Sugar Cup Mystery

Compare concentration and test dissolving speed

P.5.5B "Students will demonstrate an understanding of mixtures and solutions. Obtain and evaluate scientific information to describe what happens to the properties of substances in mixtures and solutions (solvent and solute)..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB In the table, underline each sugar amount, circle each water amount, and number the cups from least to most concentrated. Give cups with equal concentrations the same number.

Mira's Drink Test

1. At the school fair, Mira mixes sugar into water for a drink test. Water is the solvent, and sugar is the solute. When the sugar dissolves, the drink looks clear, but the sugar is still there and makes the water taste sweet. Each cup starts with room-temperature water, and Mira stirs until no grains are visible.

2. Mira records how much sugar and water she uses in each cup. To compare concentrations, she looks at the amount of sugar for every 100 mL of water. A cup with more sugar for the same amount of water is more concentrated. A larger cup can hold more sugar in total but have the same concentration as a smaller cup.

MIRA'S DRINK RECIPES

Cup	Sugar (teaspoons)	Water (mL)
A	1	100
B	2	100
C	2	200
D	3	100

3. Next, Mira tests dissolving speed using two fresh cups. She puts 2 teaspoons of the same sugar into 100 mL of room-temperature water in each cup. She stirs one cup but leaves the other still. Sugar disappears from view faster in the stirred cup. Once all the sugar dissolves, both cups have the same concentration.

2 ANSWER WITH EVIDENCE

Use the passage

1. Compare the concentrations of Cups A and C. Use amounts from the table to explain your answer.

2. Rank Cups C, B, and D from least to most concentrated. How much sugar does each have for every 100 mL of water?

3. If Mira pours all of Cup B into Cup C, how much sugar and water will the new cup contain? Will it be more or less concentrated than Cup B?

4. In Mira's test with two fresh cups, what did stirring change? What did it not change?

3 YOUR TURN

Your own words

Create a new drink recipe using 150 mL of water and a whole number of teaspoons of sugar. In three sentences, give your recipe, compare its concentration with Cup B, and describe a fair test of whether warmer water changes how fast its sugar dissolves.

ANSWER KEY

Sugar Cup Mystery

PART 1 · READ AND MARK

In the table, underline each sugar amount, circle each water amount, and number the cups from least to most concentrated. Give cups with equal concentrations the same number. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Compare the concentrations of Cups A and C. Use amounts from the table to explain your answer.	**They have the same concentration. Cup A has 1 teaspoon per 100 mL of water, and Cup C has 2 teaspoons per 200 mL.**
2	Rank Cups C, B, and D from least to most concentrated. How much sugar does each have for every 100 mL of water?	**C, B, D. They have 1, 2, and 3 teaspoons of sugar per 100 mL of water, respectively.**
3	If Mira pours all of Cup B into Cup C, how much sugar and water will the new cup contain? Will it be more or less concentrated than Cup B?	**The new cup has 4 teaspoons of sugar and 300 mL of water. It is less concentrated than Cup B.**
4	In Mira's test with two fresh cups, what did stirring change? What did it not change?	**Stirring made the sugar dissolve faster. It did not change the cups' final concentration.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would mix 6 teaspoons of sugar into 150 mL of water. This is more concentrated than Cup B because it has 4 teaspoons per 100 mL of water, while Cup B has 2. To test temperature, I would make two cups with this recipe, one warm and one cool, stir them the same way, and time how long each takes to dissolve.

Accept any whole-number sugar amount with an accurate comparison to Cup B. The temperature test should keep the sugar amount, water amount, and stirring the same in both cups.