

12.



$$\begin{aligned}
 h &= \sqrt{x^2 - \left(\frac{p-2x}{2}\right)^2} \\
 &= \sqrt{x^2 - \left(\frac{p^2 - 4px + 4x^2}{4}\right)} \\
 &= \sqrt{px - \frac{p^2}{4}}
 \end{aligned}$$

$$A = \frac{1}{2}bh = \frac{1}{2}(p-2x)\left(px - \frac{p^2}{4}\right)^{\frac{1}{2}}$$

$$\frac{dA}{dx} = \frac{1}{2} \times -2 \left(px - \frac{p^2}{4}\right)^{\frac{1}{2}} + \frac{p-2x}{2} \times \frac{1}{2}p / \left(px - \frac{p^2}{4}\right)^{\frac{1}{2}}$$

$$0 = -\left(px - \frac{p^2}{4}\right)^{\frac{1}{2}} + \frac{p-2x}{2} \times \frac{p}{2 \left(px - \frac{p^2}{4}\right)^{\frac{1}{2}}}$$

$$0 = \frac{-3px}{2} + \frac{p^2}{2} = 0$$

$$x = \frac{p}{3}$$