How do we solve applied maximum and minimum problems?

Quick Check

Find two numbers whose sum is 23 and whose product is a maximum.

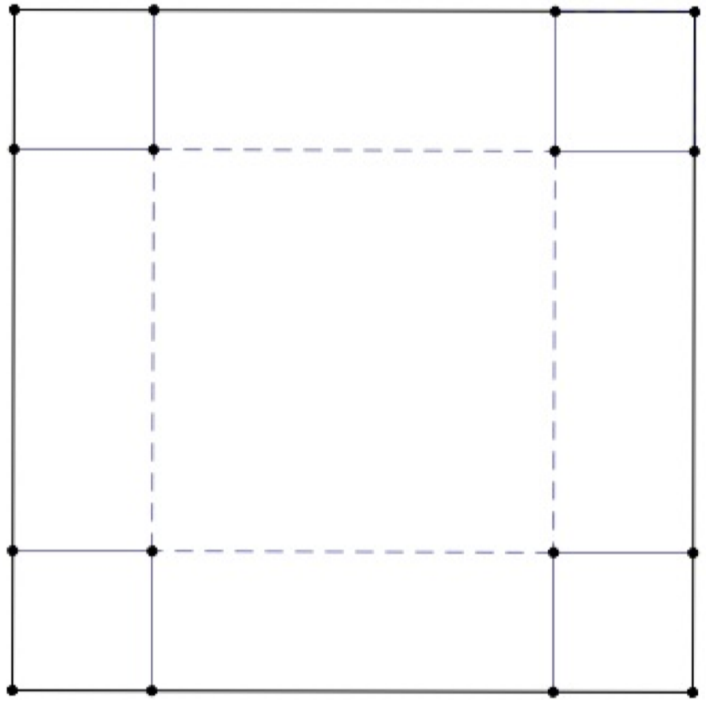
1. Use a table of values to estimate the answer to the problem.

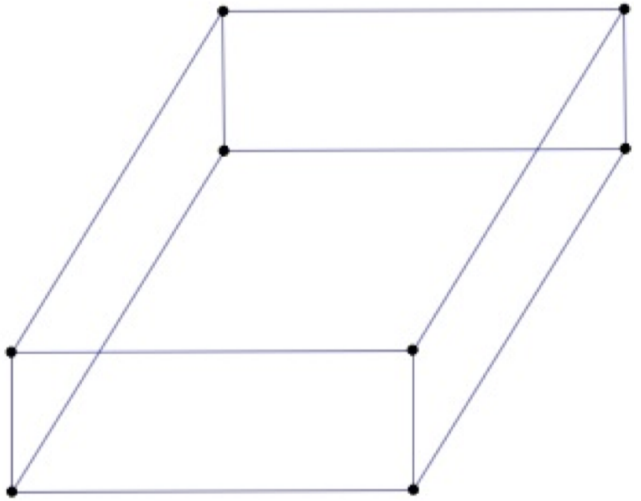
1^{st} Number	2^{nd} Number	Product
1	22	22
2	21	42
.	.	.
.	.	.

2. Think through the problem algebraically and using calculus techniques learned regarding extrema.

Optimization - Box with open top - Desmos APP

A box with an open top is made by taking a $8cm$ by $10cm$ sheet and cutting out square corners whose sides have length x, and then bending up the sides. Which length x gives the maximum volume? What is that volume?



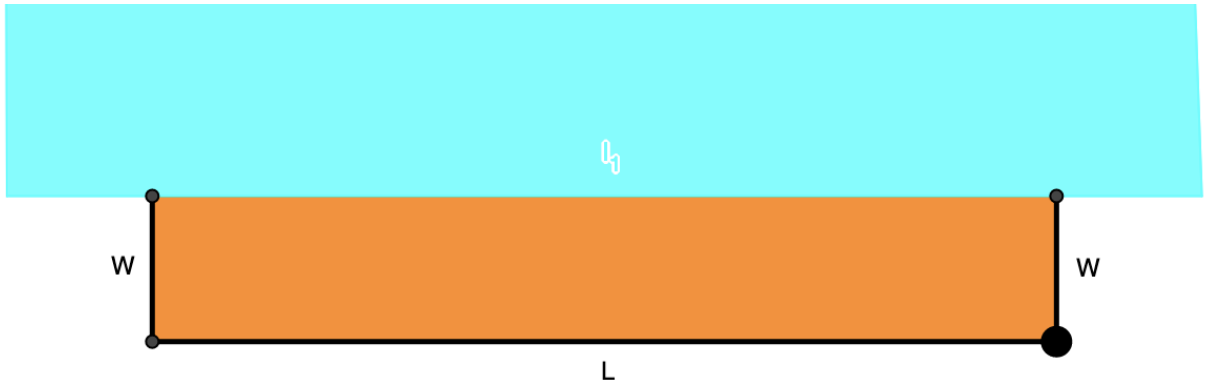


Solving Applied Optimization Problems

1. Read the problem.
2. Draw a picture.
3. Introduce Variables. Think about constraints on lengths, values due to the scenario.
4. Write an equation for the unknown quantity.
5. Test the critical points and endpoints in the domain of the unknown.

Fencing problem

A farmer has $2400ft$ of fencing and wants to fence off a rectangular field that borders a straight river. He needs no fence along the river. What are the dimensions of the field that has the largest area?



Visualize with Geogebra Applet.

NOT a farmer $\Longrightarrow$ think about building a garden bed, fencing a property, same problem applies in different contexts.

Can of Soda, Soup, Goya Beans, Tomato Paste instead...

A cylindrical can is to be made to hold $1L$ of oil. Find the dimensions that will minimize the cost of the metal to manufacture the can. ($1L = 1000cm^3$)

Visualize using the
Geogebra Applet

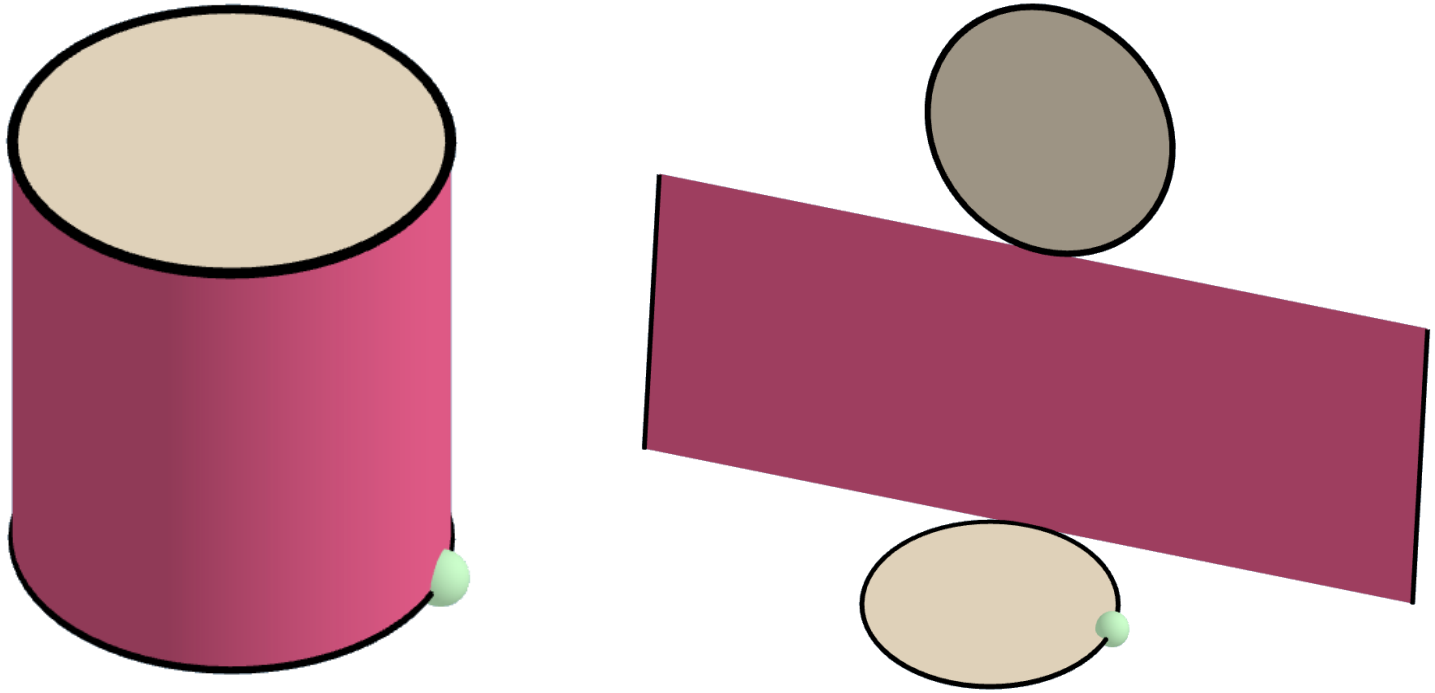


Illustration of an endpoint maximum

Four feet of wire is to be used to form a square and a circle. How much of wire should be used for the square and how much should be used for the circle to enclose the maximum total area?

⭐ Draw a diagram...

more practice on handout!