Peaks and Valleys

Key Idea: What must the slope of the graph be at the highest and lowest points?

1. Find the coordinates of the vertex (lowest point) of the parabola

$$y = x^2 + 4x - 72.$$

$x =$ ☐

$y =$ ☐

2. You have 100m of fencing to make a pen on a farm, and one of sides of your pen is provided by the wall of your barn. So you only need fencing for three sides. If ℓ and w are the dimensions (length and width) of your pen, the total fencing equation below relates the length and width

$$2\ell + w = 100.$$

Here there are two lengths and only one width because the barn wall serves as the second width.

(a) You know the area of the pen in terms of ℓ and w. Express the area of the pen in terms of ℓ only.

$A(\ell) =$ ☐

(b) Find the length that results in the largest area $A(\ell)$ for your pen.

$\ell =$ ☐

(c) Use your answer in part (b) to find the maximum area for your pen.

$A_{\max} =$ ☐