Example

Find two numbers that sum to 20 and have a maximum product.

Example

Find the minimum sum of two non-negative numbers which have a product of 25.

Example

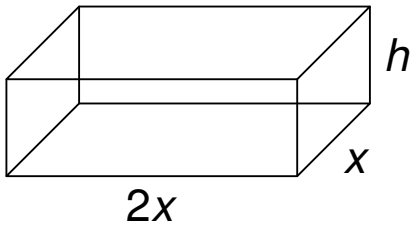
Farmer Albert is fencing in a rectangular field adjacent to a river. If Farmer Albert has 100 m of fencing, what is the largest area of his new field? (Assume the side against the river has no fence.)

Example

Farmer Bob is fencing in a rectangular field adjacent to a river. Farmer Bob wants to have a 10,000 m^2 field. Putting in fencing against the river costs \$10 per meter, and the fencing away from the river costs \$5 per meter. What are the dimensions of the field that minimize Farmer Bob's costs?

Example

A manufacturer of cardboard boxes has been asked to make a closed rectangular box having a volume of $\frac{1}{3}$ m^3, with the bottom of the box having a length equal to twice its width.



Find the dimensions of the box using the least amount of material for its construction.

Example

The monthly cost of production for Charlie's boxes of chocolates is

$$C(x) = \frac{1}{2}x^3 + 20x + 40$$

where x is the number of boxes produced, in thousands and $C(x)$ is the cost of production, in hundreds of dollars.

(a) Determine the average cost per thousand boxes of chocolates per month.

(b) Find the minimum average cost per month, and the production level required.