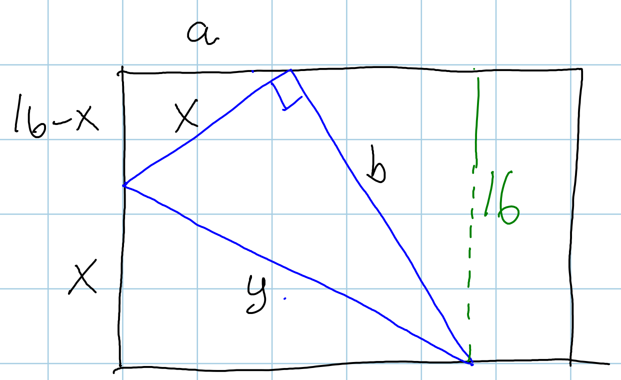
D3230

den 31 mars 2011
23:04



Minimera y!

$$a = \sqrt{x^2 - (16-x)^2} = \sqrt{32x - 16^2} = \sqrt{32x - 256}$$

$$b = \sqrt{y^2 - x^2}$$

Likformighet ger:

$$\frac{a}{x} = \frac{16}{b} \Leftrightarrow \frac{\sqrt{32x-256}}{x} = \frac{16}{\sqrt{y^2-x^2}}$$

$$\overset{\text{kvadrera}}{\Rightarrow} \quad \frac{32x-256}{x^2} = \frac{256}{y^2-x^2}$$

$$\Leftrightarrow \quad (y^2-x^2)(32x-256) = 256x^2$$

$$\Leftrightarrow \quad y^2(32x-256) - 32x^3 + 256x^2 = 256x^2$$

$$\Leftrightarrow \quad y^2(32x-256) = 32x^3$$

$$\Leftrightarrow \quad y^2 \quad 32x^3 \quad = \quad x^3$$

$$\Leftrightarrow \quad y^2 = \frac{32x^3}{32x-256} = \frac{x^3}{x-8}$$

y^2 som minst precis då y minst så vi kan lika gärna minimera $y^2 = g(x) = \dfrac{x^3}{x-8}$, $8<x<16$

säkrast att kalla y^2 för $h(x)$.

$$h'(x) = \frac{3x^2(x-8) - x^3 \cdot 1}{(x-8)^2} = \frac{2x^3 - 24x^2}{(x-8)^2}$$

$$h'(x) = 0 \Leftrightarrow 2x^3 - 24x^2 = 2x^2(x-12) = 0$$

$$\Leftrightarrow x = 12$$

$(\text{ty } x > 0)$

max el. min ... Teckenstudie enklast

x	8		12		16
h'		$-$	0	$+$	
h		$\searrow$		$\nearrow$	

$\underline{x = 12}$ ger minsta y

Svår uppgift!