NWEA Assessment Item Illustrating 5.NF.B.5.a

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

Move symbols to the boxes to make each comparison true.

$$\frac{20}{9} \times \frac{1}{7} \boxed{} \frac{9}{20} \times \frac{1}{7}$$

$$45 \times \frac{14}{15} \boxed{} 45 \times \frac{3}{2}$$

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Alignment: 5.NF.B.5a: Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.

This standard assesses the understanding of multiplication as scaling. The item is designed to explore the misconception that multiplying always results in a product greater than either factor. Unfriendly numbers were chosen to encourage the use of number sense rather than computation. In both comparisons, students must consider the result of multiplying by a fraction greater than 1 and multiplying by a fraction less than 1. The fractions in the second comparison were selected so that students with a solid understanding of the structure of fractions and the meanings of numerators and denominators will recognize that even though 14 and 15 are greater numbers than 3 and 2, the fraction 14/15 is a lesser number than 3/2.

Coherence: Students were formally introduced to multiplication with whole numbers in grade 3 when the focus was on multiplication as equal groups.[3.OA.A.1] In grade 4, the concept of multiplication as a comparison was developed with whole numbers.[4.OA.A] Students also began multiplying fractions by whole numbers in grade 4. It should be noted that grade 4 standards built upon the equal-groups interpretation of multiplication, in which students thought about 5 × 2/3 as 5 groups of two-thirds. This work continues in grade 5, when students multiply both fractions or whole numbers by fractions and solve problems about finding a fraction of a whole number.[5.NF.6] The work of finding a fraction of a whole number builds understanding of the idea of multiplication as scaling,[5.NF.5] which will be developed further in grade 6 when students are introduced to ratios[6.RP.A] and in grade 7 when they are introduced to scale drawings.[7.G.A.1]

Rigor: This item attends to conceptual understanding. Although students can compute to find the answer, the intention of the item and the selected numbers is to support a conceptual rather than procedural approach.

Answer Key:

Move symbols to the boxes to make each comparison true.

$$\frac{20}{9} \times \frac{1}{7} \boxed{>} \frac{9}{20} \times \frac{1}{7}$$

$$45 \times \frac{14}{15} \boxed{<} 45 \times \frac{3}{2}$$

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