

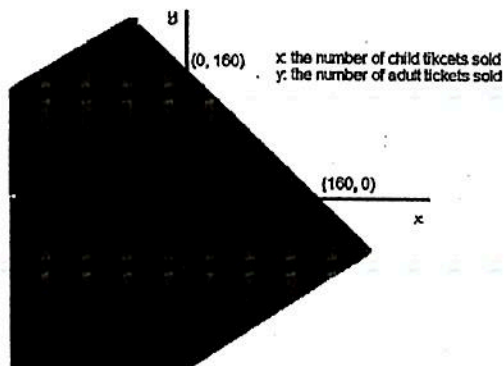
Essential Question: How do we solve real-world problems of systems of linear inequalities?

Do Now:

The local theater in Kevin's home town has a maximum capacity of 160 people. Kevin shared with Erin the following graph and said that the shaded region represented all the possible combinations of adult and child tickets that could be sold for one show.

- (a) Erin objected and said there was more than one reason that Kevin's thinking was flawed. What reasons could Erin be thinking of?

- Negative amounts of tickets do not make sense.
- Only whole number of tickets can be sold.



- (b) Using inequalities, describe for Kevin the set of all possible combinations of adult and child tickets that could be sold for one show. What restrictions are on the domain and range?

$$x + y \leq 160$$

$$x \geq 0$$

$$y \geq 0$$

The domain and range are restricted to whole numbers.

SYSTEMS OF LINEAR INEQUALITIES: DISCRETE & CONTINUOUS SOLUTIONS

- 1) The National Collegiate Athletic Association (NCAA) regulates the lengths of aluminum baseball bats used by college baseball teams. The NCAA states that the length (in inches) of the bat, x , minus the weight (in ounces) of the bat, y , cannot exceed 3. Bats can be purchased at lengths from 26 to 34 inches.

- a. Write and graph a system of linear inequalities that describes the information given above. How many inequalities are needed to represent the situation?

$$x - y \leq 3 \quad x \geq 26 \quad x \leq 34$$

$$y \geq x - 3$$

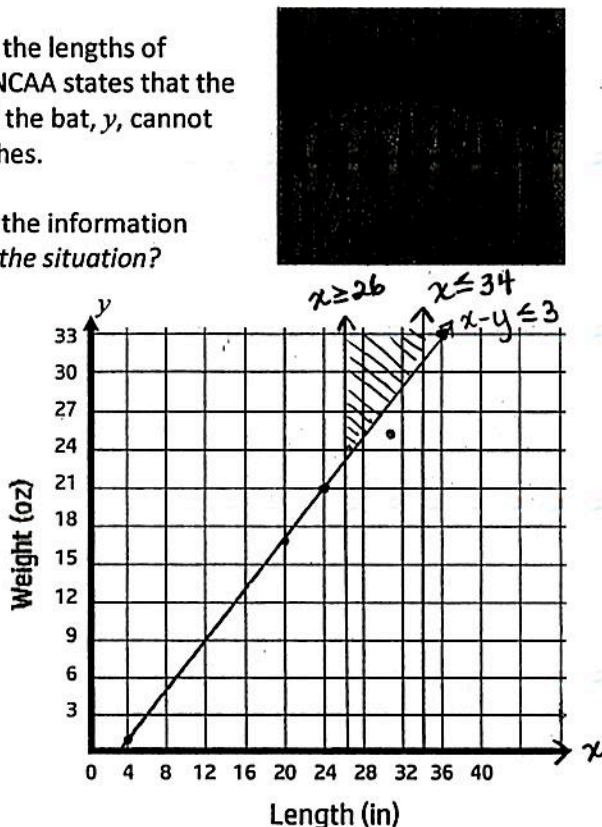
x	y
0	-3
4	1
20	17
24	21
36	33

- b. Use the graph to determine if an aluminum bat that is 31 inches long and weighs 25 ounces can be used by a player on an NCAA team.

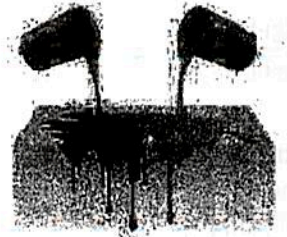
No, it is not in the overlapping solution area.

- c. State a combination of bat length and weight which would be acceptable according to NCAA regulations.

Answers vary i.e. 28in / 27oz
32in / 30oz



2) Starr is mixing green, g , and dark purple dye, d , to create a brown dye. She needs less than 100mL of the brown dye. She wants to use at least 20mL more of the green dye than the dark purple dye.



a. Write and graph a system of linear inequalities that describes the information given above.

$$g + d < 100$$

$$g < -d + 100$$

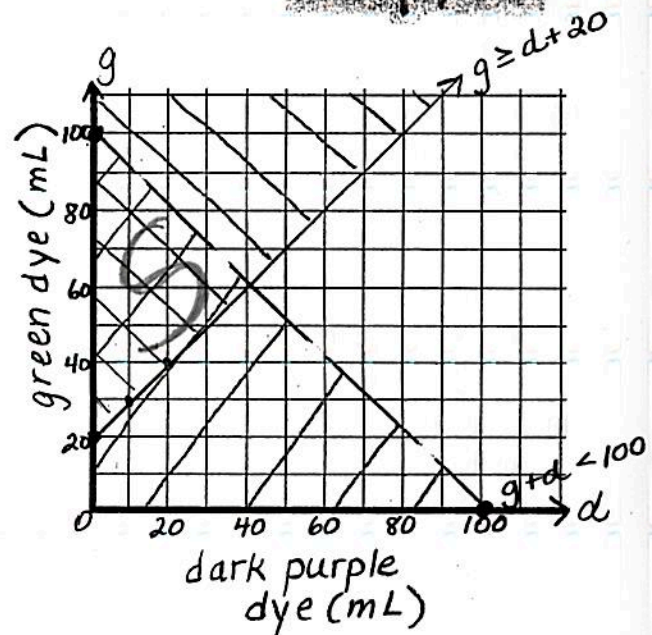
$$y\text{-int: } 100$$

$$x\text{-int: } 100$$

$$g \geq d + 20$$

$$y\text{-int: } 20$$

$$x\text{-int: } -20$$



b. What combinations of dye are possible? Are the solutions discrete or continuous?

Answers vary i.e.

dark purple

green

20 mL

60 mL

10 mL

80 mL

30 mL

60 mL

The solutions are continuous but are restricted to positive numbers.

SUMMARY...

When interpreting the solution region for a linear inequality, consider the restrictions on the domain and range of the variables.

- If the solution set is continuous, all the points in the solution region are in the solution set.
- If the solution set is discrete, only specific points in the solution region are in the solution set.