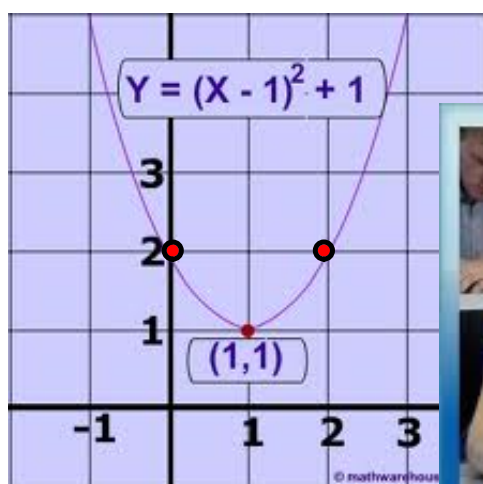


# DETERMINE A QUADRATIC FUNCTION IN VERTEX FORM GIVEN A GRAPH



# DETERMINING FUNCTIONS

The Forms of Quadratic functions are:

Standard Form...  $f(x) = ax^2 + bx + c$

Factored form...  $f(x) = a(x - r)(x - s)$

Vertex Form...  $f(x) = a(x - p)^2 + q$

If we're given the **vertex** of the parabola and **ONE other point** on the graph, we can determine the quadratic function.

**Ex.1: Find the equation of the parabola with vertex  $(1, -12)$  which passes through  $(3, -1)$ .**

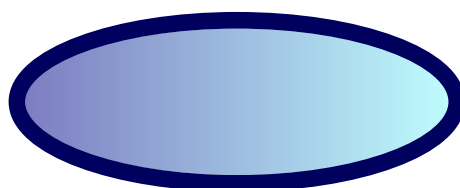
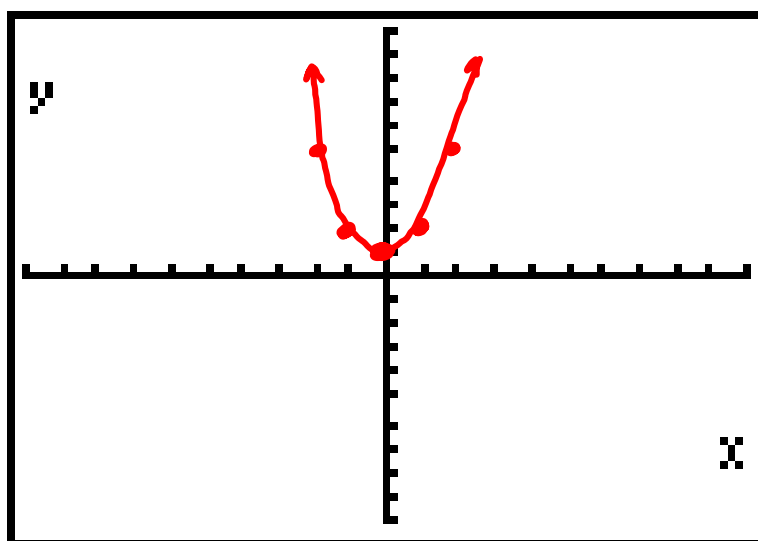


**Ex.2: Find the eq. of the parabola with vertex  $(2, 6)$  passing through  $(1, 7)$ .**



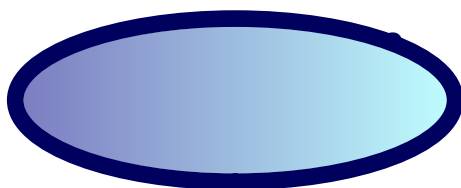
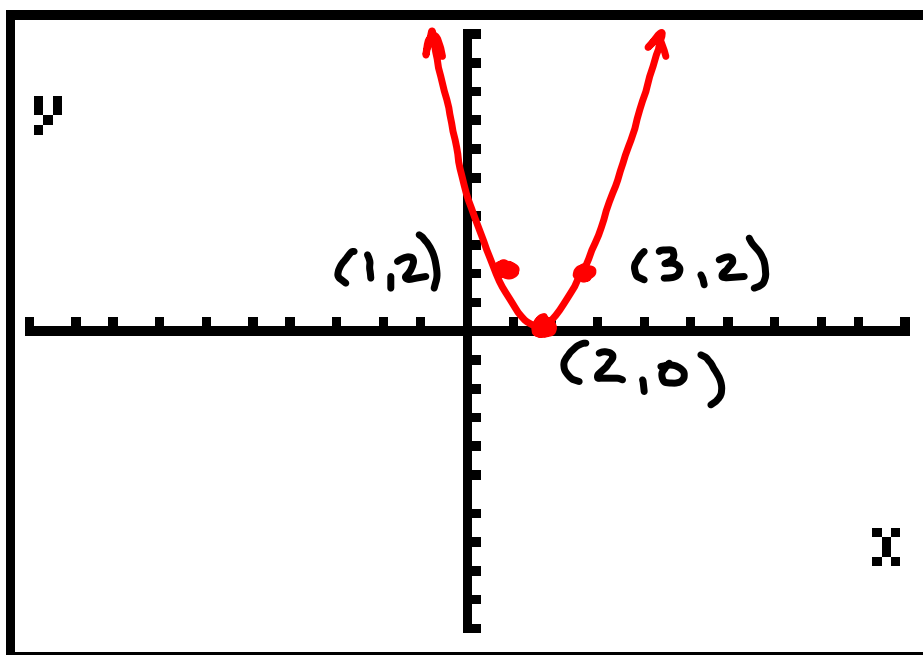
**Ex.3: Find the equations of the parabolas...**

**a)**



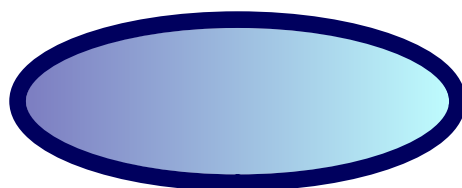
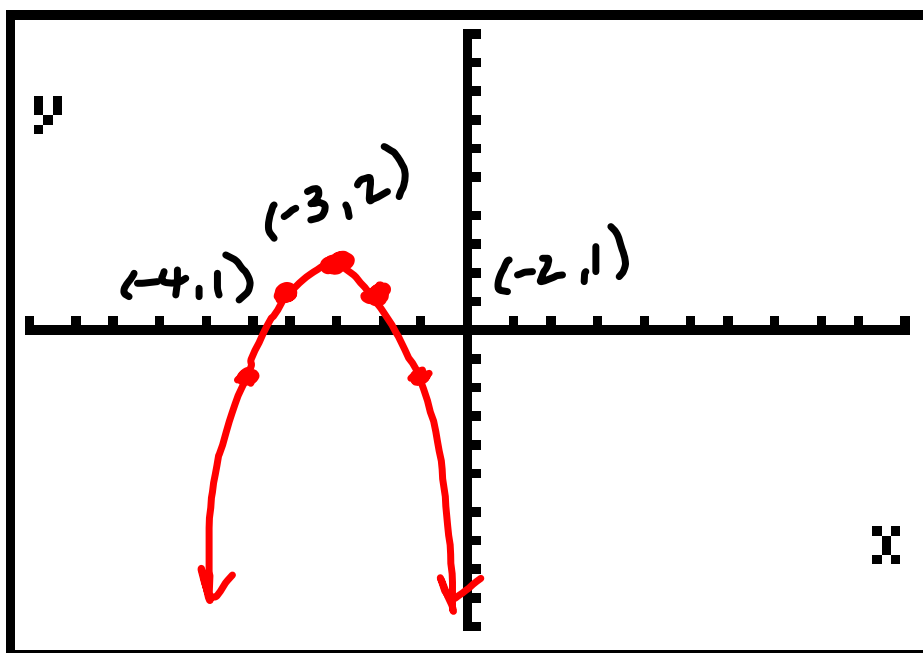
# Determining Equations of Parabolas

b)



# Determining Equations of Parabolas

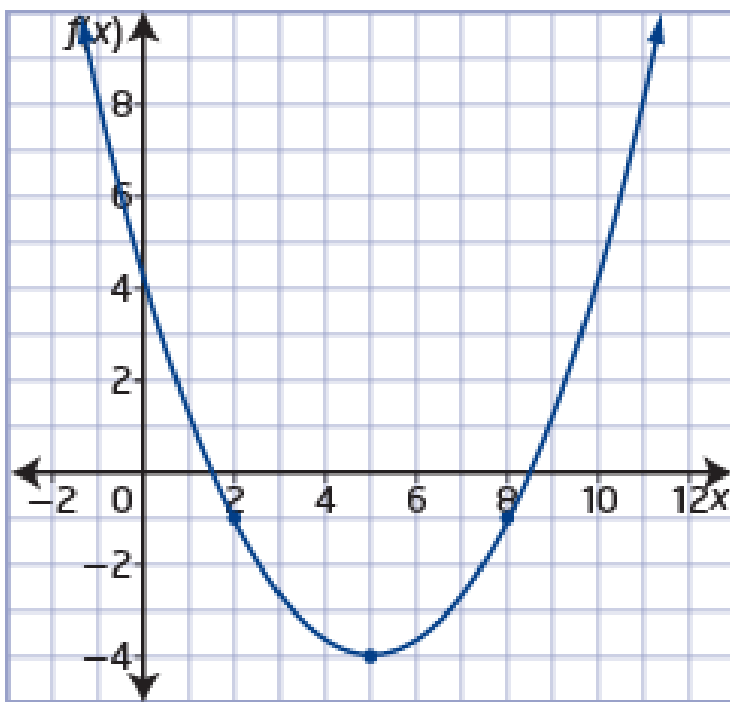
c)



## Determining Equations of Parabolas

Determine a quadratic function in vertex form for each graph.

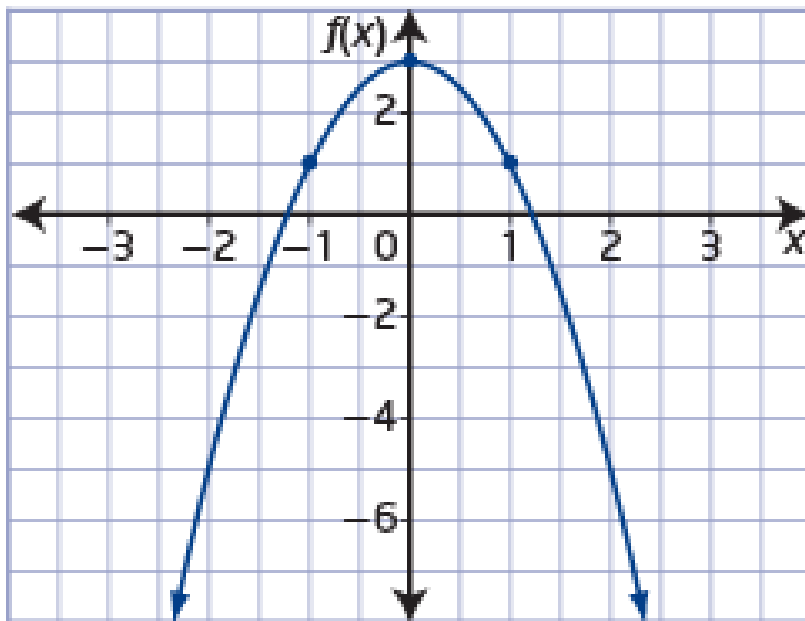
a)





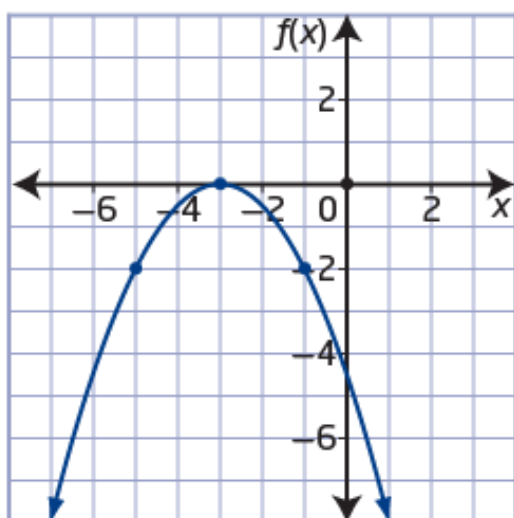
## Determining Equations of Parabolas

b)

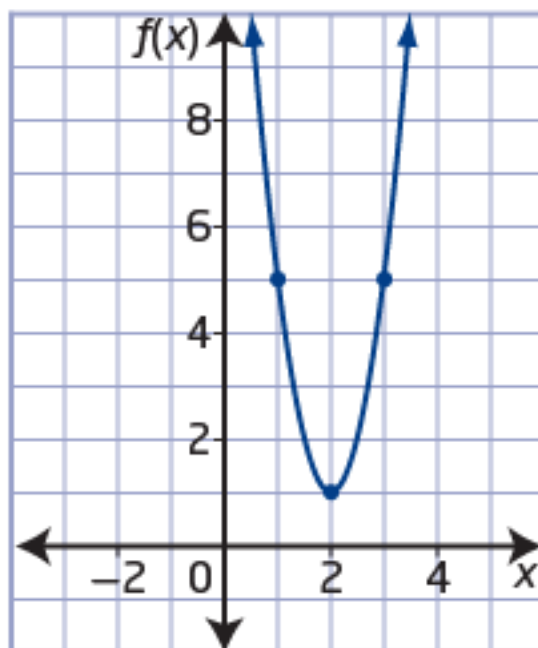


## Determining Equations of Parabolas

c)



d)



## APPLICATION QUESTION

The deck of the Lions' Gate Bridge in Vancouver is suspended from two main cables attached to the tops of two supporting towers. Between the towers, the main cables take the shape of a parabola as they support the weight of the deck. The towers are 111 m tall relative to the water's surface and are 472 m apart. The lowest point of the cables is approximately 67 m above the water's surface.



Lion's Gate Bridge, Vancouver

## Determining Equations of Parabolas

Draw a diagram and label it with the given information.

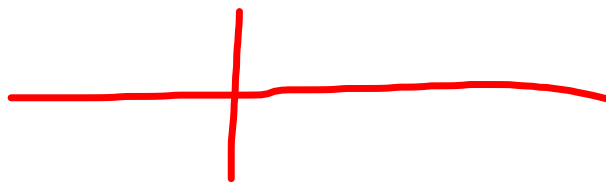


## Determining Equations of Parabolas

- a)** Model the shape of the cables with a quadratic function in vertex form.

$$y = a(x - p)^2 + q$$

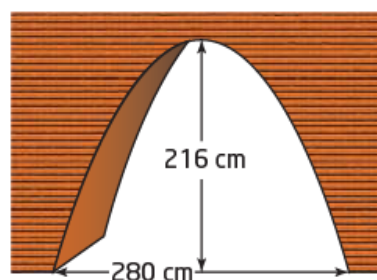
- b)** Determine the height above the surface of the water of a point on the cables that is 90 m horizontally from one of the towers. Express your answer to the nearest tenth of a metre.



## ONE MORE PROBLEM

Suppose a parabolic archway has a width of 280 cm and a height of 216 cm at its highest point above the floor.

- Write a quadratic function in vertex form that models the shape of this archway.
- Determine the height of the archway at a point that is 50 cm from its outer edge.





# ASSIGNMENT

*Pre-Calculus 11 Text*

*Pages 158 - 161*

*Questions 9, 10, 13, 15-18, 20-23*