

Mathematics 3206

**Exam 1 of 2 Unit II Quadratic Functions;
Max and Min Applications**

Name: _____

The following formulas will be necessary for this exam:

$$x = \frac{-b}{2a}$$

- 1 Which equation below would be considered a quadratic equation ?

A) $5x^2 - 6x + 7 = 0$
B) $2x^3 + x^2 - 4 = 0$
C) $5x^4 + x^2 + 3 = 0$
D) $2^x - 24 = 40$

- 2 What is the line that passes through the vertex of a parabola called?

A) axis of symmetry
B) curve of best fit
C) parabola
D) vertex

- 3 What is the x - coordinate of the vertex to the quadratic function below?
 $y = -4x^2 - 800x$

A) -800
B) -200
C) -4
D) 200

- 4 What is the y-coordinate of the vertex of the quadratic function below?
 $y = -x^2 - 8x$

A) - 8
B) - 4
C) 16
D) 48

- 5 It takes 2 second for a ball to reach a height of 10 m. The same ball takes 4 seconds to reach a maximum height of 50 m. It then takes 6 seconds in total to hit the ground. Where is the vertex of this path if the path fits a quadratic function?

A) (0,0)
B) (2, 10)
C) (4,50)
D) (6,0)

- 6 Given the equation $y = 4.9x^2 + 45x$, which direction will the graph open?

A) left
B) right
C) downwards.
D) upwards

- 7 The quadratic function $y = 2x^2 - 4x + 6$ has a vertex at (1, 4). Which statement is true?
- A) the maximum value of $y = -4$ occurs at $x = -1$
 - B) the minimum value of $y = -4$ occurs at $x = -1$
 - C) the maximum value of $y = 4$ occurs at $x = 1$
 - D) the minimum value of $y = 4$ occurs at $x = 1$
- 8 What is the maximum or minimum point of a parabola called?
- A) roots
 - B) axis of symmetry
 - C) vertex
 - D) x-intercepts of the graph
- 9 What is the y-coordinate of the vertex to the graph of $y = \frac{1}{2}x^2 + 4x + 5$?
- A) -13
 - B) -4
 - C) 4
 - D) 25
- 10 The function below describes the path of a rocket as it is shot into the air. At what height above ground was the rocket released? (H is in meters, t is in seconds)
- $$H = -4.9t^2 + 29.4t + 25$$
- A) 3
 - B) 4.9
 - C) 25
 - D) 29.4
- 11 Which statement is true below concerning $y = ax^2 + bc + c$
- A) if $a > 0$ the graph opens downward
 - B) if $a > 1$ then the graph is more wider than $y = x^2$
 - C) if $0 < a < 1$, then the graph is more wider than $y = x^2$
 - D) if $a < 0$ then the graph opens upward

1 For the quadratic function $y = x^2 - 8x + 12$

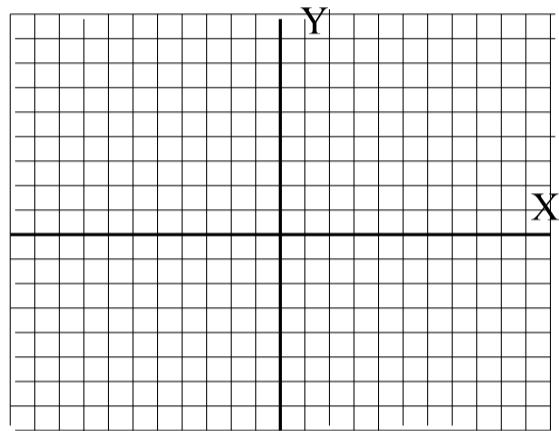
A) Find the coordinates of the vertex.

4 marks

B) Use the table below to create a table of values to sketch its graph. Your vertex should be in the middle of the table.

8 marks

x	$y = x^2 - 8x + 12$



C) Type of vertex = _____, orientation _____, Y has a _____ value of _____ and it occurs at $x =$ _____.

5 marks

D) What is the domain and range of the graph?

5 marks

2 A farmer has 560 m of fencing with which to make a rectangular fenced region. He plans to this time to use all sides of the rectangle.

A) Draw a diagram to determine what the field would look like. Be sure to use variables to identify the sides.

2 marks

B) Fill in the table below:

4 marks

width	10 m	20 m	30	40	50
length					
Area					

C) Show that the sequences for Area is a quadratic sequence.

3 marks

- D) Find the equation of the curve of best fit that will describe the relationship between width and area. 3 marks
- E) Using your curve in D, determine the vertex. 4 marks
- F) Interpret your vertex and use it to find the dimensions that will yield that maximum area. (Statement needed here!) 5 marks

3 A ball is thrown into the air and its path can be described by the path $h(t) = -5t^2 + 40t + 3$, where t is time in seconds and $h(t)$ is the height in metres.

- A) What is the maximum height achieved by the ball? 4 marks
- B) When was the ball at its maximum height? 1 mark
- C) Using the function, determine the height of the ball after 2 s. 4 marks
Where do you sub the 2 s to?

4 The sum of two numbers is 86. Using the information below, answer the following:

first number (x)	1	2			
second number (y)					
product					

- A) Fill in the table above. 8 marks
- B) Show that the sequence formed by the product is a quadratic sequence. 3 marks
- C) Determine a quadratic equation between the first number and the product. 4 marks
- D) Using your equation in C, find the coordinates of the vertex. 4 marks
- E) Using your vertex, determine the two numbers if their product is a maximum. 4 marks