

University of South Carolina
Math 221: Math for Elementary Educators
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Section 001
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Quiz 1

1. Give an example of
- a. a real number that is not a rational number.

Solution: We talked about $\sqrt{2}$, but actually $\sqrt[n]{n}$ for any n that's not a perfect square works (like 3, but not 4, 5, 6, 7, 8, but not 9, etc.). *Actually*, $\sqrt[n]{n}$ is irrational for any n that isn't a perfect m^{th} power. There are plenty of other examples (there are actually "more" irrational numbers than there are rational ones), but π and e are other famous ones.

- b. a rational number that is not an integer.

Solution: Pick any fraction (positive or negative) whose denominator doesn't divide the numerator: $\frac{1}{2}$, $\frac{2}{3}$, $\frac{-10}{3}$, etc. You also could have given a terminating or repeating decimal, such as 2.5 or $-.123$.

- c. an integer that is not a whole number.

Solution: Pick any negative whole number: -1, -2, -100, etc.

- d. a whole number that is not a natural number.

Solution: The only whole number that isn't a natural number is 0.

2. For each of the following word problems
- a. tell what operation is involved (+, -, \times , or \div),
 - b. give the name of an appropriate model for the problem, and
 - c. draw a picture demonstrating the solution.

i. Austin distributes 15 shots of tequila among 3 people (himself included). How many shots does each person receive?

Solution: We need to put 15 objects into 3 equally-sized groups, so this is the partition model of division.

ii. It takes Austin only 10 seconds to finish his shots, while it takes Kenny 15 seconds. How much longer does it take Kenny than Austin?

Solution: We need to see how many more seconds it takes Kenny than Austin, so subtraction will be involved. The fact that we are dealing with time suggests that the number line is a more appropriate model than, say, the comparison model.

iii. Later in the evening, everyone's empty shot glasses are stacked in towers on the bar. There are 5 towers with 6 shot glasses in each. How many shot glasses are on the bar?

Solution: We have 5 groups, each having 6 objects, so the total number of objects can be visualized by the repeated addition model of multiplication (though, I also accepted the array model of multiplication).