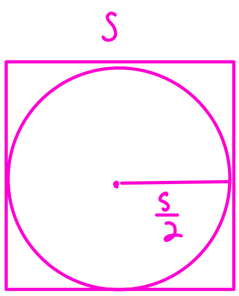
Do Now: #s 4 and 6 from Modeling with Functions Practice packet 2

4. A circle is inscribed in a square of side *s*. Write the area of the circle as a function of *s*.



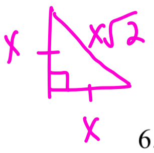
s = diameter

$\frac{s}{2}$ = radius

$A = \pi r^2$ *need r in terms of s

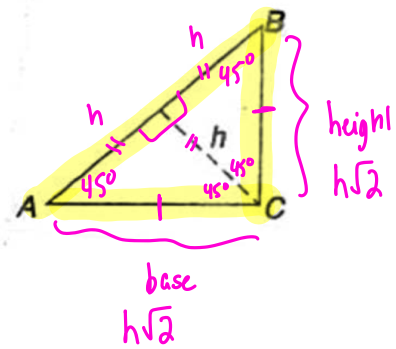
$A(s) = \pi\left(\frac{s}{2}\right)^2$

$A(s) = \frac{\pi s^2}{4}$, $s > 0$



6. Triangle *ABC* is an isosceles right triangle with right angle at *C*. *h* is the measure of the perpendicular from *C* to side *AB*. Express the area of triangle *ABC* as a function of *h*.

$A = \frac{1}{2}bh$



$A(h) = \frac{1}{2}(h\sqrt{2})(h\sqrt{2})$

$A(h) = \frac{1}{\cancel{2}}h^2(\cancel{2}) = h^2$

$h > 0$

or

$A(h) = \frac{1}{\cancel{2}}\cancel{2}h(h) = h^2$

Wrapping up packet 2…

3. The height of a right circular cylinder equals its diameter. Write the volume of the cylinder as a function of its radius.

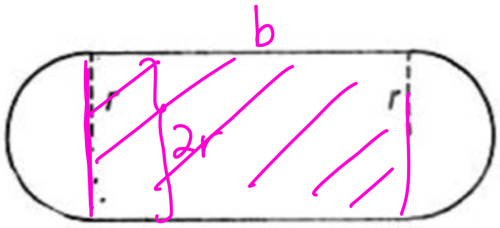
diameter $= 2r$

$V = \pi r^2 h$

$V(r) = \pi r^2 (2r)$

$V(r) = 2\pi r^3, \quad r > 0$

8. An athletic field is semicircular at each end as shown. If the radius of each semicircle is r, and if the total perimeter of the field is 400 meters, express the area of the field in terms of r.



$P = 400$ m

circumference of circle

2 sides of rectangle

$400 = 2\pi r + 2b$

$400 - 2\pi r = 2b$

$200 - \pi r = b$

$A =$ circle + rectangle

$A(r) = \pi r^2 + 2r \cdot b$ ← need b in terms of r

$A(r) = \pi r^2 + 2r(200 - \pi r)$

$A(r) = \pi r^2 + 400r - 2\pi r^2$

$A(r) = 400 - \pi r^2, \quad 0 < r < \frac{200}{\pi}$

$r > 0$

$200 - \pi r > 0$

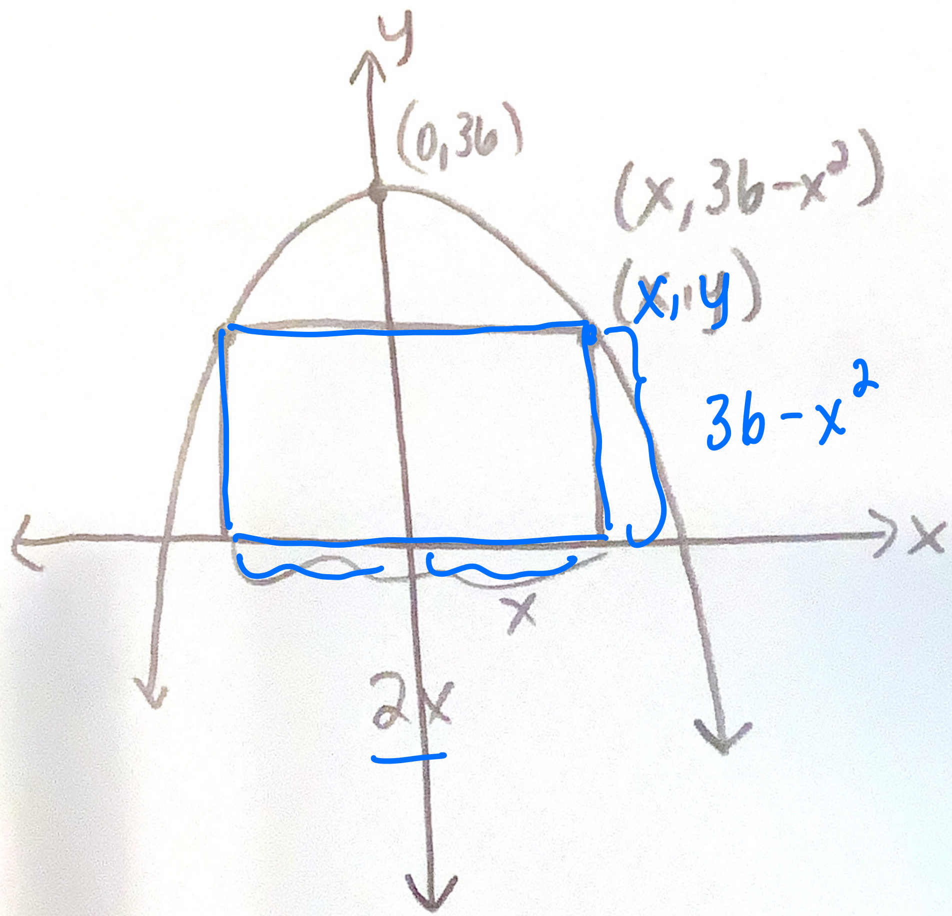
$200 > \pi r$

$\frac{200}{\pi} > r$

Work on Modeling with Functions Practice packet 3 #s 1 and 2

2. A rectangle is inscribed between the x axis and the parabola $y = 36 - x^2$ with one side along the x axis. Write the area of the rectangle as a function of x.

Homework 11-09



$A = lw$

$A(x) = 2x(36-x^2)$

$A(x) = 72x - 2x^3, \quad 0 < x < 6$

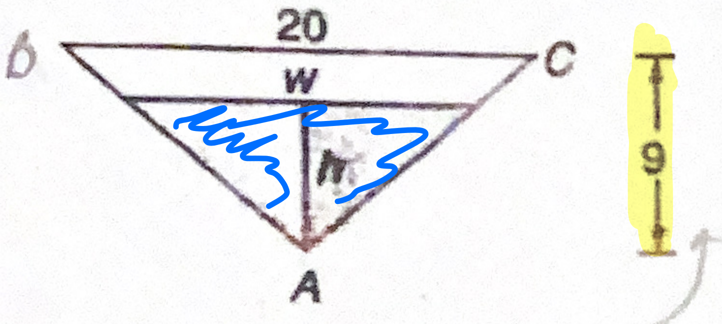
$2x > 0$

$x > 0$

$36 - x^2 > 0$

$-6 < x < 6$

5. In the figure, the shaded triangle is similar to triangle ABC. If $BC = 20$ and the altitude of triangle $ABC = 9$, express w as a function of the altitude h of the shaded triangle. and express the area of the shaded Δ as a function of h.



$$A = \frac{1}{2} bh$$

$h > 0$

$h < 9$

$$A(h) = \frac{1}{2}\left(\frac{20h}{9}\right) \cdot h$$

$$A(h) = \frac{10h^2}{9}$$

$0 < h < 9$

$$\frac{20}{w} = \frac{9}{h}$$

$$20h = 9w$$

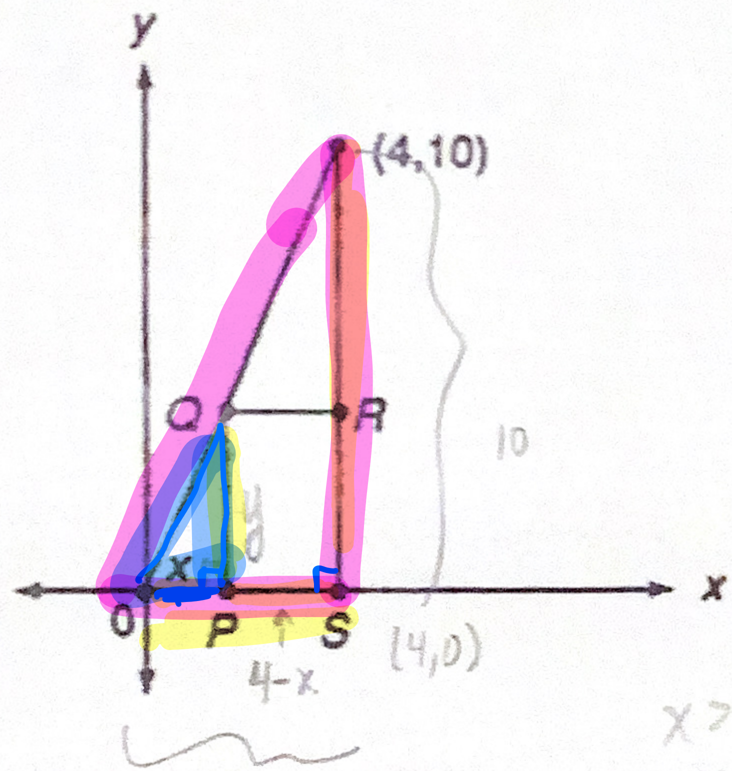
$$\frac{20h}{9} = w$$

7. Express the area of rectangle $PQRS$ as a function of $x = OP$.

$A = lw$

$A(x) = (4-x)\left(\frac{5x}{2}\right)$

$0 < x < 4$



$x > 0$

$x < 4$

4

$\frac{x}{4} = \frac{y}{10}$

$10x = 4y$

$\frac{5x}{2} = \frac{10x}{4} = y$

Review

9. Graph: $f(x) = \begin{cases} x^2 & \text{if } x \le 0 \\ \sqrt{x} & \text{if } x > 0 \end{cases}$