1.) (10 pts.) Determine the center and radius of the circle given by : $x^2 - 2x + y^2 + 6y = -6$
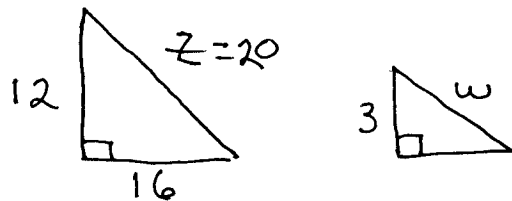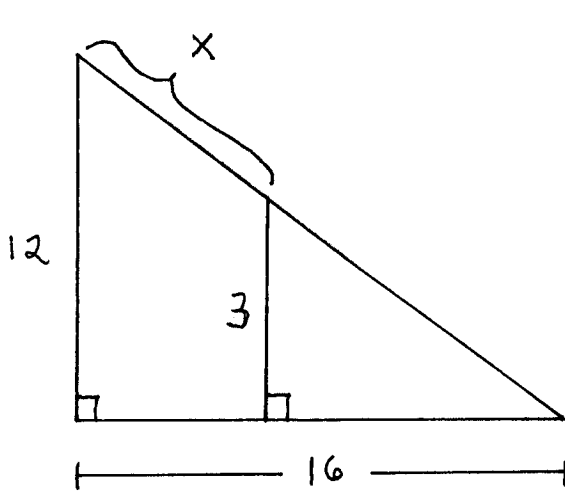
$$x^2 - 2x + 1 + y^2 + 6y + 9 = -6 + 1 + 9 \longrightarrow$$

$$(x-1)^2 + (y+3)^2 = 4 = 2^2 \longrightarrow$$

center : $(1, -3)$

radius : $r = 2$

2.) (10 pts.) Solve for x in the following diagram :

$$12^2 + 16^2 = z^2 \longrightarrow 144 + 256 = z^2$$
$$\longrightarrow z^2 = 400 \longrightarrow z = 20$$
$$\frac{20}{12} = \frac{w}{3} \longrightarrow 60 = 12w \longrightarrow$$
$$w = 5 \longrightarrow x = 20 - 5 \longrightarrow \boxed{x = 15}$$

3.) (10 pts.) Let $f(x) = \dfrac{3}{x+4}$ and $g(x) = \dfrac{x}{1-x}$. Find and simplify the functional composition $f(g(x))$.

$$f(g(x)) = \frac{3}{g(x)+4} = \frac{3}{\frac{x}{1-x}+4} \cdot \frac{1-x}{1-x}$$

$$= \frac{3(1-x)}{\frac{x}{1-x} \cdot (1-x) + 4(1-x)} = \frac{3 - 3x}{x + 4 - 4x} = \frac{3 - 3x}{4 - 3x}$$