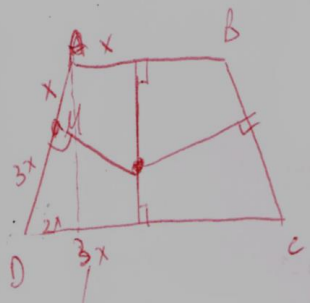
3.6
4.



$h = \sqrt{16x^2 - 4x^2} = 2\sqrt{3}x = 2r \rightarrow x = \frac{r}{\sqrt{3}}$

$AD = BC = 4x = \frac{4}{\sqrt{3}}r$

$AB = 2x = \frac{2}{\sqrt{3}}r$

$DC = 6x = \frac{6}{\sqrt{3}}r$

$\cos(xD) = \frac{2x}{4x} = \frac{1}{2} \rightarrow xD = 60°$

$\measuredangle A = 120°$

$S_{ABCD} = \frac{\left(\frac{2}{\sqrt{3}} + \frac{6}{\sqrt{3}}\right)r \cdot 2r}{2} = \frac{8}{\sqrt{3}}r^2 = \frac{2\sqrt{3}}{3}r^2$