LESSON MAKER PRO

# Constraint Check

*Model limits, then test what works.*

**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 _____

## MODELING CONSTRAINTS

Use an inequality for each limit. "At least" means >=, and "at most" or "no more than" means <=. A choice is viable only if it satisfies every constraint, and counting amounts are whole numbers.

## WORKED EXAMPLE

A movie rental costs $19 per movie. You can spend at most $83. Let x be the number of movies. Write an inequality.

1. Let x = number of movies.
2. The total cost is 19x.
3. "At most $83" means the cost is <= 83.

**Answer: 19x <= 83**

## PRACTICE 5 problems

**1** A club needs at least 8 members. Let x be the number of members. Write an inequality.

**ANSWER** _____

**2** A phone can store no more than 12 new apps. Let x be the number of new apps. Write an inequality.

**ANSWER** _____

**3** Each snack costs $7. You have $6. Let x be the number of snacks. Is x = 1 viable? Write the inequality and answer.

**ANSWER** _____

**4** Let x be a whole number with x >= 9 and x <= 14. List all viable values of x.

**ANSWER** _____

**5** Tickets cost $3 each. You can spend no more than $30 and must buy at least 2 tickets. Let x be the number of tickets. Write the system and give the greatest viable x.

**ANSWER** _____

## APPLY IT Show your work

**1** An esports event has a $54 snack budget. Each player snack costs $6. The team must register at least 2 players, and only 7 headsets are available. Let x be the number of players. Write the constraints and list all viable values of x.

WORK SPACE

**ANSWER** _____

**2** A student store will buy exactly 10 merchandise packs for a fundraiser. Let x be the number of sticker packs. The rest are button packs. The store can spend at most $24 and needs at least 2 packs of each kind. Write the constraints and list all viable values of x.

**MERCHANDISE PACK COSTS**

| Pack | Cost |
|---|---|
| Sticker pack | $3 |
| Button pack | $2 |

WORK SPACE

**ANSWER** _____

## CHALLENGE One step up

A music festival charges an $8 entry fee plus $3 per ride. You can spend at most $26, but you must ride at least 7 rides to earn a prize. Let x be the number of rides. Write the constraints and explain whether any viable choice exists.

WORK SPACE AND ANSWER

# Constraint Check



## PART 1 · PRACTICE

| # | PROBLEM | ANSWER |
|---|---|---|
| 1 | A club needs at least 8 members. Let x be the number of members. Write an inequality. | **x >= 8** |
| 2 | A phone can store no more than 12 new apps. Let x be the number of new apps. Write an inequality. | **x <= 12** |
| 3 | Each snack costs $7. You have $6. Let x be the number of snacks. Is x = 1 viable? Write the inequality and answer. | **7x <= 6; no, x = 1 is not viable.** |
| 4 | Let x be a whole number with x >= 9 and x <= 14. List all viable values of x. | **9, 10, 11, 12, 13, 14** |
| 5 | Tickets cost $3 each. You can spend no more than $30 and must buy at least 2 tickets. Let x be the number of tickets. Write the system and give the greatest viable x. | **3x <= 30 and x >= 2; greatest viable x = 10** |

## PART 2 · APPLY IT

1. **6x <= 54, x >= 2, x <= 7; x = 2, 3, 4, 5, 6, or 7** The budget allows up to 9 players, but the headset limit lowers the maximum to 7. Combine that limit with x >= 2.
2. **3x + 2(10 - x) <= 24, x >= 2, 10 - x >= 2; x = 2, 3, or 4** Use 10 - x for the number of button packs. The cost inequality simplifies to x <= 4, and the requirement for sticker packs gives x >= 2.

## CHALLENGE

**8 + 3x <= 26 and x >= 7. No viable choice exists because 8 + 3x <= 26 gives x <= 6, which conflicts with x >= 7.**

Accept equivalent inequality forms, such as x <= 10 instead of 3x <= 30. For counting contexts, accept only whole-number values that satisfy every stated constraint.