



**Activity for 1.1** - Logically sort the following numbers into 6 different groups. Each group may contain only 5 numbers. First, use a piece of scrap paper then fill in the notes with the rest of the class.

25.000	0.142857142857...	$\sqrt{81}$	3.125
$30.1\bar{6}$	$\frac{5}{7}$	11.732050804...	10
0.828427125...	$\sqrt{25}$	$43.\bar{1}$	$\frac{7}{2}$
6.33333333...	307	$\sqrt{16}$	4.5
$7\frac{1}{9}$	$\sqrt{26}$	$\sqrt{50}$	$\sqrt{11}$
$\sqrt{36}$	$\frac{2}{3}$	$\sqrt{75}$	3.60555127...
9.949874371...	$\sqrt{144}$	$8.\bar{3}$	$\frac{21}{10}$
$\sqrt{101}$	7.81024967...		

Group 1	Group 4
Group 2	Group 5
Group 3	Group 6

## 1.1 Rational Numbers vs Irrational Numbers

**Class Notes** - State whether the expression is rational or irrational. Justify your answer.

LP#1 $\frac{7}{9}$	$\sqrt{121}$	4.1111111111...	$\sqrt{12}$	10.05095482...
LP#2 $\frac{41}{20}$	5.25	$25.\overline{27}$	$7\frac{4}{5}$	$\sqrt{71}$

**Review** - State whether the expression is rational or irrational. Justify your answer.

R#1 $\sqrt{4}$	$\frac{9}{11}$	$\sqrt{56}$	$1\frac{8}{9}$	11.375
R#2 8.83876326...	0.6666666666...	$\sqrt{225}$	$3.\overline{73}$	$\frac{15}{17}$
R#3 10.00004	$\sqrt{31}$	$2\frac{11}{12}$	$\frac{6}{19}$	$5.25\overline{1}$

### Homework Problems

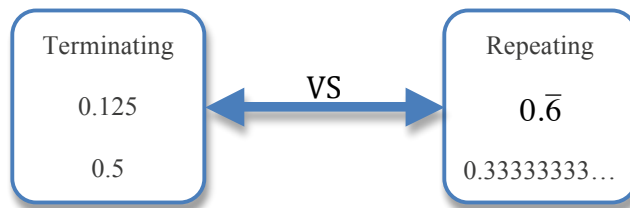
State whether the expression is rational or irrational. Justify your answer.

- 1) 13      2)  $\frac{3}{16}$       3)  $\sqrt{62}$       4) 5.4059216...      5)  $7.\overline{3}$       6)  $7\frac{16}{17}$
- 7)  $12.2\overline{6}$       8)  $\sqrt{49}$       9)  $\frac{16}{29}$       10) 0.2222222...      11)  $1\frac{10}{11}$       12) 0.050126...
- 13)  $\frac{1}{14}$       14)  $9\frac{18}{19}$       15) 11.161095...      16)  $\sqrt{7}$       17) 0.4545...      18)  $11.\overline{6}$
- 19)  $\sqrt{100}$       20)  $7\frac{16}{21}$       21) 0.909090...      22) 8.85896421...      23)  $\frac{4}{11}$       24)  $278.\overline{23}$
- 25)  $6\frac{1}{12}$       26) 12.437698...      27)  $0.23\overline{1}$       28) 0.0666666...      29)  $\sqrt{3}$       30)  $\frac{1}{2}$

Fill in the blanks.

- 31)  $1, \sqrt{2}, \sqrt{3}, 2, \_, \_, \sqrt{6}, \sqrt{7}, \_, \_$       32) 1.28571428\_\_714\_\_...      33) 1, 4, \_\_, 16, 25, \_\_
- 34)  $\sqrt{24}, \_, \_, \sqrt{26}, \_, \_, \sqrt{28}, \sqrt{29}$       35) 0.727272\_\_2\_\_27272...      36) 81, 100, \_\_, 144, \_\_

## 1.2 Converting Terminating Decimals into Fractions

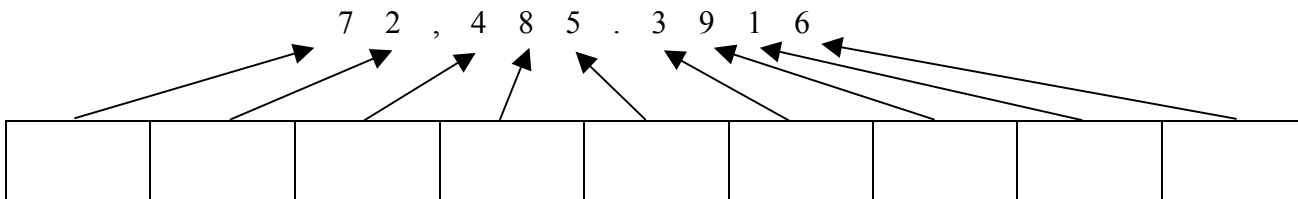


Remember how to convert a fraction into a decimal?

Example 1	Example 2	Example 3
$\frac{3}{4} = 0.75$ $\begin{array}{r} 0.75 \\ 4 \overline{)3.00} \\ \underline{-28} \phantom{0} \\ 20 \phantom{0} \\ \underline{-20} \\ 0 \end{array}$	$\frac{2}{11} = 0.1818\dots$ $\begin{array}{r} 0.1818\dots \\ 11 \overline{)2.0000} \\ \underline{-11} \phantom{000} \\ 90 \phantom{0} \\ \underline{-88} \phantom{0} \\ 20 \phantom{0} \\ \underline{-11} \phantom{0} \\ 90 \phantom{0} \\ \underline{-88} \phantom{0} \\ 2 \end{array}$	$\frac{11}{8} = 1.375$ $\begin{array}{r} 1.375 \\ 8 \overline{)11.000} \\ \underline{-8} \phantom{00} \\ 30 \phantom{0} \\ \underline{-24} \phantom{0} \\ 60 \phantom{0} \\ \underline{-56} \phantom{0} \\ 40 \phantom{0} \\ \underline{-40} \\ 0 \end{array}$

Remember place value?

Let's review the place values of the following number:



Fill in the boxes above using the terms below.

tenths	ten-thousands	hundredths	tens	ten-thousandths
hundreds	thousandths	ones	thousands	

**Class Notes** - Write each decimal as a fraction or mixed number in simplest form.

LP#1 0.6	0.25	0.5271	0.456
LP#2 2.8	-3.12	6.329	-1.75

**Class Notes** - Place a  $<$ ,  $>$ , or  $=$  in between the expressions to make the sentence true.

LP#3 (convert decimal to fraction) $\frac{1}{10}$ 0.12	$\frac{2}{5}$ 0.7	$-2\frac{3}{10}$ -2.3
LP#4 (convert fraction to decimal) $\frac{3}{5}$ 0.395	$\frac{1}{4}$ 0.1	0.6 $\frac{3}{20}$

**Review** - Convert the following decimals into fractions.

R#1 0.7	-0.15	0.032	0.1021	4.31
R#2 1.4	0.30	0.64	-2.042	0.05
R#3 -0.125	0.0121	-1.45	0.10005	9.77

### Homework Problems

Convert the following decimals into fractions.

- 1) 0.5      2) 0.34      3) 0.743      4) 5.1251      5) 0.635  
6) 0.87      7) 0.2      8) 0.6623      9) 0.007      10) 0.921  
11) 2.941      12) 0.321      13) 0.9      14) 0.91      15) 0.5232  
16) 0.007      17) 0.221      18) 0.13      19) 0.3      20) 0.0012  
21) 0.06      22) 4.0003      23) 0.0302      24) 0.054      25) 0.1  
26) 0.93      27) 52.25      28) 9.032      29) 0.00001      30) 0.932

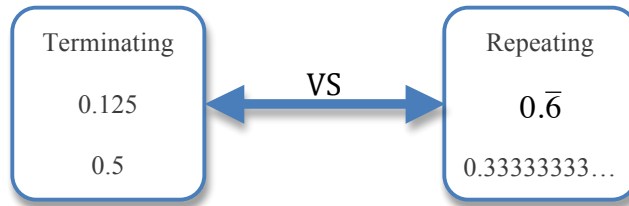
State whether the following statements are true or false and justify your answer.

- 31)  $\frac{3}{10} = 0.03$       32)  $\frac{345}{1000} = 0.345$       33)  $\frac{215}{10} = 2.15$       34)  $\frac{4161}{1000} = 4.161$   
35)  $\frac{1}{5} = 0.2$       36)  $\frac{3}{4} = 0.8$       37)  $\frac{7}{20} = 0.35$       38)  $\frac{320}{10} = 3.2$

### Synthesis

- 39) Is there a fraction that only contains whole numbers in its numerator and denominator that is equivalent to  $\sqrt{23}$ ? Explain your answer.
- 40) Is there a fraction that only contains whole numbers in its numerator and denominator that is equivalent to  $\sqrt{49}$ ? Explain your answer.
- 41) Create a fraction with an irrational denominator. Express it as a decimal rounded to the nearest tenth.
- 42) Create a fraction with an irrational numerator. Express it as a decimal rounded to the nearest hundredth.

### 1.3 Converting Repeating Decimals into Fractions



Remember – Where do repeating decimals come from?

$\frac{1}{3} = 0.\overline{3}$  $\begin{array}{r} 0.333... \\ 3 \overline{)1.000} \\ \underline{-9} \phantom{00} \\ 10 \phantom{0} \\ \underline{-9} \phantom{0} \\ 10 \phantom{0} \\ \underline{-9} \phantom{0} \\ 1 \phantom{0} \end{array}$	$\frac{2}{11} = 0.1818...$  $\begin{array}{r} 0.1818... \\ 11 \overline{)2.0000} \\ \underline{-11} \phantom{000} \\ 90 \phantom{0} \\ \underline{-88} \phantom{0} \\ 20 \phantom{0} \\ \underline{-11} \phantom{0} \\ 90 \phantom{0} \\ \underline{-88} \phantom{0} \\ 2 \phantom{0} \end{array}$
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**Class Notes** - Convert the following decimals into fractions.

LP#1 $0.\overline{3}$	$0.\overline{1}$
LP#2 $0.44444444444444...$	$0.077777777777....$

LP#3 0.18181818...	0.4545454545...
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**Review** - Convert the following decimals into fractions.

R#1 $0.\overline{6}$	0.1616161616...
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R#2 $0.\overline{5}$	0.72727272...
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R#3 0.00 $\bar{3}$	0.000 $\bar{6}$
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### Homework Problems

Convert the following decimals into fractions.

- 1)  $0.\bar{2}$     2)  $0.\bar{7}$     3)  $0.0\bar{5}$     4)  $0.00\bar{8}$     5)  $0.909090\dots$     6)  $0.\bar{4}$
- 7)  $0.\bar{8}$     8)  $0.7\bar{3}$     9)  $0.4\bar{6}$     10)  $0.1333333\dots$     11)  $0.9\bar{3}$     12)  $0.8666666\dots$

13) State three fractions that are equivalent to a repeating decimal expression.

14) State three denominators to proper fractions that will always yield a terminating decimal regardless of what non-zero numerator is used.

### Synthesis

Convert the fractions into a decimal. Round to the nearest ten-thousandth.

- 15)  $\frac{7}{9}$                       16)  $\frac{2}{3}$                       17)  $\frac{6}{11}$                       18)  $\frac{3}{22}$

Round the following decimals to the nearest thousandth and express your answer as a fraction.

- 19)  $0.7\bar{3}$                       20)  $0.\bar{5}$                       21)  $0.08\bar{3}$                       22)  $0.4\bar{6}$

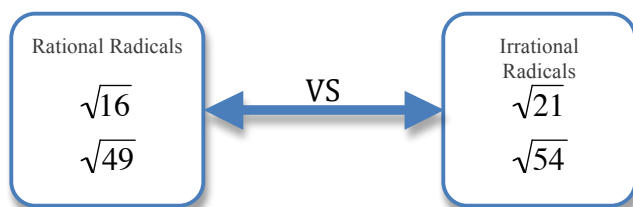
23) Can a radical expression have a repeating decimal other than zero? Explain.

24) Give 3 different rational approximations for  $\sqrt{56}$ . For each approximation state the name of the decimal that you rounded to.

25) What is the repeating decimal for the fraction  $\frac{3}{7}$ . Give 3 different approximations for this fraction.



## 1.4 Rational Approximations for Irrational Numbers Using a Number Line



**List of Perfect Squares**

$x$	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
$x^2$															

Without using a calculator, approximate the value of  $\sqrt{39}$  to the nearest whole number.



**Class Notes** – Estimate the values of the each radical expression to the nearest whole number using a number line.

LP#1 $\sqrt{20}$	$\sqrt{52}$	$\sqrt{93}$
LP#2 $\sqrt{14}$	$\sqrt{2}$	$\sqrt{46}$
LP#3 $\sqrt{30}$	$\sqrt{125}$	$\sqrt{200}$

**Review** - Approximate the values of the each radical expression to the nearest whole number utilizing a number line.

R#1 $\sqrt{58}$	$\sqrt{109}$	$\sqrt{40}$
R#2 $\sqrt{32}$	$\sqrt{260}$	$\sqrt{10}$

R#3 $\sqrt{3}$	$\sqrt{145}$	$\sqrt{17}$
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### Homework

Approximate the values of the each radical expression to the nearest whole number utilizing a number line.

- 1)**  $\sqrt{13}$       **2)**  $\sqrt{53}$       **3)**  $\sqrt{300}$       **4)**  $\sqrt{85}$       **5)**  $\sqrt{41}$   
**6)**  $\sqrt{61}$       **7)**  $\sqrt{182}$       **8)**  $\sqrt{22}$       **9)**  $\sqrt{111}$       **10)**  $\sqrt{97}$   
**11)**  $\sqrt{525}$       **12)**  $\sqrt{219}$       **13)**  $\sqrt{19}$       **14)**  $\sqrt{5}$       **15)**  $\sqrt{405}$   
**16)**  $\sqrt{1250}$       **17)**  $\sqrt{10}$       **18)**  $\sqrt{60}$       **19)**  $\sqrt{198}$       **20)**  $\sqrt{740}$

### Synthesis

**21)** If the  $\sqrt{1} = 1$  and  $\sqrt{9} = 3$ , then  $\sqrt{1/9} = ?$

**22)** If the  $\sqrt{1} = 1$  and  $\sqrt{36} = 6$ , then  $\sqrt{1/36} = ?$

**23)** Evaluate  $\sqrt{1/64} =$

**24)** Evaluate  $\sqrt{1/100} =$

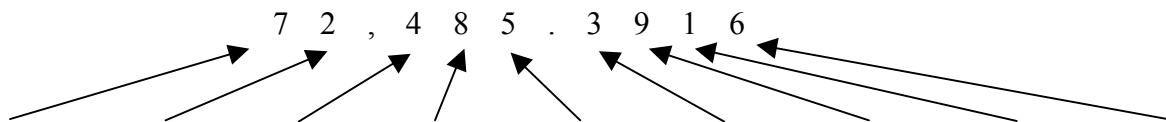
**25)** Evaluate  $\sqrt{1/4} =$

**26)** Find two radical expressions that the mixed number  $5\frac{31}{100}$  falls in-between.

**27)** Find two radical expressions that the mixed number  $11\frac{3}{25}$  falls in-between.

## 1.5 Rational Approximations for Irrational Numbers Using a Calculator

State the place value for each digit.



**Class Notes** – Use your calculator to find a rational approximation for each radical expression.

LP#1 – Round to the nearest tenth $\sqrt{20}$	$\sqrt{52}$	$\sqrt{93}$
LP#2 – Round to the nearest thousandth $\sqrt{14}$	$\sqrt{2}$	$\sqrt{46}$
LP#3 – Round to the nearest millionth $\sqrt{30}$	$\sqrt{125}$	$\sqrt{200}$



**Review** - Use your calculator to estimate each radical expression.

R#1 – Round to the nearest hundredth $\sqrt{58}$	$\sqrt{109}$	$\sqrt{40}$
R#2 – Round to the nearest tenth $\sqrt{32}$	$\sqrt{260}$	$\sqrt{10}$
R#3 – Round to the nearest thousandth $\sqrt{3}$	$\sqrt{145}$	$\sqrt{17}$

### Homework

Use your calculator to find a rational approximation for each radical expression. Round your approximations to the *nearest ten-thousandth*.

- 1)  $\sqrt{13}$       2)  $\sqrt{53}$       3)  $\sqrt{300}$       4)  $\sqrt{85}$       5)  $\sqrt{41}$   
6)  $\sqrt{61}$       7)  $\sqrt{182}$       8)  $\sqrt{22}$       9)  $\sqrt{111}$       10)  $\sqrt{97}$

Estimate each radical expression to the *nearest hundredth*.

- 11)  $\sqrt{525}$     12)  $\sqrt{219}$     13)  $\sqrt{19}$     14)  $\sqrt{5}$     15)  $\sqrt{405}$   
16)  $\sqrt{1250}$     17)  $\sqrt{10}$     18)  $\sqrt{60}$     19)  $\sqrt{198}$     20)  $\sqrt{740}$

- 21) Find a rational approximation for  $\sqrt{62}$  to the nearest hundredth.  
22) Find a rational approximation for  $\sqrt{15}$  to the nearest ten  
23) Find a rational approximation for  $\sqrt{125}$  to the nearest tenth.

### Synthesis

24) If the  $\sqrt{16} = 4$  and  $\sqrt{25} = 5$ , then  $\sqrt{16/25} = ?$

25) If the  $\sqrt{81} = 9$  and  $\sqrt{49} = 7$ , then  $\sqrt{81/49} = ?$

26) Evaluate  $\sqrt{36/64} =$

27) Evaluate  $\sqrt{9/100} =$

28) Evaluate  $\sqrt{121/4} =$