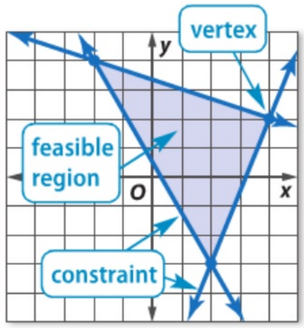
Algebra 2 3.3

Find the maximum and minimum values of a function over a region

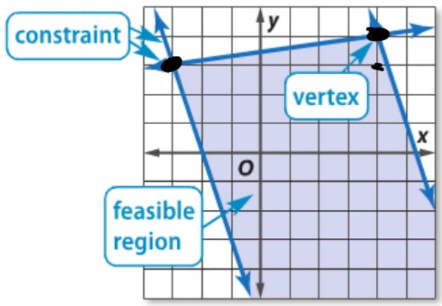
Solve optimization problems using linear programming

maximum
minimum
constraints
feasible region
bounded
unbounded ☆
optimize
linear programming lines
whiteboards

KeyConcept Feasible Regions



The feasible region is enclosed, or **bounded**, by the constraints. The maximum or minimum value of the related function *always* occurs at a vertex of the feasible region.



The feasible region is open and can go on forever. It is **unbounded**. Unbounded regions have either a maximum or a minimum.

2 Optimization

To **optimize** means to seek the best price or amount to minimize costs or maximize profits. This is often obtained with the use of linear programming.

KeyConcept Optimization with Linear Programming

p. 156

If you're stuck...
try these steps!

Step 1 Define the variables.

Step 2 Write a system of inequalities.

Step 3 Graph the system of inequalities.

Step 4 Find the coordinates of the vertices of the feasible region.

Step 5 Write a linear function to be maximized or minimized.

Step 6 Substitute the coordinates of the vertices into the function.

Step 7 Select the greatest or least result. Answer the problem.

What is the object of the game?
(write objective function first)

$2.5(?) = 1$ (How long does it take to paint each?)

25. **CCSS PRECISION** Sean has 20 days to paint as many play houses (p) and sheds (s) as he is able. The sheds can be painted at a rate of 2.5 per day, and the play houses can be painted at a rate of 2 per day. He has 45 structures that need to be painted.

a. Write a system of inequalities to represent the possible ways Sean can paint the structures.

b. Draw a graph showing the feasible region and list the coordinates of the vertices of the feasible region.

c. If the profit is \$26 per shed and \$30 per play house, how many of each should he paint?

d. What is the maximum profit?

max $f(p,s) = 30p + 26s$

$p + s \leq 45$

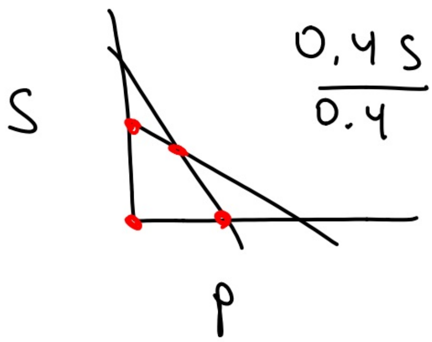
$\frac{1}{2}p + 0.4s \leq 20$

$-0.5p \qquad -0.5p$

$\frac{0.4s}{0.4} \leq \frac{-0.5p}{0.4} + \frac{20}{0.4}$

$p + s \leq 45$

$$\boxed{\begin{aligned} s &\leq -p + 45 \\ s &\leq -1.25p + 50 \end{aligned}}$$



WB 3.3 30 min 7.5 min

7 $e \ \frac{1}{2}$ hr $\quad s \ \frac{1}{8}$ hr

2/hr 8/hr.

note: trouble here will look again on Mon.

WB prac. 3.3

$$\frac{1}{2}e + \frac{1}{8}S \leq 8$$

$$e + S \geq 40$$

$$f(e,s) = 35e + 30s$$

max