University of South Carolina
Math 221: Math for Elementary Educators
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Section 001
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Quiz 5

1a. Write 2.543 as a fraction. (Do not worry about reducing it.)

Solution: The numerator of the fraction should be 2543. The only thing we have to decide is what power of 10 goes in the denominator. We moved the decimal place 3 places to the right to turn 2.543 into 2543, which is the same as multiplying by 1000. To balance this out, we put 1000 in the denominator. In other words,

$$2.543 = \frac{2.543 \cdot 1000}{1000} = \frac{2534}{1000}$$

1b. Write $\frac{12}{11}$ as a decimal. (Hint: It might be helpful to decide first whether the decimal repeats or terminates.)

Solution: Notice first that the decimal form of $\frac{12}{11}$ will repeat, since it is reduced and the denominator cannot be factored into just 2's and 5's. Now, remember that $\frac{12}{11}$ is the same thing as $12 \div 11$, so we can find the decimal form by long division. I will omit the details, but be aware that you are dividing by 11, not by 12, so the 11 is on the "outside" and the 12 is on the "inside" of your long division setup. Also remember that you can change 12 into 12.000000 (however many zeroes you like) if you need to do so to keep dividing. After a few divisions, you'll get 1.0909, and so it becomes clear that $\frac{12}{11} = 1.\overline{09}$.

2. Find each of the following by first converting the decimals to fractions or writing them in expanded form, as appropriate. Convert your final answer back into a decimal.

a. $0.223 + 6.87$

Solution: If you read each of the digits out loud, it tells you how to write the expanded form. The number 0.223 is "2 tenths, 2 hundredths, and 3 thousandths", so $0.223 = \frac{2}{10} + \frac{2}{100} + \frac{3}{1000}$. The number 6.87 is "6 ones, 8 tenths, and 7 hundredths", so $6.87 = 6 + \frac{8}{10} + \frac{7}{100}$. After all

this, we can write

$$\begin{aligned}
0.223 + 6.87 &= \left(\frac{2}{10} + \frac{2}{100} + \frac{3}{1000}\right) + \left(6 + \frac{8}{10} + \frac{7}{100}\right) \\
&= 6 + \left(\frac{2}{10} + \frac{8}{10}\right) + \left(\frac{2}{100} + \frac{7}{100}\right) + \frac{3}{1000} \\
&= 6 + \frac{10}{10} + \frac{9}{100} + \frac{3}{1000} \\
&= (6+1) + \frac{9}{100} + \frac{3}{1000} \\
&= 7 + \frac{9}{100} + \frac{3}{1000} \\
&= 7.093.
\end{aligned}$$

Notice how this method justifies the rule that you have to line up the decimal point and add columnwise.

b. $2.3 \cdot 0.35$

Solution: It's easier to use improper fractions instead of expanded form with multiplication and division. So, we'll convert 2.3 to $\frac{23}{10}$ and 0.35 to $\frac{35}{100}$. Now we can write,

$$\begin{aligned}
2.3 \cdot 0.35 &= \frac{23}{10} \cdot \frac{35}{100} \\
&= \frac{23 \cdot 35}{10 \cdot 100} \\
&= \frac{805}{1000} \\
&= 0.805.
\end{aligned}$$

Notice how this method justifies the rule that you add up the number of digits behind the decimal point in the multiplier and the multiplicand (in this case, one digit in 2.3 and two digits in 0.35, so three digits total) and make sure the product has that many digits behind the decimal point (in this case, 0.805 has three digits behind the decimal point).

3. You have an \$80 phone bill and the company charges a 20% late fee. What is your *total* bill if you are late? (Round to the nearest cent.)

Solution: This is a percent increase problem - the total bill will be 20% *more* than the current bill of \$80. The percent we want to use then is $1 + \frac{20}{100} = 1.2$. Now we can do

$$\begin{aligned}
\text{percent} &= \frac{\text{part}}{\text{whole}} \\
1.2 &= \frac{\text{part}}{80} \\
1.2 \cdot 80 &= \text{part} \\
96 &= \text{part}.
\end{aligned}$$

So, the total bill is \$96.