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| --- | --- | --- |
| NAME | Date | Band |
| **Introduction to Optimization**  Calculus | Packer Collegiate institute | | |

**Challenge #1**

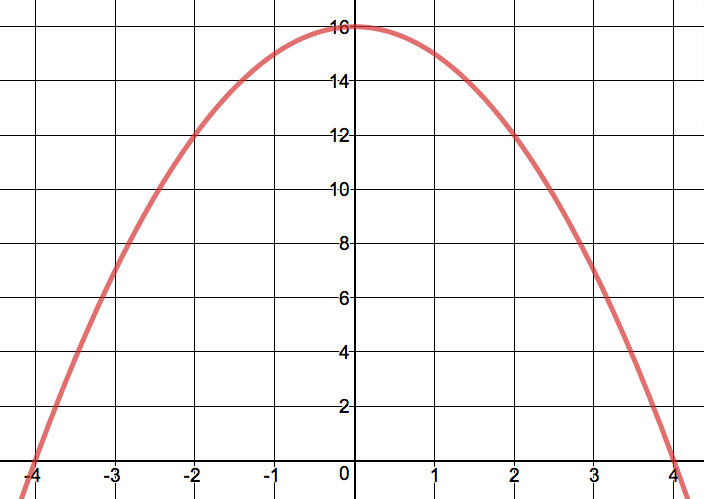
Draw the rectangle you came up with in Desmos. (The equation of the line was .)



Width: Height: Area:

**Challenge #2**

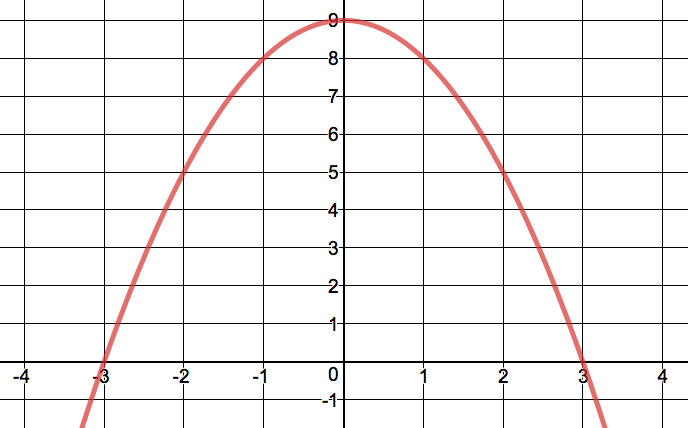
Draw the rectangle you came up with in Desmos. (The equation of the parabola was .)



Width: Height: Area:

**Challenge #3**

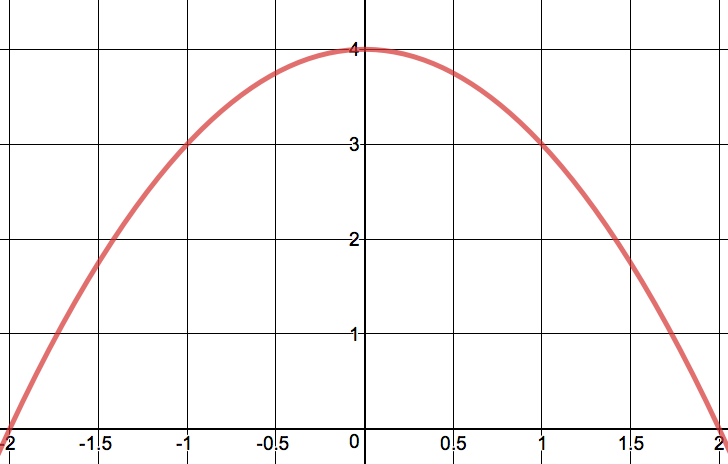
Draw the isosceles triangle you came up with in Desmos. (The equation of the parabola was .)



Width: Height: Area:

**Challenge #4**

Draw the isosceles trapezoid you came up with in Desmos. (The equation of the parabola was .)



Width: Height: Area:

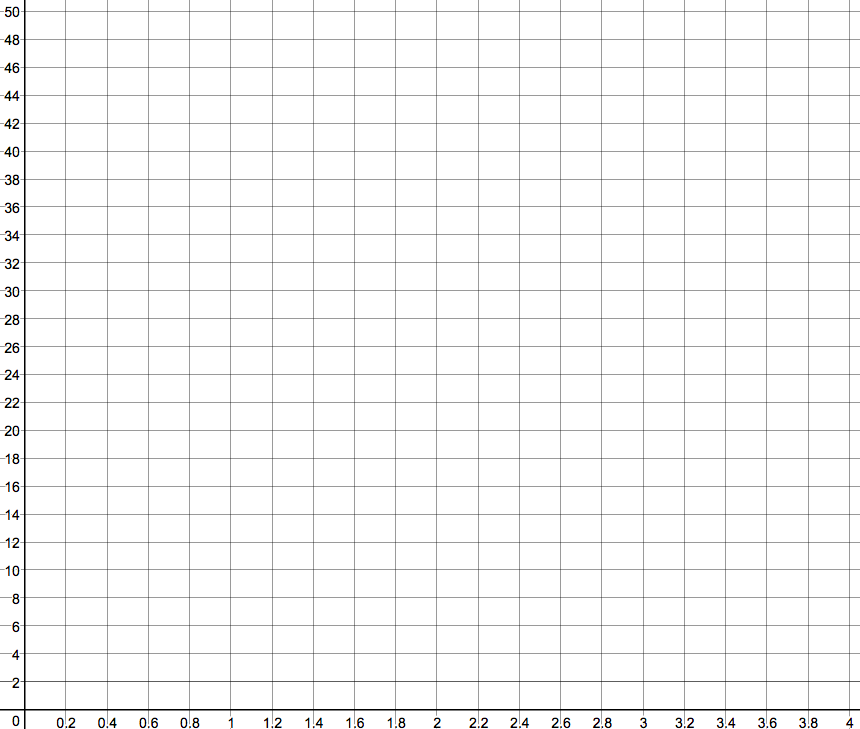
**Challenge #2 (reprise)**

Now let’s plot the area of each rectangle as a function of the -coordinate of its corner in Quadrant I.

1. To get started, let’s revist the rectangle you drew for Challenge #2 the first time. Record the following:

The -coordinate of the corner in Quadrant I: The area of the rectangle:

1. Plot this point below. Then, use Desmos to help you plot any eight additional points.

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1. These points seem to outline a curve. Gosh, wouldn’t it be great if we could figure out an equation for this curve? (Yes / No / Maybe So )
2. Fill in the blank below. Then, label all of the sides of the rectangle in terms of .
3. Write down a function for the area of the rectangle as a function of :

RectArea

1. Plot your function in Desmos! Then, fill in the blank:

The maximum possible area was approximately , and this occurred when was approximately .

1. Sketch the best rectangle below, labeling its width, height, and area:

**Calculus to the rescue!**

Our next question is this—how could we have determined the dimensions of this rectangle without Desmos?

1. Remind me—if has a maximum (a peak) at a certain -value—like , for example—what must be the value of ?
2. Determine RectArea’.
3. Let’s figure out what our candidate points are by setting RectArea’ and solving for .
4. Finally, determine the best rectangle’s exact dimensions and area.