G1FERMAT

Fermat's Principle

Graph of total travel time

t1 is the time to go from the initial position (0,0) to point (xq,y) in medium with velocity v1
t2 is the time to go from point (xq,y) to the final position (xf,yf) in medium with velocity v2
There is a y value for minimum time

$xq := 20 \quad xf := 40 \quad yf \equiv 40$ v1 and v2 are at the Graph

$y := 0, .1 .. 40$

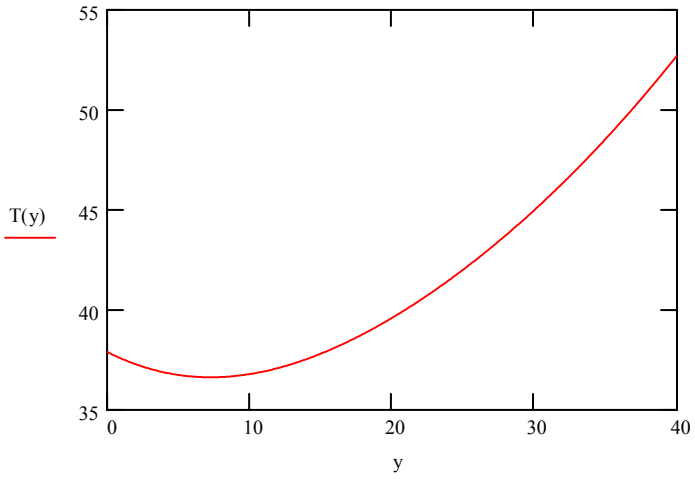
Time in medium 1

$$t1(y) := \frac{1}{v1} \cdot \sqrt{(xq)^2 + y^2}$$

Time in medium 2

$$t2(y) := \frac{1}{v2} \cdot \sqrt{(xf - xq)^2 + (yf - y)^2}$$

$$T(y) := t1(y) + t2(y)$$



$v1 \equiv 1 \quad v2 \equiv 2.5$

Changing the parameters v1 and v2 changes the minimum time for total travel