Lesson Plan

Assembly Line Grade 6 Ratios

CCSSM: Grade 6

DOMAIN: Ratios and Proportional Relationships

Cluster: Understand ratio concepts and use ratio reasoning to solve problems.

Standard: 6.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

Standard 6.RP.2 Understand the concept of a unit rate a/b associated with a ratio a:b with b $\neq 0$ (b not equal to zero), and use rate language in the context of a ratio relationship.

Standard 6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems.

Clarification: The clarification is an explanation of the indicator and objective and how these math concepts appear in the puzzle.

Materials and/or Set Up*: Interactive Resource 1, Interactive Resource 2, Assessment*

Relevant Vocabulary: multiples, ratio, fraction, numerator, denominator

Note to Teacher – Students should have attempted Level 1 of the Assembly Line puzzle before this lesson plan is implemented.

Activities:

1. After students have played level 1 of Assembly Line, ask them to share their experiences. Have them describe the relationships between the numbers on the gears, spaces on the conveyor belt, placement of cans, numbers of cans, and numbers of starred cans.
2. Have students stand in a circle around the room. Ask every other student to clap as each student counts off. Extend the game after one round to include a snap on every 8^{th} count. Note that the students who snap will also be clapping. Discuss the pattern repetition modeled in this activity using the term **multiples**.
3. Distribute ***Interactive Resource 1***. Have the students continue the pattern by drawing the missing star. Ask the students to explain how they determined the placement of the star. Make a connection to the clap/snap game.
4. Have students circle each repetition of the pattern. Examine one circle of cans. Ask the students to identify how many stars and how many total cans are evident. (*1 star, 4 cans*). Examine two circles of cans. Ask the students to identify how many stars and how many total cans are evident. (*2 stars, 8 cans*).
5. Ask the students to write the **ratio** of stars to cans for the first circle.($\frac{1}{4}$) Have students write a second **ratio** for the two circles of cans. ($\frac{2}{8}$) Emphasize the vocabulary term, **ratio** and relate this to a **fraction** using the terms **numerator**

and **denominator**.

6. Pair students and tell them you have continued the assembly line to have 20 cans. Ask the student pairs to determine how many of these cans would have stars. (*5*)
7. Ask student pairs to imagine the assembly line has nine circles of can patterns. Have the students determine how many cans would be on the assembly line and how many would have stars. (*36 cans and 9 stars*)
8. Direct the students to individually look at the second assembly line on ***Interactive Resource 1.*** Review the relationship between the gear 1 and the number of cans placed on the belt and gear 2 and the number of labeled star cans. Ask the students to determine the numbers for each gear. (*3 and 9*) Have student pairs extend the discussion to determine other equivalent ratios. ($\frac{1}{3}, \frac{2}{6}, \frac{3}{9}, \ldots$)

Differentiation Suggestions:

- For students who are excelling with the Assembly Line puzzle, have them create their own assembly line and work with a partner to determine the gears required for the partner's assembly line.
- For students who are having difficulty, distribute ***Differentiated Interactive Resource 2***. Work with students to identify the pattern. Have the students write the pattern as a ratio of stars to total cans. ($\frac{1}{5}$) Lead the students to determine an equivalent fraction $\frac{2}{10}$ and record in the first proportion. ($\frac{1}{5} = \frac{2}{10}$) Provide the students with a given numerator (i.e. 3) and ask them to determine its denominator so that the fraction is still equivalent to $\frac{1}{5}$. Lead the students to determine what number was multiplied by the numerator and the denominator to determine the equivalent fraction of $\frac{3}{15}$. (*3*) Finally, have students determine their own equivalent fraction.

Assessment

- Distribute the ***Assessment*** resource sheet.

  Answers:

  1. C

2. B

Follow Up:

- Have students return to the puzzle to apply what they learned in the lesson. Ask: Did the lesson help you to clarify the math in the puzzle? How so? What other strategies could you have used to help you solve the puzzle? Additionally, check teacher stats in the game to determine students' level of understanding.

- Provide students with this scenario:

  You have won a handful of coins as a prize. To collect your prize, you get to reach into either a bag full of dimes or a bag full of quarters and keep as many coins as you can hold in one handful. Would you choose a handful of dimes or a handful of quarters? Why? How about if you had to choose between a handful of pennies, or a handful of nickels? *(Answers will vary. Have students justify their answer mathematically. In the case of the dimes and quarters, students would have to hold more than two and a half times as many dimes as quarters, which might be possible, considering the comparative sizes of the coins, and the size of hands of different age groups. In the case of the pennies and nickels, students would have to "grab" five times as many pennies as nickels, so in this case, the nickels are likely the more profitable option.)*

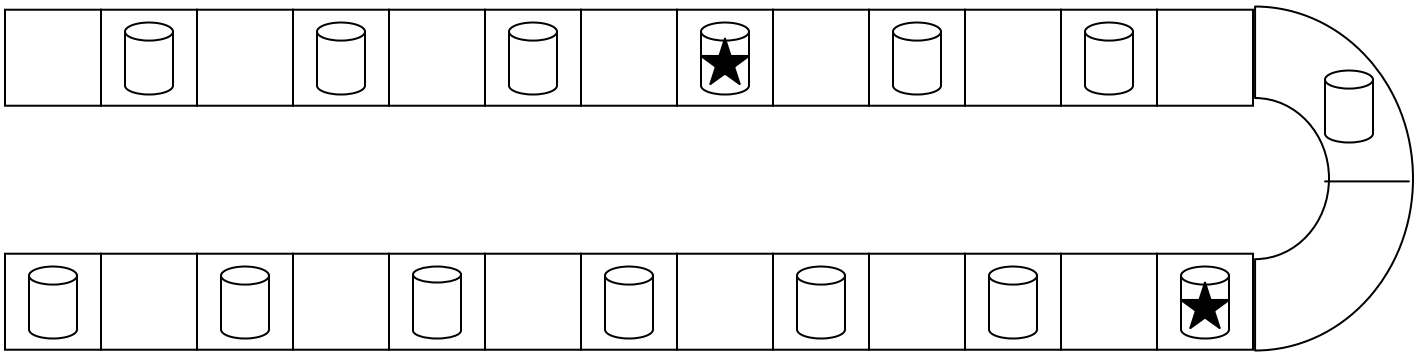
Real World Connection:

- Provide students with this scenario:

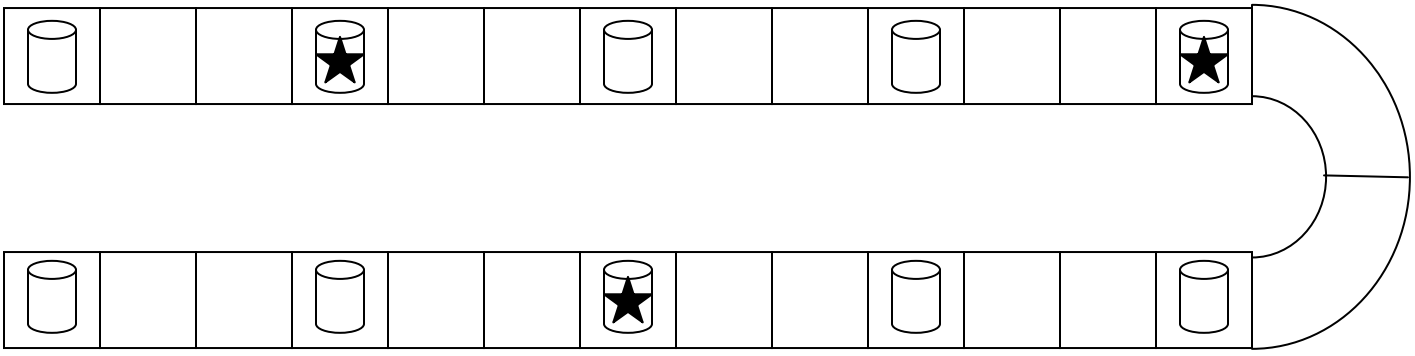
  You are making banana splits for you and seven friends. For each dish you need one banana and three scoops of ice cream. How many bananas will you need? How many scoops of ice cream will you need? (*8 bananas and 24 scoops of ice cream*)

Interactive Resource 1

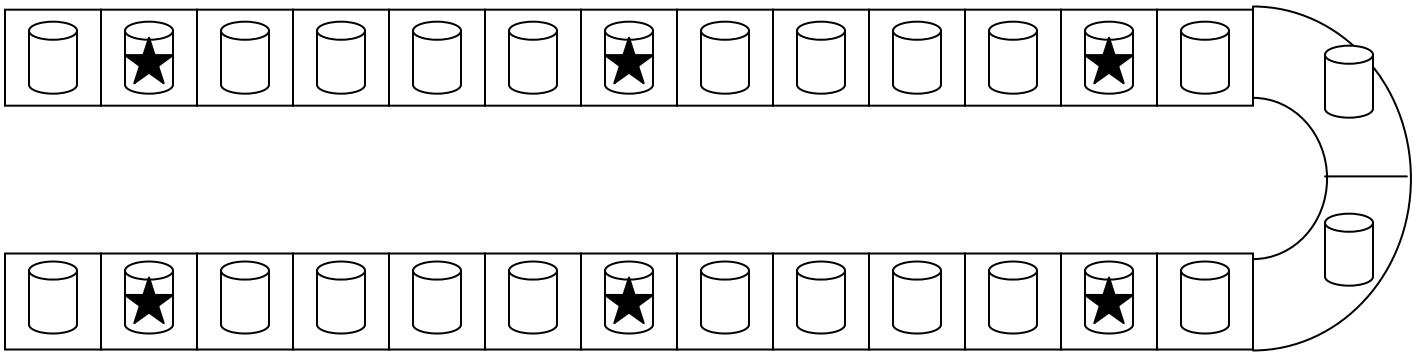
Assembly Line A:

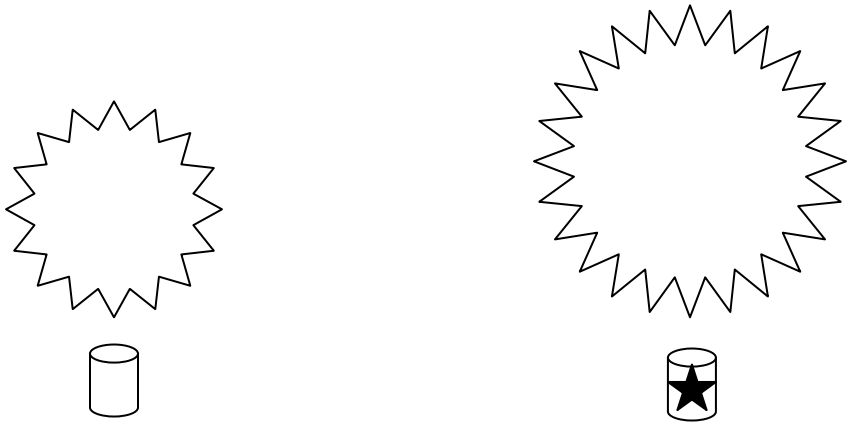


Assembly Line B:



Differentiated Interactive Resource 2





$\frac{1}{5} = \frac{\quad}{\quad}$ $\frac{1}{5} = \frac{\quad}{\quad}$ $\frac{1}{5} = \frac{\quad}{\quad}$

1. Circle the fraction that is equivalent to $\frac{1}{6}$.

A. $\frac{3}{24}$ **B.** $\frac{2}{6}$ **C.** $\frac{4}{24}$ **D.** $\frac{3}{12}$

2. Circle the pair of equivalent fractions.

A. $\frac{3}{5}=\frac{6}{15}$ **B.** $\frac{2}{6}=\frac{10}{30}$ **C.** $\frac{4}{24}=\frac{1}{8}$ **D.** $\frac{3}{12}=\frac{1}{6}$

