Physical Optimization Word Problems

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Example

Suppose we have 2400 feet of fencing and we'd like to build a rectangular fence that encloses the most possible area. What is the maximum area we can enclose?

Example

Now suppose we have 2400 feet of fencing and we'd like to build a rectangular fence against a river, so we only need to build three sides. How can we enclose the most possible area?

Example

Suppose we want to construct a cylindrical can that holds $250\pi \text{cm}^3 \approx 785\text{cm}^3$ of liquid, and we want to use the least possible metal to construct the can—and thus build the can with the least possible surface area. We have $A = 2\pi r^2 + 2\pi rh$.

Example

Suppose a man wishes to cross a 20 m river and reach a house on the other side that is 48m downstream. The man can walk at 5 m/s or swim at 3 m/s. What path will get him to the house fastest?