

# 5-1 Rational Numbers (Pages 224–228)

<b>Sets of Numbers</b>	<ul style="list-style-type: none"> <li>The set of <b>whole numbers</b> is <math>\{0, 1, 2, 3, 4, 5, \dots\}</math>. Such numbers as <math>\frac{5}{5}</math>, <math>\frac{9}{1}</math>, and <math>\frac{25}{5}</math> are also whole numbers because they can be written as a member of this set.</li> <li>The set of <b>integers</b> is the set of whole numbers and their opposites.</li> <li>The set of <b>rational numbers</b> consists of all numbers that can be expressed as <math>\frac{a}{b}</math>, where <math>a</math> and <math>b</math> are integers and <math>b \neq 0</math>. The numbers <math>\frac{1}{3}</math> and <math>-5</math> are rational numbers.</li> </ul>
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Some decimals are rational numbers.

<b>Types of Decimals</b>	<ul style="list-style-type: none"> <li>Decimals either terminate (come to an end) or they go on forever. Every <b>terminating decimal</b> can be written as a fraction, so all terminating decimals are rational numbers. For example, <math>0.45 = \frac{45}{100}</math> or <math>\frac{9}{20}</math>.</li> <li><b>Repeating decimals</b> can always be written as fractions, so repeating decimals are always rational numbers. You can use <b>bar notation</b> to indicate that some part of a decimal repeats forever, for example, <math>0.333\dots = 0.\overline{3}</math>.</li> <li>Decimals that do not terminate and do not repeat cannot be written as fractions and are not rational numbers.</li> </ul>
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## EXAMPLE

Express  $0.\overline{23}$  as a fraction in simplest form.

Let  $N = 0.232323\dots$ . Then  $100N = 23.232323\dots$

$100N = 23.232323\dots$     Multiply  $N$  by 100 because two digits repeat.

$- N = 0.232323\dots$     Subtract  $N$  from  $100N$  to eliminate the repeating part.

$99N = 23$      $\Rightarrow$      $N = \frac{23}{99}$     To check this answer divide 23 by 99.

## PRACTICE

Express each decimal as a fraction or mixed number in simplest form.

1. 0.6                      2.  $0.444\dots$                       3.  $-0.\overline{15}$                       4. 1.26

Name the set(s) of numbers to which each number belongs.

5.  $\frac{3}{8}$                       6.  $-1280$                       7.  $-2.5$                       8.  $-0.\overline{53}$

Replace each  $\bullet$  with  $<$ ,  $>$ , or  $=$  to make a true sentence.

9.  $\frac{1}{3} \bullet 0.\overline{3}$                       10.  $-2 \bullet 2.25$                       11.  $1.8 \bullet 1.\overline{7}$                       12.  $\frac{6}{8} \bullet 0.75$



**13. Standardized Test Practice** Which number is the greatest,

$\frac{5}{10}$ ,  $\frac{6}{11}$ ,  $\frac{6}{13}$ , or  $\frac{4}{9}$ ?

**A**  $\frac{4}{9}$

**B**  $\frac{6}{11}$

**C**  $\frac{5}{10}$

**D**  $\frac{6}{13}$

Answers: 1.  $\frac{5}{3}$  2.  $\frac{9}{4}$  3.  $-\frac{33}{5}$  4.  $1\frac{50}{13}$  5. rational 6. integer, rational 7. rational 8. rational 9. = 10. < 11. > 12. = 13. B