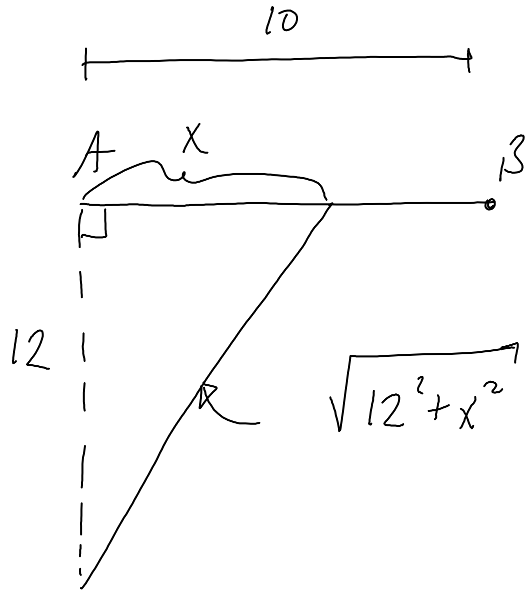
2015

den 23 mars 2011
10:39

Skiss:



$t = \frac{s}{v}$

Tid i öknen: $t_ö = \frac{\sqrt{12^2+x^2}}{15}$

Tid på väg: $t_v = \frac{10-x}{39}$

Total tid som funktion av x

$$t(x) = t_ö + t_v = \frac{\sqrt{12^2+x^2}}{15} + \frac{10-x}{39}$$

Minimera t:

$$t'(x) = \frac{2x}{2 \cdot 15 \cdot \sqrt{12^2+x^2}} - \frac{1}{39} = 0$$

$\Leftrightarrow$

$$2 \cdot 15 \cdot \sqrt{12^2+x^2}$$

$$\Leftrightarrow$$

$$\frac{x}{15\cdot\sqrt{12^2+x^2}} = \frac{1}{39}$$

$$\Leftrightarrow$$

$$39x = 15\sqrt{12^2+x^2}$$

$$\Rightarrow$$

$$39^2x^2 = 15^2(12^2+x^2)$$

$$\Leftrightarrow$$

$$(39^2-15^2)x^2 = 15^2\cdot 12^2$$

$$\Leftrightarrow$$

$$x^2 = \frac{15^2\cdot 12^2}{39^2-15^2} = 25$$

$$x = \pm 5$$

Max el. min; kolla med $t''(x)$

$$t''(x) = \frac{1\cdot 15\sqrt{12^2+x^2} - x\cdot\frac{2x}{2\sqrt{12^2+x^2}}}{15^2(12^2+x^2)}$$

$$\Rightarrow$$

$$t''(5) = \frac{1\cdot 15\sqrt{12^2+5^2} - 5\cdot\frac{2\cdot 5}{2\cdot\sqrt{12^2+5^2}}}{\ldots} =$$

(>0)

$$\ldots \quad (>0)$$

$$= \frac{15 \cdot 13 - \frac{25}{13}}{\ldots} > 0 \quad (\Rightarrow \min)$$

Alltså ger $x=5$ minsta tid.