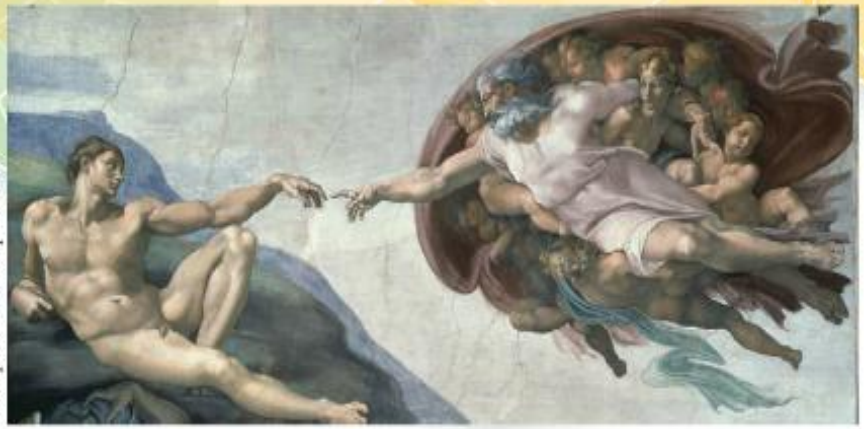
3.2 COMPARING THE INFINITE

Pairing Up Collections via a One-to-One Correspondence



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Michelangelo Buonarroti, *The Creation of Adam* (1508–1512). An early one-to-one correspondence.

QUESTION OF THE DAY:

How much bigger is the set of rational numbers than the set of natural numbers?

How many fractions are there between 0 and 1?

Finite & Infinite Sets

- Finite set –
  - What is the smallest finite set?
- Infinite set -

Bridge to Infinity

- Which set is larger, the Natural Numbers or the Natural Numbers with the 1 deleted?

Natural Numbers	
A Pairing	
Our New Set	

Natural Numbers	
A Pairing	
Our New Set	

Cardinality

- Cardinality –

- Two sets have the same cardinality if

How would you show a one-to-one correspondence between the set of stars and the set of states?

Cardinality of Other Sets…

- Compare the cardinality of the even natural numbers with the cardinality of the natural numbers.

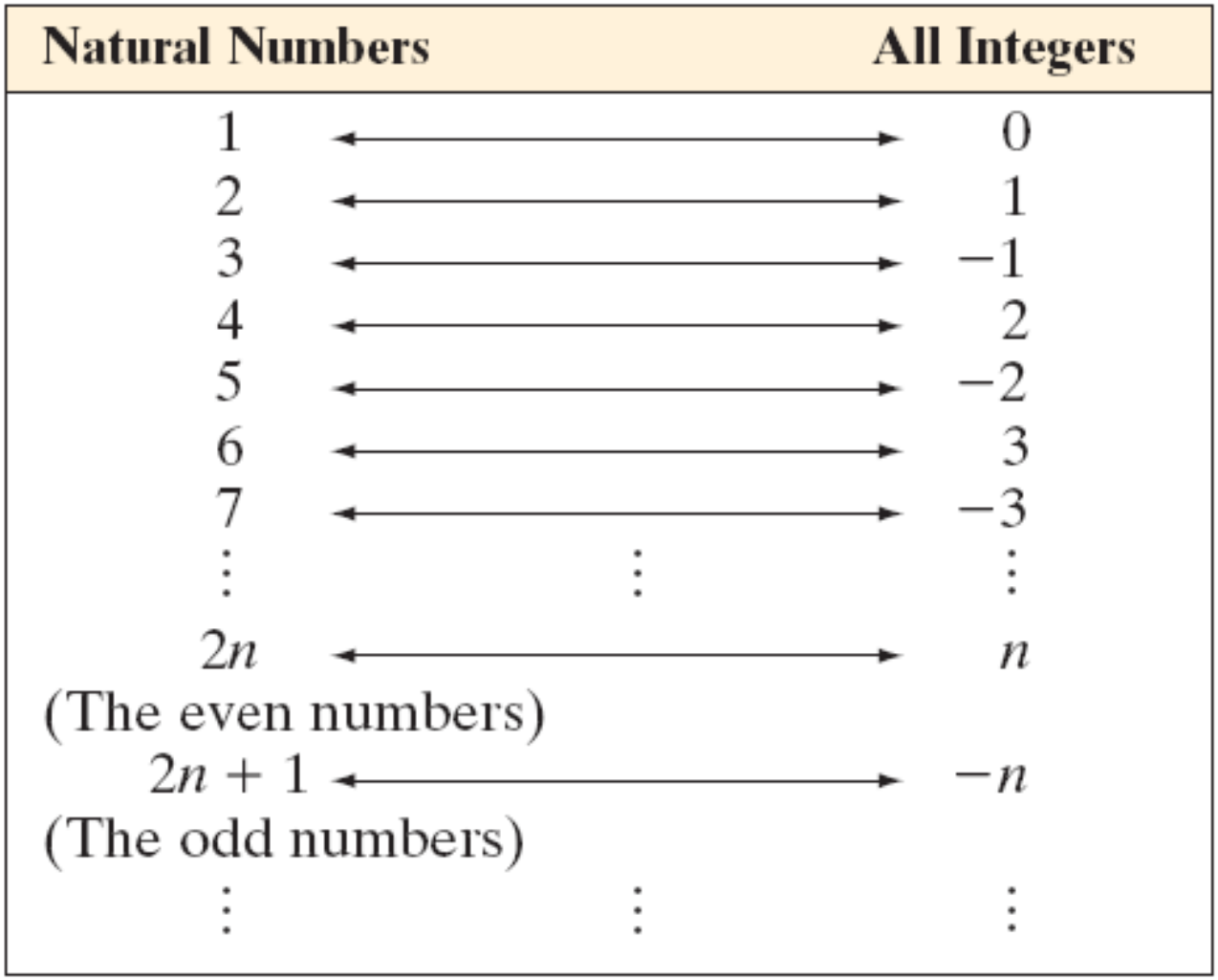
Seeking Higher Cardinalities

- Is there a set of numbers that has a greater cardinality than the cardinality of the natural numbers?

The Integers and Natural Numbers

- Do the integers and the natural numbers have the same cardinalities?

The Integers and Natural Numbers



Rational Numbers

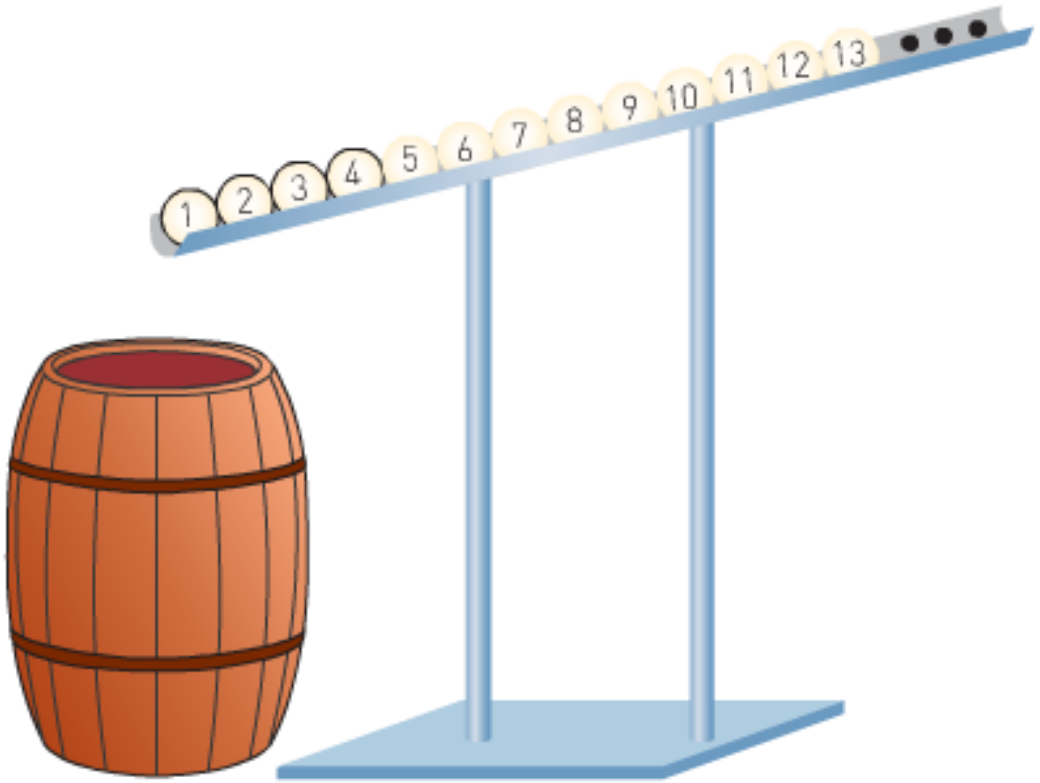
- Create a list of rationals:

Rational Numbers

- Can you construct a one-to-one correspondence between the rationals and the natural numbers?

The Ping-Pong Ball Conundrum

- Read pages 150-151



The Ping-Pong Ball Conundrum

Task Number	Time Left on the Clock at End of Task	Balls Added to the Barrel	Balls Removed from the Barrel

How many balls are left in the barrel at the end of one minute?

Homework

- Read 3.2 Comparing the Infinite pgs. 147-162.
- Mindscapes 3.2 #3, 14, 16, 30, 32, 36
- Famous Mathematician
- The $\mathrm{M}\alpha\mathrm{th}\ \mathrm{Book}$ Presentation