

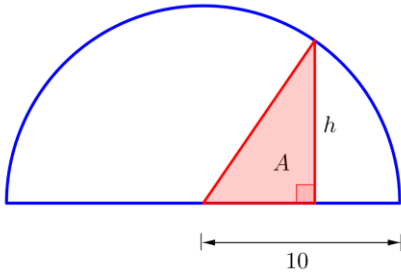
Due date: \_\_\_\_\_

Name: \_\_\_\_\_

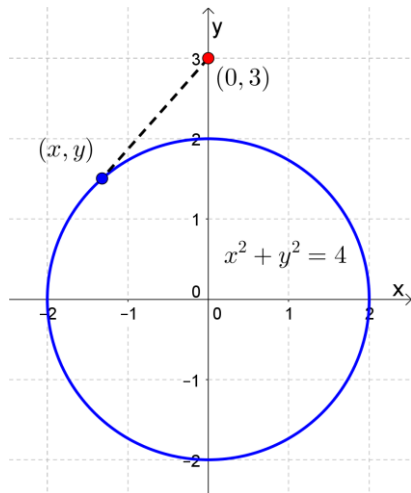
## Tools for Modeling (Part 3)

Notes

ex: A right triangle is inscribed in a semicircle of radius 10. Find a function in one variable that models the area  $A$  of the triangle in terms of its height  $h$ .



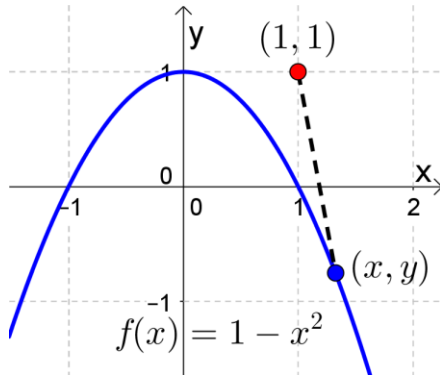
ex: Find the distance from the point  $(0, 3)$  to the circle  $x^2 + y^2 = 4$  as a function of  $y$  only. Be sure to simplify your function.



ex: A right circular cylinder is inscribed in a cone with height  $h$  and base radius  $r$ . Find a single-variable function that models the surface area of the cylinder.

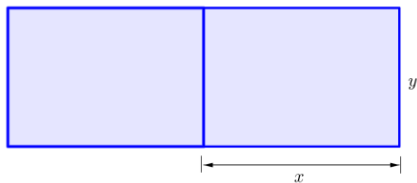
1. A rectangle is inscribed in a semicircle of radius 5. Find a function that models the area  $A$  of the rectangle in terms of its height  $y$ .

2. Find the distance from the point  $(1, 1)$  to the parabola  $f(x) = 1 - x^2$  as a function of  $x$  only. Be sure to simplify your function.



3. A right circular cylinder is inscribed in a cone with height 4 cm and base radius 3 cm. Find a single-variable function that models the volume of the cylinder.

4. A 10000-square-foot rectangular plot of land is going to be divided into two equal-sized, adjacent playgrounds (see diagram). Find the number of feet of fencing required as a function of  $x$ . (Note: there is only one fence between the playgrounds, not two.)



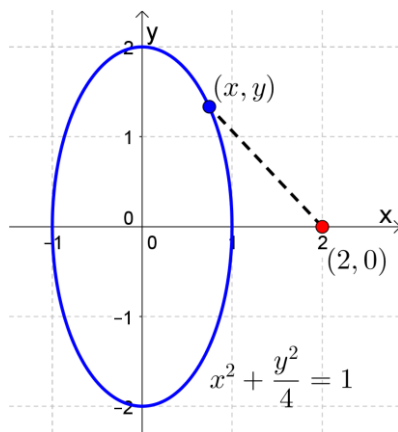
5. You buy a 5000-square-foot, rectangular piece of property with one side against a straight river. You'd like to protect your property with fencing, which costs \$5 per foot. You don't need any fencing along the river, though. Find a function in one variable that models the cost of fencing your property.

**Practice at home**

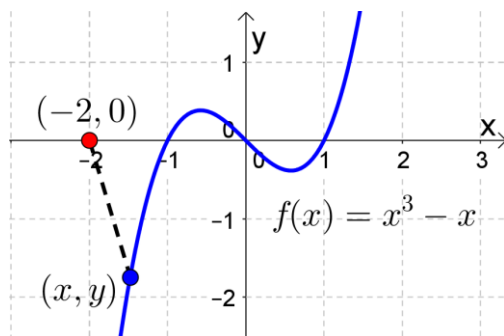
6. A rectangle is inscribed in a semicircle of radius 5. Find a function that models the perimeter of the rectangle in terms of its height  $y$ .

7. Find a single-variable function that models the area of a rectangle inscribed in a circle of radius 3.

8. Find the distance from the point  $(2, 0)$  to the ellipse  $x^2 + \frac{y^2}{4} = 1$  as a function of  $x$  only. Be sure to simplify your function.



9. Find the distance from the point  $(-2, 0)$  to the polynomial  $f(x) = x^3 - x$  as a function of  $x$  only. Be sure to simplify your function.



10. Given that a right circular cylinder is  $300 \text{ cm}^3$ , find a single-variable function that models the surface area of the cylinder.

11. A right circular cylinder is inscribed in a cone with height  $h$  and base radius  $r$ . Find a single-variable function that models the volume of the cylinder.

12. A rectangular plot of land is going to be divided into three adjacent, equal-sized playgrounds (see diagram). If the total number of feet of fencing is 200, find the area enclosed by all three playgrounds as a function of  $x$ . (Note: there is only one fence between each pair of playgrounds, not two.)



13. You buy a 500-square-foot, rectangular piece of property with one side against a straight highway. You'd like to protect your property with fencing. Most of the fencing costs \$4 per foot, but the fencing next to the road must be sturdier and costs \$6 per foot. Find a function in one variable that models the cost of fencing the property.