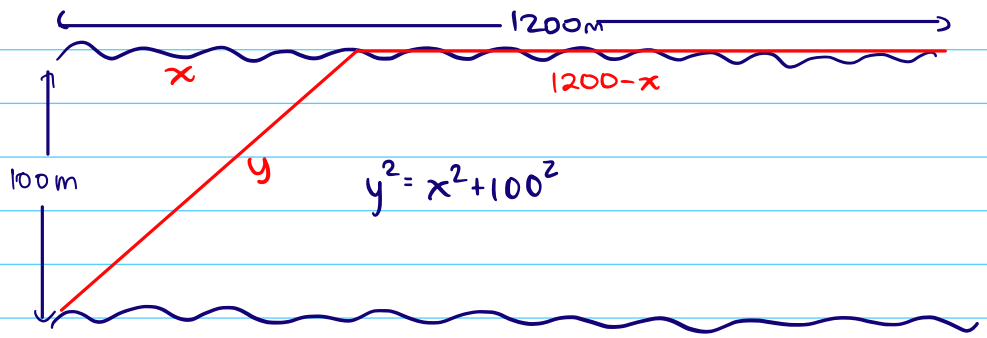
A cable television company is laying cable in an area with underground utilities. Two subdivisions are located on opposite sides of willow creek, which is 100 m wide. The company has to connect points P and Q with cable, where Q is on the north bank 1200 m east of P. It costs $40/m to lay cable underground and $80/m to lay cable underwater. Find the least expensive way to lay cable.



$$C = 80y + 40(1200 - x)$$

$$C = 80\sqrt{x^2 + 100^2} + 48000 - 40x$$

$$C' = 80 \times \frac{1}{2}(x^2 + 100^2)^{-\frac{1}{2}}(2x) - 40$$

Set $c' = 0$ to find min value

$$0 = \frac{80x}{\sqrt{x^2 + 100^2}} - 40$$

$$x = \frac{100}{\sqrt{3}}$$