NWEA Assessment Item Illustrating 5.NF.B.3

Domain: Number and Operations–Fractions

5.NF.B: Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

Calculator Availability: No

Use the information to answer the question.

A group of people is sharing water. Each person gets the same amount of water.

Which sentence describes each person getting $\frac{4}{3}$ pints of water?

- A. 3 people share $\frac{1}{4}$ pint of water.
- B. 3 people share 4 pints of water.
- C. 3 people share $\frac{4}{3}$ pints of water.
- D. 4 people share $\frac{1}{3}$ pint of water.
- E. 4 people share 3 pints of water.

Alignment: 5.NF.B.3: Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*

This standard, in which students apply their understanding of whole-number division to relate fractions to division, represents significant work for this domain. To demonstrate their understanding, students are asked to determine which scenario results in each person getting 4/3 pints of water. The underlying concept is that a fraction such as 4/3 can be thought of as one-third of 4. In other words, when 4 pints are shared equally by 3 people, each of the 4 pints contributes one-third of itself to each share. It should be noted that when students are solving other problems for this standard, equivalent forms like 4/3 and 1 1/3 are both acceptable ways to represent the answer. However, one form might make more sense than the other in the context of the problem. The answer form may also indicate a different approach to thinking about the mathematics. For example, students who give the answer in the form 1 1/3 may think of the problem in terms of each of the 3 people getting 1 pint and then dividing the remaining pint into thirds.

Coherence: Understanding the connection between equal groups and division is foundational for this standard. These concepts were developed with whole numbers in the lower grades. In grade 2, students used arrays and repeated addition to represent equal groups.[2.OA.C.4] Multiplication and division involving equal groups and the relationship between the two operations were introduced in grade 3.[3.OA.A, 3.OA.B.6] In grade 4, students solved multiplication and division problems involving multiplicative comparisons.[4.OA.A.2] The understanding of fractions as division, which is introduced in this standard, is further developed in grade 5 when students divide whole numbers and unit fractions.[5.NF.B.7] Understanding fractions as division will support the understanding of unit rate, which will be introduced in grade 6.[6.RP.A.2]

Rigor: This item attends to conceptual understanding and application. In this case, the application of the real-world scenario supports the conceptual understanding of fractions as division.

Answer Key:

Use the information to answer the question.

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