Assembly Line Grade 6 Ratio Clarification

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 of Math Discussion Terms

A **MULTIPLE** of a number is that number multiplied by a whole number. For example, multiples of 4 are: 4, 8, 12, 16… (4 x 1 = 4, 4 x 2 = 8, 4 x 3 = 12, 4 x 4 = 16…)

A **FRACTION** is a comparison of a part to a whole: $\frac{3}{5}$

A **NUMERATOR** is the top number of a fraction. It represents how many parts of the whole are being considered. In the example $\frac{3}{5}$, 3 is the numerator.

A **DENOMINATOR** is the bottom (or Down) number of a fraction. The denominator represents how many parts make up the whole. In the fraction $\frac{3}{5}$, 5 is the denominator.

A **RATIO** is a comparison of two numbers or quantities. The ratio 1 to 2 can be written as 1 out 2, 1:2 or as a fraction where the first number becomes the numerator and the second the denominator: $\frac{1}{2}$

Classroom Example 1

List the first five multiples of 7.
Answer: 7, 14, 21, 28, 35

Classroom Example 2
Given 5 counters, 3 of which are yellow and 2 are red, what is the ratio of yellow counters to the total number of counters?

Answer : $\frac{3}{5}$

The Math in the Puzzle

In the Assembly Line puzzle, players must demonstrate their knowledge of ratios and proportion by using gear ratios to label premium★ cans.

The left gear controls the placement of cans on the belt, and the right, the labeling action. To achieve the correct proportion of premium ★ cans to total cans in the collection bins, gamers must study visual clues. Clues include the "can counter" array of small square lights at the top of the screen that matches the layout of the collection bin, the numerical relationship between the★ cans and the total number of cans in the destination bin, and the appearance of each division on the conveyor belt. The visual clues on the belt are especially useful when the player is presented with two possible sets of gears that meet the required gear ratio.

For instance, when the collection bin has place-holders for 3 premium★ cans out of the 15 total spots reserved for cans, the target ratio is 1 to 5. Given the choice of left gears with 4, 5, or 6 gear teeth, and right gears with 20, 25, and 26 teeth, players must choose

between two acceptable combinations to get the required 1 to 5 ratio. The markings on the belt will give the clue as to whether 5 and 25 are the correct gears, or 4 and 20. Note also that in all cases, both original gears on the opening screen of the puzzle must be replaced, even if one is being replaced by a gear with the same number of teeth.