Adding and subtracting fractions and mixed numbers and operations with different units

PREREQUISITE ASSUMPTIONS

Before beginning this lesson, students should

- Understand how to measure accurately to the nearest 16th of an inch on a tape ruler
- Understand how to convert between feet and inches
- Understand how to add and subtract whole numbers

Notes to Self

- One thing I want to do during this lesson …teach how to find common denominators when adding and subtracting fractions

- One thing I want to pay attention to in my students' thinking … how they understand the markings on the ruler

- One connection or idea I want to remember … if you are struggling with adding fractions, in this first example, you can just look at the ruler

Suggested Timeline

Duration	Activity (Indicate question number)	Suggested Structure (Indicate group, whole class or individual work)
5 minutes	Distribute blocks and printed lesson handout—ask students to record the length (longest dimension) of each block on the handout sheet measured to the nearest 1/16 inch.	group work
10 minutes	Question 1: How long is each block to the nearest 16th of an inch? Record your answers.	group work
5 minutes	Question 2: Label the longest block A, the middle length block B and the shortest block C. Using your ruler, find the lengths of: a) Block A and block B together b) Block B and block C together; c) Block A and block C together, and: d) All three blocks together.	group work

10 minutes	Question 3: Show how can you find the combined length of the blocks without using a ruler when you know the length of each block.	group work
5 minutes	Demonstrate adding mixed numbers with different denominators.	whole class
10 minutes	Demonstrate adding mixed numbers with different denominators and with units involving both feet and inches.	whole class
5 minutes (optional, if time allows)	Ask how we can find out how much longer block A is than Block C, both with and without using the ruler.	Whole class
5 minutes (optional, if time allows)	Demonstrate subtracting mixed numbers	Whole class
5 minutes (optional, if time allows)	Ask students to find the difference in the lengths by subtraction. Then, they can line the blocks up and measure the difference to confirm.	group work
10 minutes	Question 4: In the given bathroom floor plan, would the cabinet fit in the space to left of the vanity?	group work
5 minutes	Groups report out	whole class
Until end of class	Begin practice work on adding fractions by working a few problems as a whole class then switching to solo work.	whole class then individual work

[Student Handout]

SPECIFIC OBJECTIVES

By the end of this lesson, you should understand that

- in order to add/subtract measurements we need to have the same units
- in order to add/subtract fractions we need to have the same denominators
- we can rename fractions to create a new denominator when necessary
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By the end of this lesson, you should be able to

- add and subtract fractions with different denominators
- convert from mixed number to fraction and vice versa
- add measurements given in feet and inches

PROBLEM SITUATION I : Measuring and adding wooden blocks

You have been given three wooden blocks. Measure the length (longest dimension) of each block to the nearest 16th of an inch. Label the longest block A, the middle length block B and the shortest block C.

(1) How long is each block to the nearest 16th of an inch?

We expect students might struggle with the measurement step using a tape ruler. We would intercede with help if no one in the group was able to operate in 8ths and 16th of an inch, or if anyone in the group looked like they were not understanding the explanations being offered by team mates. We would intercede by suggesting they name every measurement in 16ths of an inch to start, then convert to 8ths, 4ths or halves if even numerators present themselves.

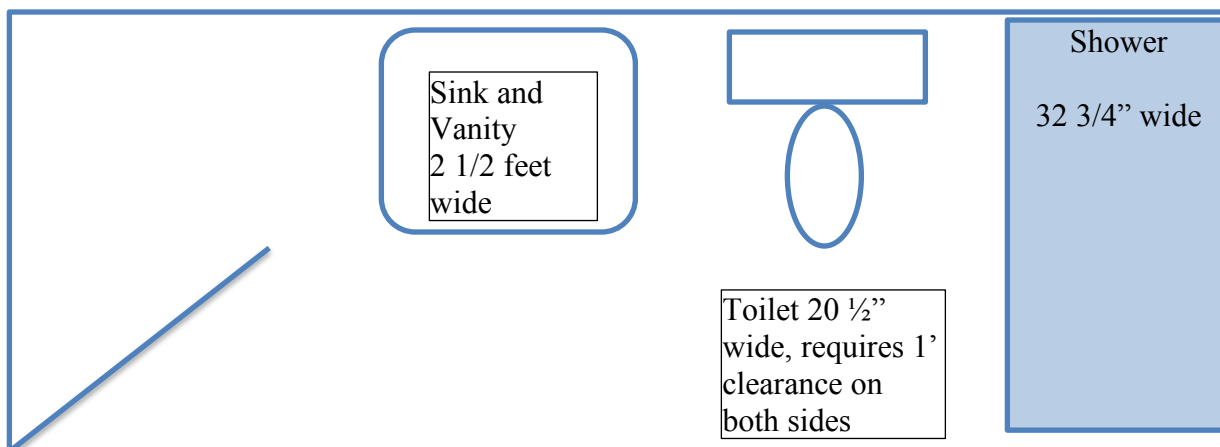(2) What is the combined length of the three blocks?

Same as above.

(3) How can you find the combined length of the three blocks without using a ruler?

We expect students to struggle with the idea of adding fractions with different denominators, converting mixed numbers to fractions and combining feet and inches. We would intercede in any group where one or more of these math skills failed to present itself.

NOTE: Include answer to each problem. Also state whether you anticipate students would struggle. How would you support the productive struggle? How would you facilitate the discussions?

PROBLEM SITUATION II : Bathroom floor plan" Room is 5' x 13'

(1) Given the sketch of this bathroom floor plan, what is the combined width of the shower, toilet, sink and vanity?

(2) Will a cabinet that measures 4 feet 3 1/16 inches fit in the space to the left of the vanity?

MAKING CONNECTIONS

Record the important mathematical ideas from the discussion.

State the main idea of the lesson

FURTHER APPLICATIONS: Additional problem situation. The purpose of it is to explore the objectives further. It can be a problem of slightly higher difficulty or an expansion of a problem covered in another lesson with addition of new objective (s) presented in this lesson.