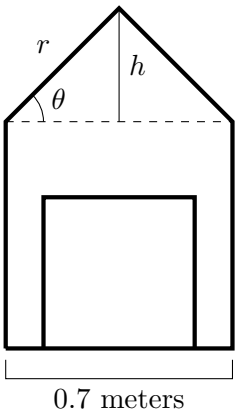
5. [5 points] Another customer of the dog boutique is making a custom dog house. A sketch of their plans (not drawn to scale) is shown below:



a. [2 points] In order to for the snow to slide off, the slope of the roof should rise at least 4 inches vertically for each 12 inches in horizontal change. **If $\theta = 20°$ will the roof be steep enough for snow to slide off?** *Show all expressions that you calculate.*

Solution: There are many ways to approach this! The simplest is probably to recall that $\tan(\theta)$ gives the slope of the line making that angle with the x-axis. With that in mind, we can use a calculator to compute $\tan(20°) = 0.36397$. Since the slope we need to let snow run off is $\frac{1}{3}$ and $0.36397 > 0.333...$, the $20°$ angle shed roof is steep enough.

In a slight variation of the above method, some students used $\tan(20°)$ to find the value of h in the diagram is 0.1274 m and then similarly found that:

$$0.1274/0.35 > 0.333....$$

There were many other methods possible to approach this problem. Some used a conversion from meters to inches, but this was not at all required or necessary to approach this problem.

(Circle one) **YES** NO NOT ENOUGH INFORMATION

b. [3 points] The dog owner decides to make $\theta = 22°$. If the overall width of the front piece shown is 0.7 meters, what will be the measurement of r shown in the diagram?
Show all work. Give your final answer in decimal form, NOT exact form.

Solution: We know that $\cos(22°) = 0.35/r$. Solving for r we get

$$r = 0.35/\cos(22°) \approx 0.377 \text{ meters}$$

$r =$ **0.377** meters