LESSON MAKER PRO

Limits in Action

Model real plans with systems of inequalities

HIGH SCHOOL · FA.F.24

FA.F.24 "Identify real-world contexts that can be modeled by a system of inequalities in two variables. (Limited to three inequalities.)"

NAME _____ DATE _____

FROM WORDS TO LIMITS

Let x and y stand for the two quantities in a situation. Translate each limit into an inequality: "at most" means <=, and "at least" means >=. When x and y count items, use nonnegative whole numbers.

WORKED EXAMPLE

A club packs x shirts and y hats. It can pack at most 23 items and needs at least 11 hats. Write a system of inequalities.

1. The total number of items is x+y.
2. At most 23 items means x+y<=23.
3. At least 11 hats means y>=11.

Answer: x+y<=23 and y>=11

PRACTICE 6 problems

1 A concert playlist has x fast songs and y slow songs. It has at most 18 songs and at least 5 slow songs. Write two inequalities.

ANSWER _____

2 A club buys x phone grips for $4 each and y stickers for $2 each. It can spend at most $40 and needs at least 3 phone grips. Write two inequalities.

ANSWER _____

3 A gaming tournament has x players on Team A and y players on Team B. It needs at least 24 players total. Team A can have no more than 10 players. Write two inequalities.

ANSWER _____

4 An art show displays x paintings and y photographs. It has room for at most 28 pieces. It needs at least 8 photographs and can display no more than 12 paintings. Write three inequalities.

ANSWER _____

5 A club orders x small pizzas for $9 each and y large pizzas for $14 each. Its budget is no more than $70, and it needs at least 4 large pizzas. Write two inequalities.

ANSWER _____

6 A video editor schedules x short clips and y long clips. There is room for at most 9 clips, and the video needs at least 4 long clips. Which plan meets both limits: A (x=7, y=3), B (x=5, y=4), or C (x=2, y=3)? Write the letter.

ANSWER _____

APPLY IT Show your work

1 A school merch booth stocks x tote bags for $8 each and y pins for $3 each. It can spend at most $54, needs at least 4 tote bags, and has room for at most 10 items. Write three inequalities. Can it stock 4 tote bags and 6 pins? Explain.

WORK SPACE

ANSWER _____

2 A student film festival shows x two-minute films and y five-minute films. It has at most 50 minutes of screen time, wants at least 12 films, and can show no more than 7 five-minute films. Write three inequalities. Can it show 4 two-minute films and 8 five-minute films? Explain.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A student-run film night sells x standard tickets for $8 each and y discounted tickets for $5 each. The organizers want at least $80 in sales, can seat at most 14 people, and must sell at least 4 discounted tickets. Write three inequalities. What is the least possible number of standard tickets? Explain why fewer cannot work.

WORK SPACE AND ANSWER

Limits in Action

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A concert playlist has x fast songs and y slow songs. It has at most 18 songs and at least 5 slow songs. Write two inequalities.	**x+y<=18 and y>=5**
2	A club buys x phone grips for $4 each and y stickers for $2 each. It can spend at most $40 and needs at least 3 phone grips. Write two inequalities.	**4x+2y<=40 and x>=3**
3	A gaming tournament has x players on Team A and y players on Team B. It needs at least 24 players total. Team A can have no more than 10 players. Write two inequalities.	**x+y>=24 and x<=10**
4	An art show displays x paintings and y photographs. It has room for at most 28 pieces. It needs at least 8 photographs and can display no more than 12 paintings. Write three inequalities.	**x+y<=28, y>=8, and x<=12**
5	A club orders x small pizzas for $9 each and y large pizzas for $14 each. Its budget is no more than $70, and it needs at least 4 large pizzas. Write two inequalities.	**9x+14y<=70 and y>=4**
6	A video editor schedules x short clips and y long clips. There is room for at most 9 clips, and the video needs at least 4 long clips. Which plan meets both limits: A (x=7, y=3), B (x=5, y=4), or C (x=2, y=3)? Write the letter.	**B**

PART 2 · APPLY IT

1. **8x+3y<=54, x>=4, and x+y<=10. Yes. The order costs $50, includes 4 tote bags, and has 10 items.** For (4,6), the cost is 8(4)+3(6)=50<=54. Also, 4>=4 and 4+6=10<=10.
2. **2x+5y<=50, x+y>=12, and y<=7. No. The plan fits the time limit and has 12 films, but 8 five-minute films exceeds the limit of 7.** For (4,8), screen time is 2(4)+5(8)=48<=50, and 4+8=12. However, 8>7.

CHALLENGE

8x+5y>=80, x+y<=14, and y>=4. The least possible x is 4: selling 4 standard and 10 discounted tickets brings in $82 and fills 14 seats. With at most 3 standard tickets, the greatest possible revenue is 8(3)+5(11)=$79, which is less than $80.

Accept inequalities in any order and equivalent simplified forms. All ticket, film, item, player, song, and clip counts are nonnegative whole numbers.