Systems in the Real World

Two facts about two unknowns become two equations: solve and read back. Two limits become two inequalities: the overlap is every plan that obeys both.

Name _____ Date _____

Words we use

say the math word, then the plain English

WORD	PLAIN ENGLISH	WHAT YOU DO
System from a story	Two facts about two unknowns become two equations; two limits become two inequalities.	Name the unknowns, write each fact or limit, solve or shade.
Count and value	The usual pair of facts: how many in all, and what they add up to.	Count equation plus value equation.
Constraint	A limit written as an inequality (Unit 5).	Two limits make a system of inequalities.
Feasible region	The overlap: every plan that obeys every limit.	Find a point in it and say what it means.
Read it back	Say the answer in the story's words, with units, and check it against the story.	Count right? Value right? Both limits obeyed?
Discrete, continuous	Whole things versus any amount (Unit 2).	Whole things: only the dots in the overlap are plans.

Part A Set up and solve

Name the unknowns, write the two equations, solve by the method that fits, read the answer back into the story, and check.

1. 40 tickets, adults $8 and kids $5, $260 in all.

2. 25 coins, dimes and quarters, worth $4.00.

3. 8 pounds of trail mix from peanuts at $3 a pound and raisins at $5 a pound, costing $32.

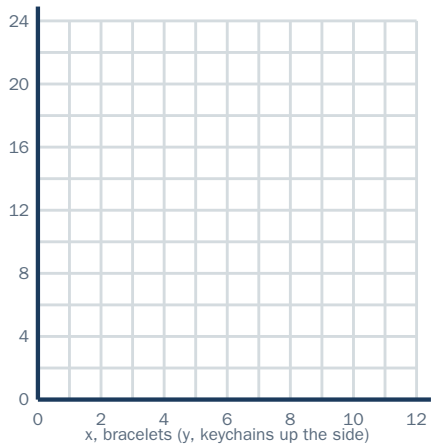
4. Two numbers with a sum of 30 and a difference of 8.

Part B Two limits

Bracelets (x) cost $2 and take 45 minutes; keychains (y) cost $1 and take 15 minutes. At most $20 and at most 360 minutes.

1. Write both constraints (simplify the time one).

2. Shade both on the grid and mark the overlap. Mark the whole-number points inside.



3. Is (5, 8) feasible? Show both checks.

4. Is (7, 5)?

Part C In your own words, and the exit ticket

1. Find a plan with at least 4 bracelets that obeys both limits, and say what it costs and how long it takes.

2. Why are the plans a set of dots and not the whole shaded overlap?

3. How is a two-fact story different from a two-limit story?

4. Exit ticket: 30 tickets, adults $10 and kids $6, $220. Write the system, solve it, read it back.

Answer key

Part A. 1. $a + k = 40$, $8a + 5k = 260$: 20 and 20. 2. $d + q = 25$, $10d + 25q = 400$: 15 dimes, 10 quarters. 3. $p + r = 8$, $3p + 5r = 32$: 4 pounds each. 4. $x + y = 30$, $x – y = 8$: 19 and 11.

Part B. 1. $2x + y \leq 20$ and $3x + y \leq 24$. 2. Overlap in the corner below both lines. 3. $18 \leq 20$ and $23 \leq 24$: feasible. 4. $19 \leq 20$ but $26 > 24$: not feasible.

Part C. 1. e.g. 4 bracelets and 10 keychains: \$18, 330 minutes. 2. Whole bracelets and keychains only. 3. Facts give equations and a point; limits give inequalities and a region. 4. $a + k = 30$, $10a + 6k = 220$: 10 adults, 20 kids; 30 tickets, \$220.