**Main Problem #6**

Topic: *Equivalent Fractions on a Number Line*

Problem: Your friend Nic is a chemical engineer at *ChemOX,* an offshore oil company where he designs the company's storage (tank) units. This year, he invented a new tank that can hold 80 gallons of oil. He called you because he needs some consultation regarding the meter, which is drawn like a number line. Alongside the cylindrical tank is a meter for measuring the amount of oil in the tank. The issue with his design is that he does not know which interval (whole number) he should use.

As of this moment, he has narrowed down his choices to 5, 8, and 10. The fraction line below shows the basic design for the meter.

**80**

Whole Number Representation

Proper Fraction Representation

(40/80) = (½)

40

Q1. Draw the number line above for the intervals of 5, 8 and 10.

Q2. Out of the three choices for intervals, which number line will help the most in terms of precision? Justify your answer.

A1. The first step to solving this problem is to figure out how many points/marks are needed to get from 0 to 80 (0 to 1 for fraction representation) given an interval. To do this, students would have to figure out how much a 5,8, and 10 fit into 80, meaning they would have to divide.

For interval 5, there will be 16 marks (including the last one). For the whole number representation, the value at each interval is: 5,10,15,20,....,80. For the fraction representation, the value for each interval is: $\frac{5}{80}, \frac{10}{80}, \frac{15}{80}, \frac{20}{80},..., \frac{80}{80}$(or 1). **Note**: Students are encouraged to simplify fractions.

For interval 8, there will be 10 marks (including the last one). For the whole number representation, the value at each interval is: 8,16,24,32,....,80. For the fraction representation, the value for each interval is: $\frac{8}{80}, \frac{16}{80}, \frac{24}{80}, \frac{32}{80},..., \frac{80}{80}$(or 1). **Note**: Students are encouraged to simplify fractions.

For interval 10, there will be 8 marks (including the last one). For the whole number representation, the value at each interval is: 10,20,30,40,....,80. For the fraction representation, the value for each interval is: $\frac{10}{80}, \frac{20}{80}, \frac{30}{80}, \frac{40}{80},..., \frac{80}{80}$(or 1). **Note**: Students are encouraged to simplify fractions.

A2. For this question, students need to understand that precision matters when attempting to obtain an accurate amount of a certain substance. The most precise number line is the one with the most intervals because it helps one predict the position of a value that is not necessarily marked on the number line. *For example: If I want to know where the points for 27 gallons and six fifteenths of the tank are located, the number line with the smallest interval would help me obtain a precise approximation.* Therefore the number line (meter) with interval 5 will help the most.