LESSON MAKER PRO

Constraint Check

Model limits, then test choices.

HIGH SCHOOL · HSA-CED.A.3

CCSS.Math.Content.HSA-CED.A.3 "Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example..."

NAME _____ DATE _____

BUILD AND TEST SYSTEMS

Write one inequality for each limit in the situation. A choice is viable only if it makes every inequality in the system true.

WORKED EXAMPLE

A theater sells x student tickets and y adult tickets. It can sell at most 23 tickets and needs at least 9 student tickets. Is (12, 8) viable?

1. Write: x + y <= 23 and x >= 9.
2. Substitute x = 12 and y = 8.
3. 20 <= 23 and 12 >= 9 are both true.

Answer: Yes, (12, 8) is viable.

PRACTICE 5 problems

1 Let x be $2 notebooks and y be $3 folders. Write a system for spending no more than $17 and buying at least 4 items.

ANSWER _____

2 Is (6, 4) viable for x + y <= 13, x >= 5, and y >= 1?

ANSWER _____

3 Let x be tutoring hours at $6 per hour and y be job hours at $4 per hour. Write a system for earning at least $36 in no more than 7 total hours.

ANSWER _____

4 Is (3, 5) viable for 2x + y >= 10, x + y <= 11, x >= 0, and y >= 0?

ANSWER _____

5 A team needs at least 15 points. Each win is worth 3 points and each tie is worth 1 point. Write an inequality for x wins and y ties.

ANSWER _____

APPLY IT Show your work

1 A dance committee buys x snack boxes for $3 each and y drink packs for $2 each. It has at most $18 and needs at least 7 total packs. Is (4, 3) viable?

WORK SPACE

ANSWER _____

2 A student earns $5 per hour dog walking and $7 per hour tutoring. Let x be dog-walking hours and y be tutoring hours. The student wants at least $35 and can work no more than 6 hours. Is (4, 2) viable?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A student prints x color pages for $2 each and y black-and-white pages for $1 each. The student can spend at most $13, needs at least 7 pages, and needs at least 3 color pages. If x = 4, list all viable integer values of y.

_____

_____

Constraint Check

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Let x be $2 notebooks and y be $3 folders. Write a system for spending no more than $17 and buying at least 4 items.	**2x + 3y <= 17; x + y >= 4; x, y are nonnegative integers.**
2	Is (6, 4) viable for x + y <= 13, x >= 5, and y >= 1?	**Yes. (6, 4) is viable.**
3	Let x be tutoring hours at $6 per hour and y be job hours at $4 per hour. Write a system for earning at least $36 in no more than 7 total hours.	**6x + 4y >= 36; x + y <= 7; x, y are nonnegative.**
4	Is (3, 5) viable for 2x + y >= 10, x + y <= 11, x >= 0, and y >= 0?	**Yes. (3, 5) is viable.**
5	A team needs at least 15 points. Each win is worth 3 points and each tie is worth 1 point. Write an inequality for x wins and y ties.	**3x + y >= 15; x, y are nonnegative integers.**

PART 2 · APPLY IT

1. **3x + 2y <= 18; x + y >= 7; x, y are nonnegative integers. Yes, (4, 3) is viable.** The choice costs $18 and has 7 packs, so it meets both constraints.
2. **5x + 7y >= 35; x + y <= 6; x, y are nonnegative. No, (4, 2) is nonviable.** The choice uses 6 hours but earns only $34, which is less than $35.

CHALLENGE

y = 3, 4, or 5.

Accept equivalent inequalities, reordered systems, and equivalent forms such as 17 >= 2x + 3y. For viability questions, students must check every constraint.