

# SOL HW 1.1

September 25, 2016 2:02 PM

Angel Liu

## Assignment 1.1 Fractions and Decimals Worksheet:

1. Convert each of the following fractions to a percentage without using a calculator.

### Denominator 2

Fraction	Decimal
$\frac{1}{2}$	0.5
$\frac{2}{2}$	1
$\frac{3}{2}$	1.5
$\frac{4}{2}$	2
$\frac{5}{2}$	2.5
$\frac{6}{2}$	3

### Denominator 3

Fraction	Decimal
$\frac{1}{3}$	$0.\overline{3}$
$\frac{2}{3}$	$0.\overline{6}$
$\frac{3}{3}$	1
$\frac{4}{3}$	$1.\overline{3}$
$\frac{5}{3}$	$1.\overline{6}$
$\frac{6}{3}$	2

### Denominator 4

Fraction	Decimal
$\frac{1}{4}$	0.25
$\frac{2}{4}$	0.5
$\frac{3}{4}$	0.75
$\frac{4}{4}$	1
$\frac{5}{4}$	1.25
$\frac{6}{4}$	1.5

### Denominator 5

Fraction	Decimal
$\frac{1}{5}$	0.2
$\frac{2}{5}$	0.4
$\frac{3}{5}$	0.6
$\frac{4}{5}$	0.8
$\frac{5}{5}$	1
$\frac{6}{5}$	1.2
$\frac{7}{5}$	1.4
$\frac{8}{5}$	1.6

### Denominator 6

Fraction	Decimal
$\frac{1}{6}$	$0.1\overline{6}$
$\frac{2}{6}$	$0.\overline{3}$
$\frac{3}{6}$	0.5
$\frac{4}{6}$	$0.\overline{6}$
$\frac{5}{6}$	$0.8\overline{3}$
$\frac{6}{6}$	1
$\frac{7}{6}$	$1.1\overline{6}$
$\frac{8}{6}$	$1.\overline{3}$

### Denominator 7

Fraction	Decimal
$\frac{1}{7}$	$0.1\overline{42857}$
$\frac{2}{7}$	$0.2\overline{85714}$
$\frac{3}{7}$	$0.4\overline{28571}$
$\frac{4}{7}$	$0.5\overline{71428}$
$\frac{5}{7}$	$0.7\overline{14285}$
$\frac{6}{7}$	$0.8\overline{57142}$
$\frac{7}{7}$	$1.\overline{142857}$
$\frac{8}{7}$	$1.2\overline{85714}$

### Denominator 8:

Fraction	Decimal
$\frac{1}{8}$	0.125
$\frac{2}{8}$	0.25
$\frac{3}{8}$	0.375
$\frac{4}{8}$	0.5
$\frac{5}{8}$	0.625
$\frac{6}{8}$	0.75
$\frac{7}{8}$	0.875
$\frac{8}{8}$	1
$\frac{9}{8}$	1.125
$\frac{10}{8}$	1.25

### Denominator 9:

Fraction	Decimal
$\frac{1}{9}$	$0.\overline{1}$
$\frac{2}{9}$	$0.\overline{2}$
$\frac{3}{9}$	$0.\overline{3}$
$\frac{4}{9}$	$0.\overline{4}$
$\frac{5}{9}$	$0.\overline{5}$
$\frac{6}{9}$	$0.\overline{6}$
$\frac{7}{9}$	$0.\overline{7}$
$\frac{8}{9}$	$0.\overline{8}$
$\frac{9}{9}$	1
$\frac{10}{9}$	$1.\overline{1}$

### Denominator 11

Fraction	Decimal
$\frac{1}{11}$	$0.0\overline{9}$
$\frac{2}{11}$	$0.1\overline{8}$
$\frac{3}{11}$	$0.2\overline{7}$
$\frac{4}{11}$	$0.3\overline{6}$
$\frac{5}{11}$	$0.4\overline{5}$
$\frac{6}{11}$	$0.5\overline{4}$
$\frac{7}{11}$	$0.6\overline{3}$
$\frac{8}{11}$	$0.7\overline{2}$
$\frac{9}{11}$	$0.8\overline{1}$
$\frac{10}{11}$	$0.9\overline{0}$

2. What do you notice about all fractions with 3, 6, or 9 as a denominator? What patterns did you notice?

Explain?

- only 1 repeating digit

$$-\frac{1}{3} = 2 \times \frac{1}{6}$$

$$-\frac{1}{3} = 3 \times \frac{1}{9}$$

- can all become a fraction with the base of 9 (or multiple of 9)

3. What do you notice about all fractions with 2, 4, or 8 as a denominator? What patterns did you notice?

Explain?

- no repeating digits

$$-\frac{1}{2} = 2 \times \frac{1}{4}$$

$$-\frac{1}{2} = 4 \times \frac{1}{8}$$

- has decimal representation

4. What do you notice about all fractions with 7 as a denominator? What patterns did you notice? Explain?

- always has digits 1, 4, 2, 8, 5, 7

- always in the same order

- starts with next biggest number when numerator increases by 1

5. What patterns do you think there will be for all fractions with 11, 99, 999 or 9999 as a denominator? Explain and justify your answer.

- has same number of repeating digits as number of 9's in denominator

- fraction with 11 as denominator has 2 repeating digits

6. Evaluate each of the following expressions to atleast three decimal places without using a calculator:

$$\begin{aligned} \text{a) } \frac{35}{45} + \frac{14}{18} &= \frac{7}{9} + \frac{7}{9} \\ &= \frac{14}{9} \\ &= 1.\bar{5} \end{aligned}$$

$$\underline{1.\bar{5}}$$

$$\begin{aligned} \text{b) } \frac{1}{3} \times \frac{6}{10} \times \frac{15}{21} \times \frac{28}{36} \times \frac{45}{55} &= \frac{1}{3} \times \frac{3}{5} \times \frac{5}{7} \times \frac{7}{9} \times \frac{9}{11} \\ &= \frac{1}{5} \times \frac{5}{9} \times \frac{9}{11} \\ &= \frac{1}{11} \\ &= 0.\bar{09} \end{aligned}$$

$$\begin{aligned} \text{c) } 0.007 \div 0.35 &= \frac{7}{1000} \div \frac{35}{100} \\ &= \frac{7}{1000} \times \frac{20}{7} \\ &= \frac{1}{50} \\ &= 0.02 \end{aligned}$$

$$\begin{aligned} \text{d) } (0.375)^3 \times \left(\frac{2}{3}\right)^2 &= \left(\frac{3}{8}\right)^3 \times \frac{4}{9} \\ &= \frac{27}{512} \times \frac{4}{9} \\ &= \frac{3}{128} \\ &= 0.023 \end{aligned}$$

$$\begin{aligned} \text{e) } (0.\bar{3} - 0.25) \times 1.2 &= \left(\frac{1}{3} - \frac{1}{4}\right) \times 1.2 \\ &= \frac{1}{12} \times \frac{6}{5} \\ &= \frac{1}{10} \\ &= 0.1 \end{aligned}$$

$$\underline{0.1}$$

$$\begin{aligned} \text{f) } 0.\bar{2} \times 0.5 - 0.\bar{6} &= \frac{2}{9} \times \frac{1}{2} - \frac{2}{3} \\ &= \frac{1}{9} - \frac{6}{9} \\ &= -\frac{5}{9} \\ &= -0.\bar{5} \end{aligned}$$

$$\begin{aligned} \text{g) } 0.\bar{7} \times 0.\overline{857142} - 0.4 &= \frac{7}{9} \times \frac{6}{7} - \frac{2}{5} \\ &= \frac{2}{3} - \frac{2}{5} \\ &= \frac{10}{15} - \frac{6}{15} \\ &= \frac{4}{15} \\ &= 0.\bar{26} \end{aligned}$$

$$\begin{aligned} \text{h) } \frac{2}{7} \times 0.\bar{55} \times 1.4 \div \frac{5}{4} &= \frac{2}{7} \times \frac{5}{9} \times \frac{7}{5} \div \frac{5}{4} \\ &= \frac{2}{5} \times \frac{5}{9} \div \frac{5}{4} \\ &= \frac{2}{9} \div \frac{5}{4} \\ &= \frac{2}{9} \times \frac{4}{5} \\ &= \frac{8}{45} \\ &= 0.0\bar{17} \end{aligned}$$

7. Simplify each of the following as a single fraction to lowest terms:

$$\begin{aligned} \text{a) } (0.\bar{2})(0.\bar{3}) &= \frac{2}{9} \times \frac{1}{3} \\ &= \frac{2}{27} \end{aligned}$$

$$\underline{\frac{2}{27}}$$

$$\begin{aligned} \text{b) } (0.\bar{13})(0.\bar{5}) &= \frac{13}{99} \times \frac{5}{9} \\ &= \frac{65}{891} \end{aligned}$$

$$\begin{aligned} \text{c) } (0.875) \times (0.\bar{4}) \times (0.75) &= \frac{7}{8} \times \frac{4}{9} \times \frac{3}{4} \\ &= \frac{7}{18} \times \frac{3}{4} \\ &= \frac{7}{24} \end{aligned}$$

$$\begin{aligned} \text{d) } 0.\bar{12} \times 0.375 - 0.\bar{2} &= \frac{12}{99} \times \frac{3}{8} - \frac{2}{9} \\ &= \frac{4}{33} \times \frac{3}{8} - \frac{2}{9} \\ &= \frac{1}{22} - \frac{2}{9} \\ &= \frac{9}{198} - \frac{44}{198} \\ &= -\frac{35}{198} \end{aligned}$$

$$\begin{aligned} \text{e) } 0.\overline{63} \div 1.75 & \\ &= \frac{7}{11} \div \frac{7}{4} \\ &= \frac{7}{11} \times \frac{4}{7} \\ &= \frac{4}{11} \end{aligned}$$

$$\underline{\frac{4}{11}}$$

$$\begin{aligned} \text{f) } 0.\overline{44} \times 2.25 - 0.\overline{5} & \\ &= \frac{4}{9} \times \frac{9}{4} - \frac{5}{9} \\ &= 1 - \frac{5}{9} \\ &= \frac{9}{9} - \frac{5}{9} \\ &= \frac{4}{9} \end{aligned}$$

$$\underline{\frac{4}{9}}$$

$$\begin{aligned} \text{g) } (2.\overline{3}) \times (0.125) \times 0.875 & \\ &= \frac{7}{3} \times \frac{1}{8} \times \frac{7}{8} \\ &= \frac{7}{24} \times \frac{7}{8} \\ &= \frac{49}{192} \end{aligned}$$

$$\underline{\frac{49}{192}}$$

$$\begin{aligned} \text{h) } 0.\overline{285714} \times 1.75 \div 1.25 & \\ &= \frac{2}{7} \times \frac{7}{4} \div \frac{5}{4} \\ &= \frac{1}{2} \div \frac{5}{4} \\ &= \frac{1}{2} \times \frac{4}{5} \\ &= \frac{2}{5} \end{aligned}$$

$$\underline{\frac{2}{5}}$$

8. What is the digit of the 100<sup>th</sup> decimal place for  $\frac{1}{7}$ ?

$$\begin{aligned} \frac{1}{7} &= 0.\overline{142857} \text{ (6 digits)} \\ 96^{\text{th}} &= \text{multiple of } 6 = 7 \\ 97^{\text{th}} &= 1 \\ 98^{\text{th}} &= 4 \\ 99^{\text{th}} &= 2 \\ 100^{\text{th}} &= 8 \end{aligned}$$

$$\underline{8}$$

9. What is the digit of the 200<sup>th</sup> decimal place for  $\frac{1}{13}$ ?

$$\begin{aligned} \frac{1}{13} &= 0.\overline{076923} \\ 198^{\text{th}} &= \text{multiple of } 6 = 3 \end{aligned}$$

$$\underline{\hspace{2cm}}$$

10. Given that the first 8 digits for the decimal representation

of  $\frac{1}{17}$  is 0.05882341, derive the next 8 digits.

\_\_\_\_\_

11. How many repeating digits does the decimal representation

of fraction  $\frac{1}{19}$  have? Write them down.

\_\_\_\_\_

12. Simplify each of the following expressions without using a calculator:

a)  $\overline{0.428571} - \overline{0.285714}$

b)  $\frac{0.875 - 0.125}{0.25}$

c)  $\frac{0.15 - \overline{0.3}}{0.5}$

d)  $(\overline{0.2})^2 \times (\overline{0.3})^2$

\_\_\_\_\_

$$e) \frac{(\overline{0.18}) - (\overline{0.3})}{(\overline{0.27})}$$

$$f) \frac{\overline{0.72} - \overline{0.45}}{0.75}$$

$$g) \frac{0.375 + (\overline{0.8})^{-1} - 0.25}{(\overline{0.25})^2}$$

$$h) \frac{\overline{0.3} - \overline{0.15}}{\overline{0.2} \times \overline{0.3}}$$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

13. Convert the following decimal representations to a mixed fraction:

a) 0.00353

b)  $14.\overline{285714}$

c) 3.23232323...

d)  $-4.\overline{151515}$

\_\_\_\_\_

e)  $0.\overline{255}$

f)  $0.\overline{0255}$

g)  $0.0\overline{255}$

h)  $0.0\overline{0255}$

\_\_\_\_\_

i)  $0.0\overline{00671}$

j)  $0.000\overline{3817}$

k)  $0.1212212221\dots$

l)  $0.\overline{38501927}$

\_\_\_\_\_

14. Let  $x = 0.7181818\dots$ , where the digits '18' repeat. When  $x$  is expressed as a fraction in lowest terms, then its denominator exceeds its numerator by:

(a) 18

(b) 31

(c) 93

(d) 141

(e) 279