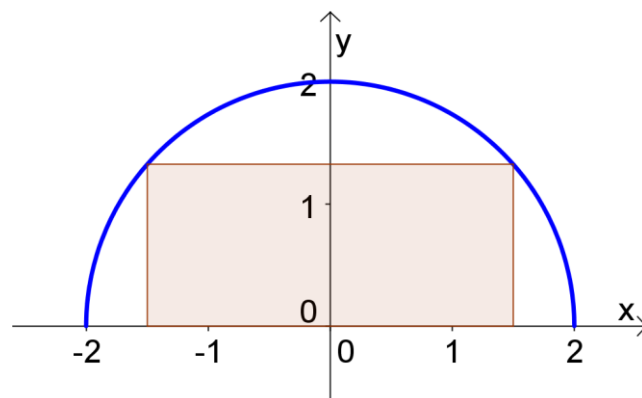


Due date: _____

Name: _____

1. A rectangle is to be inscribed in a semicircle of radius 2. What is the largest area the rectangle can have, and what are its dimensions?



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2. A rectangular plot of farmland will be bounded on one side by a river and on the other three sides by a fence. With 800 m of fencing at your disposal, what is the largest area you can enclose, and what are its dimensions?

3. Find the points on the parabola $y = 4 - x^2$ that are closest to the point $(0, 2)$.

4. Find the points on the parabola $x = y^2$ that are closest to the point $(1, 0)$.
5. An open box with a square base is going to be made. The sides of the box will cost \$4 per square foot, and the base will cost \$5 per square foot. What are the dimensions of the box with the largest volume that can be constructed for \$60? Be sure to write the units for your answer.

6. Find the dimensions (base and height) of the isosceles triangle of largest area that can be inscribed in a circle of radius 5.

7. Find the largest possible volume of a cylinder that's inscribed in a sphere of radius 3.
8. A right circular cylinder is inscribed in a cone with height 3 cm and base radius 2 cm. Find the largest possible volume of such a cylinder. Be sure to write the units of your answer.

9. You cut an 8-ft long piece of wire into two pieces. You bend one piece into a square and the other into an equilateral triangle. How should you cut the wire so that you minimize the total area enclosed by the square and triangle? Be sure to write the units of your answer.
10. You cut a piece of wire that is 10 m long into two pieces. You bend one piece into a square and the other into a circle. How should you cut the wire so that you minimize the total area enclosed by the square and circle? Be sure to write the units of your answer.

Q: Why should you stand in the corner when you're cold?

Optional exercises from the Stewart textbook if you'd like more practice:
4.7 (p.336) #3, 7, 15, 16 (answer: \$163.54), 17, 21-29 odd, 33-37 odd