

Chapter 2 The Real Numbers

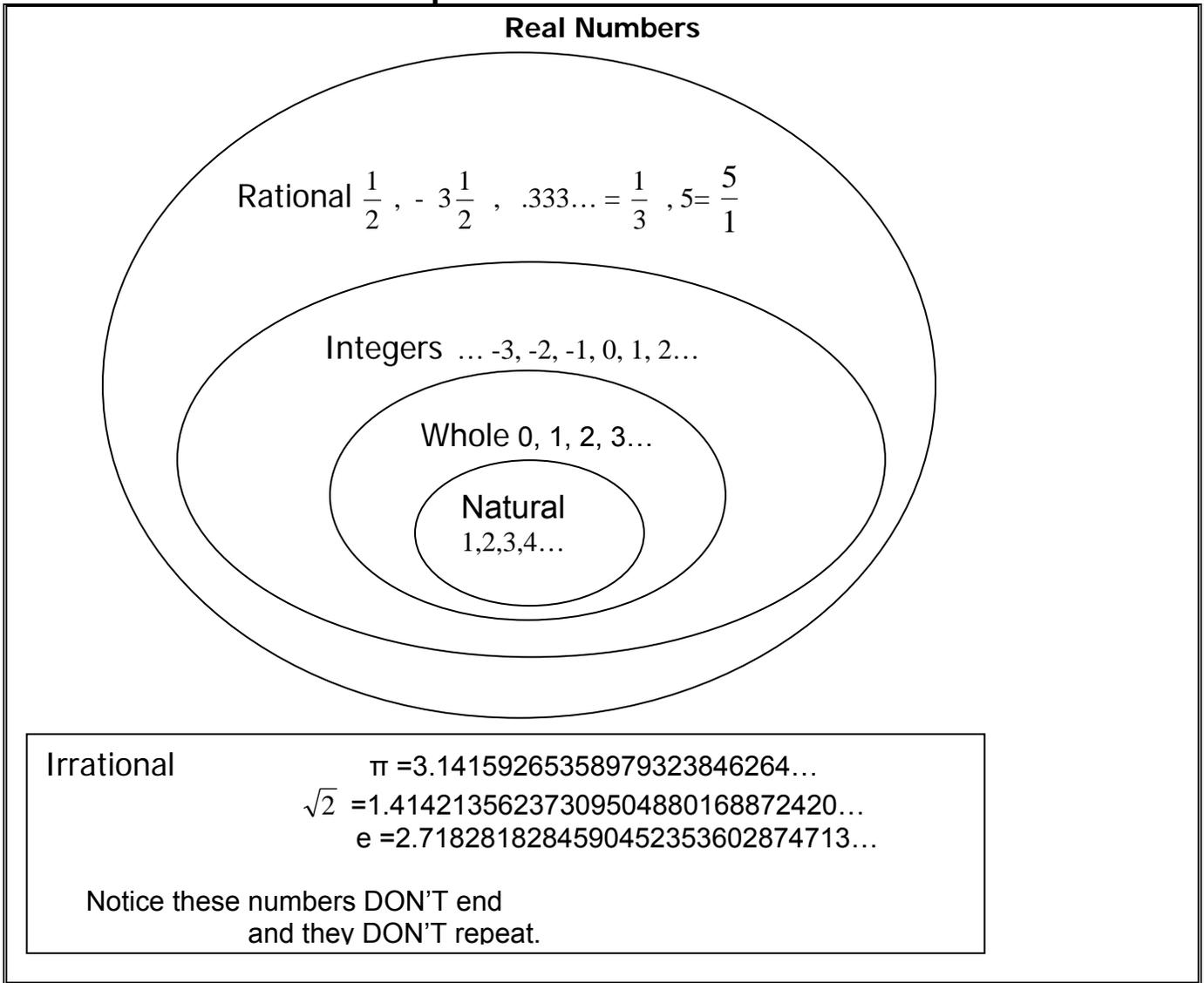
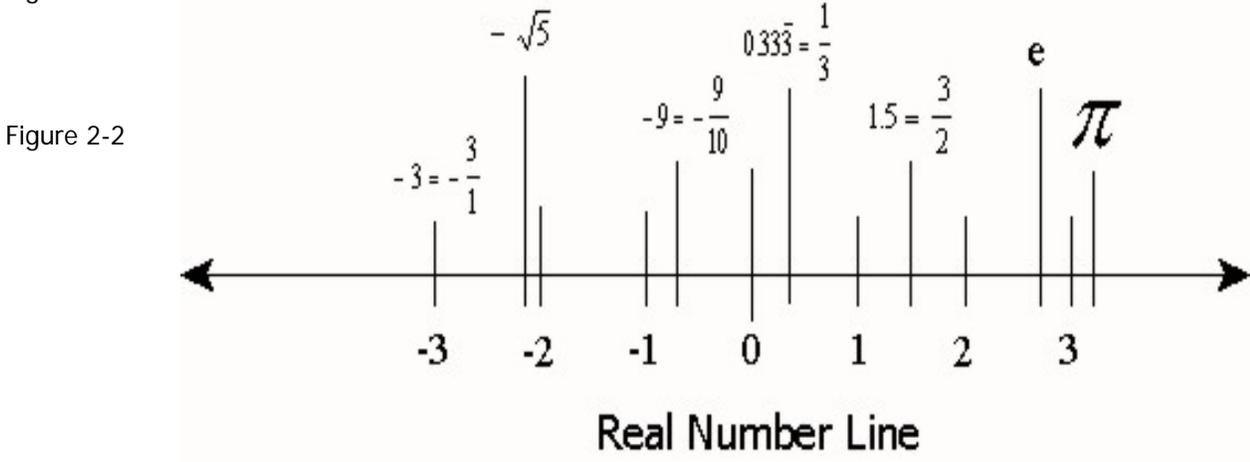


Figure 2-1



2-1 Real Numbers

Did all civilizations use zero? Have they all used negative numbers? We don't always use all the kinds of numbers available to us. Here you will learn to classify some of the numbers explored in this text. As you read the following terms refer to figure 2-1 and figure 2-2.

Natural numbers: Your three year old can count to two. He asks for two cookies, one for each hand. Natural numbers or counting numbers are the first kind of numbers we learn.

Whole numbers: One day your child asks, "How many cookies may I have?" and she learns about another number, zero. The natural numbers and zero together make the whole numbers.

Integers: When you got your first checkbook, you learned first hand about another kind of number, \$-25, -3 etc. Whole numbers and negative numbers that are the opposite of natural numbers are integers.

Rational numbers: Notice on the number line (figure 2-2) that if integers were the only numbers possible there would be many gaps. Rarely does a cash receipt or checkbook balance come to an integer amount. 3.5 and $2\frac{1}{2}$ are examples of rational numbers. If a number can be written as the **ratio** of two integers it is **rational**. 5 can be written as $\frac{5}{1}$ and 0.333... can be written as $\frac{1}{3}$ so 5 and 0.333... are rational. Notice the rational numbers include the integers which include the whole numbers which include the counting numbers. The gaps in the real number line are now partially filled in.

Irrational numbers: These are numbers that cannot be written as a ratio of two integers. These are numbers that have an infinite non-repeating decimal expansion. $\sqrt{2}$, e, and B (pi) are examples of irrational numbers.

Real numbers: All together the rational and irrational numbers comprise the real numbers. Here is a thought: If these are called real numbers, what does that suggest to you?

Practice: Identify the following numbers as Natural - \mathbb{N} , Whole- \mathbb{W} , Integer- \mathbb{Z} , Rational - \mathbb{Q} , Irrational- \mathbb{I} and Real- \mathbb{Y} Most will have more than one classification.

- | | | |
|---------------------|---------------------------------|----------------------------|
| a) 0.25 _____ | 8.252525... _____ | -1/2 _____ |
| b) 5 _____ | 0 _____ | -5 _____ |
| c) B _____ | Negative balance of \$23 _____ | 5 degrees above zero _____ |
| d) $\sqrt{5}$ _____ | 5000 feet above sea level _____ | stocks down 1/4 _____ |