

## 2.6

# THE IRRATIONAL SIDE OF NUMBERS

*Are There Numbers Beyond Fractions?*

*God made the integers, all else  
is the work of humankind.*

LEOPOLD KRONECKER



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Auguste Rodin, *The Thinker (Le Penseur)*,  
1880–1882. Sometimes rational thought leads to  
insights into a surprisingly irrational reality.

## QUESTION OF THE DAY:

*How can we prove that all  
numbers are rational (in  
other words, all numbers  
are fractions)?*



# CLASSIFYING NUMBERS

Natural Numbers

Whole Numbers

Integers

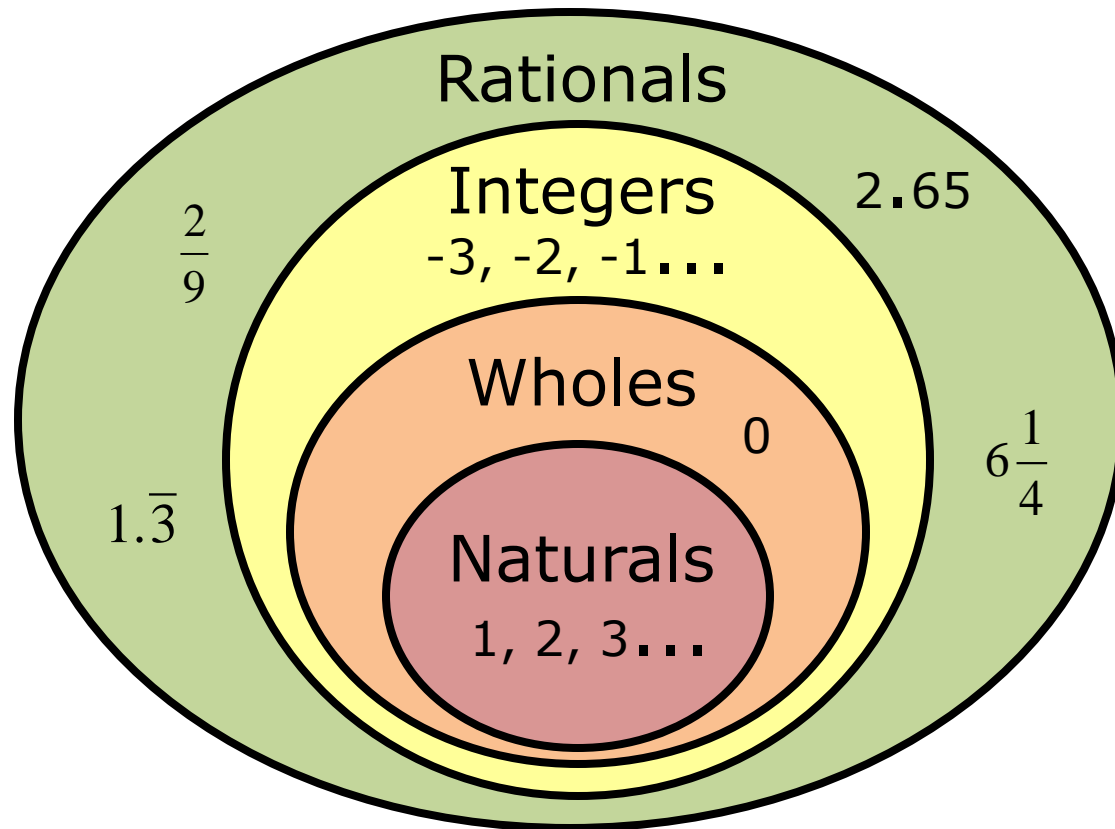


# CLASSIFYING NUMBERS

Rational Numbers

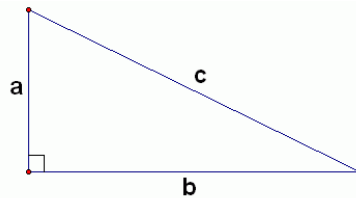


# CLASSIFYING NUMBERS

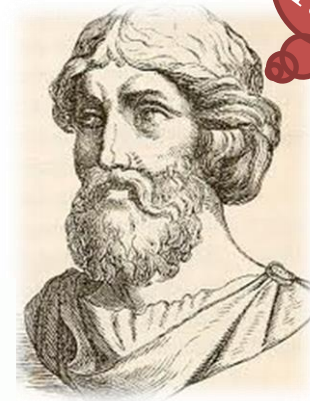


# THE PYTHAGOREANS' SECRET SOCIETY

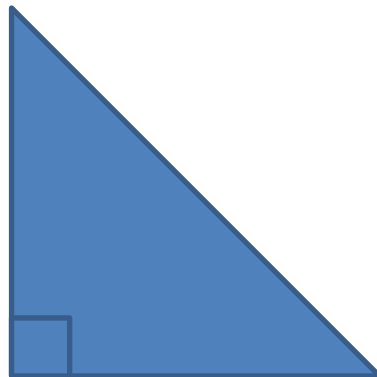
- A community of families.
- Devoted to studying numbers as a means of attaining a better understanding of the Gods.
- Pythagorean Theorem



$$a^2 + b^2 = c^2$$



All lengths are rational.



# ARE ALL NUMBERS RATIONAL?

- Claim:  $\sqrt{2}$  is a rational number





**PROVE:**  $\sqrt{3}$  is irrational.





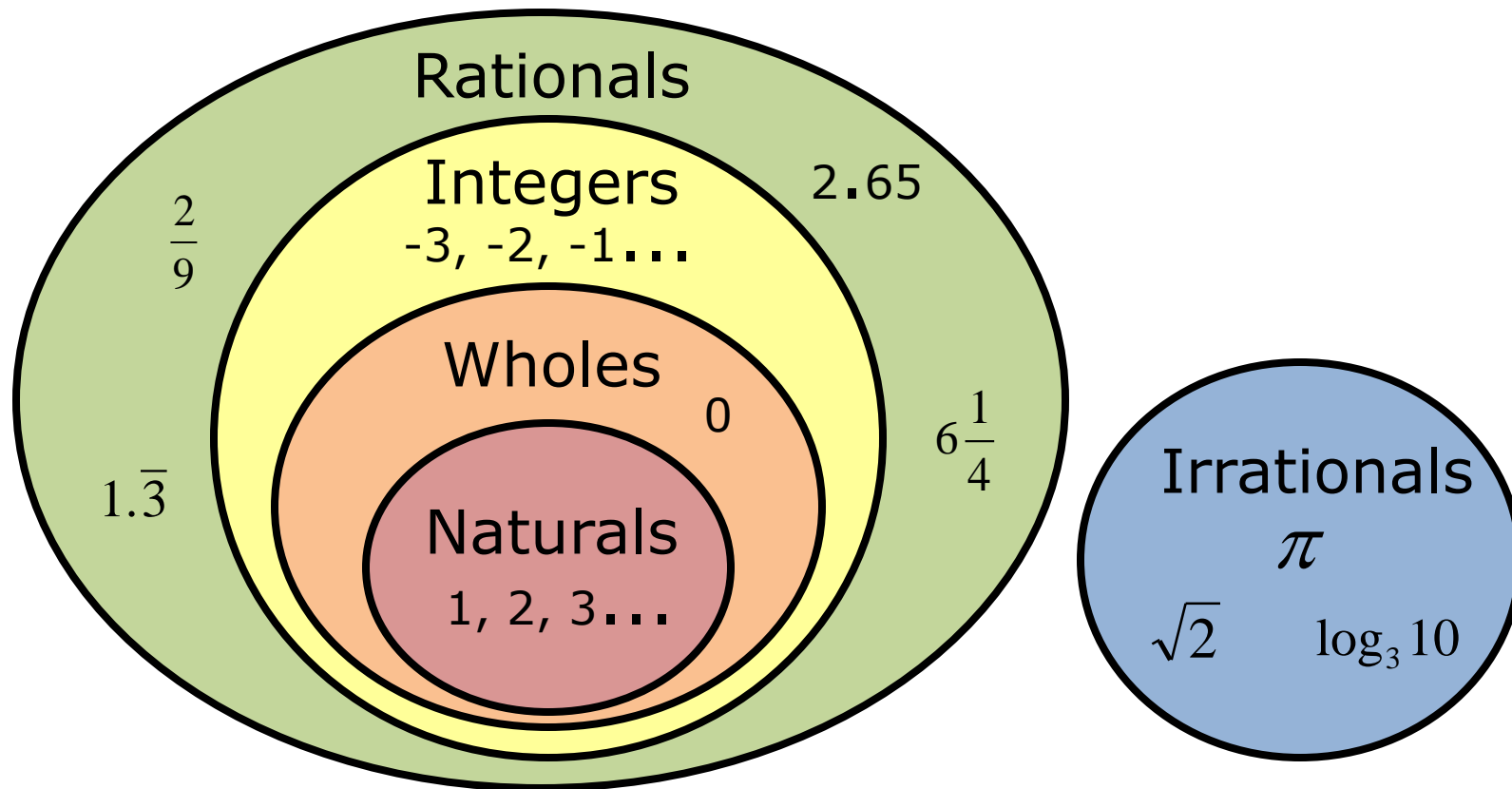
# THINK ABOUT IT...

- You are thinking of a number  $B$  and it has the property that  $3^B = 10$ . Could  $B$  be rational?





# CLASSIFYING NUMBERS



# HOMEWORK

- Read 2.6 The Irrational Side of Numbers pgs. 113-123.
- Mindscapes 2.6 #1, 2, 3, 4, 6, 10, 15, 30, 40
- A Million Things
- Famous Mathematician

