

10. [Decimals / Fractions / Percents]

Skill 10.1 Finding equivalent decimal place values.

MMYellow 1 1 2 2 3 3 4 4
MMRed 1 1 2 2 3 3 4 4

To change from **smaller** units to **larger** units

- Divide by the conversion factor (because you need less).

Example: To change 40 hundredths to tenths
 \div by 10

To change from **larger** units to **smaller** units

- Multiply by the conversion factor (because you need more).

Example: To change 4 units to tenths
 \times by 10

Hint: Conversion Factors

1 unit = 10 tenths = 100 hundredths

1 tenth = 10 hundredths

	units	tenths	hundredths
units	1	10	100
tenths	(0.1)	1	10
hundredths	(0.01)	(0.1)	1

larger ← → smaller

Q. four = hundredths

A. $4 \times 100 = 400$

Units are larger than hundredths so you need to multiply.

$$4 \times 100 = 400$$

a) 8 tenths = hundredths

$$8 \times 10 = 80$$

larger to smaller so multiply by 10

b) one = tenths

c) one = hundredths

d) six = tenths

e) seven = tenths

f) three = hundredths

g) 2 tenths = hundredths

h) 6 tenths = hundredths

i) eight = tenths

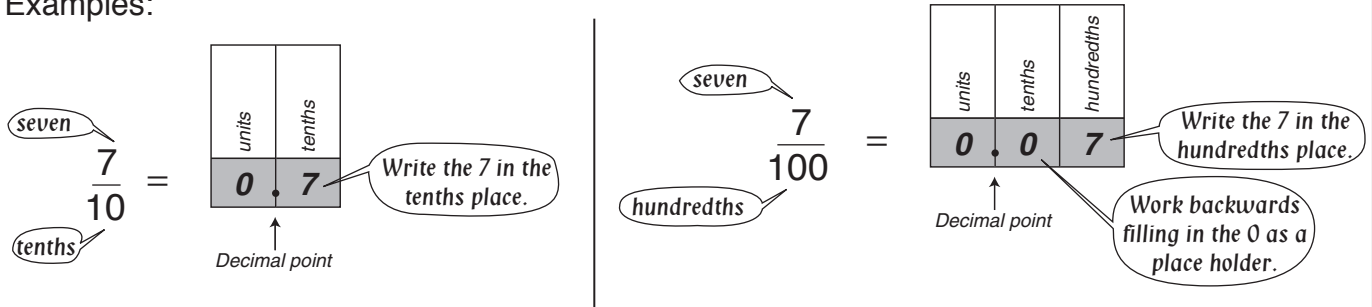
j) six = hundredths

Skill 10.2 Writing a fraction as a decimal number.

When the denominator **is** a power of 10:

- Say the fraction out loud using tenths or hundredths.
- Write the last digit of the numerator in the place spoken of in the denominator.
- Fill in the numerator working backwards to the decimal point.
- Use zeros as place holders where necessary.

Examples:



Hint: The number of zeros in the denominator shows the number of digits after the decimal point.

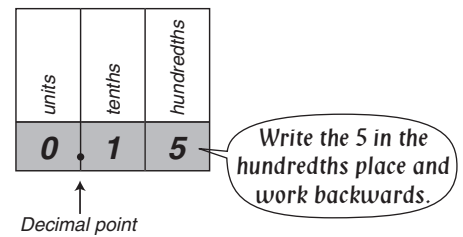
$$\frac{7}{10} = 0.\underline{7}$$

$$\frac{7}{100} = 0.\underline{07}$$

Q. Write $\frac{15}{100}$ as a decimal number.

A. 0.15

Read as: fifteen hundredths



a) Which of these decimal numbers equals $\frac{5}{10}$?

A) 1.5 B) 1.05 C) 0.5

five tenths

C

b) Write $\frac{6}{10}$ as a decimal number.

.....

c) Write $\frac{1}{10}$ as a decimal number.

.....

d) Write $\frac{27}{100}$ as a decimal number.

.....

e) Write $\frac{8}{100}$ as a decimal number.

.....

f) Write $\frac{147}{1000}$ as a decimal number.

.....

g) Which of these decimal numbers equals $\frac{7}{10}$?

A) 0.07 B) 7.0 C) 0.7

.....

h) Which of these decimal numbers equals $\frac{2}{10}$?

A) 2 B) 0.2 C) 2.0

.....

i) Which of these decimal numbers equals $\frac{35}{100}$?

A) 3.05 B) 3.5 C) 0.35

.....

Skill 10.3 Writing a decimal number as a fraction.

- From left to right (ignoring zeros if they start the number) write the digits as the numerator.
- Use the place value of the last digit of the decimal number to determine the size of the denominator. (see also 10.2 page 60)

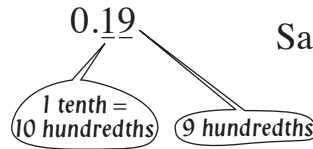
Q. Write 0.19 as a fraction.

A. $0.19 = \frac{19}{100}$

Write 19.

The nine is in the hundredths place.
Write 100ths as the denominator.

Said as: $\frac{19}{100}$ “nineteen hundredths”



a) Write 0.5 as a fraction.



$\frac{5}{10}$

b) Write 0.9 as a fraction.

c) Write 0.7 as a fraction.

d) Which of these fractions equals 0.8?

- A) $\frac{8}{10}$ B) $\frac{18}{100}$ C) $\frac{80}{10}$

eight tenths

A

e) Which of these fractions equals 0.13?

- A) $\frac{13}{100}$ B) $\frac{3}{10}$ C) $\frac{31}{100}$

.....

f) Which of these fractions equals 0.23?

- A) $\frac{3}{10}$ B) $\frac{2}{100}$ C) $\frac{23}{100}$

.....

g) Which of these fractions equals 0.3?

- A) $\frac{30}{10}$ B) $\frac{300}{100}$ C) $\frac{3}{10}$

.....

h) Which of these fractions equals 0.45?

- A) $\frac{45}{100}$ B) $\frac{4}{10}$ C) $\frac{54}{100}$

.....

i) Which of these fractions equals 0.05?

- A) $\frac{5}{10}$ B) $\frac{5}{100}$ C) $\frac{50}{100}$

.....

j) Write 0.3 as a fraction.

k) Write 0.07 as a fraction.

l) Write 0.29 as a fraction.

m) Write 0.17 as a fraction.

n) Write 0.31 as a fraction.

o) Write 0.03 as a fraction.

p) Write 0.1 as a fraction.

q) Write 0.49 as a fraction.

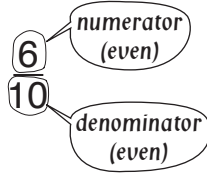
r) Write 0.01 as a fraction.

Skill 10.4 Writing a decimal number as a fraction in simplest form.

MMYellow 1 1 2 2 3 3 4 4
MMRed 1 2 2 3 3 4 4

- Write the decimal as a fraction with a power of 10 as the denominator.
- Decide if the fraction can be simplified.
If both numbers, top (numerator) and bottom (denominator), can be divided by the same number then the fraction can be simplified.

Hint: If the numbers are both even then you can start with dividing by 2.



- Divide both the numerator and the denominator by the same number.

$$\frac{6}{10} \div 2 = \frac{3}{5}$$

Q. Write 0.02 as a fraction in simplest form.

$$\begin{aligned} \mathbf{A.} \quad 0.02 &= \frac{2}{100} \\ \frac{2}{100} \div 2 &= \frac{1}{50} \end{aligned}$$

Write 0.02 as a fraction over 100.

Divide the numerator and the denominator by 2.

a) Write 0.4 as a fraction in simplest form.

$$\frac{4}{10} \div 2 = \frac{2}{5}$$

b) Write 0.75 as a fraction in simplest form.

$$= \frac{\square}{\square}$$

c) Write 0.8 as a fraction in simplest form.

$$= \frac{\square}{\square}$$

d) Write 0.2 as a fraction in simplest form.

$$= \frac{\square}{\square}$$

e) Write 0.18 as a fraction in simplest form.

$$= \frac{\square}{\square}$$

f) Write 0.36 as a fraction in simplest form.

$$= \frac{\square}{\square}$$

g) Write 0.1 as a fraction in simplest form.

$$= \frac{\square}{\square}$$

h) Write 0.45 as a fraction in simplest form.

$$= \frac{\square}{\square}$$

i) Write 0.06 as a fraction in simplest form.

$$= \frac{\square}{\square}$$

j) Write 0.62 as a fraction in simplest form.

$$= \frac{\square}{\square}$$

k) Write 0.88 as a fraction in simplest form.

$$= \frac{\square}{\square}$$

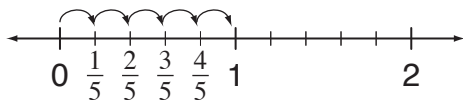
l) Write 0.12 as a fraction in simplest form.

$$= \frac{\square}{\square}$$

Skill 10.5 Reading a fraction on a number line.

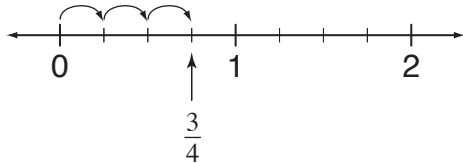
- Count the number of spaces between two consecutive whole numbers. The number of spaces tells you the value of the denominator.

Example: If there are 5 spaces between the whole numbers, then each space equals $\frac{1}{5}$



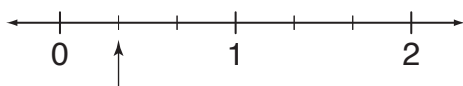
5 spaces \Rightarrow denominator

- Q.** Name the fraction shown by the arrow on this number line.



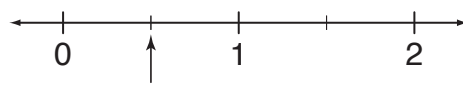
- A.** $\frac{3}{4}$ There are four spaces between 0 and 1. Each space equals $\frac{1}{4}$. The arrow points to $\frac{3}{4}$.

- a)** Name the fraction shown by the arrow on this number line.

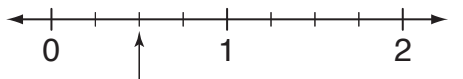


$\frac{1}{3}$

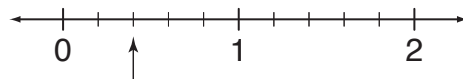
- b)** Name the fraction shown by the arrow on this number line.



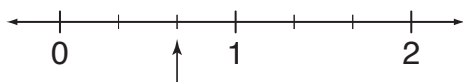
- c)** Name the fraction shown by the arrow on this number line.



- d)** Name the fraction shown by the arrow on this number line.



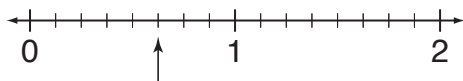
- e)** Name the fraction shown by the arrow on this number line.



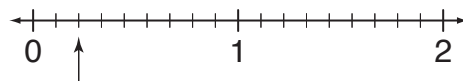
- f)** Name the fraction shown by the arrow on this number line.



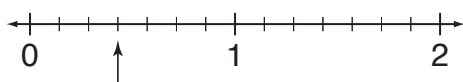
- g)** Name the fraction shown by the arrow on this number line.



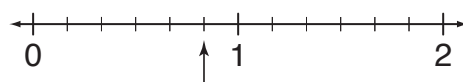
- h)** Name the fraction shown by the arrow on this number line.



- i)** Name the fraction shown by the arrow on this number line.



- j)** Name the fraction shown by the arrow on this number line.



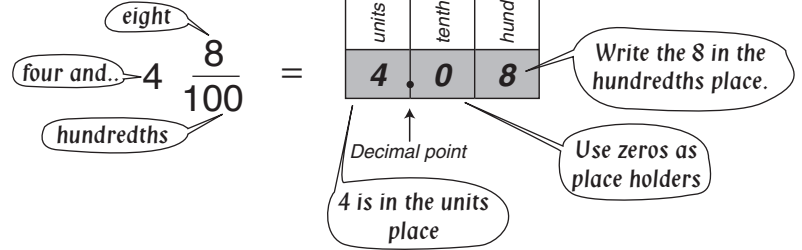
Skill 10.6 Writing a mixed number as a decimal number.

MMYellow 11 2 3 3 4 4
MMRed 11 2 2 3 3 4 4

When the denominator **is** a power of 10:

- Write the whole number first.
- Place the decimal point.
- Write the fraction as a decimal number.
(see skill 10.2, page 60)

Example:



Hint: The number of zeros in the denominator shows the number of digits after the decimal point.

$$\frac{16}{1000} = 0.\underline{0}16$$

Q. Write the mixed number **A. 8.24**

$8\frac{24}{100}$ as a decimal number.

Read as: *Eight and twenty-four hundredths*

Write the whole number, 8 units.

Put the decimal point.

Write the numerator 24, with the last digit 4 in the hundredths place.

[No zero place holders are necessary.]

a) Write the mixed number $5\frac{7}{10}$ as a decimal number.

$5 + 0.7$ 5.7

b) Write the mixed number $2\frac{4}{10}$ as a decimal number.

.....

c) Write the mixed number $9\frac{1}{10}$ as a decimal number.

.....

d) Write the mixed number $3\frac{7}{10}$ as a decimal number.

.....

e) Write the mixed number $2\frac{46}{100}$ as a decimal number.

.....

f) Write the mixed number $6\frac{33}{100}$ as a decimal number.

.....

g) Write the mixed number $7\frac{5}{10}$ as a decimal number.

.....

h) Write the mixed number $1\frac{25}{100}$ as a decimal number.

.....

i) Write the mixed number $8\frac{2}{100}$ as a decimal number.

.....

Skill 10.7 Modeling and writing a percent as a fraction.

Hint: Percent means “fraction of one hundred”.

Q. Shade 75% or $\frac{3}{4}$ of this rectangle.



75% is said as 75 percent.
75% means 75 out of 100 and as the fraction equals $\frac{75}{100}$

Divide by 25 to simplify:

$$\frac{75 \div 25}{100 \div 25} = \frac{3}{4}$$

Q. Write 10% as a fraction.

A. $10\% = \frac{10}{100}$
 $\frac{10 \div 10}{100 \div 10} = \frac{1}{10}$

10% is said as “10 percent”.
10% means 10 out of 100 and as the fraction equals $\frac{10}{100}$

Divide by 10 to simplify.

a) Shade 25% or $\frac{1}{4}$ of this rectangle.



b) Shade 50% or $\frac{1}{2}$ of this rectangle.



c) Shade 75% or $\frac{3}{4}$ of this circle.



d) Shade 25% or $\frac{1}{4}$ of this circle.



e) Shade 10% or $\frac{1}{10}$ of this rectangle.



f) Shade 20% or $\frac{1}{5}$ of this circle.



g) Write 20% as a fraction.

$$\frac{20}{100} = \frac{20 \div 20}{100 \div 20} = \frac{1}{5}$$

h) Write 50% as a fraction.

$$= \frac{\quad}{\quad}$$

i) Write 75% as a fraction.

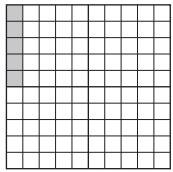
$$= \frac{\quad}{\quad}$$

j) Write 25% as a fraction.

$$= \frac{\quad}{\quad}$$

Hint: Percent means "fraction of one hundred".

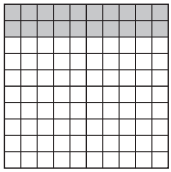
Q. What percent of the whole square is shaded?



A. 5%

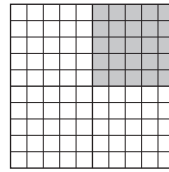
The whole square is divided into 100 smaller squares.
Calculate or count the number of small squares that are shaded.
5 squares shaded means 5%

a) What percent of the whole square is shaded?



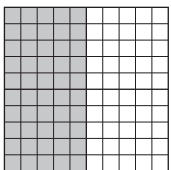
20%

b) What percent of the whole square is shaded?



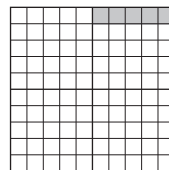
%

c) What percent of the whole square is shaded?



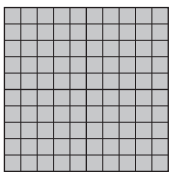
%

d) What percent of the whole square is shaded?



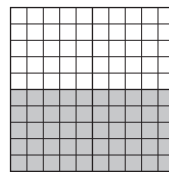
%

e) What percent of the whole square is shaded?



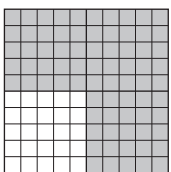
%

f) What percent of the whole square is shaded?



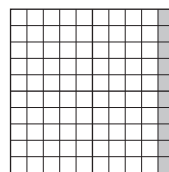
%

g) What percent of the whole square is shaded?



%

h) What percent of the whole square is shaded?



%

Skill 10.9 Writing a fraction as a percent.

- Find the equivalent fraction which has a denominator of 100.

Hint: Percent means "fraction of one hundred".

Q. Write $\frac{8}{10}$ as a percent.

$$\begin{aligned} \text{A. } \frac{8}{10} &= \frac{?}{100} \\ \frac{8 \times 10}{10 \times 10} &= \frac{80}{100} \\ &= \mathbf{80\%} \end{aligned}$$

Make the denominator 100 by finding the equivalent fraction.

Denominator:

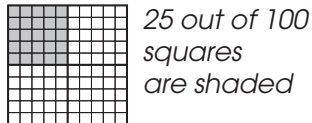
To get from 10 to 100 you must \times by 10.

Numerator:

Multiply 8 by 10.

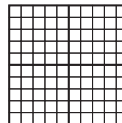
80 out of 100 means 80%

a) One quarter is what percent?



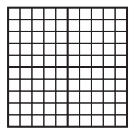
25 %

b) One half is what percent?



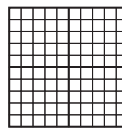
%

c) Two quarters is what percent?



%

d) Three quarters is what percent?



%

e) Write $\frac{90}{100}$ as a percent.

%

f) Write $\frac{20}{100}$ as a percent.

%

g) Write $\frac{3}{10}$ as a percent.

$$\frac{3 \times 10}{10 \times 10} = \frac{30}{100} =$$

%

h) Write $\frac{7}{10}$ as a percent.

%

i) Write $\frac{10}{100}$ as a percent.

%

j) Write $\frac{60}{100}$ as a percent.

%

k) Write $\frac{9}{10}$ as a percent.

%

l) Write $\frac{1}{10}$ as a percent.

%

Skill 10.10 Writing a decimal number as a percent.

- Move the decimal point 2 places to the right.
- Add the percent sign.

Hint: A decimal number with two places after the decimal point is like a fraction with a denominator of 100. Both mean the whole is divided into 100 parts.

Moving the decimal point 2 places to the right turns any number into a percent.

$$0.07 = \begin{array}{|c|c|c|} \hline & \text{units} & \text{tenths} & \text{hundredths} \\ \hline 0 & . & 0 & 7 \\ \hline \end{array} = \begin{array}{c} \text{seven} \\ \frac{7}{100} \\ \text{hundredths} \end{array} = 7\%$$

↑
Decimal point

Q. Write 0.17 as a percent.

A. 17%

Read as: “seventeen hundredths”.
Move the decimal point 2 places to the right.
Add the percent sign.

a) Write 0.3 as a percent.

0.3 = three tenths

0.30 = thirty hundredths

30%

b) Write 0.25 as a percent.

%

c) Write 0.17 as a percent.

%

d) Write 0.99 as a percent.

%

e) Write 0.5 as a percent.

%

f) Write 0.1 as a percent.

%

g) Write 0.45 as a percent.

%

h) Write 0.6 as a percent.

%

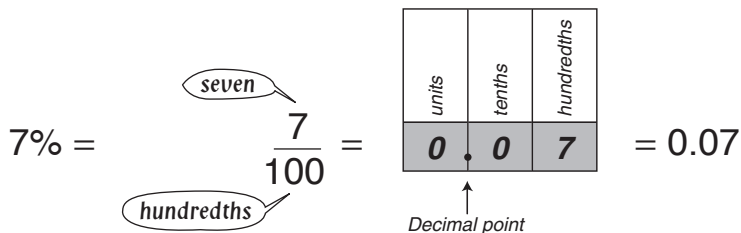
Skill 10.11 Writing a percent as a decimal number.

- Remove the percent sign.
- Place the decimal point and add zeros either side of the number.
- Move the decimal point 2 places to the left.

Hint: A percent is a number out of 100.

A decimal number with two places after the decimal point is like a fraction with a denominator of 100.

Both mean the whole is divided into 100 parts.



Q. Write 50% as a decimal.

A. 50%
 $= 050.0$
 $= 0\widehat{50}.0$
 $= 0.5$

Remove the % sign.

Place the decimal point and add zeros either side of the number.

Move the decimal point 2 places to the left.

a) Write 10% as a decimal.

$0\widehat{10}.0 =$

b) Write 25% as a decimal.

.....

c) Write 15% as a decimal.

.....

d) Write 23% as a decimal.

.....

e) Write 30% as a decimal.

.....

f) Write 70% as a decimal.

.....

g) Write 55% as a decimal.

.....

h) Write 9% as a decimal.

.....

i) Write 65% as a decimal.

.....

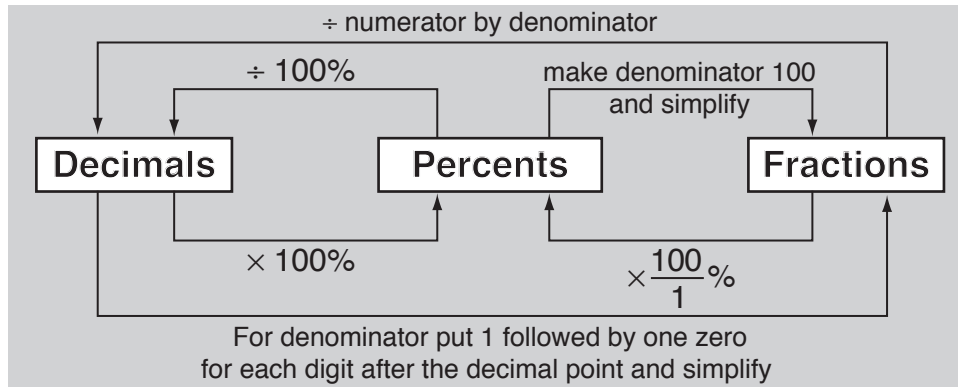
j) Write 12% as a decimal.

.....

Skill 10.12 Converting between decimals, fractions and percents.

MMYellow 1 1 2 2 3 3 4 4
MMRed 1 1 2 2 3 3 4 4

- Convert between decimals, fractions and percents. (see skills 10.2, 10.3, 10.4, pages 60 to 62, skill 10.7 page 65 and skills 10.9, 10.10 and 10.11, pages 67 to 69)



Q. Complete the table:

Decimal	Fraction	Percent
	$\frac{6}{10}$	

A.

Decimal	Fraction	Percent
0.6	$\frac{6}{10}$ OR $\frac{60}{100}$	60%

$$\frac{6}{10} = 6 \div 10 = 0.\widehat{6}$$

Decimal

$$\frac{6}{10} = \frac{6}{10} \times \frac{100}{1} \% = 6 \times 10\% = 60\%$$

Percent

a) Complete the table:

Decimal	Fraction	Percent
0.5	$\frac{50}{100}$ OR $\frac{1}{2}$	50%

b) Complete the table:

Decimal	Fraction	Percent
0.45	$\frac{45}{100}$	

c) Complete the table:

Decimal	Fraction	Percent
	$\frac{51}{100}$	51%

$0.5 =$

d) Complete the table:

Decimal	Fraction	Percent
0.85		85%

e) Complete the table:

Decimal	Fraction	Percent
0.9		90%

f) Complete the table:

Decimal	Fraction	Percent
	$\frac{23}{100}$	23%

$0.85 =$

g) Complete the table:

Decimal	Fraction	Percent
0.2		20%

h) Complete the table:

Decimal	Fraction	Percent
	$\frac{75}{100}$ OR $\frac{3}{4}$	75%

i) Complete the table:

Decimal	Fraction	Percent
0.8	$\frac{80}{100}$ OR $\frac{4}{5}$	

$0.2 =$

Skill 10.13 Solving proportions (1).

- Write the ratio or word statement as a fraction or an equation with fractions.

EITHER

- Check to see if the numerator and the denominator of the first fraction can be multiplied or divided by the same number to result in the second fraction.


Example:

These fractions are all in proportion to $\frac{2}{3}$

$$\frac{2}{3} \times 2 = \frac{4}{6} \quad \frac{2}{3} \times 3 = \frac{6}{9} \quad \frac{2}{3} \times 4 = \frac{8}{12} \quad \frac{2}{3} \times 5 = \frac{10}{15}$$

OR

- Cross multiply the numerator of each fraction by the denominator of the other.

Example: $\frac{2}{3} = \frac{4}{6}$ 

$$2 \times 6 = 12$$

$$4 \times 3 = 12$$

Hint: If the cross products are equal the ratios are in proportion.


Q. Complete the proportion:

A. 10

1 is to 5 as 2 is to...

First write the words as a fraction.

$$1 : 5 = \frac{1}{5} \quad \text{and} \quad 2 : ? = \frac{2}{?}$$

$$\frac{1}{5} = \frac{2}{?}$$
 

Cross multiply $2 \times 5 = 10$

Find $1 \times ? = 10$

$1 \times 10 = 10$ so the missing number is 10.

a) Complete the proportion:

1 is to 4 as is to 20.

$$\frac{1}{4} = \frac{?}{20} \quad \text{SO} \quad \frac{1}{4} \times 5 = \frac{5}{20}$$

b) Complete the proportion:

2 is to 10 as is to 50.

c) Complete the proportion:

9 : 12 as 3 :

d) Complete the proportion:

4 : 12 as 1 :

e) Which ratio forms a proportion with $\frac{1}{4}$?

- A) $\frac{4}{4}$ B) $\frac{3}{12}$

f) Which ratio forms a proportion with $\frac{3}{4}$?

- A) $\frac{2}{3}$ B) $\frac{9}{12}$

Skill 10.13 Solving proportions (2).

MMYellow 1 1 2 2 3 3 4 4
MMRed 1 1 2 2 3 3 4 4

Q. Which ratio forms a proportion with $\frac{1}{4}$?

- A) $\frac{4}{12}$ B) $\frac{3}{9}$ C) $\frac{25}{100}$ D) $\frac{8}{8}$

A. C

Check to see if the numerator and the denominator of $\frac{1}{4}$ can be multiplied by the same number to result in any of the other fractions.

- A) $\frac{1}{4} \times 4 = \frac{4}{16}$ (not the result we want)
 B) $\frac{1}{4} \times 3 = \frac{3}{12}$ (not the result we want)
 C) $\frac{1}{4} \times 25 = \frac{25}{100}$ (the result we want)
 D) $\frac{1}{4} \times 8 = \frac{8}{32}$ (not the result we want)

g) Which is the cheapest per banana?

- A) \$2.00 for 10 bananas
 B) \$1.32 for 6 bananas

A) $200 \div 10 = 20$

B) $132 \div 6 = 22$

A

h) Which is the cheapest per plum?

- A) \$2.50 for 5 plums
 B) \$2.70 for 6 plums

i) Which ratio forms a proportion with $\frac{1}{3}$?

- A) $\frac{3}{100}$ B) $\frac{3}{4}$ C) $\frac{2}{6}$ D) $\frac{1}{6}$

j) Which ratio forms a proportion with $\frac{1}{5}$?

- A) $\frac{6}{12}$ B) $\frac{4}{10}$ C) $\frac{20}{100}$ D) $\frac{3}{8}$

k) The price of 4 pounds of apples is \$5.40. What is the price of 1 pound of apples?

\$

l) The price of 6 gallons of gas is \$22.80. What is the price of 1 gallon of gas?

\$

m) The price of 5 gallons of paint is \$35.25. What is the price of 1 gallon of paint?

\$

n) The price of 10 tennis raquets is \$875. What is the price of 1 tennis raquet?

\$

Skill 10.14 Solving word problems using fractions and percents.

- Write the problem as a number sentence.
Hint: Replace 'out of' with '÷', and 'of' with '×'.

Q. The meal costs \$35. You tip 10%. How much do you tip?

A. 10% of \$35
 $= \frac{10}{100} \times \frac{35}{1}$
 $= \frac{350}{100}$
 $= \mathbf{\$3.50}$

Restate the word problem.
You tip 10% of \$35.

Write the problem as a number sentence by changing the percent and the whole number to fractions.

Q. Out of the 240 stamps in the collection, 180 stamps are from Cuba. What percent is this?

A. $\frac{180}{240} = \frac{3}{4}$
 $\frac{3}{4} \times \frac{100}{1}$
 $= \frac{300}{4}$
 $= 300 \div 4$
 $= \mathbf{75\%}$

Simplify the fraction.

Then multiply by 100 to find the percent.

a) Four out of five Harvard students graduate with honors. What percent is this?

$$\frac{4}{5} \times \frac{100}{1} = \frac{400}{5}$$

$$400 \div 5 =$$

80 %

b) The English alphabet has 26 letters. How many letters are in the Hawaiian alphabet if it has 50% of this number?

.....

c) You have a coin collection of 40 coins and 30 coins are from New Zealand. What percent is this?

.....
 %

d) One fifth of the earth's land surface is desert. What percent of the earth's land surface is desert?

.....
 %

e) At a major league baseball game 30 of the 120 baseballs used are tossed into the crowd. What percent is this?

.....
 %

f) In Massachusetts sales tax is 5%. What is the final cost of a \$20 calculator?

.....
 \$