Algebra 2H
WS 00.0- Algebra Review

Do all work neatly on a separate sheet of paper.

Translate the verbal sentence into an equation or an inequality. Then use the information to solve for the variable(s).

1. The quotient of *m* and 7 is greater than or equal to 16.
2. The sum of 4 and the second power of *b* is equal to 104.
3. The distance *t* you travel by train is $3\frac{2}{3}$ times the distance *d* you live from the train station. You travel 3 miles to get from your house to the train station.

Evaluate the expression for the given value of *x*.

4. $3+x+(-4), \quad x=5$

5. $-x+12-5, \quad x=9$

6. $3.5-(-x), \quad x=1.5$

7. $-(-3)^2(x), \quad x=7$

8. $6x(x+2), \quad x=2$

9. $(8x+1)(-3), \quad x=\frac{1}{2}$

10. $\frac{1}{4}|(-x)(-x)(-x)|, \quad x=4$

11. $\frac{x^2+4}{6}, \quad x=8$

12. $(-5)\left(-\frac{3}{4}x\right), \quad x=6$

Solve the equation. Round the result to the nearest hundredth.

13. $-\frac{2}{9}(x-5)=12$

14. $7x-(3x-2)=38$

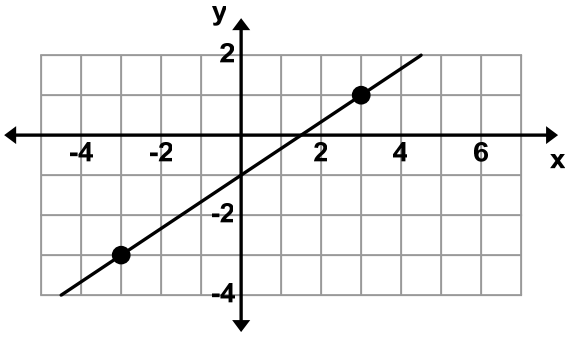
15. $\frac{1}{3}x+7=-7x-5$

16. $8(x+3)-2x=4(x-8)$

17. $11.47+6.23x=7.62+5.51x$

18. $-3(2.98-4.1x)=9.2x+6.25$

In Exercises 19 and 20, use the graph to the right.



19. Write an equation of a line that is parallel to the line shown.

20. Write an equation of a line that is perpendicular to the line shown.

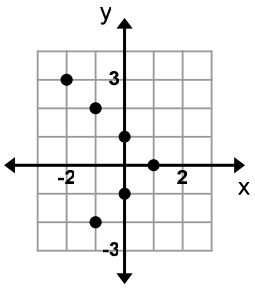
Graph both lines you created above in the same plane as the original to check your answer.

Decide whether the relation is a function. Then indicate the domain and range of each relation.

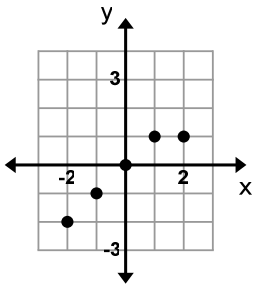
21.

Input	Output
-1	-1
1	-1
3	1
5	3
7	5

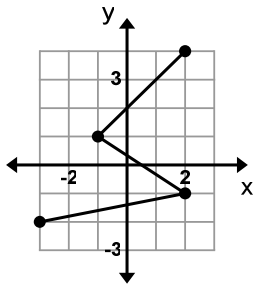
22.



23.



24.



Use the information provided to write an equation of the line in standard form. Then graph each on a separate plane.

25. The slope is $\frac{4}{5}$; the *y*-intercept is -3

26. The line passes through $(-1, 2)$; the slope is $\frac{1}{3}$

Solve the inequality and graph the solution.

27. $-3 < -4x+9 \le 14$

28. $|3x+16|+2<10$

29. $3x-4>5$ or $5x+1<11$

Solve each system of linear equations. Then graph each system on a separate coordinate plane.

30. $\begin{aligned} 4y &= -8x + 16 \\ 2y &= 11x - 7 \end{aligned}$

31. $\begin{aligned} -2x + 3y &= 15 \\ 10x - 11y &= 9 \end{aligned}$

32. $\begin{aligned} y &= 5x - 2 \\ 3x + 7y &= 5 \end{aligned}$

Simplify. Then evaluate the expression when *a*=1 and *b*=2.

33. $\dfrac{b^8}{b^2}$

34. $3a^4 \cdot a^{-3}$

35. $\left(-a^3\right)\left(2b^2\right)^3$

36. $4b^3 \cdot (2+b)^2$

37. $\dfrac{4a^{-3}b^3}{ab^{-2}}$

38. $\dfrac{\left(5ab^2\right)^{-2}}{a^{-3}b}$

Decide how many solutions the equation has. Then solve the equation.

39. $6x^2 + 8 = 34$

40. $4x^2 - 9x + 5 = 0$

41. $3x^2 + 6x + 3 = 0$

Completely factor the expression.

42. $x^2 + 6x + 8$

43. $x^2 - 24x - 112$

44. $3x^2 + 17x - 6$

45. $4x^2 + 12x + 9$

46. $x^2 + 10x + 25$

47. $x^2 - 14x + 49$

Solve the equation.

48. $(3x+1)(2x+7) = 0$

49. $6x^2 - x - 7 = 8$

50. $4x^2 + 16x + 16 = 0$

51. $x^3 + 5x^2 - 4x - 20 = 0$

52. $x^4 + 9x^3 + 18x^2 = 0$

53. $x^2 - \dfrac{4}{3}x + \dfrac{4}{9} = 0$

Simplify the expression.

54. $\dfrac{4x}{12x^2}$

55. $\dfrac{2x+6}{x^2-9}$

56. $\dfrac{3x}{x^2-2x-24} \cdot \dfrac{x-6}{6x^2+9x}$

57. $\dfrac{x^2-6x+8}{x^2-2x} \div (3x-12)$

58. $\dfrac{4}{x+2} + \dfrac{15x}{3x+6}$

59. $\dfrac{3x}{x+4} - \dfrac{x}{x-1}$

Simplify the expression.

60. $4\sqrt{7} + 3\sqrt{7}$

61. $9\sqrt{2} - 12\sqrt{8}$

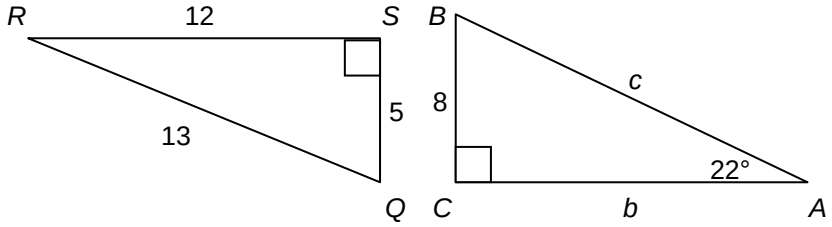
62. $\sqrt{6}\left(5\sqrt{3} + 6\right)$

63. $\dfrac{11}{7 - \sqrt{3}}$

In Exercises 64 and 65, use the triangles at the right.

64. Find the sine, cosine, and tangent of $\angle Q$ and $\angle R$. Round your answer to the nearest hundredth.

65. Find the lengths of the sides of ΔABC. Round each answer to the nearest hundredth.



In Exercises 66 and 67, Company A sells a Personal Video Recorder (PVR) for $700 and charges a $5 monthly subscription fee. Company B sells a PVR for $500 and charges a $20 monthly fee.

66. What is the total cost of each PVR after one year? After 3 years?

67. How many months must the PVRs be used in order for the total costs of the two models to be the same?

Algebra 2H
WS 02.2- Normal Distributions

TESTING For Exercises 1–6, use the following information.
The scores on a test administered to prospective employees are normally distributed with a mean of 100 and a standard deviation of 15.

1. About what percent of the scores are between 70 and 130?
2. About what percent of the scores are between 85 and 130?
3. About what percent of the scores are over 115?
4. About what percent of the scores are lower than 85 or higher than 115?
5. If 80 people take the test, how many would you expect to score higher than 130?
6. If 75 people take the test, how many would you expect to score lower than 85?

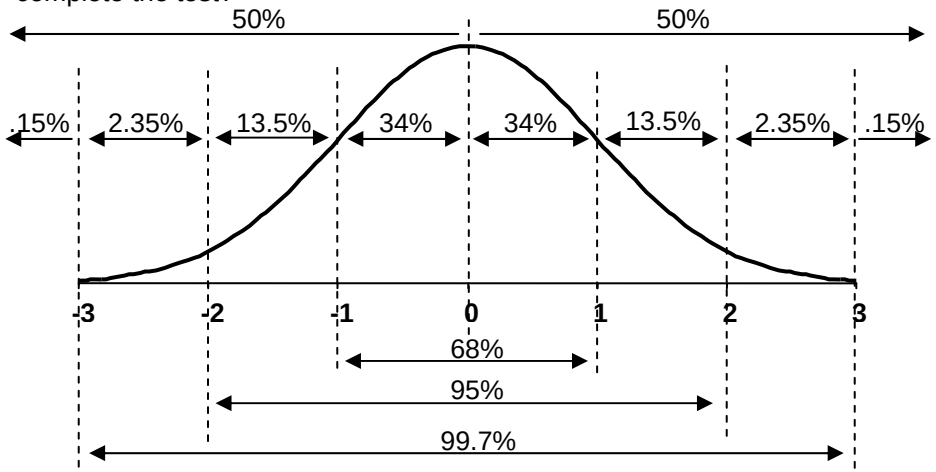
7. TEMPERATURE The daily July surface temperature of a lake at a resort has a mean of 82° and a standard deviation of 4.2. If you prefer to swim when the temperature is at least 77.8°, about what percent of the days does the temperature meet your preference?

DELIVERY For Exercises 8–10, use the following information.
The time it takes a bicycle courier to deliver a parcel to his farthest customer is normally distributed with a mean of 40 minutes and a standard deviation of 4 min.

8. About what percent of the trips to the customer take between 36 and 44 min?
9. About what percent of the trips to the customer take between 40 and 48 min?
10. About what percent of the trips to the customer take less than 32 minutes?

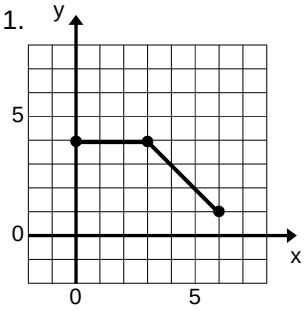
TESTING For Exercises 11-13, use the following information.
The average time it takes sophomores to complete a math test is normally distributed with a mean of 63.3 minutes and a standard deviation of 12.3 minutes.

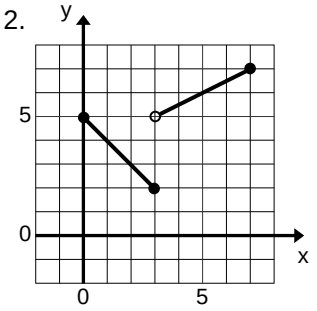
11. About what percent of the sophomores take more than 75.6 minutes to complete the test?
12. About what percent of the sophomores take between 51 and 63.3 minutes?
13. About what percent of the sophomores take less than 63.3 minutes to complete the test?

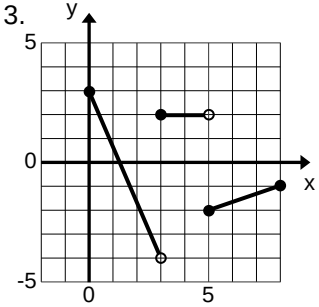


Algebra 2H
WS 03.X- Piecewise Functions

For each graph, write a rule for the piecewise function graphed.

1. 

2. 

3. 

Graph each piecewise function.

4. $f(x)=\begin{cases}-x+2 & \text{if } 0\le x<3\\ -1 & \text{if } 3\le x\le 5\end{cases}$

5. $f(x)=\begin{cases}2x-4 & \text{if } x<2\\ \frac{1}{2}x-1 & \text{if } x\ge 2\end{cases}$

6. $f(x)=\begin{cases}1 & \text{if } 0\le x<2\\ 2 & \text{if } 2\le x<4\\ 3 & \text{if } 4\le x\le 6\end{cases}$

7. $f(x)=\begin{cases}\frac{x}{3} & \text{if } 0\le x<3\\ 1 & \text{if } 3\le x<6\\ -\frac{x}{3}+3 & \text{if } 6\le x\le 9\end{cases}$

8. Under a graduated income tax system, different incomes are taxed at different rates. Suppose a function that gives the tax $T(i)$ on a person's income i in a certain state is:

$$T(i)=\begin{cases}0.03i & \text{if } 0\le i\le 20{,}000\\ 600+0.08(i-20{,}000) & \text{if } 20{,}000<i<50{,}000\\ 3000+0.15(i-50{,}000) & \text{if } i\ge 50{,}000\end{cases}$$

a) Graph the function $T(i)$.

b) What is the tax on an income of \$10,000? On \$54,000?

Algebra 2H
WS 04.5- Mid-Chapter Review

Use these functions to find each value: $f(x) = -3x + 5$, $g(x) = (x-2)^2$, $h(x) = x^2 + 4$

1. $f(x+2)$
2. $g(2x)+1$
3. $h(x-1)+3$
4. $f(g(6))$

5. $h(f(7))$
6. $g(h(-5))$
7. $f(g(h(-2)))$
8. $g(h(f(4)))$

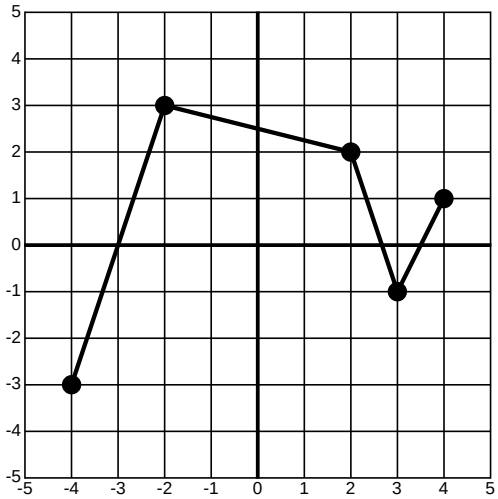
9. $h(g(f(0)))$
10. $f(h(a))$
11. $h(f(a))$
12. $g(h(a))$

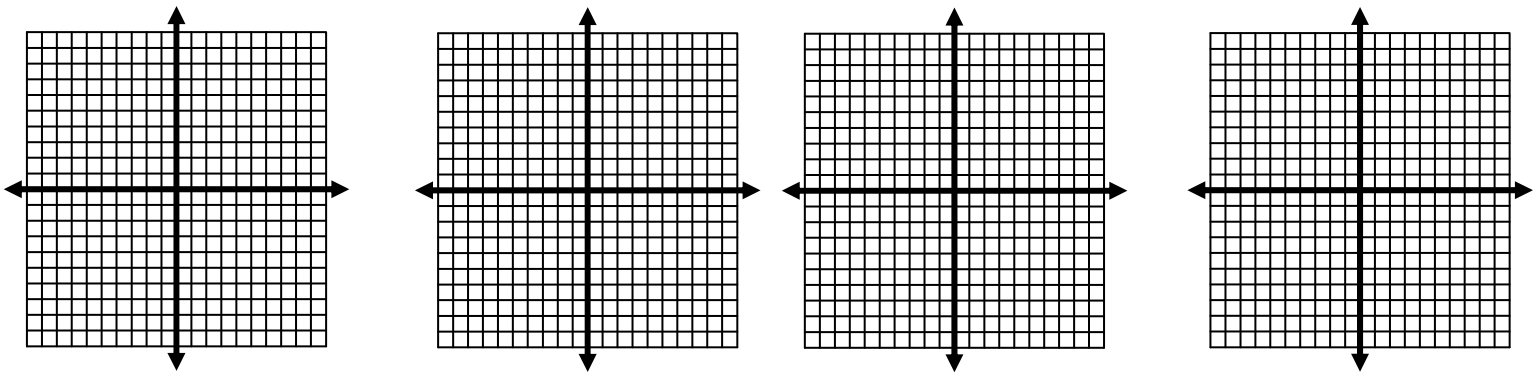
Describe the translations of the graph of $y = x^2$ needed to produce the graph of each equation.

13. $y = (x+5)^2$
14. $y = x^2 + 2.5$
15. $y = (x-3)^2 - 9$
16. $y = (x+7.5)^2 + 2.5$

The graph of $y = f(x)$ is shown to the right. Graph each related function.

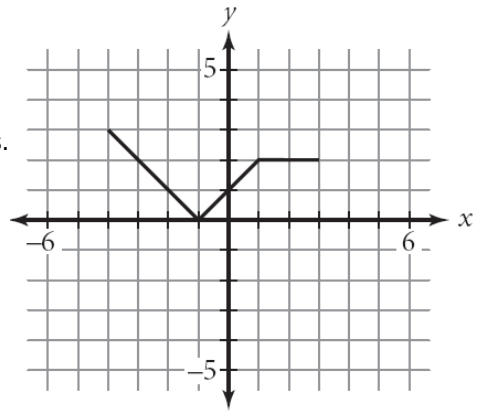
17. $y = f(x) - 1$	18. $y = -f(x)$
19. $y = f(x+1)$	20. $y = f(x-1) + 2$



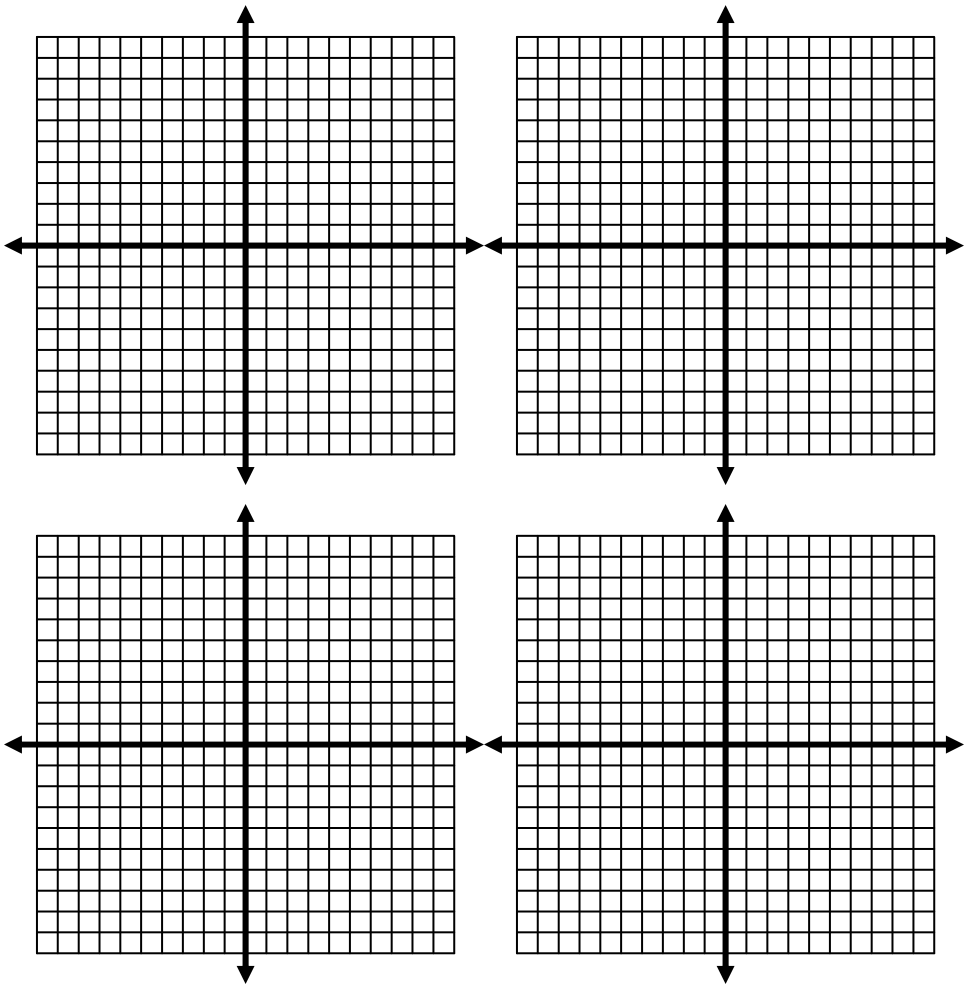


Algebra 2H
WS 04.X- Transformation Practice

The following graph is $y = f(x)$. Draw the graph of each with the given transformations.



1. $y = 2 \cdot f(x-3)+1$
2. $y = 0.5 \cdot f(x+3)-2$
3. $y = 3 \cdot f(x-1)-3$
4. $y = -2 \cdot f(x-3)+1$



Algebra 2H
WS 05.7- Properties of Logarithms

1. Complete the following statements.
   a) The logarithm of the product of two numbers equals the _____ of the logarithms of the numbers.

   b) The logarithm of the _____ of two numbers equals the difference of the logarithms of the two numbers.

Write each expression in terms of $\log M$ and $\log N$.

2. $\log M^3$
3. $\log MN^3$
4. $\log \dfrac{M^7}{N^5}$
5. $\log \dfrac{1}{N^2}$
6. $\log \sqrt[3]{M^2}$
7. $\log M\sqrt{N}$

Write each expression as a single logarithm.

8. $\log 2 - 3\log 7$
9. $\log_3 16 + 2\log_3 5 - \log_3 4$
10. $\log_4 7 + \log_4 5$
11. $7\log x + \dfrac{1}{4}\log x^8$
12. $3\log_5 2 + \dfrac{1}{2}\log_5 49 - \log_5 14$
13. $4\log_6 t - 8\log_6 u - 5\log_6 v$

Write the following as a single logarithm and give its numerical value.

14. $\log_3 36 - \log_3 4$
15. $\log 125 + \log 8$
16. $\log_5 12 - \log_5 60$

Let $x = \log_3 2$ and $y = \log_3 10$. Write each expression in terms of x and y.

17. $\log_3 20$
18. $\log_3 \dfrac{1}{8}$
19. $\log_3 400$

Algebra 2H
WS 05.8- Real World Logs

Do all work neatly, showing all work, on a separate sheet of paper.

1. Hazel wants to invest $2000 for her newly born grandson. At what interest rate must she invest to end up with $10,000 on the lad's 21st birthday? Assume continuous compounding and round your answer to the nearest hundredth of a percent.

2. Hazel has a granddaughter who is 7 years old. She wants to present the lass with a gift of $10,000 on the child's 21st birthday.
   a. If the highest interest rate she can find is 11% compounded quarterly, how much must she invest now?
   b. Answer the same question for an interest rate of 11% compounded continuously.

3. It is commonly said that the human population of the world is doubling every 35 years. Find the value for *r* in the growth formula $y = Pe^{rt}$ where *t* is measured in years. Round your answer to the nearest thousandth.

4. A piece of machinery is worth $35,000 depreciates 20% per year by the fixed rate method. After how many years will the value have depreciated to $5000? Round your answer to the nearest tenth of a year.

5. In 1970, a grand piano cost $6300. In 1984, the same model cost $11,100. Assuming a steady rate of increase, what was the yearly rate of inflation? Round your answer to the nearest tenth of a percent.

6. In living matter, the proportion of Carbon-14 remains constant. When the matter dies, the Carbon-14 decays radioactively so that only half of the Carbon-14 atoms are left after 5570 years.
   a. Find the constant *r* for the decay formula: $y = Pe^{rt}$
   b. Charcoal from an ancient fire was found to have one-fifteenth of the Carbon-14 that a living sample of the same size has. How old was the charcoal, to the nearest 10 years.

7. What interest rate compounded annually is equivalent to 12% compounded continuously? *n*% compounded continuously?

8. A toxic chemical has been mistakenly introduced into a lake which is a city's source of drinking water. The level of toxicity is 12 times the safe level. Through natural flushing action of the lake, the level of toxicity will be reduced by 30% each week. In how many weeks will it be safe to use the water again?

Numbers 9 and 10 are an Algebra review and do not require exponents.

9. Find two numbers whose difference is 13 and whose product is a minimum.

10. Two candles are the same length. One burns up in 8 hours and the other in 12 hours. If they are both lit at the same time, how long is it before one is twice as long as the other?

Algebra 2H
WS 05.8- Logarithmic Word Problems

Show a complete calculator set-up for each of the following.

1. One thousand dollars is invested at 12% interest compounded annually. Determine how much the investment is worth after:
   a) 1 year b) 3 years
2. One thousand dollars is invested at 12% annual interest for three years. Determine how much the investment is worth if the interest is compounded:
   a) semi-annually b) quarterly c) daily
3. The value of a $12,500 used car decreases 20% per year. Find its value after:
   a) 1 year b) 3 years
4. The value of a $3500 sailboat depreciates 10% per year. Find its value after:
   a) 1 year b) 10 years
5. How long will it take you to double your money if you invest $1000 at 8% compounded annually?
6. How long will it take you to triple your money if you invest $4000 at 6% compounded annually?
7. A gold coin appreciated in value from $100 to $238 in eight years. Find the average annual rate of appreciation.
8. Ten years ago Michael paid $250 for a rare 1823 stamp. Its current value is $1000. Find the average annual rate of growth.
9. A used car valued at $12,000 decreased in value to $4900 in 5 years. Find the annual rate of depreciation.
10. A certain radioactive element decays over time according to the equation $y = A\left(\frac{1}{2}\right)^{\frac{t}{300}}$ where A= the number of grams present initially and *t*=time in years. If 1000 grams were present initially…
    a) How many grams are present after 900 years?
    b) How long will it take for there to be 100 grams remaining?
11. Bacteria in a culture are growing exponentially with time according to the table shown.
    a) Write an equation to model the number or bacteria present at any time *t*.
    b) How may bacteria a there after 8 hours?
    c) How long will it take for there to be 100,000 bacteria present?

Bacteria Growth

Hour	Bacteria
0	60
1	120
2	240

ANSWERS

1a) $1120.00
1b) $1404.93

2a) $1418.52
2b) $1425.76
2c) $1433.24

3a) $10,000
3b) $6400

4a) $3150
4b) $1220.37

5) 9.01 years

6) 18.9 years

7) 11.4%

8) 14.9%

9) 16.4%

10a) 125 grams
10b) 996.6 years

11a) $y = 60(2)^t$
11b) 15,360 bacteria
11c) 10.7 hours

Chapter 4 Design Project

DUE DATE: Monday, November 5th, 2018 at the beginning of your period.

Late projects will have 5 points taken off for each day it is late, starting when the teacher collects the projects. Projects are not accepted if not handed directly to the teacher.

Goal: Use concepts (transformations, domain, range) learned in this chapter on functions to create a design and write the corresponding equations.

Project Directions

1) Create a design using each of the following functions at least once:
   Linear, absolute value, quadratic, square root, and circle
2) Draw your design by hand on a full sized sheet of graph paper, including the x-axis and y-axis. Each square must represent 1 unit. Your picture should reasonable take up most of the page.
3) Title your picture.
4) Label each point of intersection and/or vertex and/or endpoint with a capital letter: A, B, C, D, …
5) On a SEPARATE SHEET OF PAPER, copy and complete the table below. Include as many columns as you need. You will lose points if this is not on a separate sheet of paper. The back side is NOT a SEPARATE sheet.

Letter of Point	A	B	C	D	…
x-coordinate					
y-coordinate					

6) Label each segment (curve) of your design with a lower-case letter: a, b, c, d, …
7) On a SEPARATE SHEET OF PAPER, copy and complete the table below. Include as many rows as you need. You will lose points if this is not on a separate sheet of paper. The back side is NOT a SEPARATE sheet.

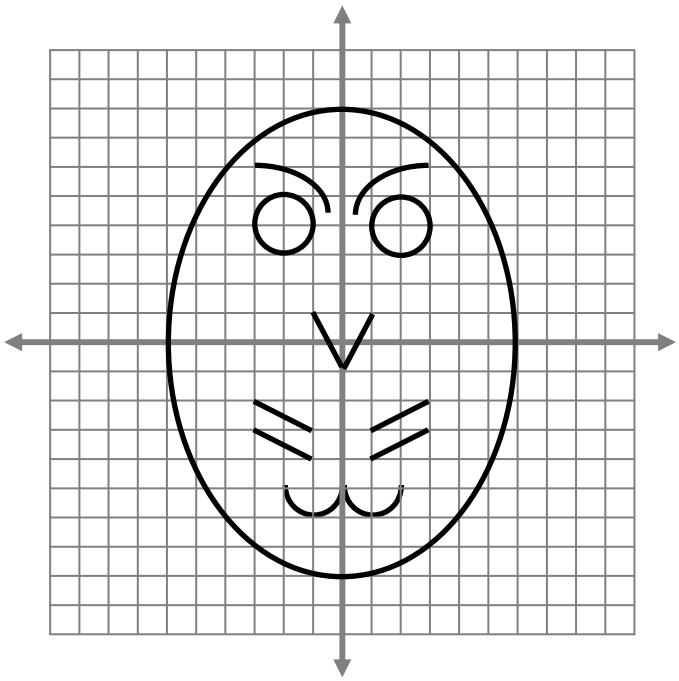
Letter of Section	Type of Function	Equation in y= format	Domain	Range
a				
b				
c				
…				

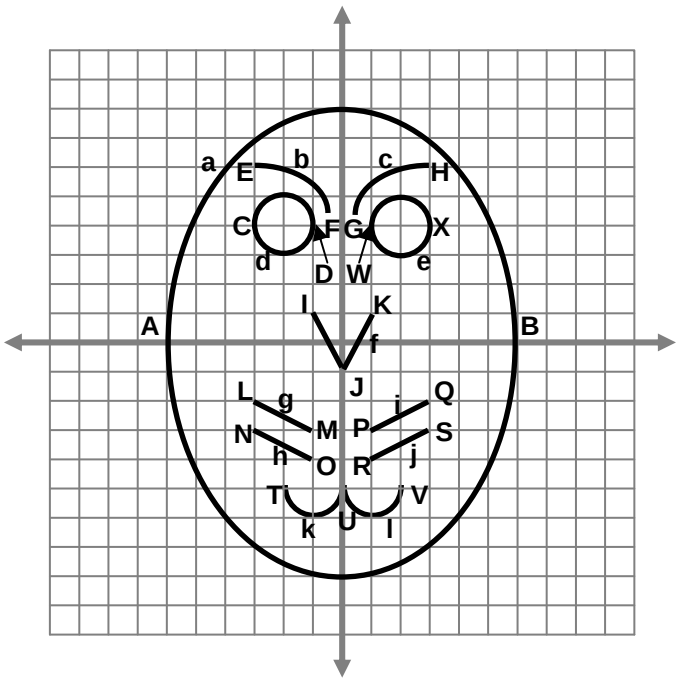
8) Include this ENTIRE grading sheet with your name on it. DO NOT detach the bottom portion.

THIS PROJECT HAS A VALUE OF 30 POINTS
Projects will be graded based on correctness, neatness, and creativity

---

NAME:	Possible Pts.	Points Earned
Graph hand-drawn with a scale of 1	2	
All types included: Linear, Absolute Value, Quadratic, Square Root, Circle	2	
All vertices labeled	2	
Coordinates given in a table	2	
All segments labeled	2	
Function table (Part 6 Above)	2	
Names of functions	2	
Accurate equations	8	
Accurate domains	4	
Accurate ranges	4	
Creativity, neatness, presentation (Possible EC)	X	
POINTS DEDUCTED FOR NOT FOLLOWING DIRECTIONS, NEATNESS, ETC.	X	
TOTAL POINTS	30	





Letter of Point	A	B	C	D	E	F	G	H	I	J	K	L	M	N
x-coordinate														
y-coordinate														

Letter of Point	O	P	Q	R	S	T	U	V	W	X
x-coordinate										
y-coordinate										

Letter of Section	Type of Function	Equation in y= format	Domain	Range
a				
b				
c				
d				
e				
f				
g				
h				
i				
j				
k				
l				

Note: E, F, G, H are endpoints of the square root functions; a is the entire ellipse; d and e are the entire circles; k and l represent parabolas

Algebra 2H
WS 06.0- Properties of Matrices

A ***matrix*** (***matrices*** is the plural) is rectangular arrangement of data in rows and columns. You have most likely seen this done in places such as MS Excel.

Matrices can be classified according to its ***dimensions***. Dimensions are always shown as $M_{r\times c}$, where r is the number of rows in the matrix and c is the number of columns. (Think of the word "mat**ric**es" with **r** before **c**)

A ***row matrix*** has only one row, where a ***column matrix*** has only one column.

We can also refer to a specific entry, called an ***element***, according to its position. Thus, we would refer to the element in row 3, column 2 as $e_{3\times 2}$.

State the dimensions of each matrix. Then identify the position of the circled element in each matrix.

$$A=\begin{bmatrix} 2 & 9 & -1 \\ 4 & 0 & 7 \\ -3 & -11 & 4 \\ 7 & \textcircled{8} & 1 \end{bmatrix} \qquad B=\begin{bmatrix} -3 & 1 & 0 \\ 6 & 0 & \textcircled{-5} \end{bmatrix} \qquad C=\begin{bmatrix} 3 & 1 & \textcircled{2} & -8 \end{bmatrix}$$

Imagine two matrices set equal to one another. This simply means that the corresponding elements must be equal. For example:

$$\begin{bmatrix} x+4 \\ 5 \end{bmatrix}=\begin{bmatrix} 2x \\ y-7 \end{bmatrix}$$

This implies that $x+4=2x$ and $5=y-7$

Solve each equation to find that $x=4$ and $y=12$

Solve each equation.

1. $\begin{bmatrix} 4x & 42 \end{bmatrix}=\begin{bmatrix} 24 & 6y \end{bmatrix}$

2. $\begin{bmatrix} -2x & 22 & -3z \end{bmatrix}=\begin{bmatrix} 6x & -2y & 45 \end{bmatrix}$

Solve each equation:

3. $\begin{bmatrix} 6x \\ 2y+3 \end{bmatrix}=\begin{bmatrix} -36 \\ 17 \end{bmatrix}$

4. $\begin{bmatrix} 7x-8 \\ 8y-3 \end{bmatrix}=\begin{bmatrix} 20 \\ 2y+3 \end{bmatrix}$

5. $\begin{bmatrix} 5x+8y \\ 3x-11 \end{bmatrix}=\begin{bmatrix} -1 \\ y \end{bmatrix}$

Algebra 2H
WS 06.0- Operations with Matrices

It is important to note, really really important to note, that you can only add or subtract two matrices if their dimensions are the same. If the matrices have different dimensions, the operation is "impossible."

Otherwise, you add matrices intuitively. Since the matrices have the same dimensions, you must only add or subtract corresponding elements.

$$A=\begin{bmatrix}5 & 2 & -3\\ 0 & -2 & 1\end{bmatrix} \qquad B=\begin{bmatrix}0 & -2 & 1\end{bmatrix} \qquad C=\begin{bmatrix}0 & -1 & 2\\ 3 & 10 & -3\end{bmatrix}$$

$$D=\begin{bmatrix}-1 & 4 & -3\end{bmatrix} \qquad E=\begin{bmatrix}2 & -4\\ -1 & 3\end{bmatrix} \qquad F=\begin{bmatrix}7 & -4\\ -6 & 1\\ 3 & 2\end{bmatrix}$$

Given the matrices, perform the requested operations. If an operation is impossible, write "Impossible."

1. $A+C$

2. $C-A$

3. $C+F$

4. $E+E$

5. $B-D$

6. $D-B$

The last concept of the day is multiplying by a ***scalar***, which is just some constant number. This is also intuitive. If you were asked to find $2E$, what would it look like?

Find the following sum, difference, or product.

7. $2D$

8. $3C$

9. $2A+C$

10. $3B-2D$

Algebra 2H
WS 06.X- Determinants and Inverses

Do work on a separate sheet of paper.

Find the value of each determinant and find its inverse.

1. $\begin{vmatrix} 1 & 6 \\ 2 & 7 \end{vmatrix}$

2. $\begin{vmatrix} 9 & 6 \\ 3 & 2 \end{vmatrix}$

3. $\begin{vmatrix} 4 & 1 \\ -2 & -5 \end{vmatrix}$

4. $\begin{vmatrix} -14 & -3 \\ 2 & -2 \end{vmatrix}$

5. $\begin{vmatrix} 4 & -3 \\ -12 & 4 \end{vmatrix}$

6. $\begin{vmatrix} 3 & -4 \\ 7 & 9 \end{vmatrix}$

Find the value of each determinant using expansion by minors.

7. $\begin{vmatrix} -2 & 3 & 1 \\ 0 & 4 & -3 \\ 2 & 5 & -1 \end{vmatrix}$

8. $\begin{vmatrix} 2 & -4 & 1 \\ 3 & 0 & 9 \\ -1 & 5 & 7 \end{vmatrix}$

9. $\begin{vmatrix} 2 & 1 & 1 \\ 1 & -1 & -2 \\ 1 & 1 & -1 \end{vmatrix}$

10. $\begin{vmatrix} 2 & 7 & -6 \\ 8 & 4 & 0 \\ 1 & -1 & 3 \end{vmatrix}$

Answers:

1. -5, $-\frac{1}{5}\begin{vmatrix} 7 & -6 \\ -2 & 1 \end{vmatrix}$

2. 0, No Inverse Exists

3. -18, $-\frac{1}{18}\begin{vmatrix} -5 & -1 \\ 2 & 4 \end{vmatrix}$

4. 34, $\frac{1}{34}\begin{vmatrix} -2 & 3 \\ -2 & -14 \end{vmatrix}$

5. -20, $-\frac{1}{20}\begin{vmatrix} 4 & 3 \\ 12 & 4 \end{vmatrix}$

6. 55, $\frac{1}{55}\begin{vmatrix} 9 & 4 \\ -7 & 3 \end{vmatrix}$

7. -48

8. 45

9. 7

10. -72

Algebra 2H
WS 06.4- System of Equations Word Problems

For each of the following
a) Identify the variables used.
b) Write a system of equations used to solve the problem.
c) Write the system of equations in matrix equation format.
d) Solve the system and answer the question.

Do work on a separate sheet of paper.

1. If Alice bought 4 rolls of film, 4 sets of batteries and 3 disposable cameras, her total cost would be $36. She figured if she bought 6 rolls of film, 6 sets of batteries and 1 disposable camera, it would cost $33. If sets of batteries cost $0.50 more than a roll of film; find the cost of each item.

2. One side of a triangle is 3 inches longer than another side of the triangle. The sum of the lengths of those two sides, less 9 inches, equals the length of the third side of the triangle. If the perimeter of the triangle is 29 inches, find the length of each side.

3. The sum of Adam, Betsy and Carol's ages is 47. Half the sum of Adam and Betsy's ages, less one, is Carol's age. If Adam is 6 years older than Betsy, find each person's age.

4. A vendor sold 3 hot dogs, 2 malts and one soda for $8.30. He sold 1 hot dog and 4 sodas for $7.60. Three malts cost the same as 2 sodas. Find the cost of each item.

5. The perfume, Flora-Scent, may be purchased as a spray for $15, dusting powder for $12, or body lotion for $8. At a fragrance store, 22 Flora-Scent products were sold for a total of $276. Twice as much perfume spray as body lotion was purchased. How many products of each type were sold?

Algebra 2H
WS 06.5- Matrix Problems

HEALTH CLUB MEMBERSHIP A health club offers three different membership plans. With Plan A, you can use all club facilities: the pool, fitness center, and racquet club. With Plan B, you can use the pool and fitness center. With Plan C, you can only use the racquet club. The matrices below show the annual cost for a Single and a Family membership for the years 1998-2000.

$$1998\ \begin{matrix} & S & F \end{matrix}\quad \begin{matrix} \text{Plan A} \\ \text{Plan B} \\ \text{Plan C} \end{matrix}\begin{bmatrix} 336 & 624 \\ 228 & 528 \\ 216 & 385 \end{bmatrix}$$

$$1999\ \begin{matrix} & S & F \end{matrix}\quad \begin{matrix} \text{Plan A} \\ \text{Plan B} \\ \text{Plan C} \end{matrix}\begin{bmatrix} 384 & 720 \\ 312 & 576 \\ 240 & 432 \end{bmatrix}$$

$$2000\ \begin{matrix} & S & F \end{matrix}\quad \begin{matrix} \text{Plan A} \\ \text{Plan B} \\ \text{Plan C} \end{matrix}\begin{bmatrix} 420 & 972 \\ 360 & 672 \\ 288 & 528 \end{bmatrix}$$

1) If you purchased a Single Plan A in 1998, a Family Plan B in 1999, and a Family Plan A in 2000, what is the total spent over the three years?
2) You purchased a Family Plan C in 1998 and upgraded your Family Plan to the next highest membership each year. How much did you spend over the three years?

BASKETBALL A high school basketball coach helps the six seniors on the team to set goals for the season. The single game goals for the seniors are:

Andi: 2 3-pointers, 10 Field Goals, 3 Rebounds
Emily: 1 3-pointer, 6 Field Goals, 3 Rebounds
Sam: 3 3-pointers, 5 Field Goals, 1 Rebound
Bob: 4 3-pointers, 3 Rebounds
Kyle: 4 3-pointers, 3 Rebounds
Mike: 3 3-pointers, 3 Rebounds

3) Write a 6×3 matrix that represents the game goals for the six seniors.
4) If there are 15 games in a season, write the matrix representing their season goals.

WORLD SERIES The Yankees won the 1998 World Series in four games. The matrices below show the statistics for runs, hits, and RBIs for each team in each game.

$$\text{Game 1:}\ \begin{matrix} & R & H & RBI \end{matrix}\quad \begin{matrix} \text{San Diego} \\ \text{New York} \end{matrix}\begin{bmatrix} 6 & 8 & 5 \\ 9 & 9 & 9 \end{bmatrix}$$

$$\text{Game 2:}\ \begin{matrix} & R & H & RBI \end{matrix}\quad \begin{matrix} \text{San Diego} \\ \text{New York} \end{matrix}\begin{bmatrix} 3 & 10 & 3 \\ 9 & 16 & 8 \end{bmatrix}$$

$$\text{Game 3:}\ \begin{matrix} & R & H & RBI \end{matrix}\quad \begin{matrix} \text{San Diego} \\ \text{New York} \end{matrix}\begin{bmatrix} 4 & 7 & 3 \\ 5 & 9 & 5 \end{bmatrix}$$

$$\text{Game 4:}\ \begin{matrix} & R & H & RBI \end{matrix}\quad \begin{matrix} \text{San Diego} \\ \text{New York} \end{matrix}\begin{bmatrix} 0 & 7 & 0 \\ 3 & 9 & 3 \end{bmatrix}$$

5) Write a matrix that gives the series statistics for runs, hits, and RBIs for each team.
6) Which team had more hits in the series?

TRIANGLES A triangle has vertices $(6,1)$, $(2,5)$, and $(-3,2)$. Let A be the 2×3 matrix whose columns consist of the coordinates of these three points. In the problems, plot each result as a point in a coordinate plane in order to describe, in words, the geometric effect of the operations in the problem on the triangle represented by Matrix A.

7) $A+\begin{bmatrix} 0 & 0 & 0 \\ -3 & -3 & -3 \end{bmatrix}$ 8) $A+\begin{bmatrix} -1 & -1 & -1 \\ 4 & 4 & 4 \end{bmatrix}$ 9) $3A+\begin{bmatrix} 2 & 2 & 2 \\ -5 & -5 & -5 \end{bmatrix}$

Describe the transformation of Matrix A using the changes below.

10) Each entry of the new matrix is the opposite of the corresponding entry of A.
11) Each entry in the first row of the new matrix is the opposite of the entry in the second row of A, while each entry in the second row of the new matrix is the same as the corresponding entry in the first row of A.

SENIOR PLAY The senior class play was performed on three different evenings. The attendance for each evening is shown in the table below. Adult tickets sold for $3.50 while Student tickets sold for $2.50.

12) Use matrix multiplication to determine how much money was taken in each night.

Performance	***Adults***	***Students***
Opening Night	420	300
Second Night	400	450
Final Night	510	475

CLASS ELECTION Day and Ethan are running for student council president. After attending a debate, some students change their minds about the candidate for whom they will vote. The percent of students who will change their support is shown in the given matrix. Day estimated that prior to the debate she would lose the election 350 votes to 400 votes.

13) After the debate, how many votes will Day and Ethan receive?

$$\begin{matrix} & & \overbrace{}^{\text{To}} \\ & & \text{Day}\quad\ \text{Ethan} \\ \text{From} & \begin{matrix}\text{Day} \\ \text{Ethan}\end{matrix} & \begin{bmatrix} 0.80 & 0.20 \\ 0.25 & 0.75 \end{bmatrix} \end{matrix}$$

Algebra 2H
Winter Break Extra Credit

Due: The first school day after Winter Break, during your math period.

- No late submissions are accepted for any reason.
- It must be handed to the teacher; submissions to teacher mailboxes will not be graded.

Directions: You may choose one of the following projects to complete. A maximum of 5 points may be earned. Only exemplary projects that are neat, completed correctly, and done in intricate detail will earn 5 points. It should make the teacher go, "WOW"...but in a good way!

- Students are reminded that all work must be clearly shown and in good algebraic form.
- Any formulas used should be written with all variables properly labeled.
- Any written analysis must be typed using complete sentences.
- This is to be done independently, without any assistance from other students, family members, tutors, etc.
- Projects are graded on correctness, neatness, completeness, etc.

Projects: You may choose one of the following.

1) Page 244: Project- Cost of Living

2) Page 260: Project- Powers of 10
   - You only need to select one unit of measurement to complete.
   - You MUST include at least 15 powers of 10 using the SAME unit of measurement.

3) Page 280: Investigation- Slide Rule
   - All parts of Step 1 – Step 10 must be completed.
   - Students must make a slide rule out of wood or paper to be submitted. Students are not allowed to submit a manufactured slide rule; it must be the creation of the student.

4) Page 292: Project- Income by Gender

5) Page 294: Project- All About *e*
   - You may not use the method on page 293 as one of the two you must find.
   - You must interview at least one student in calculus (this may be a family member). Include how they use the number *e* in their calculus course.