

Math 303

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$$\begin{array}{r} 0.\overline{4} \\ 9 \overline{) 4.0} \\ \underline{-36} \\ \textcircled{4} \end{array}$$

$$\begin{array}{r} 0.\overline{285714} \\ 7 \overline{) 2.000000} \\ \underline{-14} \\ 60 \\ \underline{-56} \\ 40 \\ \underline{-35} \\ 50 \\ \underline{-49} \\ 10 \\ \underline{-7} \\ 30 \\ \underline{-28} \\ \textcircled{2} \end{array}$$

$$\begin{array}{r} 0.\overline{27} \\ 11 \overline{) 3.00} \\ \underline{-22} \\ 80 \\ \underline{-77} \\ \textcircled{3} \end{array}$$

$$\begin{array}{r} 0.\overline{06} \\ 15 \overline{) 1.00} \\ \underline{-90} \\ \textcircled{10} \end{array}$$

$$\begin{array}{r} 0.\overline{026} \\ 75 \overline{) 2.000} \\ \underline{-150} \\ \textcircled{500} \\ \underline{-450} \\ \textcircled{50} \end{array}$$

$$\begin{array}{r} 0.\overline{01} \\ 99 \overline{) 1.00} \\ \underline{-99} \\ \textcircled{1} \end{array}$$

$$\begin{array}{r} 0.\overline{83} \\ 6 \overline{) 5.00} \\ \underline{-48} \\ \textcircled{20} \\ \underline{-18} \\ \textcircled{2} \end{array}$$

$$\begin{array}{r} 0.\overline{076923} \\ 13 \overline{) 1.000000} \\ \underline{-91} \\ 90 \\ \underline{-78} \\ 120 \\ \underline{-117} \\ 30 \\ \underline{-26} \\ 40 \\ \underline{-39} \\ \textcircled{1} \end{array}$$

$$\begin{array}{r} 0.\overline{047619} \\ 21 \overline{) 1.000000} \\ \underline{-84} \\ 160 \\ \underline{-147} \\ 130 \\ \underline{-126} \\ 40 \\ \underline{-21} \\ 190 \\ \underline{-189} \\ \textcircled{1} \end{array}$$

#2. (a) $N = 0.\overline{4}$

$$\begin{array}{r} 10N = 4.\overline{4} \\ - N = 0.\overline{4} \\ \hline 9N = 4 \\ N = \frac{4}{9} \end{array}$$

(b) $N = 0.\overline{61}$

$$\begin{array}{r} 100N = 61.\overline{61} \\ - N = 0.\overline{61} \\ \hline 99N = 61 \\ N = \frac{61}{99} \end{array}$$

(c) $N = 1.3\overline{96}$

$$\begin{array}{r} 100N = 139.6\overline{96} \\ - N = 1.3\overline{96} \\ \hline 99N = 138.3 \\ N = \frac{138.3}{99} = \frac{1383}{990} \\ = \frac{461}{330} = 1\frac{131}{330} \end{array}$$

(d) $N = 0.\overline{55}$

$$\begin{array}{r} 100N = 55.\overline{55} \\ - N = 0.\overline{55} \\ \hline 99N = 55 \\ N = \frac{55}{99} = \frac{5}{9} \end{array}$$

(e) $N = -2.3\overline{4}$

$$\begin{array}{r} 10N = -23.4\overline{4} \\ - N = 2.3\overline{4} \\ \hline 9N = -21.1 \\ N = \frac{-21.1}{9} = \frac{-211}{90} \\ = -2\frac{31}{90} \end{array}$$

(f) $N = -0.0\overline{2}$

$$\begin{array}{r} 10N = -0.2\overline{2} \\ - N = 0.0\overline{2} \\ \hline 9N = -0.2 \\ N = -\frac{0.2}{9} = -\frac{2}{90} \\ = -\frac{1}{45} \end{array}$$

#3.
$$\begin{array}{r} 0.01\overline{6} \\ 60 \overline{) 1.000} \\ \underline{-60} \\ 400 \\ \underline{-360} \\ 40 \end{array}$$

#8. (a)
$$\begin{array}{r} 0.\overline{323232} \\ + 0.\overline{123123} \\ \hline 0.446355 \end{array}$$

Six digits are repeating.

(b)
$$\begin{array}{r} 1.2\overline{343434} \\ + 0.\overline{123412341} \\ \hline 1.357755775 \end{array}$$

Four digits in the repetend.
The value is a rational number.

#4.
$$\begin{array}{r} -1.4\overline{545454} \\ -1.4\overline{54}454 \\ -1.4\overline{54545} \\ -1.4\overline{54}444 \\ -1.454000 \end{array}$$

$$-1.454 > -1.4\overline{54} > -1.4\overline{54} > -1.4\overline{5} = -1.4\overline{54}$$

#10. (a) (Answers will vary)

Sample. $3.22 < 3.2201 < 3.221 < 3.2215 < 3.\overline{2}$

(b) Sample. $462.\overline{24} < 462.2425 < 462.2427 < 462.2429 < 462.243$

#12. (Answers will vary)

(a) Sample. $\frac{3}{4} < 0.751 < 0.755 < 0.\overline{75} < 0.\overline{75}$

(b) Sample. $\frac{1}{3} < 0.33\overline{4} < 0.34 < 0.34\overline{3} < 0.\overline{34}$

#13. (a)

$$\begin{array}{r} 0.428571 \\ 7 \overline{) 3.000000} \\ \underline{-28} \\ 20 \\ \underline{-14} \\ 60 \\ \underline{-56} \\ 40 \\ \underline{-35} \\ 50 \\ \underline{-49} \\ 10 \\ \underline{-7} \\ \textcircled{3} \end{array}$$

Since $21 = 3(6) + 3$,
the 21st digit is the
third digit in the repetend.
The 21st digit is 8.

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(d) $0.332 > 0.32 > 0.3 > 0.233$

(b) $2 < 2.25 < 2.5 = \frac{5}{2}$

(b)

$$\begin{array}{r} 0.05882352941176 \\ 17 \overline{) 1.00000000000000} \\ \underline{-85} \\ 150 \\ \underline{-136} \\ 140 \\ \underline{-136} \\ 40 \\ \underline{-34} \\ 60 \\ \underline{-51} \\ 90 \\ \underline{-85} \\ 50 \\ \underline{-34} \\ 160 \\ \underline{-153} \\ 70 \\ \underline{-68} \\ 20 \\ \underline{-17} \\ 30 \\ \underline{-17} \\ 130 \\ \underline{119} \\ 110 \\ \underline{102} \\ 80 \\ \underline{-68} \\ 120 \\ \underline{-119} \\ \textcircled{1} \end{array}$$

The repetend has
16 digits.

$$\begin{array}{r} 330 \\ 16 \overline{) 5280} \\ \underline{-48} \\ 48 \\ \underline{-48} \\ 00 \end{array}$$

Since the remainder
is 0, the 5280th
digit is 7 the last
digit in the repetend.

$$\begin{array}{r} 102 \\ 80 \\ \underline{-68} \\ 120 \\ \underline{-119} \\ \textcircled{1} \end{array}$$

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#1. (Answers will vary.) Sample. $0.23223222322223222223222223\dots$

#3. 0.9000 $0.\overline{9} > 0.9\overline{98} > \sqrt{0.98} > 0.\overline{98} > 0.9\overline{88} > 0.9 > 0.\overline{898}$
 $0.\overline{9999}$
 $0.\overline{9898}$
 $0.9\overline{8888}$
 $0.9\overline{9898}$
 $0.\overline{898}$
 $\sqrt{0.98} \approx 0.989949$

#4. (a) $\sqrt{51}$ irrational (b) $\sqrt{64} = 8$ rational (c) $\sqrt{324} = 18$ rational
 (d) $\sqrt{325}$ irrational (e) $2 + 3\sqrt{2}$ irrational (f) $\frac{\sqrt{2}}{5}$ irrational

#5. (a) $\sqrt{225} = 15$ (b) $\sqrt{169} = 13$

(c) $\sqrt{-81}$ not real (d) $\sqrt{625} = 25$
 (complex number $9i$)

#13. (a) $Q \cup S = R$ (b) $Q \cap S = \emptyset$
 (c) $Q \cap R = Q$ (d) $S \cap W = \emptyset$
 (e) $W \cup R = R$ (f) $Q \cup R = R$

#14.

	N	I	Q	R	S
a) 6.7			x	x	
b) 5	x	x	x	x	
c) $\sqrt{2}$				x	x
d) -5		x	x	x	
e) $3\frac{1}{2}$			x	x	

Worksheet

$$\#5. (d) 1.45 \div \frac{5}{13} = \frac{1.45}{1} \cdot \frac{13}{5} = 3.77$$

$$\begin{array}{r} 0.29 \\ \times 13 \\ \hline 87 \\ 29 \\ \hline 3.77 \end{array}$$

$$(e) \frac{3}{5} + 14.89 = 0.6 + 14.89 \\ = 15.49$$

$$\begin{array}{r} 14.89 \\ + 0.6 \\ \hline 15.49 \end{array}$$

$$(f) 0.\overline{3} \times 4.2 = \frac{1}{3} \times \frac{4.2}{1} = 1.4$$

$$(g) 0.\overline{31} \times 1.\overline{2} = \frac{31}{99} \times \frac{12}{9} = \frac{31}{81}$$

$$\begin{array}{r} 100N = 31.\overline{31} \\ - N = 0.\overline{31} \\ \hline 99N = 31 \\ N = \frac{31}{99} \end{array}$$

$$\begin{array}{r} 10N = 12.\overline{2} \\ - N = 1.\overline{2} \\ \hline 9N = 11 \\ N = \frac{11}{9} \end{array}$$

$$(j) 4.8 + 9.125 + 7\frac{3}{4} \\ = 4.8 + 9.125 + 7.75 \\ = 21.675$$

$$\begin{array}{r} 4.8 \\ 9.125 \\ + 7.75 \\ \hline 21.675 \end{array}$$