

Real Numbers

Numbers fall into several important categories:

Natural Numbers are positive numbers with no fractional or decimal part.

1, 2, 3, 4, ...

Whole Numbers include all the natural numbers and zero.

0, 1, 2, 3, 4, ...

Integers are positive and negative whole numbers.

..., -3, -2, -1, 0, 1, 2, 3, 4, ...

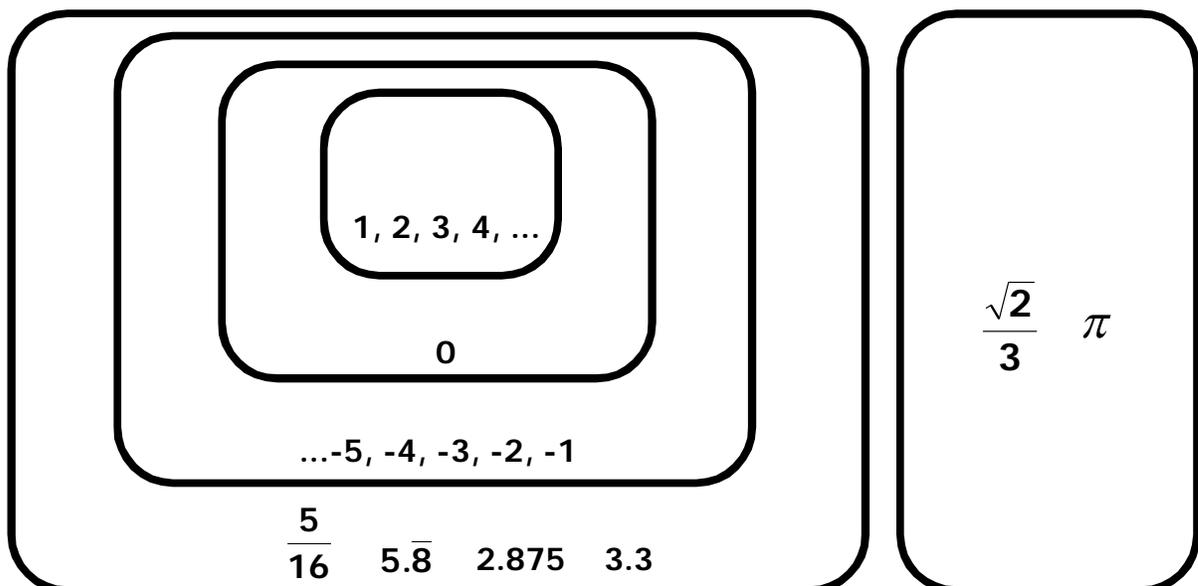
Rational Numbers are numbers which can be represented as fractions with integer numerator and denominator. This includes repeating and terminating decimals:

5.5, $\frac{5}{16}$, $0.\bar{3}$, $-5.\overline{4321}$, 7, and 1,000,000 are all rational.

Irrational Numbers cannot be expressed as a fraction with integer numerator and denominator. Common examples are listed below.

π , $\sqrt{7}$, 0.123456789101112..., and combinations like $\frac{\sqrt{7}}{\pi}$.

A diagram like the one below is a common way to represent the relationship between all the sets of numbers above. Label each box with: **Integers, Whole, Natural, Irrational, and Rational.**



Practice: Many solutions exist for several of these.

1. Name an integer that is not a whole number.
2. Write a rational number that is between 5 and 6.
3. How many whole numbers are less than 10?
4. Is the positive solution to the equation $x^2 - 3 = 7$ rational or irrational?
5. Is the solution to the equation $\pi(x - 3) = 4\pi$ rational or irrational?
6. How many integers satisfy the inequality $-2 < x \leq 5$?

Practice: Many solutions exist for several of these.

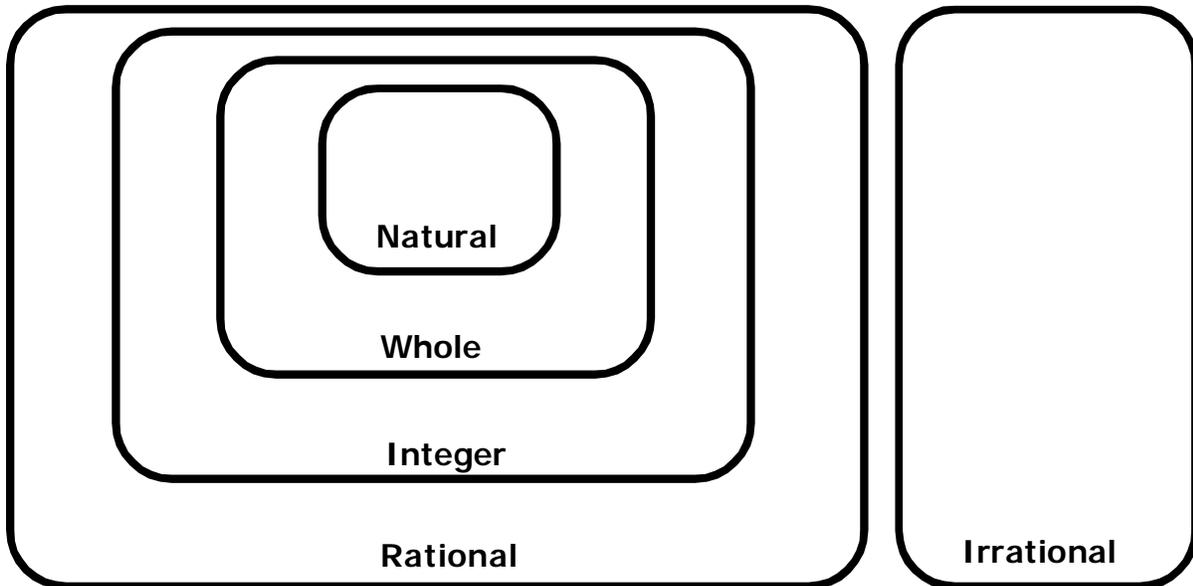
1. Write a decimal that is not rational.
2. Write an irrational number that is greater than 10.
3. Write all the categories that can be used to classify x if $2x=5$.
4. There are 90 2-digit whole numbers. How many 2-digit integers are there?
5. Pi is often estimated as $22/7$. Is this number rational or irrational?
6. How many numbers are whole numbers but not integers?

Real Numbers

Math 8

Place each number in the correct region of the diagram below:

1. 0 2. $3.\bar{2}$ 3. 0.625 4. $\sqrt{3}$ 5. $\frac{5}{3}$
6. -4.5 7. $\frac{5\pi}{\pi}$ 8. $\sqrt{25}$ 9. 2.121314... 10. -7



List ALL of the categories to which each number belongs.

11. 700 12. $0.\bar{2}$ 13. $\frac{5}{6}$ 14. 7.2π

Many answers apply to the following. List one.

- _____ 15. Write a number that is rational but not an integer.
- _____ 16. Write a number that is an integer but not a whole number.
- _____ 17. Write a square root that represents a rational number.
- _____ 18. Write an integer that is not a natural number.
- _____ 19. Write a rational number that is between 6 and 7.
- _____ 20. Write an irrational number that is between 6 and 7.