MBF 3C1 Name: _____

Midterm Exam Review (Units 1 – 4)

WHAT YOU NEED TO KNOW:

	MIDTERM EXAM	MIDTERM CULMINATING
DATE		
TIME	70 minutes	70 minutes
VALUE	10%	5%
TOTAL MARKS	73	30
PAGES, QUESTIONS	6, 10	4, 4

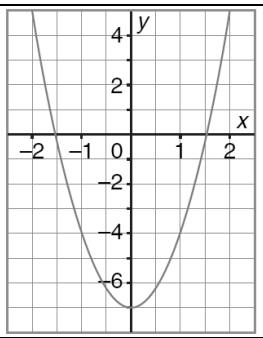
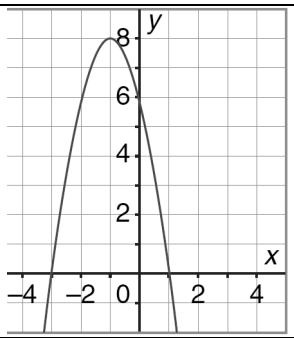
FORMULAS:

FINANCIAL FORMULAS	Simple Interest $I = \text{Pr}\,t$ A=P+Prt	Compound Interest $A = P(1+i)^n$ $i = \frac{r}{C}$ $n = Ct$
GENERALIZATIONS OF RELATIONS	Linear Relation $y = mx + b$	Quadratic Relation $y = ax^2 + bx + c$ $y = a(x-r)(x-t)$ $y = a(x-h)^2 + k$
EXPONENTIAL GENERALIZATIONS	$y = a(b)^x$	

DEFINITIONS:

Calculate – compute the number that answers the question
Compare – tell what is the same and what is different
Construct – build or make a model
Create – make your own example
Describe – draw, model or write about what something is to create a mental picture for the reader
Estimate – Make a reasonable guess about a quantity of an object based on your knowledge of the physical characteristics of the object and its environment
Evaluate – to find a number answer
Explain – use words and symbols to make your solutions clear and understandable
Give Reasons for Your Answer – explain your reasoning in your own words
Justify – give reasons and evidence to show your answer is correct or proper
List – write down or identify in point form
Measure – use an object or tool to describe the physical characteristics of an object
Model – show an idea or process using objects and/or pictures
Predict – work out and say what you think will happen based on what you know
Relate – show and explain a connection between ideas, objects, drawings, number and events
Represent – communicate ideas and information in different ways to show understanding (eg, draw a picture or show a calculation)
Simplify – reduce the complexity while maintaining equivalency
Solve – make a plan and carry out the plan to develop a solution to a problem
Show Your Work – record all calculations. Include all the steps you went through to get your answer. You may want to use words, numbers, graphs, diagrams, symbols, and/or charts

1. Complete the chart.

State:		
the zero(s)		
the axis of symmetry		
the optimal value		
the vertex		
the value of '*a*' (using step pattern)		
the equation of the function in vertex form		
the equation of the function in factored form		
the equation of the function in standard form *(expand)*		

2. Factor each of the following.

a. $y = 2x^2 + 16x$

c. $y = x^2 - 7x + 10$

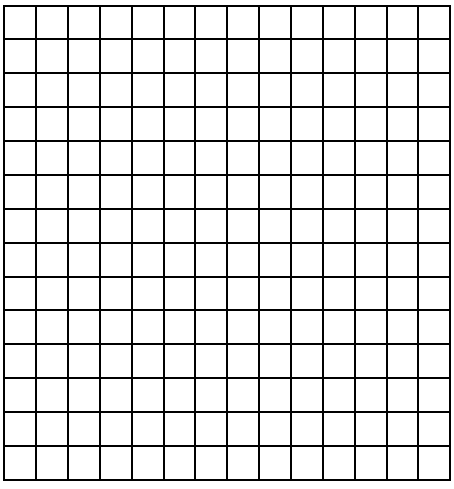
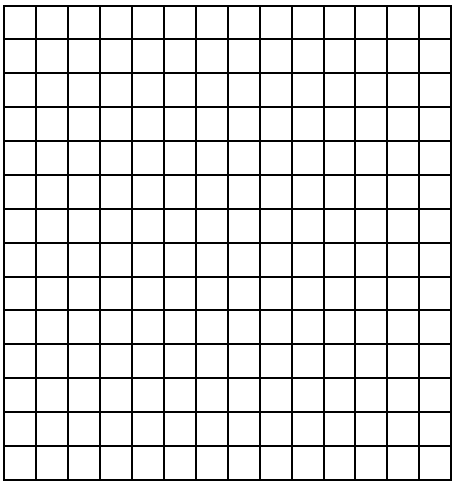
e. $y = x^2 + 16x + 15$

b. $y = 4x^2 - 9$

d. $y = 25x^2 - 49$

f. $y = 8x^2 + 24x$

3. Complete the chart.

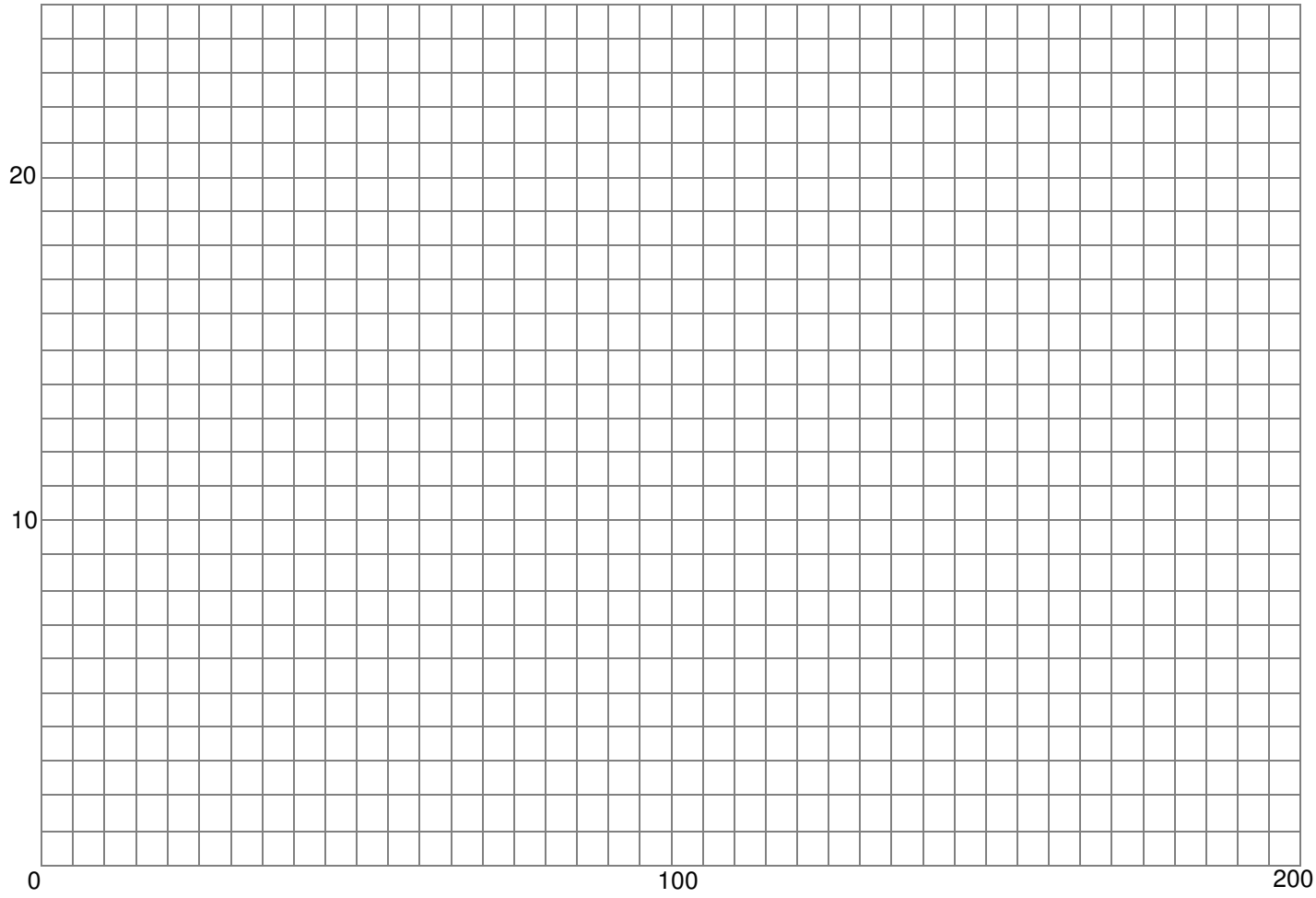
State:	$y = 5x^2 - 15x$	$y = x^2 - 6x + 8$
the *y*-intercept		
the equation of the parabola in factored form		
the zero(s)		
whether the parabola has a maximum or minimum, explain why		
the value of axis of symmetry		
the optimal value		
the vertex use this information to graph the function		

4. State the transformations and vertex for each of the following.

	Transformations	Vertex
$y=2(x+5)^2+3$		
$y=-\frac{1}{3}(x-8)^2-6$		
$y=-8(x+9)^2$		
$y=\frac{1}{2}x^2-7$		

5. The cable of a suspension bridge hangs in the form of a parabola when the load is evenly distributed horizontally. The distance (span) between the two towers is 180m, the points of support of the cable on the towers are 22m above the roadway, and the lowest point on the cable is 7m above the roadway.

   a. Sketch a graph of the parabola that can be used to model the cable.



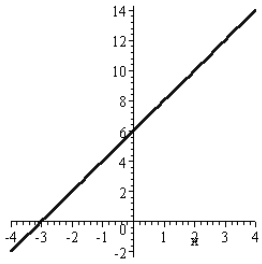
b. State the vertex of the parabola. _____

c. Determine an equation for the quadratic relation that models the cable.
Show steps of finding the 'a' using another point.

d. Use the graph to find how high the cable is 25 m from the vertex.

6. For each of the following, **circle** the type of relation (linear, quadratic, exponential or none). Give a reason for your answer.

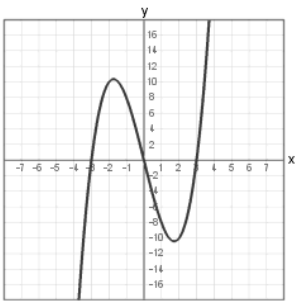
a.



linear or *quadratic* or *exponential or none*?

Reason: _____

b.



linear or *quadratic* or *exponential or none*?

Reason: _____

c.

$$y = 5x^2 + 3x - 4$$

linear or *quadratic* or *exponential or none*?

Reason: _____

d.

$$y = 3(6)^x$$

linear or *quadratic* or *exponential or none*?

Reason: _____

e.

x	y	1st	2nd
-2	8		
-1	5		
0	4		
1	5		
2	8		

linear or *quadratic* or *exponential or none*?

Reason: _____

7. British Columbia's population, *P* million, can be modelled by the equation $P = 2.9(1.0257)^t$, where *t* is the number of years after 1983.
   a. State the initial population. _____
   b. Does the relation increase or decrease? _____
   c. State the growth/decay rate . _____
   d. Determine the population in 1980.
   e. Determine the population in 1976.

8. The equation $C = 1000(0.83)^n$ models the value, *C* dollars, of a computer *n* years after it was purchased.
   a. State the initial value of the computer. _____
   b. Does the relation increase or decrease? _____
   c. State the growth/decay rate . _____
   d. Determine the value of the computer 8 years after it was purchased.

9. Simplify using the exponent laws. Then evaluate. No decimals or negative exponents.

a. $3^3 + 9^{-1}$	b. $3^5 \times 3^7$	c. $5^9 \div 5^2$
d. $(6^5)^2$	e. $4^{-7} \times 4^6$	f. $10^{-1} \div 10^{-1}$

10. A cancer treatment centre has a 100 mg sample of radioactive iodine. Each day, about 8.3% of the sample decays.
    a. Write an equation to represent the mass of iodine left after *t* days.

    b. What is the mass after 5 days

    c. Explain how the graph of the relation would change in each scenario. Show what you mean with diagrams
        i. The initial sample is 75 mg.
        ii. The decay factor is 9.5%.

11. Suppose a $500 bond earns 3.5% simple interest each year for 6years. Determine the interest and final amount of this investment.

12. Peter invests some money for 5 months in an account that earns 3.4% interest per year. He made $141.67 in interest. How much money did he invest?

13. Suppose you deposit $5000 in a retirement account that earns 10% compounded semi-annually. What will the investment be worth in 25 years?

14. Juan invests $3500 at 4.2% compounded quarterly. How much interest did he earn after 6 years?

15. Gina borrowed $2400 from her parents. She repaid the money at the end of 3 years. Suppose her parents had invested the money at 4.8% compounded annually. How much interest would they have earned?

16. Bob borrowed $3500 at 12% compounded annually for 4 years. After 1 year, Bob won $5000 in a lottery. He used part of his winnings to pay off the loan. How much interest did Bob save by paying off the loan early?

Show calculations for 1 year

Show calculations for 4 years

Now answer the question asked

17. Robert's credit card statement balance is $1350. His card charges 19.8% compounded daily on unpaid balances. He waits 4 months to pay off his bill. How much interest was Robert charged?

18. Betty's credit card charges 12.5% compounded monthly. She uses her credit card to buy a new jacket for $169, including taxes. She waits 6 months to pay off her card. What is her balance at that time?

19. Explain the difference between a savings and chequing account.

20. List the four main types of investments **and** state 1 advantage and 1 disadvantage of investing in each.

21. When purchasing a car, you must decide whether to buy new or used. State 1 advantage and 1 disadvantage for each option.

22. After purchasing a car, you must decide whether to lease or finance. State 1 advantage and 1 disadvantage for each option.

23. Sara has bought a new car with a fuel efficiency rating of 11.2L/100km.
    a. How far can she go if her car has a 55L tank?
    b. How much gas will she need to travel 310 km?

24. Jamie has to take his car to be serviced. He paid $28.00 for an oil change, $125 for new breaks and replaced his tires for $75 each. He was charged for 4 hours work at a rate of $65/hour. What was his total bill before taxes?