2.7 GET REAL

The Point of Decimals and Pinpointing Numbers on the Real Line

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Why are wise few, fools numerous in the excesse? 'Cause, wanting number, they are numberlesse.

AUGUSTA LOVELACE

QUESTION OF THE DAY:

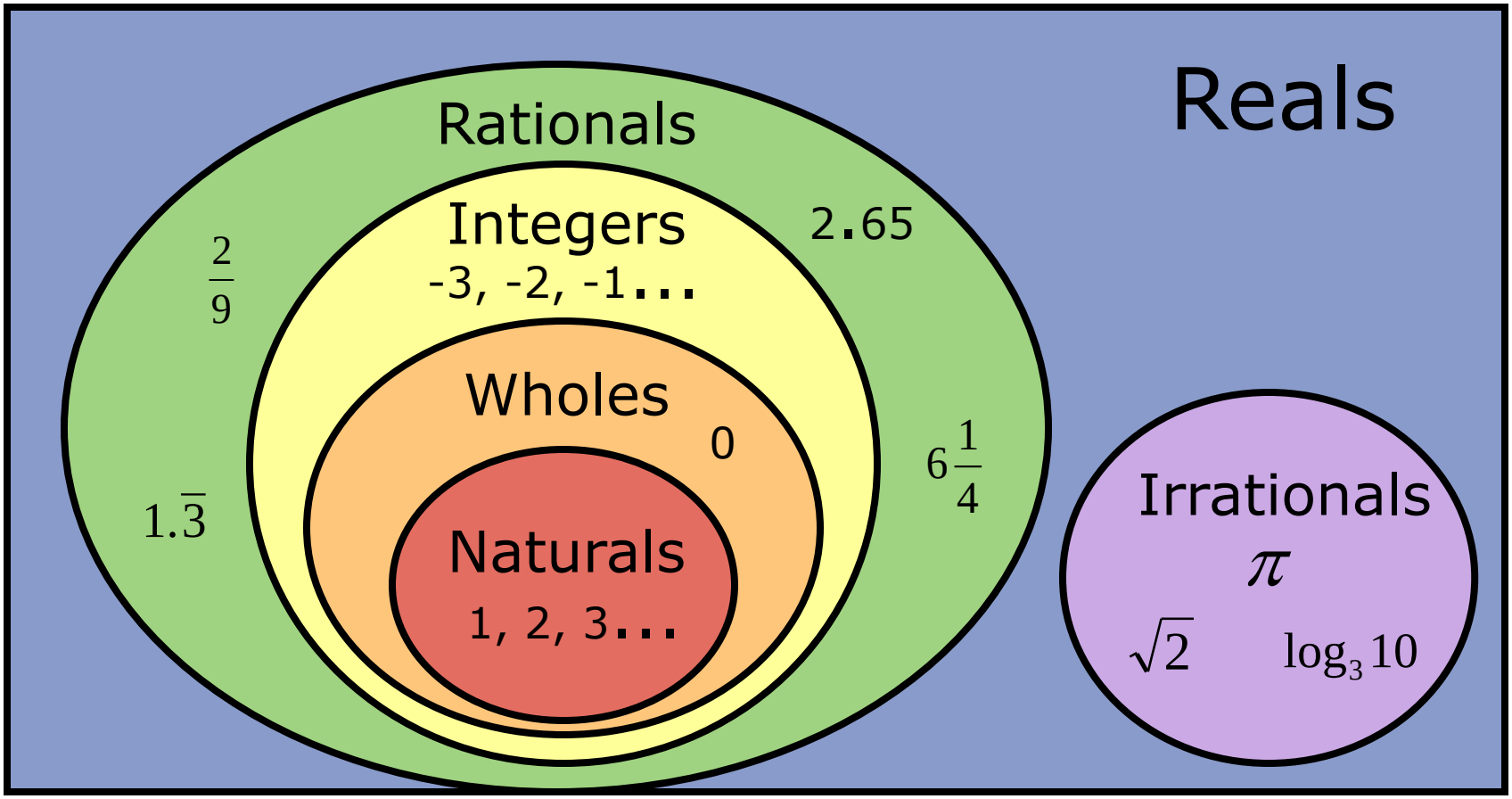
Is there a number between 0.999... and 1?

Rational and Irrational Numbers

- What are Rational Numbers? Give five examples.

- What are Irrational Numbers? Give five examples.

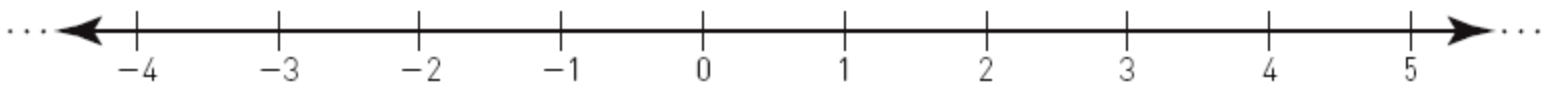
Real Numbers



What are Real Numbers?

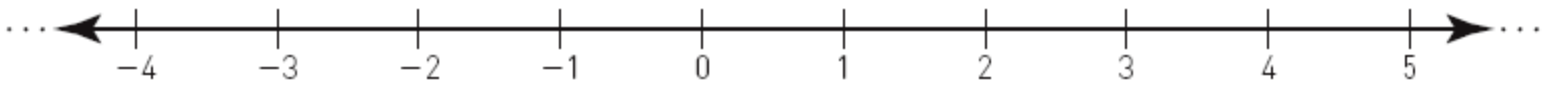
$$17, \qquad 0, \qquad -\frac{5}{2}, \qquad \sqrt{2}$$

- Arrange the numbers in increasing order from left to right.



Rationals everywhere…

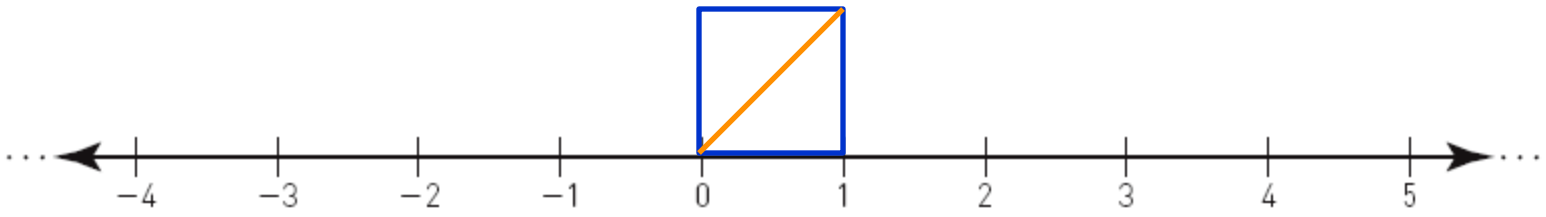
- Does every interval on the line contain infinitely many rational numbers?



- Are there any unlabeled or undescribed points left on the number line?

Irrational Numbers and the Real Number Line

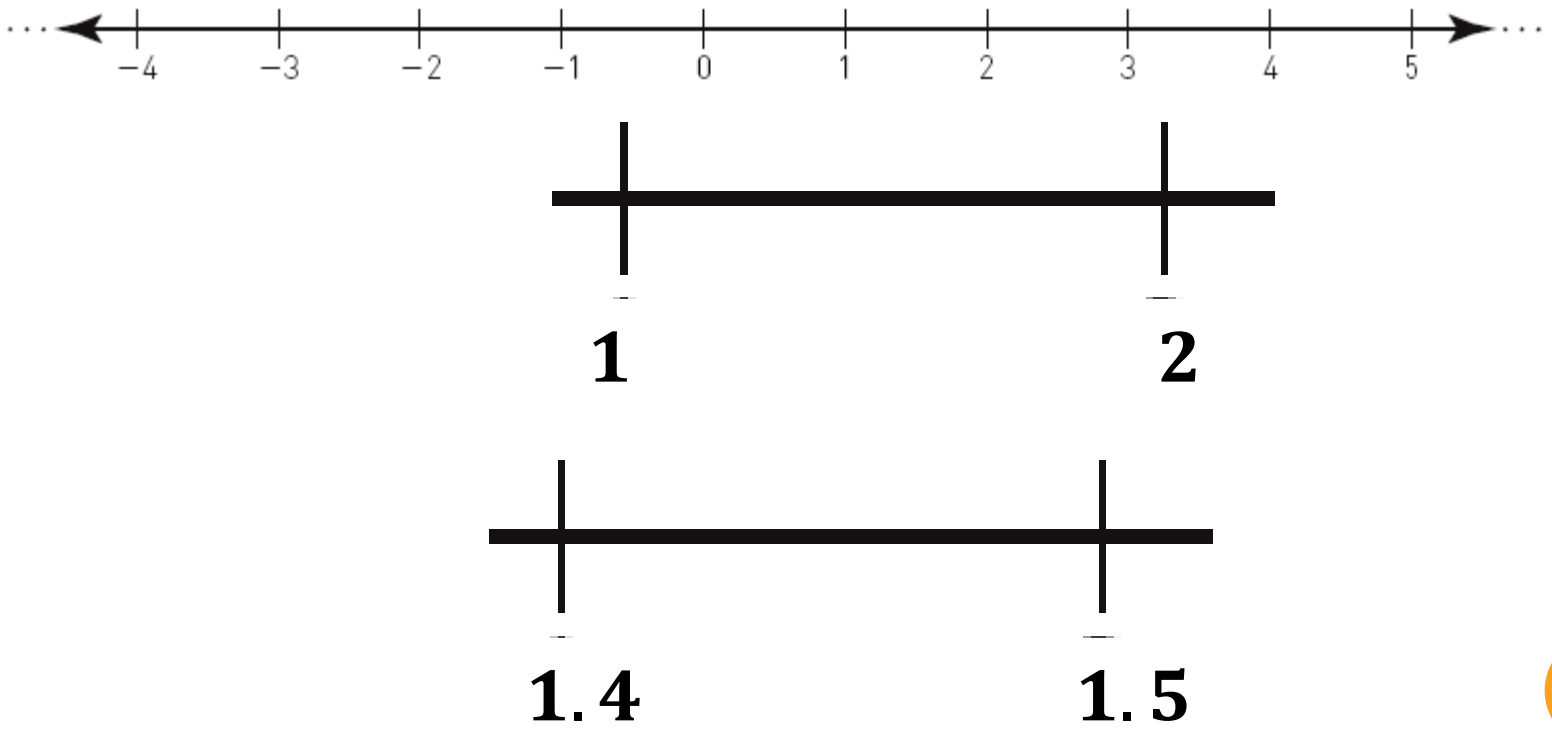
- Draw a real number line and locate the irrational number: $\sqrt{2}$.



The Decimal Point

- What is the address of $\sqrt{2}$? *(Where exactly does it sit on the number line?)*

$$\sqrt{2} = 1.41213562\ldots$$



Decimal Expansions - Rationals

- Find the decimal expansion of the following numbers:

$$\frac{11}{4}, \qquad \frac{1}{3}$$

Decimal Expansions - Rationals

- Find the decimal expansion of the following number:

$$\frac{22}{7}$$

Decimal Expansions

- How do the decimal expansions of the rational numbers differ from those of irrational numbers?

Reversing a Decimal Expansion

- Transform the following decimal to fraction form:

$$6.3709$$

Reversing a Decimal Expansion

- Transform the following repeating decimal to fraction form:

$$7.63636363\ldots$$

Reversing a Decimal Expansion

- Transform the following repeating decimal to fraction form:

$$12.34567567567\ldots$$

Decimal Representation of Rational Numbers

- Neatly write out the long division 7 into 45 doing at least 14 places after the decimal point.

Question of the Day

- ***Is there a number between 0.999… and 1?***

- ***What rational number is 0.999…?***

Does 0.999 … really equal 1?

- $\frac{1}{9} =$
- $\frac{2}{9} =$
- $\frac{3}{9} =$
- $\frac{4}{9} =$
- $\frac{5}{9} =$
- $\frac{6}{9} =$
- $\frac{7}{9} =$
- $\frac{8}{9} =$
- $\frac{9}{9} =$

Still not Convinced that $0.999\ldots = 1$?

- $\frac{1}{3} =$
- $\frac{2}{3} =$

$$\frac{1}{3} + \frac{2}{3} =$$

END DAY 1

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>
> AUGUSTA LOVELACE

QUESTION OF THE DAY:

Is the number 1.23456789101112131 4...

rational or irrational?

Rational or Irrational?

Which numbers are rational and why?

- 1.25
- 0.333…
- 4.121121112…
- 17.3965

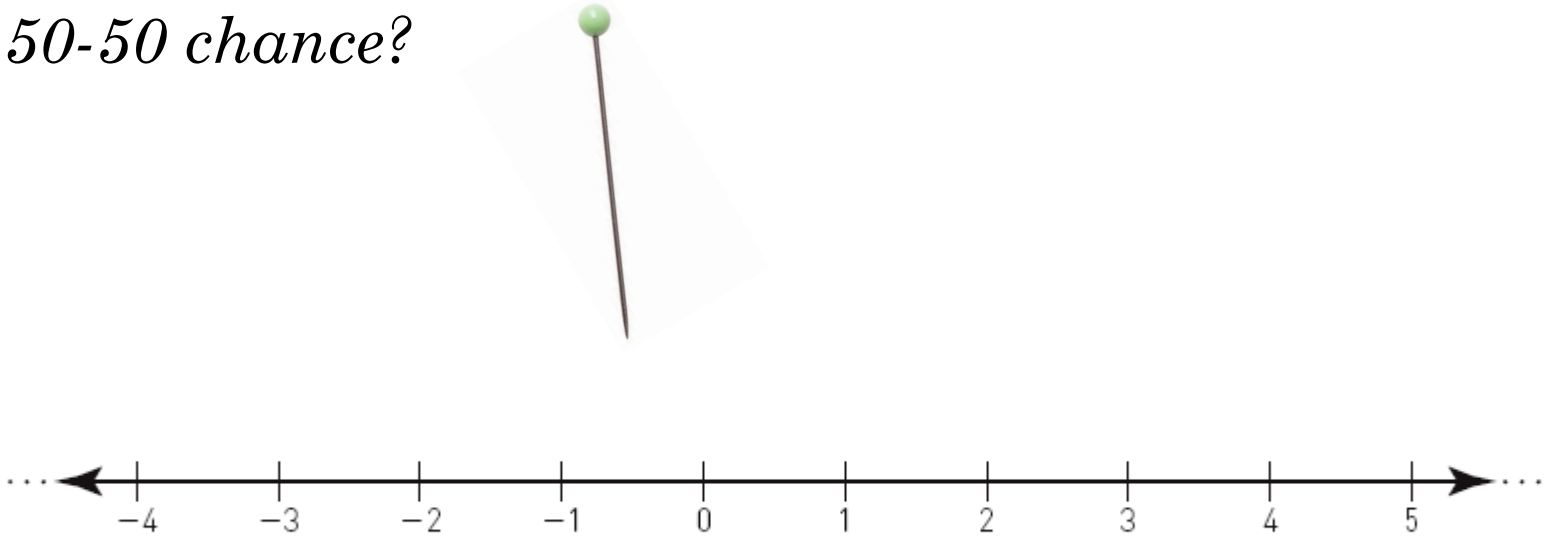
Think about it…

- If a number is irrational, what must its decimal expansion look like?

- Create other examples of irrational numbers in decimal forms.

Random Reals

- *If we randomly pick a real number – that is, we take a pin, close our eyes, and place the pin on some point on the real number line – what is the likelihood that the number we picked is a rational number? Is it a 50-50 chance?*



Random Reals

- Roll a 10-sided dice to come up with a random number. (infinite number of rolls.) Will the number be rational or irrational?

0.

- If we just randomly pick a number, it is certain to be

IRRATIONAL!!

Homework

- Read 2.7 Get Real pgs. 124-137.
- Mindscapes 2.7 #1, 2, 3, 5, 6, 7, 10, 14, 20, 23, 25, 36
- Famous Mathematician