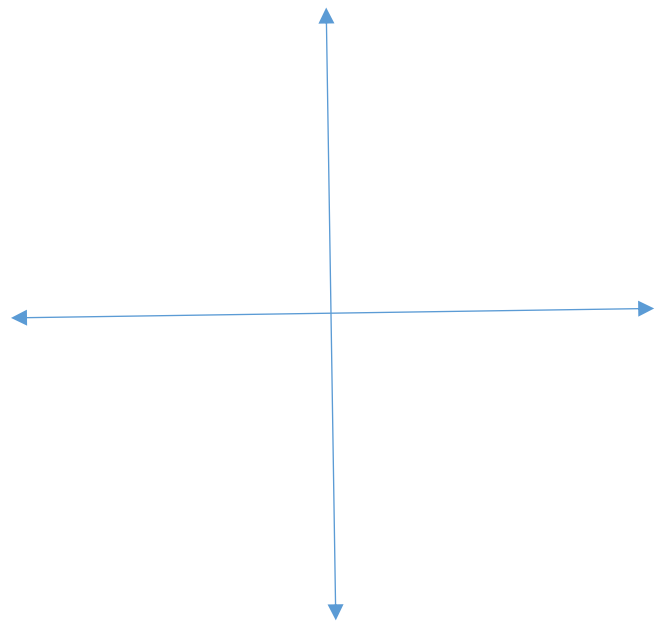


**Part II:**

*Open Response: All work is to be shown for each of the following in the space provided.*

1. Using the quadratic function  $f(x) = -4x^2 + 8x - 1$  complete the chart shown below and sketch the function on the axes provided below. [12]

<b>VERTEX</b>	
<b>EQUATION OF AXIS OF SYMMETRY</b>	
<b>DIRECTION OF OPENING</b>	
<b>Y-INTERCEPT</b>	
<b>MAXIMUM? OR MINIMUM? (CIRCLE ONE)</b>	
<b>MAX. OR MIN. VALUE</b>	
<b>DOMAIN</b>	
<b>RANGE</b>	



2. A parabolic train tunnel passing through a mountain is shown in the diagram below. The tunnel is 18 feet wide at the base and 25 feet high at the center of the tunnel.



- (a) Determine a quadratic function that could be used to model this parabolic shaped tunnel. [4]

- (b) The steel rails on these train tracks are 8 feet apart. Assuming that the train tracks are running through the center of the tunnel, determine how far it would be from one of the steel rails up to the top of the tunnel. [2]

3. Determine the exact roots of the following quadratic equation:

[6]

$$(3x - 1)^2 - 2(15 + 2x) = (5x + 1)(x - 3)$$

4. (a) Using the quadratic equation  $5x^2 - 8x - 4 = 0$ , determine the value of the discriminant.

[2]

(b) Based on the value of the discriminant, indicate which of the following describes the solutions?

[1]

2 Real Solutions	<input type="checkbox"/>
1 Real Solution	<input type="checkbox"/>
2 Non-Real Solutions	<input type="checkbox"/>

(c) Determine the value(s) of any roots of this quadratic equation.

[3]

5. A Bald Eagle swoops down toward an unsuspecting black bear in a parabolic flight path in an attempt to scare the bear away from it's nesting area. The height of the eagle above the bear in metres  $t$  seconds after beginning its flight is given by  $h = 4t^2 - 24t + 37$ .

(a) Determine the **closest** that the eagle will come to the bear along it's parabolic flight. [3]

(b) How long did it take for the eagle to reach the closest point to the bear along its path? [1]

(c) How high is the eagle above the bear 1 second after it begins to swoop down toward the bear? [1]

(d) Determine when the eagle will be 11 m above the bear. (*Express answers to nearest tenth*) [4]

6. A rectangular picture frame measures 20 cm by 30 cm. A matte is made of uniform width to go inside the frame and make a nice border for the picture. The area of the matte is to be equal to the area of the picture. What is the width of the matte? [5]

