

**Part I. Fill in the blank. 2 points each. No calculators. No partial credit**

1) Fill in the blank

a)  $-2 + 8 = \underline{\hspace{2cm}}$

h)  $5^0 = \underline{\hspace{2cm}}$

b)  $-5 - \underline{\hspace{2cm}} = 7$

i)  $\frac{21}{8} \times \frac{4}{3} = \underline{\hspace{2cm}}$

c)  $-3^2 = \underline{\hspace{2cm}}$

j)  $-2 - 7 = \underline{\hspace{2cm}}$

d) The additive inverse of -6 is  $\underline{\hspace{2cm}}$

k) What is the multiplicative identity?  $\underline{\hspace{2cm}}$

e)  $|-7| = \underline{\hspace{2cm}}$

l)  $-2 + 3 = 3 + -2$  is an example of the  $\underline{\hspace{2cm}}$  property

f) The degree of  $f(x) = 2x^2 - 5x^3$  is  $\underline{\hspace{2cm}}$

m)  $2(3+5) = 2(3) + 2(5)$  is an example of the  $\underline{\hspace{2cm}}$  property.

g) The leading coefficient of  $f(x) = 2x^2 - 5x^3$  is  $\underline{\hspace{2cm}}$

**Part II Show all work algebraically for possible partial credit. 5 points each.**

Simplify. Complete one step per line according to the order of operations.

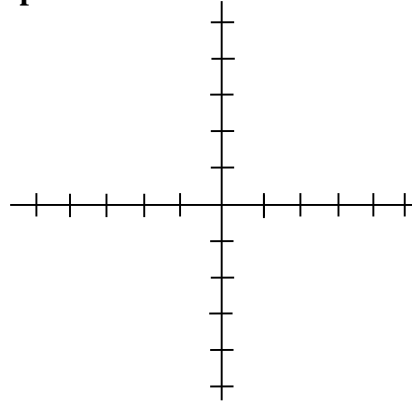
1)  $[3^3 + 2] \cdot 3 - 3 + 2$

3)  $-2 + 4\left(\frac{3}{4}\right)^2$

4) Solve algebraically:  $2^{3x+1} = 8^{2x}$

5. Graph the given line. **Label all intercepts with coordinates.**

$$5x - 2y = 6$$



6. Write an equation for a function that has the same shape as  $y = x^4$ , but
- a) Shifted left 2 and down 3                      b) Reflected in the x-axis and stretched vertically by a factor of 3.
7. a) Find the slope of the line through the points (1, 2) and (-3, 5)
- b) Write the equation of the line. Write final answer in  $y=mx+b$  form.
8. Factor completely.
- a)  $20x^2 + 18x - 18$                       b)  $x^3 + x^2 - 4x - 4$

Simplify using **only positive exponents**. Assume all variables represent positive real numbers.

9)  $\frac{3x^5 \cdot 2^{-3}}{(x^{-3})^3}$

10)  $3a^2 \cdot (2a^3)^4$

11. Suppose a new ball drops downward from a height of 36 feet onto a paved lot and keeps bouncing up and down, again and again. Suppose the rebound height of the ball is  $\frac{1}{3}$  of its bounce height.

a) How high will the ball rebound after the 2<sup>nd</sup> bounce?

b) Give a function for the rebound height,  $h$ , as a function of the bounce height,  $x$ .

12. Convert to scientific notation

a) 0.000000004

b)  $\frac{42 \times 10^3}{6 \times 10^9}$

13. Solve for  $x$ .  $\frac{2x+5}{4} + \frac{x+4}{8} = 2$

14. If  $x = 2$ ,  $y = -3$  and  $z = 4$ , find:

a)  $-\sqrt{z} + 2y$

b)  $y^3 + xz$

15. Solve the system algebraically.

$$2x - 3y = 5$$

$$3x + y = -9$$

16. Solve the inequality. Give the solution set in both interval and graph forms.

$$1 \leq -5x - 3 < 7$$

Graph solution:



Interval notation:

17. Translate into an algebraic expression:

a) The sum of two and the product of 5 and a number.

b) The ratio of 9 more than  $x$  and  $x$

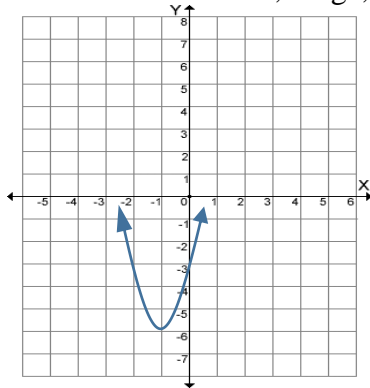
c) Twice the difference of a 7 and a number.

18. Write as an equation in one variable. Define the variable(s). **DO NOT SOLVE.**

a) The perimeter of a rectangle is 60 cm. The length is 6 more than 2 times the width.

b) At the end of the day, a pharmacist counted and found she has  $\frac{4}{3}$  as many prescriptions for antibiotics as she did for tranquilizers. She had 96 prescriptions for the two types of drugs.

19. Find the domain, range,  $f(-1)$  and  $f(0)$



Domain:  
(use interval notation)

$f(0)$ :

Range:  
(use interval notation)

$f(-1)$ :

20. A movie theater holds 250 people. For any particular show, the amount of money the theater makes is a function of the number of people,  $n$ , in attendance. If a ticket costs \$5,

a) Give the domain

b) Give the range

c) What is the dependent variable?

21. Give an equation of a: (there are many different answers possible)

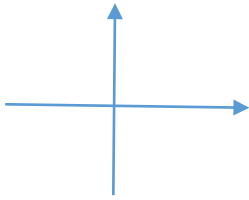
a) Linear function

b) Exponential function

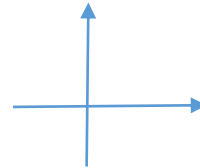
c) Quadratic function

22. Sketch the general shape of a: (no labels on axes needed, many different answers)

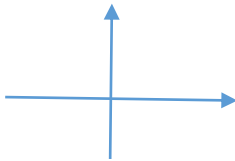
a) Linear function



b) Exponential function



c) Quadratic function

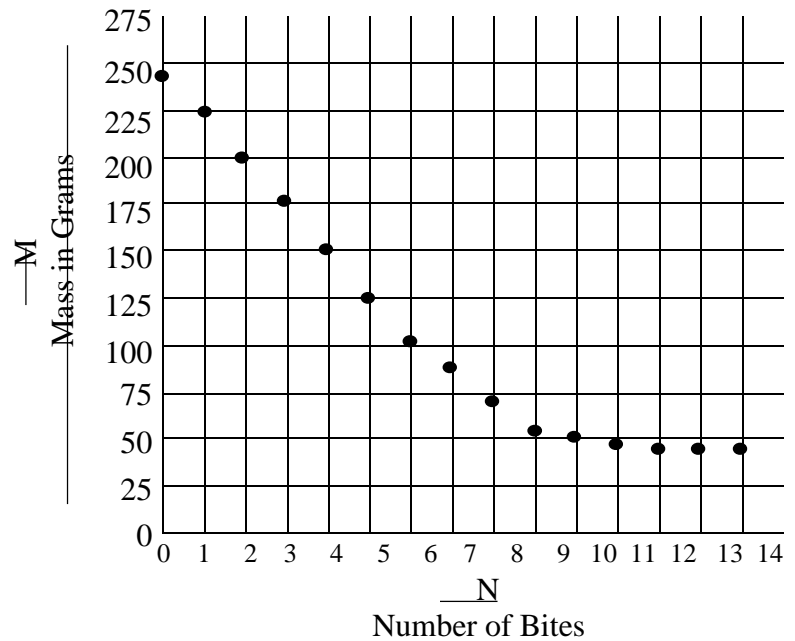


23. Set up a system of equations. **Do NOT solve. Define each variable.**

- a) Kim bought supplies for a party. Three rolls of streamers and 15 party hats cost \$30. Later, Kim bought 2 rolls of streamers and 4 party hats for \$11. How much did each roll of streamers cost? How much did each party hat cost?
- b) A chemist has one solution that is 50% acid. She has another solution that is 25% acid. How many liters of each type of acid solution should she combine to get 10 liters of 40% acid solution?

24. Solve and simplify solutions:  $x^2 - 4x - 4 = 0$

25. Rich was eating an apple. He plotted his data in the following graph. Tell a story about the graph. Include at least three facts about eating the apple in your story.



26. The percentage of all doctors who are female is increasing. Thus the overall percentage of male doctors is decreasing. Supposed that trends in percent of female and male doctors can be modeled by the following functions, where  $t$  is the number of years after 1960

Percentage of Male Doctors:  $y_1 = 98 - 0.54t$

Percentage of Female Doctors:  $y_2 = 2 + 0.54t$

Write questions that can be modeled by the following equations or inequalities:

a)  $98 - 0.54t = 65$

b)  $Y_2 = 2 + 0.54(50)$

c)  $98 - 0.54t > 2 + 0.54t$

d) Write an equation or inequality for the following question: How long will the percent of female doctors stay below 40%?

27. Given  $f(x) = x^2 - 3x$ , evaluate

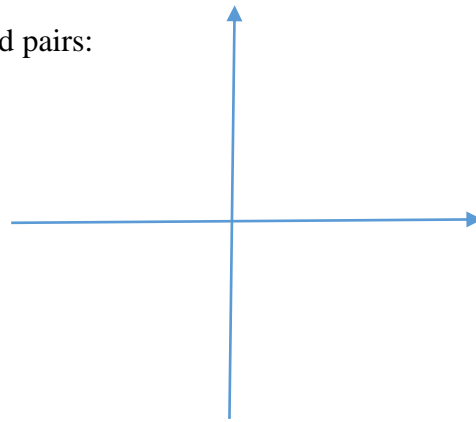
a)  $f(0)$

b) Find all  $x$  such that  $f(x) = 0$

28. Graph the function by creating a table of ordered pairs:

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

x	y



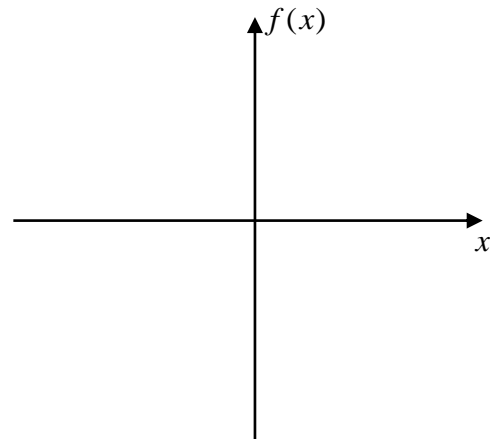
**Part III Show all work for possible partial credit. 9 points each.**

29. Given the function  $f(x) = (x+2)^2(2x-3)(x+5)$

a) Find y-intercept.

b) Fill in the chart:

zero	multiplicity	tangent or cross through?



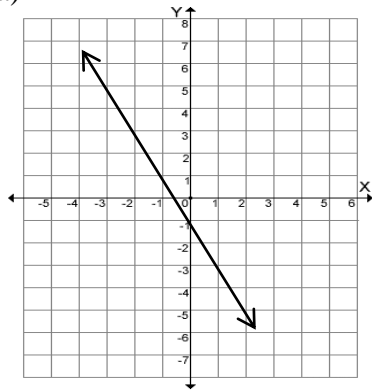
c) Draw ending behavior

d) Sketch graph. Label all intercepts.



30. For each line, give the slope and y-intercept. Give the equation where indicated.

a)

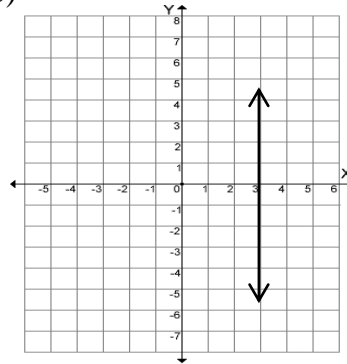


Slope:

y-intercept:

Equation of line:

b)



Slope:

y-intercept:

Equation of line:

c)  $5x - 6y = 12$

Slope:

y-intercept:

31) Put the following numbers in all circles that would apply. A number may be placed in no circle, 1 circle, or more than 1 circle. Write the **LETTER** choice in the circle.

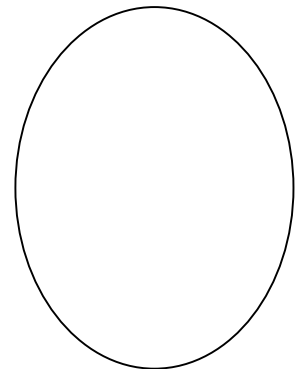
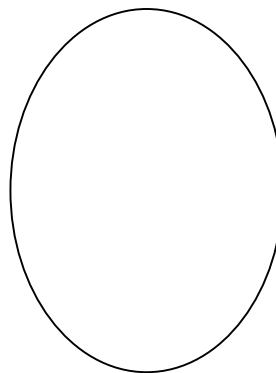
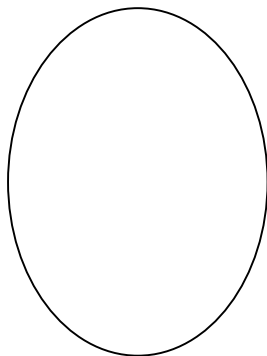
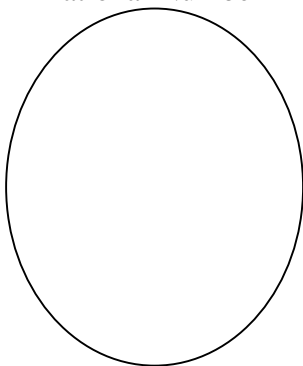
- A**=  $1/3$ ;    **B**=0;    **C**=  $-4/5$ ,    **D**=  $2\pi$ ,  
**E**=4,    **F**= -8,    **G**= -1.25,    **H**=  $1.\bar{2}$ ,  
**I**= 1.258201.....,    **J**= 200%    **K**= 21%

Rational Number

Integer

Irrational Number

Whole Number



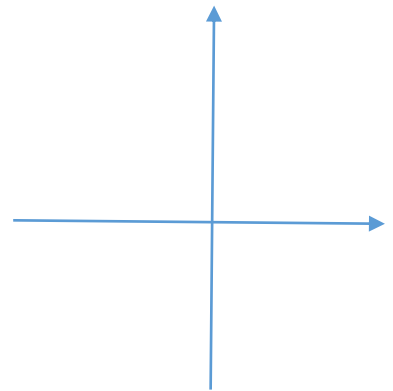
32. A stone is thrown directly upward. The height of the stone  $t$  seconds after it has been thrown is given by  $s(t) = -16t^2 + 48t + 5$  ft. Show your work algebraically and Include units on answers.

- What is the initial height of the stone?
- Find the time it takes for the stone to reach its maximum height.
- Find the maximum height the stone reaches.

33. Given the function  $f(x) = x^2 - 4x - 12$

- State the y-intercept.
- state the zeros of the function.

c) The vertex is ( \_\_\_\_\_ , \_\_\_\_\_ ).



e) Graph. Label intercepts and vertex.