

## Section 4-8 : Optimization

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1. Find two positive numbers whose sum is 300 and whose product is a maximum.
2. Find two positive numbers whose product is 750 and for which the sum of one and 10 times the other is a minimum.
3. Let  $x$  and  $y$  be two positive numbers such that  $x + 2y = 50$  and  $(x+1)(y+2)$  is a maximum.
4. We are going to fence in a rectangular field. If we look at the field from above the cost of the vertical sides are \$10/ft, the cost of the bottom is \$2/ft and the cost of the top is \$7/ft. If we have \$700 determine the dimensions of the field that will maximize the enclosed area.
5. We have  $45 \text{ m}^2$  of material to build a box with a square base and no top. Determine the dimensions of the box that will maximize the enclosed volume.
6. We want to build a box whose base length is 6 times the base width and the box will enclose  $20 \text{ in}^3$ . The cost of the material of the sides is  $\$3/\text{in}^2$  and the cost of the top and bottom is  $\$15/\text{in}^2$ . Determine the dimensions of the box that will minimize the cost.
7. We want to construct a cylindrical can with a bottom but no top that will have a volume of  $30 \text{ cm}^3$ . Determine the dimensions of the can that will minimize the amount of material needed to construct the can.
8. We have a piece of cardboard that is 50 cm by 20 cm and we are going to cut out the corners and fold up the sides to form a box. Determine the height of the box that will give a maximum volume.



