Who Needs Mixed Numbers?

Overview – Activity ID: 8936

Students divide and multiply mixed numbers and fractions in real-life examples relating to carpentry.

Math Concepts

- fractions
- mental computation
- rounding
- measurement

Materials

- TI-34 MultiView™
- pencil
- paper

Activity

Begin with a review of mixed numbers, how to write them, and what they represent.

Before we begin, let's review the concept of mixed numbers. A mixed number is a number that has both a whole part and a fractional part. For instance, $2\frac{1}{2}$ *is a mixed number. If we were describing number of pizzas, that would represent two whole pizzas plus one-half of another pizza. Mixed numbers appear every day in real-life examples.*

Ask the students to think of real-life examples of who uses mixed numbers. Give them a minute or two, and then ask for their responses. If they need help getting started, give them a few examples. Possibilities include baker, chef, construction worker, surveyor, nurse, architect, anyone who uses a measuring tape for his or her job, etc. The possibilities are endless, and the discussion can be fun for the students.

Let's look at a specific instance in which someone uses mixed numbers every day for her or his job. A carpenter is a great example. A carpenter is building a home and is framing the walls. The exterior wall is $35\frac{1}{2}$ *feet long, and the carpenter wants to center a stud every 1 foot, 4 inches. How many studs will be needed for this particular wall?*

First, it's important to establish what the question is asking and to decide what operation to use to answer the question. Ask the students how they would approach the problem, encouraging them to create a mental model with integers if that helps them better understand.

Thinking through the scenario with integers can help you determine how to proceed. For instance, if the wall were 36 feet long and the carpenter wanted a stud every 2 feet, how many studs would be needed? You can mentally divide 36 by 2 to find that 18 studs would be needed. Then you can see that you'll need to divide.

The students may need a review of dividing mixed numbers and fractions. Do this example on the board or projector so they can see the process.

Who Needs Mixed Numbers?

Start with this expression: $35\frac{1}{2} \div 1\frac{1}{3}$

Convert to improper fractions: $\frac{71}{2} \div \frac{4}{3}$

Multiply by the reciprocal: $\frac{71}{2} \bullet \frac{3}{4}$

Multiply: $\frac{213}{8}$

Convert to a mixed number: $26\frac{5}{8}$

Since it is unrealistic to use a fraction of a stud, we can round up and say this carpenter needs 27 studs.

Note: For an enriched activity, discuss how a carpenter would actually proceed from this point. Would the studs still be placed every 1 foot, 4 inches? If only 26 studs were used, how large would the last gap at the corner be? Would it be better, when using only 26 studs, to make one of the gaps in the center of the wall bigger?

Now that the students have calculated the answer manually, show them how to do it on their TI-34 MultiView calculators.

Your calculators can easily divide mixed numbers and fractions. Let's learn how.

After following the steps to the right, go on to discuss multiplying mixed numbers on the calculator.

The calculator can also calculate the product of a mixed number and a fraction, using the same process. Just multiply instead of divide.

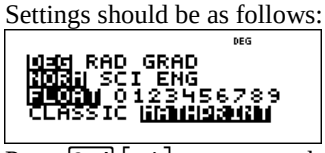
It is certainly easier and more time efficient to calculate these products and quotients using your calculator. However, it is still important to know both how to calculate these problems by hand and how to estimate the answers.

Try to estimate this in your head: $8 \bullet 2\frac{1}{4}$.

Review with the students that 8 • 2 is equal to 16, plus another one-fourth of 8 is 2. The answer is 18.

Follow these steps:

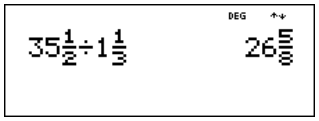
1. First, make sure your calculator is set correctly by pressing mode. Settings should be as follows:



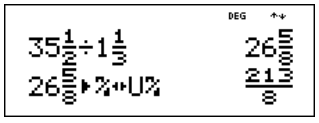
   Press 2nd [quit] to return to the home screen.

2. Press 35 $U\frac{n}{d}$ 1 ▼ 2 ▶ ÷ 1 $U\frac{n}{d}$ 1 ▼ 3 ▶ enter.

3. The screen should show this:



4. If you want or need to view the improper fraction, press 2nd $[\frac{n}{d} \blacktriangleleft\blacktriangleright U\frac{n}{d}]$ enter. The screen should show this:



Who Needs Mixed Numbers?

Name _____

Date _____

1. Multiply these mixed numbers and fractions by hand, showing all steps. Give your answer as a mixed number. Check your work with the TI-34 MultiView™.

   (a) $9\frac{2}{3} \cdot \frac{1}{2}$

   (b) $4\frac{5}{8} \cdot 1\frac{1}{4}$

   (c) $3\frac{1}{2} \cdot 3\frac{1}{2}$

2. Divide these mixed numbers and fractions by hand, showing all steps. Give your answer as a mixed number. Check your work with the TI-34 MultiView.

   (a) $15\frac{1}{5} \div 1\frac{9}{10}$

   (b) $4\frac{1}{2} \div \frac{9}{16}$

3. Estimate these answers mentally. Then check your work with the TI-34 MultiView to see how close you were.

   (a) $\frac{2}{3} \cdot 9\frac{1}{2}$ estimate: actual answer:

   (b) $1\frac{1}{2} \cdot 4\frac{1}{4}$ estimate: actual answer:

Who Needs Mixed Numbers?

Name _____

Date _____

4. A carpenter is building a fence around a pool for one of her customers. The customer wants $2\frac{1}{2}$-inch-wide slats for the pickets and a $\frac{1}{4}$-inch gap between pickets. If the perimeter of the section to be fenced is 140 feet, how many slats will the carpenter need to order for the job? (Note: You will need to convert 140 feet into inches first).

   Write a short paragraph explaining your answer. How would the carpenter actually proceed from this point? What does an answer with a mixed number mean? Does one of the gaps between slats have to be bigger or smaller than the others?

5. Timothy, a carpenter, has been hired to build a workshop for a friend. His friend wants to ensure the workshop is warm enough year-round, so he wants plenty of insulation. He has requested a 12-inch gap between studs for insulation. If each stud is $1\frac{3}{4}$ inches wide and the workshop will be 10 feet wide by 15 feet long, how many studs should Timothy order? (Note: You will need to find the perimeter of the workshop, then convert feet into inches).

   Write a short paragraph explaining your answer. How would Timothy actually proceed from this point? What does an answer with a mixed number mean? Should he round down or round up when he orders the studs?

Who Needs Mixed Numbers?

ANSWER KEY

1. (a) $9\frac{2}{3} \cdot \frac{1}{2} = 4\frac{5}{6}$

   (b) $4\frac{5}{8} \cdot 1\frac{1}{4} = 5\frac{25}{32}$

   (c) $3\frac{1}{2} \cdot 3\frac{1}{2} = 12\frac{1}{4}$

2. (a) $15\frac{1}{5} \div 1\frac{9}{10} = 8$

   (b) $4\frac{1}{2} \div \frac{9}{16} = 8$

3. (a) $\frac{2}{3} \cdot 9\frac{1}{2}$ estimate: will vary actual answer: $6\frac{1}{3}$

   (b) $1\frac{1}{2} \cdot 4\frac{1}{4}$ estimate: will vary actual answer: $6\frac{3}{8}$

4. Answer: $610\frac{10}{11}$ slats

   This means that there is not quite enough room for 611 slats. In a real-life situation, a carpenter has a few choices. He could shave down the 611th, or last, slat slightly so that he actually had exactly $610\frac{10}{11}$ slats to place evenly. Or he could use 610 slats and have a larger gap between the last two slats. He could even adjust all the slats very slightly so that the gaps all the way around the pool were even.

5. Answer: $43\frac{7}{11}$ studs

   Timothy has a few options. He could order 44 studs and just have a few closer together at the last corner. He could also order 43 studs and have a larger gap between studs at that last corner. This would allow for more insulation in that particular gap but could compromise the stability of the workshop.