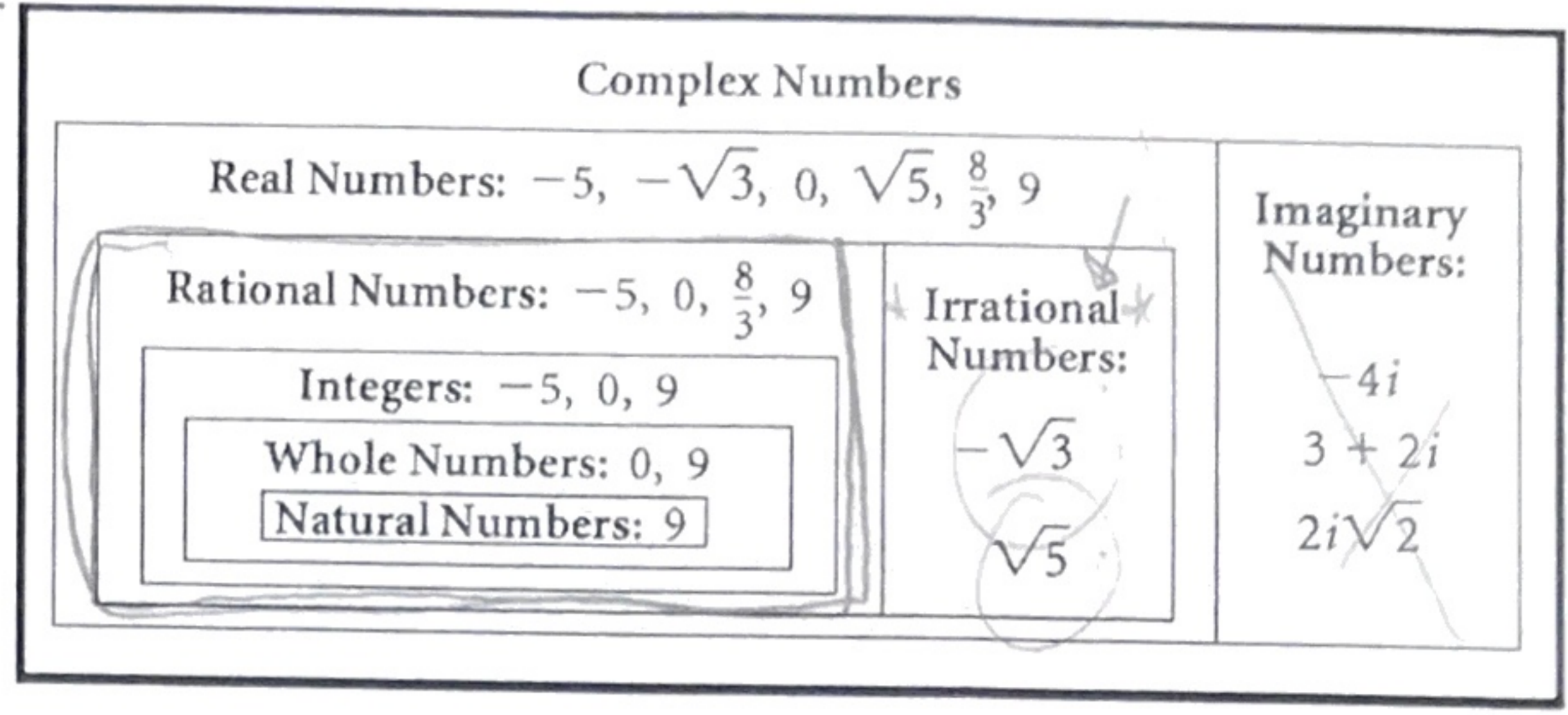


Unit 4B Day 16: Irrational Numbers

Focus Question: How can I identify an irrational number?



A. Completing the "Real" number system

On Day 14, we saw the number system looked like the diagram at right.

1. What were the two definitions of rational?

- * A # that can be written as a ratio of 2 integers
- * A # whose decimal repeats or terminates

2. Which numbers do you recognize that are not rational? $\sqrt{5}$ $-\sqrt{3}$

3. What do you say out loud when you see the symbol $\sqrt{\quad}$?
radical square root

4. What do you think in your head when you see the symbol above?
what # times itself is...

5. Give the answers to the following problems. a. $\sqrt{64}$ = $\frac{8}{1}$ b. $\sqrt{169}$ = $\frac{13}{1}$

6. Both problems above involved what type of squares? perfect
And they are rational numbers.

7. Are $\sqrt{3}$ and $\sqrt{5}$ perfect squares? No!

B. The decimal when taking the square root of a "non-perfect" square.

1. Joey's homework asked him to find $\sqrt{5}$ but his calculator at home didn't have the $\sqrt{\quad}$ symbol so his thinking is below. Complete the table.

$\sqrt{5}$ is between $\sqrt{4}$ and $\sqrt{9}$ therefore, the $\sqrt{5}$ is between 2 and 3. Since 5 is closer to 4 than it is to 9, I would estimate it to be 2.2.

Estimate	Typed in Calculator	Answer	Thinking...
2.2	2.2*2.2	4.84	That is <u>less</u> than 5 so 2.2 is too <u>small</u>
2.3	2.3*2.3	5.29	That is <u>more</u> than 5 so 2.3 is too <u>big</u>
2.24	2.24*2.24	5.0176	That is <u>more</u> than 5 so 2.24 is too <u>big</u>
2.23	2.23*2.23	4.9729	That is <u>less</u> than 5 so 2.23 is too <u>small</u>
2.237	2.237*2.237	5.004169	That is <u>more</u> than 5 so 2.237 is too <u>big</u>
2.236	2.236*2.236	4.999696	That is <u>less</u> than 5 so 2.236 is too <u>small</u>
2.2362	2.2362*2.2362	5.00059044	That's close enough, I quit!

2. When Joey got to class the next day, he typed $\sqrt{5}$ into the calculator and it said 2.23606798 but when he typed it into the calculator like he did the night before, it said 5.0000000112. He asked his teacher why it wasn't exactly 5. How do you suppose his teacher responded?

Your calculator is still wrong because...
it rounds b/c it goes on forever
without repeating
 $\sqrt{5}$ is not rational.

Not
rational
C. Irrational Numbers

$\sqrt{5}$ is an example of an irrational number because its decimal expansion does not end and does not repeat. It cannot be written as the ratio of two integers. When we take the square root of a "non-perfect" square it is actually an example of an irrational number.

1. Give 5 more examples of irrational numbers.

$$\sqrt{3}$$

$$\sqrt{7}$$

$$\sqrt{11}$$

~~$$\sqrt{4} = 2$$~~

$$\sqrt{15}$$

$$\sqrt{18}$$

$$\sqrt{17}$$

$$\sqrt{102}$$

2. There are other mathematical terms that are irrational. The one you know right now is π .

We estimate this as $\pi \approx 3.14$

3. Use the jerseys practice sheet to practice identifying rational and irrational numbers.

JERSEY MIX-UP



Two teams with unusual names (the Rationals and Irrationals) face each other in the league playoffs. But both teams are having jersey troubles! Several jerseys ended up in the wrong locker room. The Rationals should have jerseys with rational numbers and the Irrationals should have jerseys with irrational numbers.

hint
($\sqrt{\quad}$ or π)

Please shade the Rational jersey's in pencil and leave the Irrational jersey's white.

I

a $\frac{\pi}{2}$ I
 b $6.\bar{1}$
 c 7.25
 d $\sqrt{6}$ I
 e $\frac{\sqrt{22}}{\sqrt{10}}$ I
 f $\sqrt{17}$ I
 g $5.\bar{7}$
 h $0 = \frac{0}{1}$
 i $4.\bar{2}$
 j π^2 I
 k $\sqrt{9} = 3$
 l $\frac{\pi}{\pi} = 1$
 m 0.638
 n $\sqrt{2}$ I
 o $9\frac{1}{5}$
 p $\sqrt{5}$ I
 q 1
 r $\frac{\pi}{5}$ I
 s $\sqrt{7} = 2$
 t $\frac{32}{31}$
 u $6.\bar{25}$
 v $\sqrt{4} = 2$
 w $\sqrt{32}$ I
 x $\sqrt{\pi}$ I