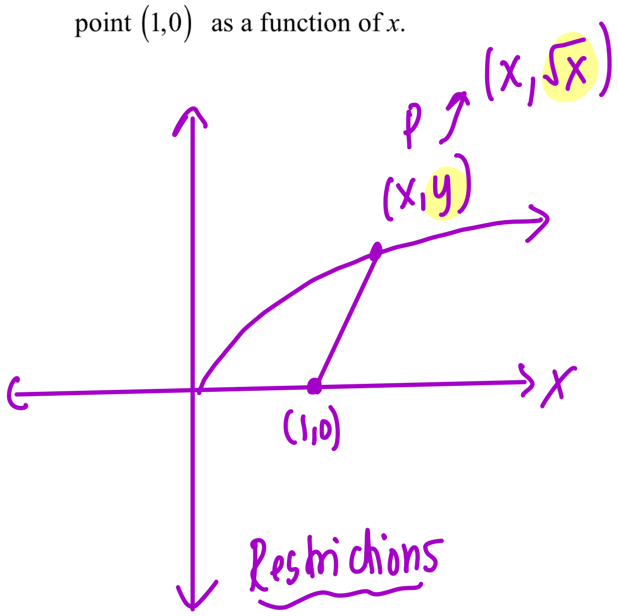
Do Now: #6 from the Modeling with Functions Practice packet 1

6. Let $P=(x,y)$ be a point on the graph of $y=\sqrt{x}$. Express the distance d from P to the point $(1,0)$ as a function of x.



Restrictions

$x>0$

$$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$

$$d=\sqrt{(x-1)^2+(\sqrt{x}-0)^2}$$

$$d=\sqrt{(x-1)^2+x}$$

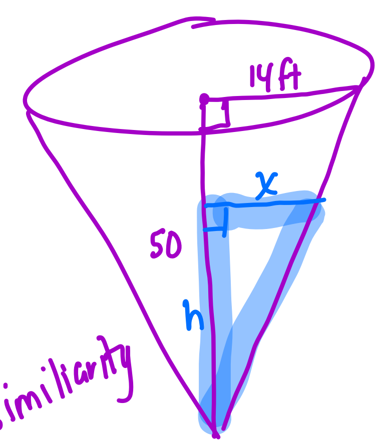
$$d=\cancel{\pm}\sqrt{(x-1)^2+x}$$

$$d(x)=\sqrt{x^2-2x+1+x}$$

$$d(x)=\sqrt{x^2-x+1},\ x>0$$

Continuing in that packet…

8. A water tank is in the shape of an inverted right cylindrical cone with altitude 50 feet and radius 14 feet. The tank is filled to a depth of h feet. Let x be the radius of the circle at the top of the water level. Express the volume of the water as a function of x.



AA Similiarity

Restrictions

$x>0$

$x\le 14$

$$\frac{14}{x}=\frac{50}{h}$$

$$14h=50x$$

$$h=\frac{50x}{14}=\frac{25x}{7}$$

$$V=\frac{1}{3}\pi r^2 h$$

$$V=\frac{1}{3}\pi x^2 h$$ ← need h in terms of x

$$V(x)=\frac{1}{3}\pi x^2\cdot\frac{25x}{7}$$

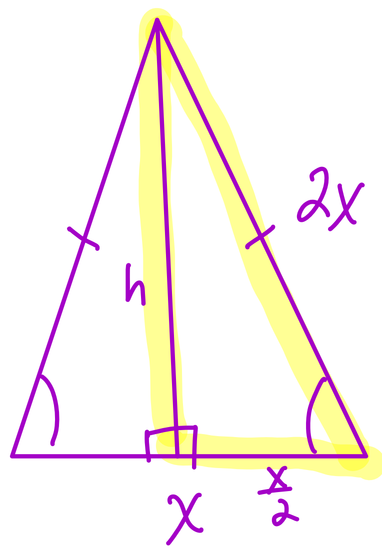
$$V(x)=\frac{25x^3\pi}{21} \qquad 0<x\le 14$$

From Modeling with Functions Practice packet 2:

Name:_______________________________________ Date:_________

PCH: Modeling with Functions Practice Packet 2 Ms. Loughran

1. The base of an isosceles triangle is half as long as the 2 equal sides. Write the area of the triangle as a function of the length of the base.



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

$A(x) = \frac{1}{2}x\,h \leftarrow$ need h in terms of x

$A(x) = \frac{1}{2} \cdot x \cdot \frac{x\sqrt{15}}{2}$

$A(x) = \frac{x^2\sqrt{15}}{4}, \ x>0$

$h^2 + \left(\frac{x}{2}\right)^2 = (2x)^2$

$h^2 + \frac{x^2}{4} = 4x^2$

$h^2 = 4x^2 - \frac{x^2}{4}$

$h^2 = \frac{15x^2}{4}$

$h = \cancel{\pm}\sqrt{\frac{15x^2}{4}} = \frac{x\sqrt{15}}{2}$

Restrictions:

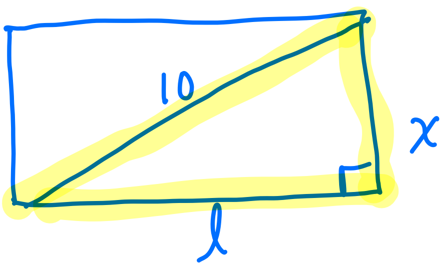
$x>0$

If $x>0$, $\frac{x\sqrt{15}}{2}$ is automatically >0

Homework 11-08

7. A rectangle has a side measuring x inches and a diagonal measuring 10 inches. Express the area of the rectangle as a function of x.

$A = lw$



$l^2 + x^2 = 10^2$

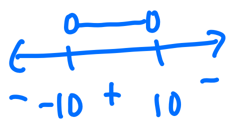
$l^2 = 100 - x^2$

$l = \cancel{\pm}\sqrt{100 - x^2}$

Rest

$x > 0$

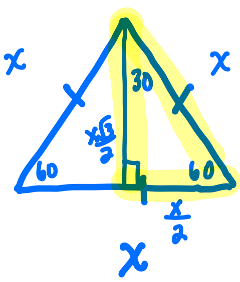
$100 - x^2 > 0$



$-10 < x < 10$

$A(x) = x\sqrt{100 - x^2}$ $0 < x < 10$

10. A wire 12 meters long is to be cut into two pieces. One piece will be shaped as an equilateral triangle and the other piece will be shaped as a circle. If x represents the length of a side of the equilateral triangle, express the total area A enclosed by the pieces of wire as a function of x.

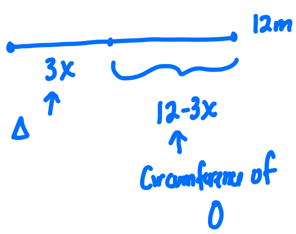


$x > 0$

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

$A = \frac{1}{2}(x)\left(\frac{x\sqrt{3}}{2}\right)$

$A(x) = \frac{x^2\sqrt{3}}{4}$



$C = 2\pi r$

$12 - 3x = 2\pi r$

$\frac{12-3x}{2\pi} = r$

$A_O = \pi r^2$

$A_O = \pi\left(\frac{12-3x}{2\pi}\right)^2$

$12 - 3x > 0$

$12 > 3x$

$x < 4$

$A(x) = \frac{x^2\sqrt{3}}{4} + \pi\left(\frac{12-3x}{2\pi}\right)^2$

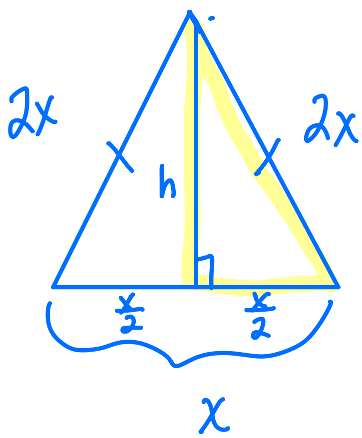
$A(x) = \frac{x^2\sqrt{3}}{4} + \frac{\cancel{\pi}(12-3x)^2}{4\pi^2}$

$A(x) = \frac{x^2\sqrt{3}}{4} + \frac{(12-3x)^2}{4\pi}$ $0 < x < 4$

Name:______________________________________ Date:________

PCH: Modeling with Functions Practice Packet 2 Ms. Loughran

1. The base of an isosceles triangle is half as long as the 2 equal sides. Write the area of the triangle as a function of the length of the base.



$x > 0$

$A_\Delta = \frac{1}{2}bh$

$A(x) = \frac{1}{2}x\left(\frac{x\sqrt{15}}{2}\right) \qquad x > 0$

$\left(\frac{x}{2}\right)^2 + h^2 = (2x)^2$

$\frac{x^2}{4} + h^2 = 4x^2$

$h^2 = 4x^2 - \frac{x^2}{4}$

$h = \cancel{\pm}\sqrt{4x^2 - \frac{x^2}{4}} = \sqrt{\frac{15x^2}{4}} = \frac{x\sqrt{15}}{2}$

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

$h = D$

$h = 2r$

$r > 0$

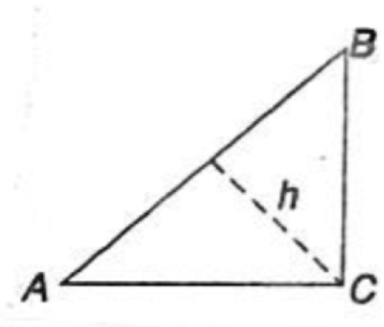
$V = \pi r^2 h$

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

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

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

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.



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.