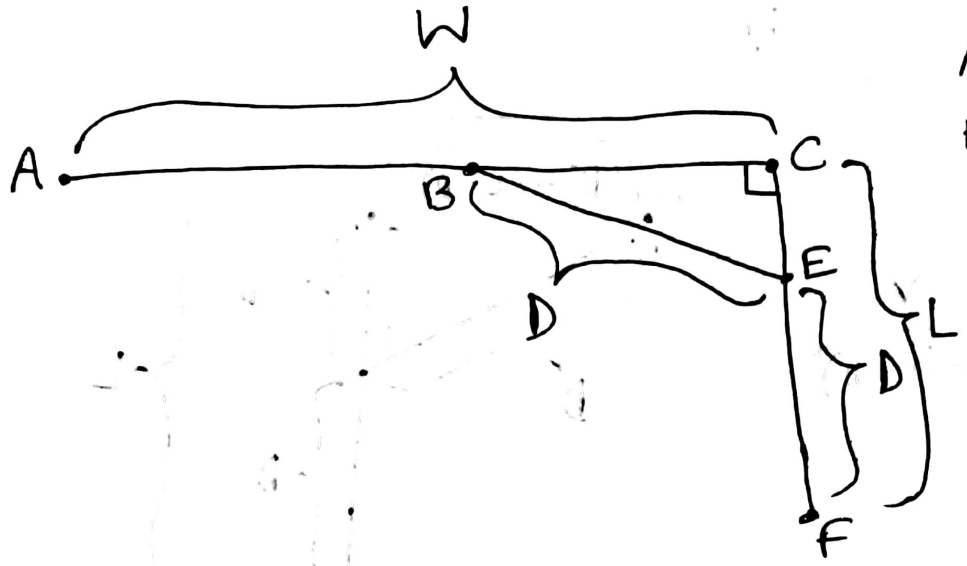


$AC = W$

$FC = L$

$FE = D$

$EB = D$

FEBA কে minimize করতে হবে।

$\because FC = L$, $FE = D$. আবার $FC = FE + EC$

$\Rightarrow EC = FC - FE$

$\therefore EC = L - D$

ΔBCE সমকোণী ত্রিভুজে পিথাগোরাসের উপপাদ্য প্রয়োগ করে পাই,

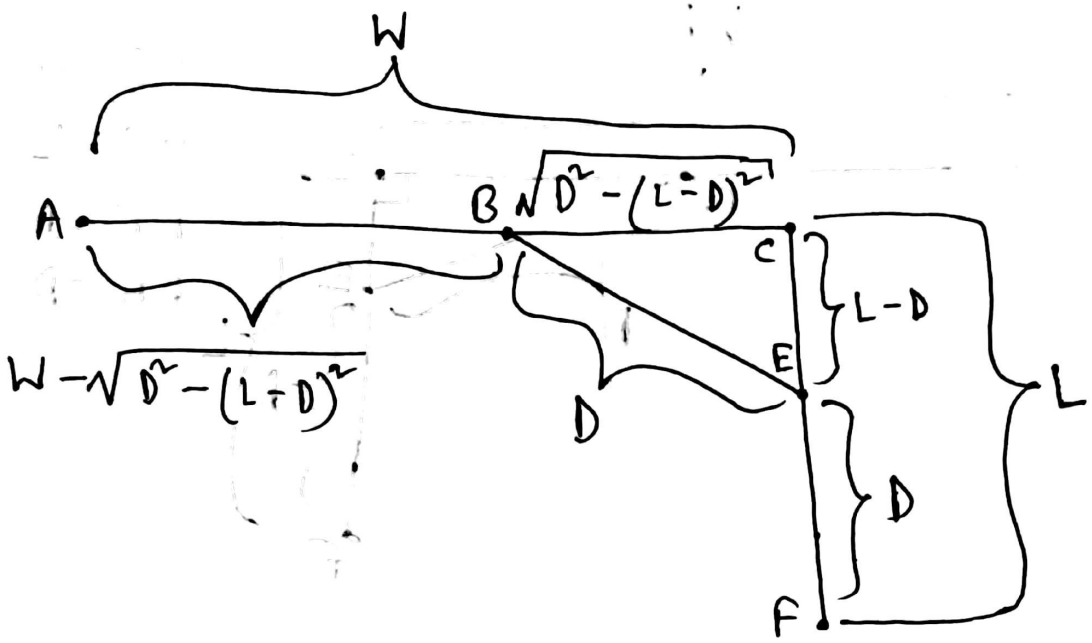
$BC^2 + EC^2 = BE^2 \Rightarrow BC^2 = BE^2 - EC^2 \Rightarrow BC = \sqrt{D^2 - (L-D)^2}$

আবার,

$AB + BC = AC$

$\Rightarrow AB = AC - BC$

$\Rightarrow AB = W - \sqrt{D^2 - (L-D)^2}$



$$\therefore FEBA = D + D + W - \sqrt{D^2-(L-D)^2}$$

$$= \underbrace{2D + W - \sqrt{D^2-(L-D)^2}}$$

এই রাশি কে D এর সাপেক্ষে minimize করতে হবে,

considering FEBA as a function of D,

$$2D + W - \sqrt{D^2-(L-D)^2} = y(D)$$

উক্ত পদের অন্তরীকরণ করে পাই,

$$2 - \frac{L}{\sqrt{L(2D-L)}} = y' \quad \text{[using derivative-calculator.net]}$$

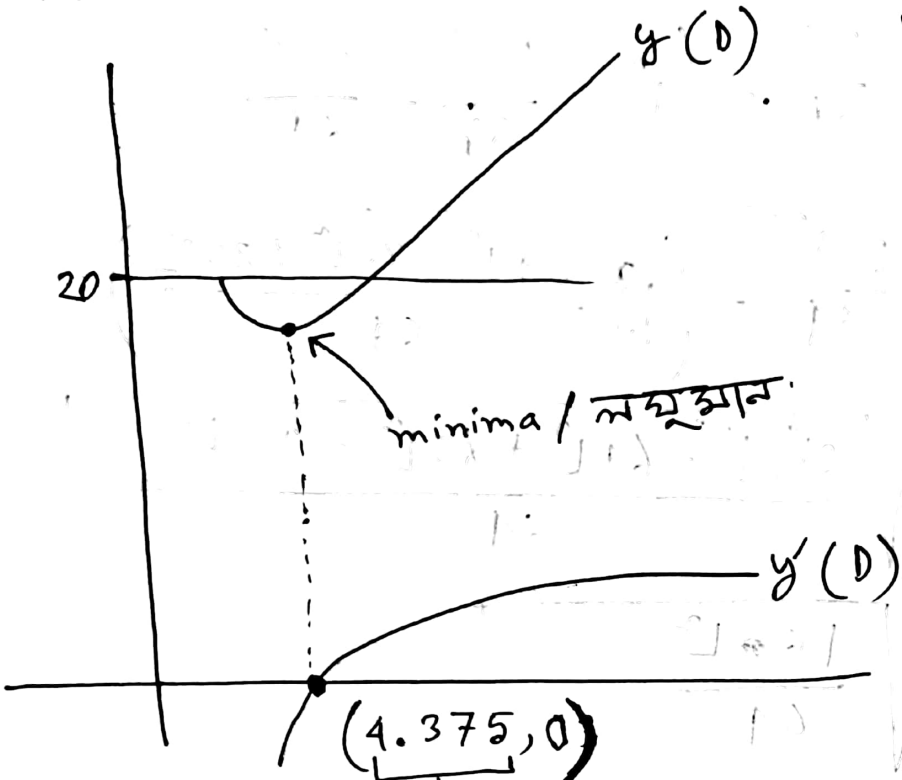
$$\Rightarrow \frac{L}{\sqrt{L(2D-L)}} = 2 \Rightarrow L = 2\sqrt{L(2D-L)} \Rightarrow L^2 = 4L(2D-L)$$

$$\Rightarrow 2D - L = \frac{L^2}{4L} = \frac{L}{4} \Rightarrow 2D = \frac{L}{4} + L \Rightarrow D = \frac{1}{2}\left(\frac{L+4L}{4}\right)$$

$$\therefore D = \frac{5L}{8}$$

sketch for
W = 13,
L = 7

graph was drawn by using help from desmos.com



$\frac{5 \times 7}{8} = \frac{5L}{8} = D$

D এর যে মানের জন্য $y'(D) = 0$ হয় সেই একই মানের জন্য $y(D)$ এর minima পাওয়া যায়, তাই $y(D)$ কে এখন $D = \frac{5L}{8}$ বসাবো,

$$y(D) = 2D + W - \sqrt{D^2 - (L-D)^2}$$

$$= 2 \times \frac{5L}{8} + W - \sqrt{\left(\frac{5L}{8}\right)^2 - \left(L - \frac{5L}{8}\right)^2}$$

$$= \frac{5L}{4} + W - \sqrt{\frac{25L^2}{64} - \left(L^2 - 2 \cdot L \cdot \frac{5L}{8} + \frac{25L^2}{64}\right)}$$

$$= \frac{5L}{4} + W - \sqrt{\frac{25L^2}{64} - \left(L^2 - \frac{10L^2}{8} + \frac{25L^2}{64}\right)}$$

$$= \frac{5L}{4} + W - \sqrt{\frac{25L^2}{64} - \left(\frac{64L^2 - 80L^2 + 25L^2}{64}\right)}$$

$$= \frac{5L}{4} + W - \sqrt{\frac{25L^2 - 64L^2 + 80L^2 - 25L^2}{64}}$$

$$= \frac{5L}{4} + W - \sqrt{\frac{16L^2}{64}}$$

$$= \frac{5L}{4} + W - \frac{4L}{8} = \frac{5L}{4} + W - \frac{L}{2}$$

$$= \frac{5L + 4W - 2L}{4}$$

$$= \frac{3L + 4W}{4}$$

এটি EBA এর minimum value.