+1} = 17$

c. $2e^x - 1 = 11$

d. $\ln(3x) = 2$

e. $8\ln(x + 3) = 16$

54. Find the next four terms of the arithmetic sequence: 101, 202, 303, ...

55. Find the first five terms of the arithmetic sequence with $a_1 = 6$ and $d = 9$

56. Write the formula for the arithmetic sequence where the first term is 18 and the common difference is 2. Then find the 8th term in the sequence.

57. Find the sum of the first 40 terms of the series: $5 + 8 + 11 + 14 + \dots$

58. If the third term of an arithmetic sequence is -8 and the seventh term is -20, find the eleventh term.

59. What are the first 5 terms of the series given by: $\sum_{n=1}^{50} n^2 - 2$

60. Find the sum of the arithmetic series given by: $\sum_{n=1}^{18} 10 + 3n$

61. Find the first five terms of the geometric series where the first term is 6 and the common ratio is 2.

62. Write an equation for the n th term of the sequence: 2, -6, 18,

63. Find the sum of the geometric series: $\sum_{n=1}^9 2(-3)^{n-1}$

64. Find the sum of the infinite geometric series:

a. $10 + 5 + \frac{5}{2} + \frac{5}{4} + \dots$

b. $\sum_{n=1}^{\infty} 6 \left(-\frac{1}{3}\right)^{n-1}$

65. As a group, the Dutch are among the tallest people in the world. The average Dutch man is 184 cm tall – just over 6 feet! The standard deviation of men’s heights is about 8 cm. Assuming the distribution is approximately Normal, sketch a model and clearly label 1, 2, and 3 standard deviations above and below the mean.

66. Let’s say it takes you 20 minutes, on average, to drive to school, with a standard deviation of 2 minutes. Suppose a Normal model is appropriate for the distribution of driving times.

- a. About how often will it take you between 18 and 22 minutes to get to school?
- b. How often will you arrive at school in less than 22 minutes?
- c. How often will it take you more than 24 minutes?

67. For an agility test, fourth-grade children jump from side to side across a set of parallel lines, counting the number of lines they clear in 30 seconds. Here are their scores

22	17	18	29	22	22	23	24	23	17	21	25
20	12	19	28	24	22	21	25	26	25	16	27
22											

- a. Find the mean, median and mode.
- b. Find the standard deviation.
- c. Find the five number summary.
- d. Find the range and IQR.
- e. Are there any outliers? How do you know?
- f. Sketch a boxplot.
- g. Which number is the 80th percentile?

68. Two psychologists surveyed 478 children in grades 4, 5, and 6 in elementary schools in Michigan. They asked the students whether their main goal was to get good grades, to be popular, or to be good in sports. Below is a 2 way table with the results.

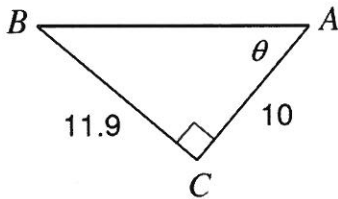
Goals

	Grades	Popular	Sports	Total
Boy	117	50	60	227
Girls	130	91	30	251
Total	247	141	90	478

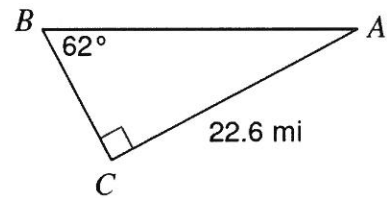
- What is the probability that a randomly selected student's goal is to excel in sports?
- What is the probability that a randomly selected student is a Boy?
- What is the probability that a randomly selected student's goal is to be popular given they are a girl?
- What is the probability that a randomly selected student is a boy, given that their goal is get good grades?

69. Solve the following right triangles.

a.



b.



70. State the amplitude, period, maximum value and minimum value of the following.

a. $y = 3\cos 3x - 1$

b. $y = -2\sin \pi x + 2$

c. $y = \sin \frac{1}{2}x$

71. (No Calculator) Evaluate the following.

a. $\sin 30^\circ$

b. $\cos 135^\circ$

c. $\tan \frac{4\pi}{3}$

d. $\sin 270^\circ$

e. $\cos 90^\circ$

f. $\tan \frac{\pi}{2}$

72. If $\tan \theta = \frac{7}{24}$ and θ is in quadrant III, find $\cos \theta$ and $\sin \theta$.

73. If the terminal side of θ goes through the point $(40, -9)$. Find $\sin \theta$, $\cos \theta$ and $\tan \theta$.

