



<b>Definition</b>	<b>Characteristics</b>
<b>Examples</b>	<b>Non-examples</b>

**RATIONAL NUMBERS**

$\frac{5}{0} \rightarrow$  doesn't exist

$\pi \rightarrow$  irrational

$3.14 \rightarrow$  rational

$\pi \neq 3.14$

Worksheet 1-2: Rational and Irrational Numbers

Matching: (Please use a ruler for the following task.)

Join the dots to match each term in the first column to a definition in the second column.

(Counting)

1. Natural Numbers	<del>•</del>	the set of numbers... <del>-3, -2, -1, 0, +1, +2, +3, ...</del>
2. Whole Numbers	<del>•</del>	a number that can be written in the form $\frac{m}{n}$ where $m$ and $n$ are integers and $n \neq 0$
3. Integers	<del>•</del>	the set of numbers 1, 2, 3, 4, 5, ...
4. Rational Numbers	<del>•</del>	the set of numbers 0, 1, 2, 3, 4, 5, ...
5. Irrational Numbers	•	a number that cannot be written in the form $\frac{m}{n}$ where $m$ and $n$ are integers and $n \neq 0$

Rational Numbers:

Rational numbers are numbers that can be expressed in fractional form.

You can write any rational numbers as a decimal by dividing the numerator by the denominator, and the result is either a **terminating decimal** or a **repeating decimal**.

Examples of terminating decimals: -2.875, 3.0, 7.231875622945, 0.25

Examples of repeating decimals: -2.333333333..., 0. $\overline{7}$ , 3.142857, 5.12121212..., -23.072311 $\overline{68945}$

Examples of irrational numbers: decimals that neither terminate nor repeat

-2.7182818184904523536..., 1.010010001000010000010...,  $\sqrt{5}$ ,  $-\sqrt{31.5}$ ,  $\pi$

$\sqrt{0.25} = 0.5$        $\sqrt{0.121} = 0.347850542...$

Practice:

Circle the rational numbers.

$y^x$      $x^y$      $\wedge$     2     $\frac{1}{2}$     3  
 $-5.7$      $7\frac{3}{4}$      $\pi$      $\sqrt{8}$      $\sqrt{121} = 11$      $2^3$      $3^{-2} = \frac{1}{9}$      $\frac{1}{3}$   
 $-3^2 = -9$     6.99    4.578534628...    0.6666666...     $\frac{8}{9}$     7.35123  
(-)    (+/-)

Assigned Work: WS 1-2; Handout on "Rational Numbers"

$$\frac{2}{5} = 0.4 \quad \frac{25}{100} = 0.25 \quad \frac{12}{4} = 3.0$$

Terminating decimals.

$$\frac{1}{9} = 0.\dot{1} \quad \frac{2}{3} = 0.\dot{6} \quad \frac{1}{11} = 0.\overline{09}$$

$0.11111111\dots$      $0.666666\dots$      $0.09090909\dots$

Repeating decimals.

**Thinking:**

1. Classify the following numbers as natural, whole, integer, rational or irrational.  
Please note that some of the numbers can belong to more than one of the above sets.

(a)  $-1$  *integer, rational*

(b)  $\sqrt{4}$

(c)  $\pi$

Check your answers with answer keys on your worksheets.

## The Rational Number System Worksheet

Classify these numbers as rational or irrational and give your reason.

1. a.  $7329 \rightarrow \frac{7329}{1} \left(\frac{m}{n}\right)$   
 b.  $\sqrt{4}$  is  $2 \rightarrow \frac{2}{1}$
2.  $\times$   $0.95832758941\dots$  non-terminating "and" non-repeating.  
 $\checkmark$   $0.5287593593593$   
 terminating

Give an example of a number that would satisfy these rules.

3. a number that is: real, rational, whole, an integer, and natural 212
4. a number that is: real and irrational
5. a number that is: real, rational, an integer -5, 6, 0  
 (-5)

Classify each number as: real, rational, irrational, whole, natural, and integer. Give your reason.

6. a.  $3/4$  rational  $\rightarrow$  fraction, real  
 b.  $-12/4 = -3 \rightarrow \frac{-3}{1} \rightarrow$  rational, integer, real
7. a.  $0.345\ 345\ 345 \rightarrow$  rational (terminating), real  
 b.  $-0.6473490424 \rightarrow$  rational (terminating), real

$$0.345\ 345\ 345 = \frac{345\ 345\ 345}{1\ 000\ 000\ 000}$$

8. Give examples of irrational rational numbers that fit between the following sets of numbers.

- a. -0.56 and -0.65    -0.565, -0.60, -0.61, -0.62
- b. -5.76 and -5.77    -5.765621931256, -5.767
- c. 3.64 and 3.46    -5.767676767676...  
 ↓

9. Which two numbers are irrational? How do you know?

- a.  $8 - \sqrt{56}$     irrational  $\sqrt{7} \times \sqrt{8}$
- b.  $8 - \sqrt{25} = 8 - 5 = 3$     rational  $\rightarrow \frac{3}{1}$
- c.  $2 - \sqrt{73}$     irrational

10. Place the following numbers in the Venn Diagram. Place the following numbers in the Venn Diagram. Note that some numbers may not fit in the diagram.

-0.462	-56	735	0.326	8321	0
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