

10. [Fractions / Decimals / Percents]

Skill 10.1 Finding equivalent decimal place values.

MMYellow 1 1 22 33 44
MMRed 11 22 33 44

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


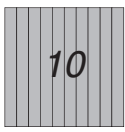
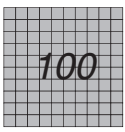



- Multiply by the conversion factor (because you need more).

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)	(0.01)	 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

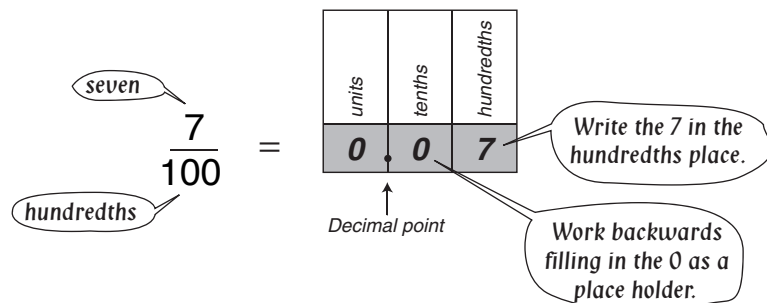
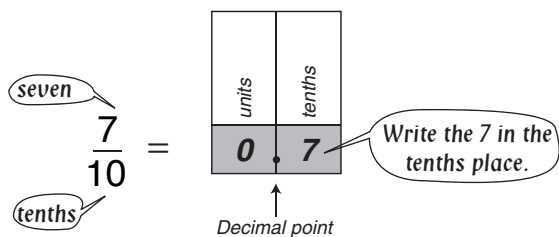
g) 2 tenths = hundredths

h) 6 tenths = hundredths

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.

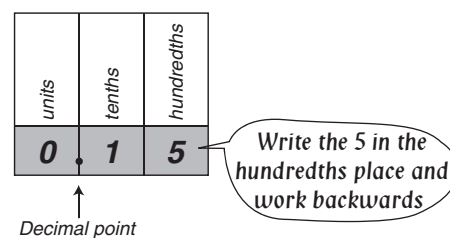
$$\frac{7}{10} = 0.\underline{7}$$

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

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) Complete the table:

Fraction	Decimal	Percent
$\frac{71}{100}$	71%

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

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

g) Complete the table:

Fraction	Decimal	Percent
$\frac{3}{10}$	30%

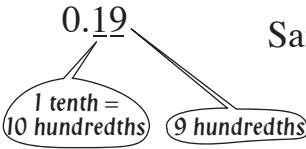
h) Which of these decimal numbers equals $\frac{2}{10}$?
A) 2 B) 0.2 C) 2.0
.....

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 57)

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. **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

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) Complete the table:

Fraction	Decimal	Percent
.....	0.3	30%

h) Complete the table:

Fraction	Decimal	Percent
.....	0.1	10%

i) Write 0.29 as a fraction.

j) Write 0.17 as a fraction.

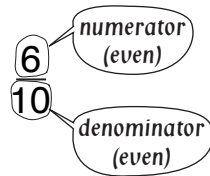
k) Write 0.31 as a fraction.

l) Write 0.03 as a fraction.

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

- 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.

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

Q. Write 0.02 as a fraction in simplest form.

A. $0.02 = \frac{2}{100}$

$$\frac{2}{100} \begin{matrix} \div 2 \\ \div 2 \end{matrix} = \frac{1}{50}$$

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.

$$\frac{4}{10} \begin{matrix} \div 2 \\ \div 2 \end{matrix} = \frac{2}{5}$$

b) Write 0.75 as a fraction in simplest form.

$$\frac{\dots}{100} = \frac{\dots}{50}$$

c) Write 0.8 as a fraction in simplest form.

$$\frac{\dots}{100} = \frac{\dots}{50}$$

d) Write 0.2 as a fraction in simplest form.

$$\frac{\dots}{100} = \frac{\dots}{50}$$

e) Write 0.18 as a fraction in simplest form.

$$\frac{\dots}{100} = \frac{\dots}{50}$$

f) Write 0.36 as a fraction in simplest form.

$$\frac{\dots}{100} = \frac{\dots}{50}$$

g) Complete the table:

Fraction	Decimal	Percent
.....	0.5	50%

$$0.5 = \frac{\dots}{100}$$

h) Complete the table:

Fraction	Decimal	Percent
.....	0.16	16%

$$0.16 = \frac{\dots}{100}$$

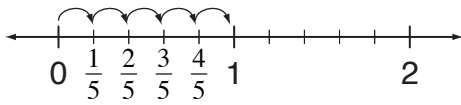
i) Write 0.06 as a fraction in simplest form.

$$\frac{\dots}{100} = \frac{\dots}{50}$$

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 $\frac{1}{5}$

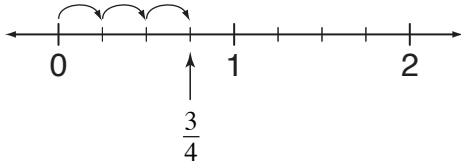


5 spaces ⇒ denominator $\frac{1}{5}$

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

A. $\frac{3}{4}$

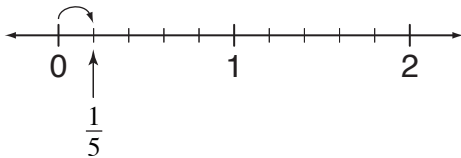
There are four spaces between 0 and 1. Each space equals $\frac{1}{4}$. The arrow points to $\frac{3}{4}$.



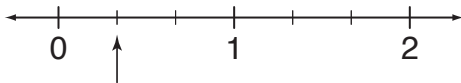
- Q.** Name the fraction shown by the arrow on this number line.

A. $\frac{1}{5}$

There are five spaces between 0 and 1. Each space equals $\frac{1}{5}$. The arrow points to $\frac{1}{5}$.

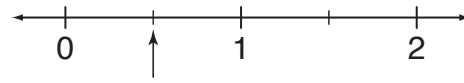


- a)** Name the fraction shown by the arrow on this number line.

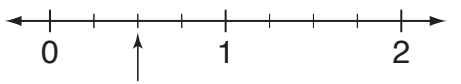


$\frac{1}{3}$

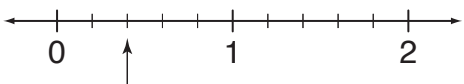
- b)** Name the fraction shown by the arrow on this number line.



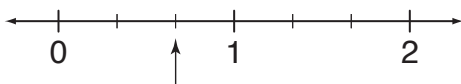
- c)** Name the fraction shown by the arrow on this number line.



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



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



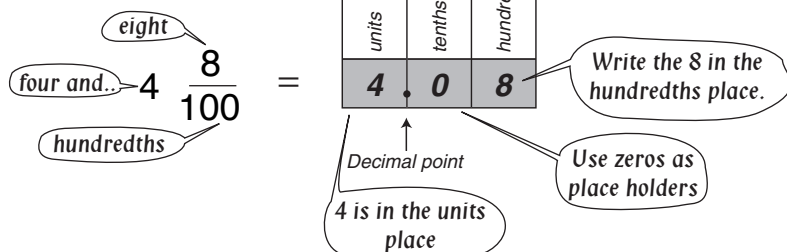
- f)** Name the fraction shown by the arrow on this number line.



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 57)

Example:



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

$$\frac{16}{1000} = 0.016$$

Q. Write the mixed number

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

A. **8.24**

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.]

Read as: *Eight and twenty-four hundredths*

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.

.....

Hint: Percent means “fraction of one hundred”.

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



A.



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.

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

Q. Write 10% as a fraction.

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

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.

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

$$\frac{1}{5}$$

h) Write 50% as a fraction.

$$=$$



i) Write 75% as a fraction.

$$=$$



j) Write 25% as a fraction.

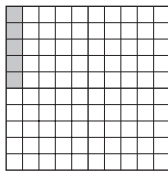
$$=$$



Hint: Percent means “fraction of one hundred”.

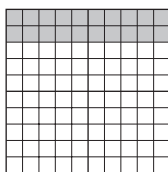
Q. What percent of the whole square is shaded?

A. 5%



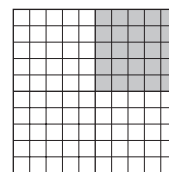
The whole square is divided into 100 smaller squares. Calculate or count the number of small squares that are shaded. 5 squares shaded means 5%

a) What percent of the whole square is shaded?



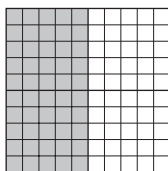
20 %

b) What percent of the whole square is shaded?



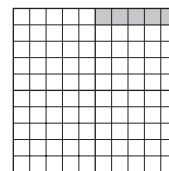
%

c) What percent of the whole square is shaded?



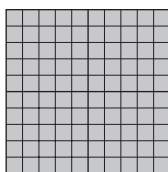
%

d) What percent of the whole square is shaded?



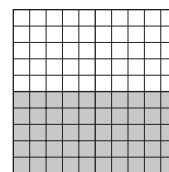
%

e) What percent of the whole square is shaded?



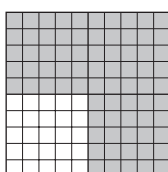
%

f) What percent of the whole square is shaded?



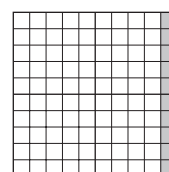
%

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.

A. $\frac{8}{10} = \frac{?}{100}$
 $\frac{8 \times 10}{10 \times 10} = \frac{80}{100}$
 $= 80\%$

Make the denominator 100 by finding the equivalent fraction.

Denominator:

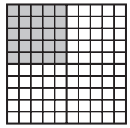
To get from 10 to 100 you must \times by 10.

Numerator:

Multiply 8 by 10.

80 out of 100 means 80%

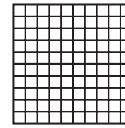
a) One quarter is what percent?



25 out of 100 squares are shaded

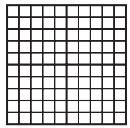
25 %

b) One half is what percent?



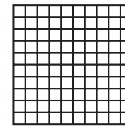
%

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) Complete the table:

Fraction	Decimal	Percent
$\frac{75}{100}$ OR $\frac{3}{4}$	0.75

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

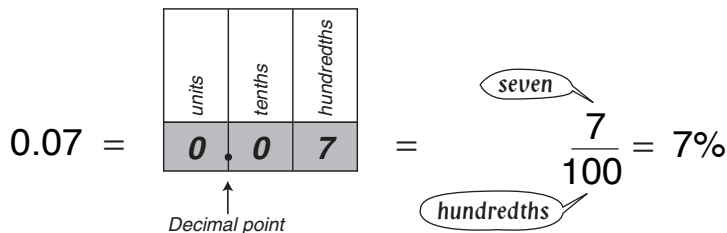
j) Complete the table:

Fraction	Decimal	Percent
$\frac{89}{100}$	0.89

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.



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) Complete the table:

Fraction	Decimal	Percent
$\frac{75}{100}$	0.75

h) Complete the table:

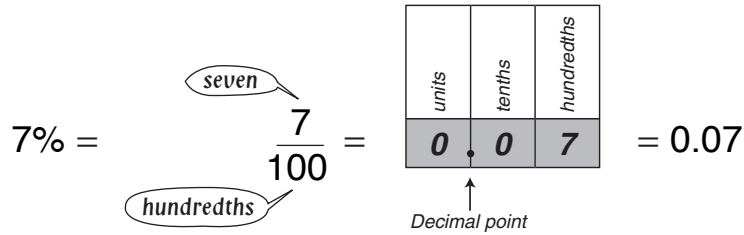
Fraction	Decimal	Percent
$\frac{4}{10}$	0.4

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
= 0⁵⁰.0
= **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.

0¹⁰.0 =

0.1

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) Complete the table:

Fraction	Decimal	Percent
$\frac{9}{10}$	90%

.....

h) Complete the table:

Fraction	Decimal	Percent
$\frac{31}{100}$	31%

.....

Skill 10.12 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) $\frac{9}{12}$

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

a) 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

b) Which is the cheapest per plum?

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

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

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

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

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

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

\$

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

\$

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

\$

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

\$

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

<p>Q. The meal costs \$35. You tip 10%. How much do you tip?</p>	<p>A. 10% of \$35 $= \frac{10}{100} \times \frac{35}{1}$ $= \frac{350}{100}$ $= \mathbf{\\$3.50}$</p>	<p>Restate the word problem. You tip 10% of \$35.</p> <p>Write the problem as a number sentence by changing the percent and the whole number to fractions.</p>
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<p>Q. Out of the 240 stamps in the collection, 180 stamps are from Cuba. What percent is this?</p>	<p>A. $\frac{180}{240} = \frac{3}{4}$ $\frac{3}{4} \times \frac{100}{1}$ $= \frac{300}{4}$ $= 300 \div 4$ $= \mathbf{75\%}$</p>	<p>Simplify the fraction.</p> <p>Then multiply by 100 to find the percent.</p>
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a) Four out of five Harvard students graduate with honors. What percent is this?

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

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 $400 \div 5 =$ 80 %

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

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

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%

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

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%

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

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%

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

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\$