1(a) \( \frac{1}{8} \)  
(b) \( \frac{7}{80} \)  
(c) \( \frac{21}{40} \)  
(d) \( \frac{9}{32} \)

2(a) \( \frac{137}{625} \cdot \frac{16}{16} = \frac{2192}{10000} = .2192 \)
(b) \( \frac{221}{1500} \) cannot be written as a finite decimal (in simplified form; the denominator has a factor of 3 in its factorization)
(c) \( \frac{2793}{186} \cdot \frac{20}{20} = \frac{3}{5} = \frac{15}{100} = .15 \)
(d) \( \frac{123}{184} \) cannot be written as a finite decimal (in simplified form; 184 = 2^3 \cdot 23)
(e) \( \frac{44}{260} = \frac{11}{65} \) cannot be written as a finite decimal (65 = 5 \cdot 13)
(f) \( \frac{84}{350} \cdot \frac{20}{20} = \frac{12.2}{50} = \frac{24}{100} = .24 \)

3 (a) \( \frac{3}{8} = .375 \)
(b) \( \frac{23}{20} = 1 \frac{3}{20} = 1 \frac{15}{100} = 1.15 \)
(g) \(x = 0.5\) 
Multiply by 100 and subtract:

\[ 0.1 - \frac{1}{9} \]

(100x = 1.01010101... \( \Rightarrow x = \frac{1}{9} \)) 

\(9x = 1.11111111... \)

(h) \(x = \frac{2}{3}\) 
Multiply by 3 and subtract:

\[ \frac{2}{3} - \frac{1}{3} = \frac{1}{3} \]

(1.03448258975620698465172413793... \( \Rightarrow x = \frac{2}{3} \))

\(10x = 1.01010101... \)

\(x = \frac{1}{9} \)
4(e) Let $x = 0.\overline{189}$ Multiply by 1000 and subtract.

\[
1000x = 189.189189 \ldots \quad - x = -0.189189 \ldots
\]

\[
\frac{999x}{999} = \frac{189}{999} \quad \rightarrow \quad x = \frac{189}{999} \quad \text{reduce} \quad \frac{21}{111} = \frac{7}{37}
\]

\[
\overline{0.189} = \frac{7}{37}
\]

(f) $0.\overline{05} = 0.05050505 \ldots$

Note this is exactly $0.\overline{50}$ which now has the decimal point immediately before the decimal point.

Let $x = 0.\overline{50}$ Mult thru by $10^2$ or 100

\[
100x = 50 \cdot 0.\overline{50} \quad - x = -0.\overline{50}
\]

\[
\frac{99x}{99} = 50 \quad \rightarrow \quad x = \frac{50}{99}
\]

\[
\overline{0.50} = \frac{50}{99}
\]

(h) Let $x = 2.31\overline{56}$

Extra Step (to get decimal point immediately before the decimal point)

Mult thru by 100 (to move the decimal point 2 places to the right)

\[
100x = 231 \cdot \overline{56} \quad \text{2 digit repeat} \quad \text{Mult thru by } 10^2 \text{or } 100
\]

\[
10000x = 23156 \cdot \overline{56}
- 100x = -231 \cdot \overline{56}
\]

\[
\frac{9900x}{9900} = 22925 \quad \leftarrow \quad \text{Shift to end of 1st repeat} \quad \text{Shift to start of 1st repeat}
\]

\[
x = \frac{22925}{9900} = \frac{917}{396} \quad \text{or} \quad 2 \overline{125} \frac{396}{396}
\]

\[
2.31\overline{56} = \frac{917}{396} \quad \text{or} \quad 2 \frac{125}{396}
\]

5 a) Let $x = \overline{q}$ Mult thru by 10

\[
10x = q \cdot \overline{q} \quad -x = -q
\]

\[
q x = q \quad \rightarrow \quad x = \frac{q}{q} = 1
\]

So $\overline{q} = 1$

b) $4329 \cdot \overline{q} = 4329 + \overline{q} = 4329 + 1 = 4330$
7 (a) \[ 0.03 = 3 \times 0.01 \]
\[ = 3 \times \frac{1}{99} = \frac{1}{33} \]

(b) \[ 0.324 = 324 \times 0.001 \]
\[ = 324 \times \frac{1}{999} = \frac{12}{37} \]

(c) \[ 5.32 = 5 + 32 \times 0.01 \]
\[ = 5 + 32 \times \frac{1}{99} = \frac{532}{99} \approx \frac{527}{99} \]

(d) \[ 0.983 = 983 \times 0.001 \]
\[ = 983 \times \frac{1}{999} = \frac{983}{999} \]