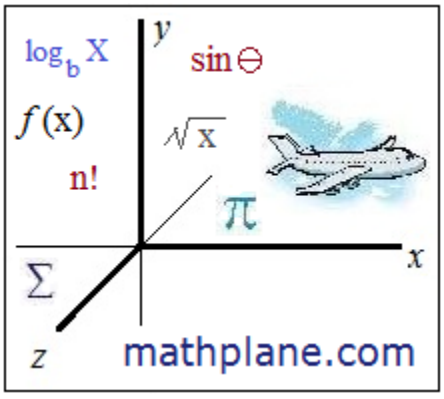
Converting Fractions to Decimals to Percentages

Includes notes, examples, and practice test (w/solutions)



Converting Percents into Decimals

Keep in mind: the percentage represents "the portion out of 100"..
and, in a number, two places right of the decimal point is the hundredths place!

Therefore, to convert a percent into an equivalent decimal:

1) Move the decimal place 2 places to the left

2) Remove the percent sign

Examples: 73%

Step 1) .73 % (move decimal 2 places)

Step 2) .73 (erase the percent sign)

80%

Step 1) .80.%

Step 2) .80 = .8

2%

Step 1) 2 % → 02.%

Step 2) .02

135%

Step 1) 135.%

Step 2) 1.35

54.788%

Step 1) 54.788 %

Step 2) .54788

Converting Percents into Fractions

Since the percentage is "the portion out of 100", it's rather easy to convert into a fraction:

1) Write the percentage divided by 100: $\frac{\text{percentage}}{100}$

2) If necessary, change the numerator to a *whole number* (i.e. removing the decimal):

   Multiply the numerator (and denominator) by multiples of 10 to move the decimal...

3) Simplify (i.e. reduce) the fraction

Examples:

45%

Step 1) $\frac{45}{100}$

Step 2) Skip (because numerator is whole number)

Step 3) $\frac{9}{20}$ (simplified by dividing numerator and denominator by 5)

10.3%

Step 1) $\frac{10.3}{100}$ (multiply numerator and denominator by 10)

Step 2) $\frac{103}{1000}$ removing the decimal

Step 3) Skip (cannot reduce)

400%

Step 1) $\frac{400}{100}$

Step 2) Skip

Step 3) $\frac{4}{1} = 4$

20.08%

Step 1) $\frac{20.08}{100}$ Multiply numerator and denominator by 100

Step 2) $\frac{2008}{10000}$ Then, reduce the fraction

Step 3) $\frac{2008}{10000} = \frac{1004}{5000} = \frac{502}{2500} = \frac{251}{1250}$

Converting Fractions into Decimals

Method 1: "Change Denominator to Power of 10"

Step 1: Find multiple of denominator that is also a power of 10

Step 2: Rewrite equivalent fraction, where denominator is power of 10

Step 3: Write the numerator with a decimal point in the correct position (i.e. move the decimal to the left for each 0 in the denominator)

Method 2: "Long Division"

Divide the numerator by the denominator.

(If the numerator is less than the denominator, add decimal point and zeros)

Examples:

$\frac{1}{4}$

(Method 1)

Step 1) 100 is a multiple of 4 AND it is a power of 10 (10 x 10 = 100)

Step 2) $\frac{1}{4} \times \frac{25}{25} = \frac{25}{100}$

Step 3) $\underset{\smile}{25}$. (2 zeros in 100)

.25

(Method 2)

$$\begin{array}{r} 0.2500 \\ 4 \overline{)\ 1.0000} \\ -0. \\ \hline 1.0 \\ -\ .8 \\ \hline .20 \\ -.20 \\ \hline 000 \end{array}$$

.2500

$\frac{3}{8}$

Step 1) 8 is not a factor of 10 or 100. But, it is a factor of 1000

Step 2) $\frac{3}{8} \times \frac{125}{125} = \frac{375}{1000}$

Step 3) $\underset{\smile}{.375}$ (3 zeros in 1000)

.375

$$\begin{array}{r} 0.37500 \\ 8 \overline{)\ 3.0000} \\ 0. \\ \hline 3.0 \\ 2.4 \\ \hline .60 \\ .56 \\ \hline 40 \\ 40 \\ \hline 0 \end{array}$$

0.375

$\frac{1}{6}$

Step 1) 6 is <u>not</u> a factor of 10, 100, 1000, 3 etc.. So, we must do an approximation.. (6 is a factor of 102)

Step 2) $\frac{1}{6} \times \frac{17}{17} = \frac{17}{102}$ approx. .17

&

Step 3) $\frac{1}{6} \times \frac{167}{167} = \frac{167}{1002}$ approx. .167

$$\begin{array}{r} 0.1666 \\ 6 \overline{)\ 1.0000} \\ -\ 0 \\ \hline 1.0 \\ -\ .6 \\ \hline .40 \\ -.36 \\ \hline 40 \\ -\ 36 \\ \hline 40 \text{ etc..} \end{array}$$

$.1666\overline{}$

Converting Fractions into Percentages

Since percent implies "per 100", we are looking to convert the fraction into a portion of 100!

So, if possible, to convert into a percentage:

Step 1: Find a number you can multiply the denominator by to get 100

Step 2: Multiply numerator and denominator by that number

Step 3: Take the numerator and add a percent sign

***Basically, we are looking for an equivalent fraction where the denominator is 100*

Examples:

$\frac{2}{5}$ Step 1) If we multiply 5 by 20, we get 100..

Step 2) $\frac{2}{5} \times \frac{20}{20} = \frac{40}{100}$

Step 3) 40%

$\frac{2}{5} = \frac{x}{100}$

To find x, *cross multiply*

$5x = 200$

$x = 40$

40%

$\frac{7}{200}$ Step 1) If we multiply 200 by .5, we get 100

Step 2) $\frac{7}{200} \times \frac{.5}{.5} = \frac{3.5}{100}$

Step 3) 3.5%

$\frac{7}{200} = \frac{x}{100}$

Cross multiply:

$200x = 700$

$x = 3.5$

3.5%

$\frac{325}{20}$ Step 1 and 2)

Multiply numerator and denominator by 5

$\frac{325}{20} \times \frac{5}{5} = \frac{1625}{100}$

Step 3) 1625%

$\frac{325}{20} = \frac{x}{100}$

$x = \frac{325 \cdot 100}{20} = 1625$

1625%

Converting Decimals into Fractions

Recognizing that a decimal number $x = \frac{x}{1}$, it's rather easy to change most decimals into a fraction

Step 1: Express the decimal as a fraction

Step 2: multiply numerator and denominator by 10 (changing to an equivalent fraction)
Repeat until decimal is gone

Step 3: If necessary, simplify (i.e. reduce) the fraction

Examples: .35

Step 1) $\frac{.35}{1}$

Step 2) $\frac{.35}{1} \times \frac{10}{10} = \frac{3.5}{10} \times \frac{10}{10} = \frac{35}{100}$

Step 3) $\frac{35}{100} = \frac{7}{20}$

.137

Step 1) $\frac{.137}{1}$

Step 2) To move the decimal 3 places to the right, we need to multiply by 1000

$\frac{.137}{1} \times \frac{1000}{1000} = \frac{137}{1000}$ (since 137 is prime and not a factor of 1000, we cannot reduce this fraction)

233.14

Step 1) $\frac{233.14}{1}$

Step 2) multiply numerator and denominator by 10 x 10 (100)

$\frac{233.14}{1} \times \frac{100}{100} = \frac{23314}{100}$

Step 3) $\frac{23314}{100} = \frac{11657}{50}$

Also,

$233.14 = 233 + .14$

$= 233 + \frac{14}{100}$

$= 233\frac{7}{50}$

Converting Decimals into Percentages

Two places to the right of a decimal represent "the hundredths place"...
Since a percentage expresses the amount "per 100",

it's rather easy to convert a decimal into a percent:

> Step 1: Move the decimal point two places to the right (adding 0's if necessary)
>
> Step 2: Add the percent sign

Examples: .35

Step 1) .35 (2 spaces) 35.

Step 2) 35%

.06

Step 1) .06 (2 spaces to the right) 06.

Step 2) 6%

4.655

Step 1) 4.655 (move decimal) 465.5

Step 2) (add percent) 465.5%

.3572

Step 1) 35.72

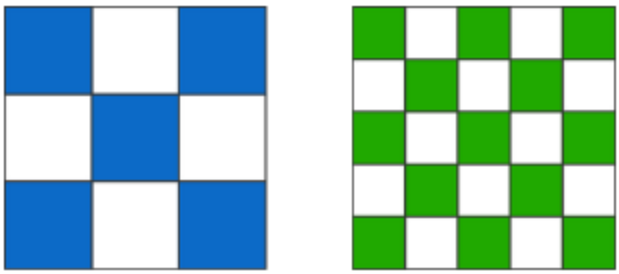
Step 2) 35.72%

62

Step 1) 62.00, move decimal (and add 0s) 6200.

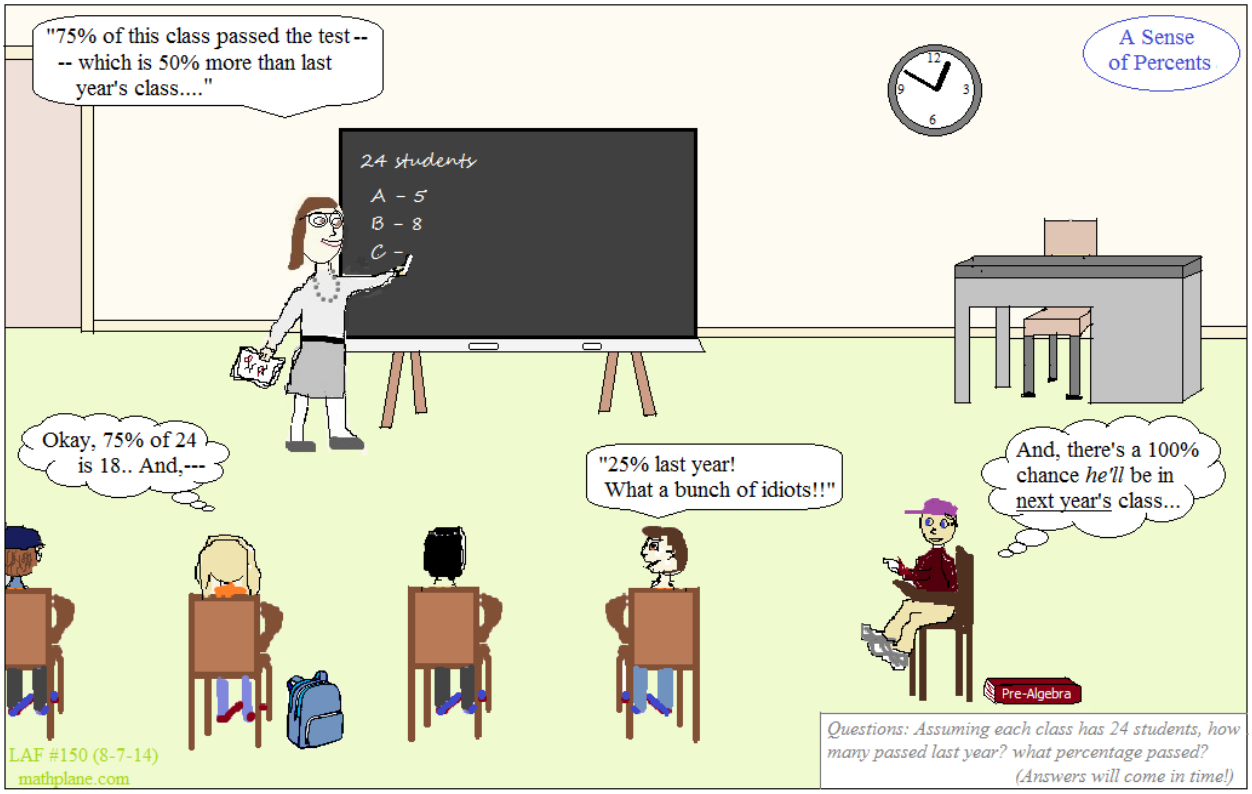
Step 2) add percent: 6200%

The two large squares are congruent...
And, each is divided into smaller squares..

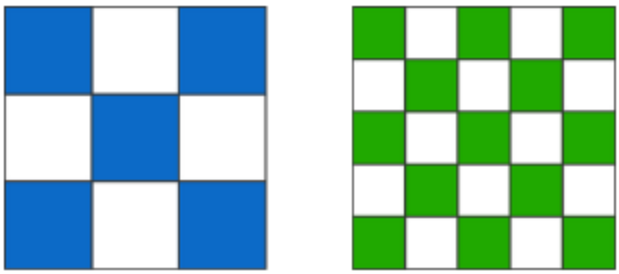


Which area is larger: Blue or Green ?
Or, are they equal?

Answer on Next Page-→



The two large squares are congruent...
And, each is divided into smaller squares..



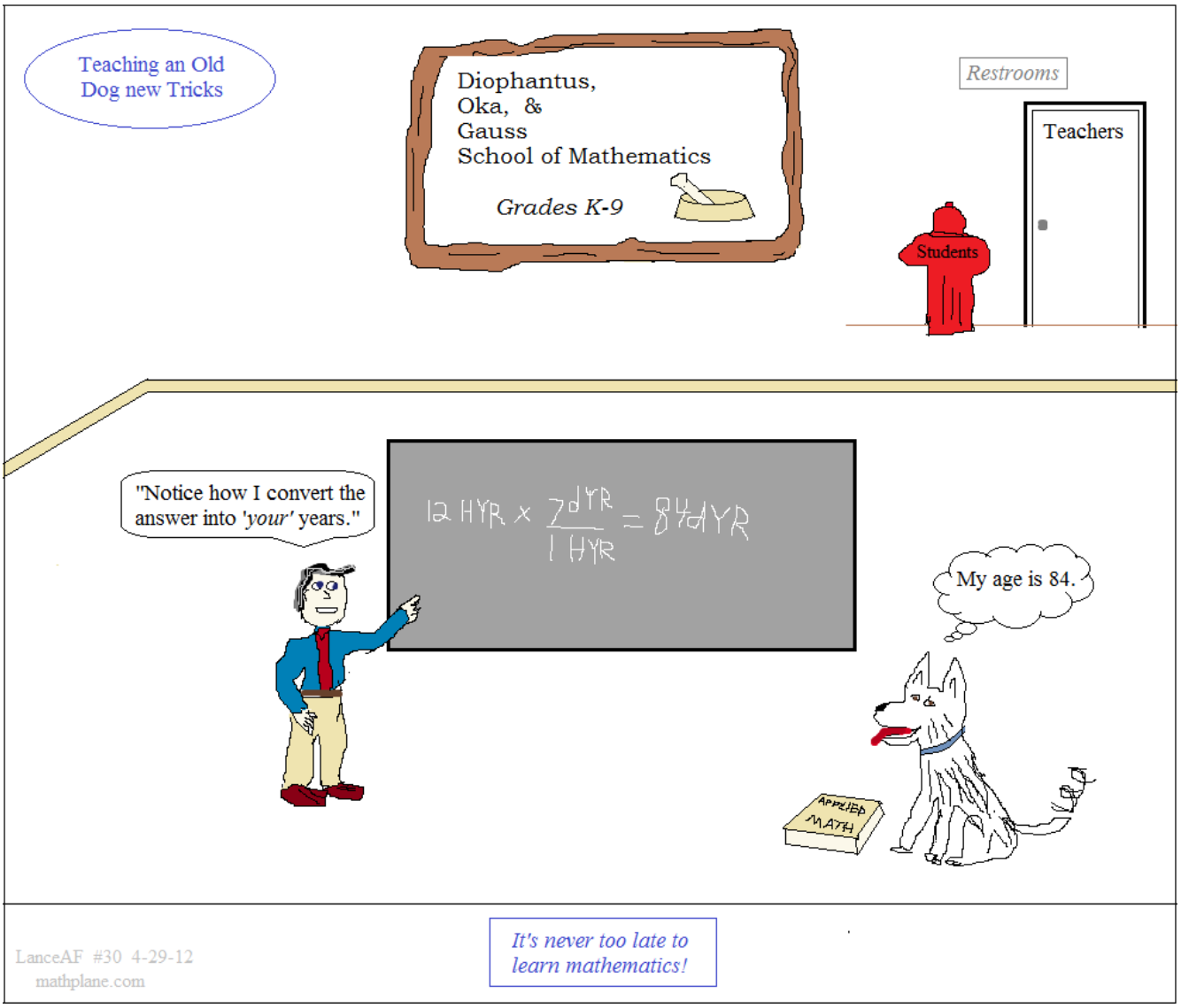
Which area is larger: Blue or Green ?
Or, are they equal?

ANSWER:

Since the large squares are congruent, and divided into smaller equal squares, we'll use a ratio comparison:

$\frac{5}{9} = .5\overline{5}$ $\qquad$ $\frac{13}{25} = .52$

The blue area is bigger!



Practice Test (with solutions)-→

Quiz: Converting Decimals to Fractions to Percentages to....

I. Converting fractions --- Convert the following to decimals and percentages

$\frac{44}{100}$	$\frac{7}{10}$	$\frac{5}{1000}$	$\frac{3}{25}$	$\frac{12}{5}$
.44	.	.	.	.
44 %	%	%	%	%

II. Converting decimals --- Convert the following to fractions and percentages

.41	.46	7.6	0.0037	.312
$\frac{41}{100}$				
41 %	%	%	%	%

III. Converting percentages -- Express each percentage as a fraction and decimal

25%	7%	.1%	220%	$\frac{1}{2}$ %
$\frac{25}{100} = \frac{1}{4}$ (reduce the fraction)				
$\frac{1}{4}$				
.25	.	.	.	.

Quiz: Converting Decimals to Fractions to Percentages to....

IV. Miscellaneous questions

Change each to a (repeating) decimal: $\frac{2}{9}$ $\frac{22}{7}$

Express the following as fractions: $.\overline{4}$ $.21\overline{21}$ $2.03\overline{3}$

Place the following portions in order (from greatest to least)

A) $\frac{77}{100}$ $\frac{777}{1000}$ 7% .7 $.\overline{77}$

B) 24% $\frac{1}{4}$ $\frac{240}{1001}$ $.2\overline{4}$ .2424

Find the following:

$.6 + \frac{3}{5} =$

$.\overline{44} - \frac{2}{5} =$

Quiz: Converting Decimals to Fractions to Percentages to....

SOLUTIONS

I. Converting fractions --- Convert the following to decimals and percentages

$\frac{44}{100}$	$\frac{7}{10}$	$\frac{5}{1000}$	$\frac{3}{25} = \frac{12}{100}$	$\frac{12}{5} = 2\frac{2}{5}$
	$\frac{7}{10} = \frac{70}{100}$	3 zeros so, move decimal 3 spaces: .005		$\frac{12}{5} \times \frac{20}{20} = \frac{240}{100}$
.44	.7	.005	.12	2.40
44 %	70 %	.5 %	12 %	240 %

II. Converting decimals --- Convert the following to fractions and percentages

.41	.46	7.6	0.0037	.312
	2 spaces to right; add %	$\frac{7.6}{1} \times \frac{10}{10} = \frac{76}{10}$	4 spaces.. 4 zeros..	$\frac{312}{1000} = \frac{39}{125}$
	$\frac{46}{100} = \frac{23}{50}$	$\frac{38}{5} = \frac{760}{100}$		
$\frac{41}{100}$	$\frac{23}{50}$	$7\frac{3}{5}$	$\frac{37}{10000}$	$\frac{39}{125}$
41 %	46 %	760 %	.37 %	31.2 %

III. Converting percentages -- Express each percentage as a fraction and decimal

25%	7%	.1%	220%	$\frac{1}{2}$ %
$\frac{25}{100} = \frac{1}{4}$ (reduce the fraction)		1% is 1/100 .1% is 1/1000 1% is .01 .1% is .001	$\frac{220}{100} = \frac{11}{5}$	.5% = $\frac{5}{1000}$
$\frac{1}{4}$	$\frac{7}{100}$	$\frac{1}{1000}$	$\frac{11}{5}$	$\frac{1}{200}$
.25	.07	.001	2.2	.005

IV. Miscellaneous questions

SOLUTIONS

Quiz: Converting Decimals to Fractions to Percentages to....

Change each to a (repeating) decimal: $\frac{2}{9} = .2\overline{2}$

$$\begin{array}{r} 0.2222 \\ 9\overline{)\,2.0000} \\ -1.8 \\ \hline .20 \\ -.18 \\ \hline .020 \\ -.018 \\ \hline .0020 \\ -.0018 \end{array}$$ etc....

$\frac{22}{7}$

$$\begin{array}{r} 3.142857 \\ 7\overline{)\,22.00000} \\ -21. \\ \hline 1.0 \\ -.7 \\ \hline .30 \\ -.28 \\ \hline .020 \\ -.014 \\ \hline .0060 \\ -.0056 \\ \hline .00040 \\ -.00035 \\ \hline 050 \\ 049 \end{array}$$

$3.142857\overline{142857}$

Express the following as fractions: $.\overline{4}$ $.2\overline{121}$ $2.03\overline{3}$

let n = $.4\overline{4}$
then
$10n = 4.4\overline{4}$

$$\begin{array}{rr} 10n & 4.4\overline{4} \\ -\ n & -\ .4\overline{4} \\ \hline 9n & 4 \end{array}$$

since 9n = 4, $n = 4/9$

let u = .2121...
then
$100u = 21.2121...$

$$\begin{array}{rr} 100u & 21.21\overline{21} \\ -\ u & -\ .21\overline{21} \\ \hline 99u & 21 \end{array}$$

since 99u = 21, $u = 21/99$

2.0 + .033...

let m = .033..
then
100m = 3.33...

$$\begin{array}{rr} 100m & 3.333 \\ -\ m & -\ 0.033 \\ \hline 99m & 3.3 \end{array}$$

since 99m = 3.3, $m = \frac{3.3}{99}$

so, 2.0 + 3.3/99 ---> $2\ \frac{1.1}{33}$

Place the following portions in order (from greatest to least)

A) $\frac{77}{100}$ .770 0 $\frac{777}{1000}$ .777 0 7% .0700 .7 .7000 $.7\overline{7}$ .77777

(greatest to least) $.7\overline{7}$ $\frac{777}{1000}$ $\frac{77}{100}$ .7 7%

B) 24% .2400 $\frac{1}{4}$ .2500 $\frac{240}{1001}$ <.2400 $.24\overline{}$ .2444 .2424 .2424

(greatest to least) $\frac{1}{4}$ $.24\overline{}$ .2424 24% $\frac{240}{1001}$

Find the following:

$.6 + \frac{3}{5} = .6 + .6 =$ 1.2 or 6/5 or $1\frac{1}{5}$

$.44\overline{} - \frac{2}{5} =$ since 2/5 = .4

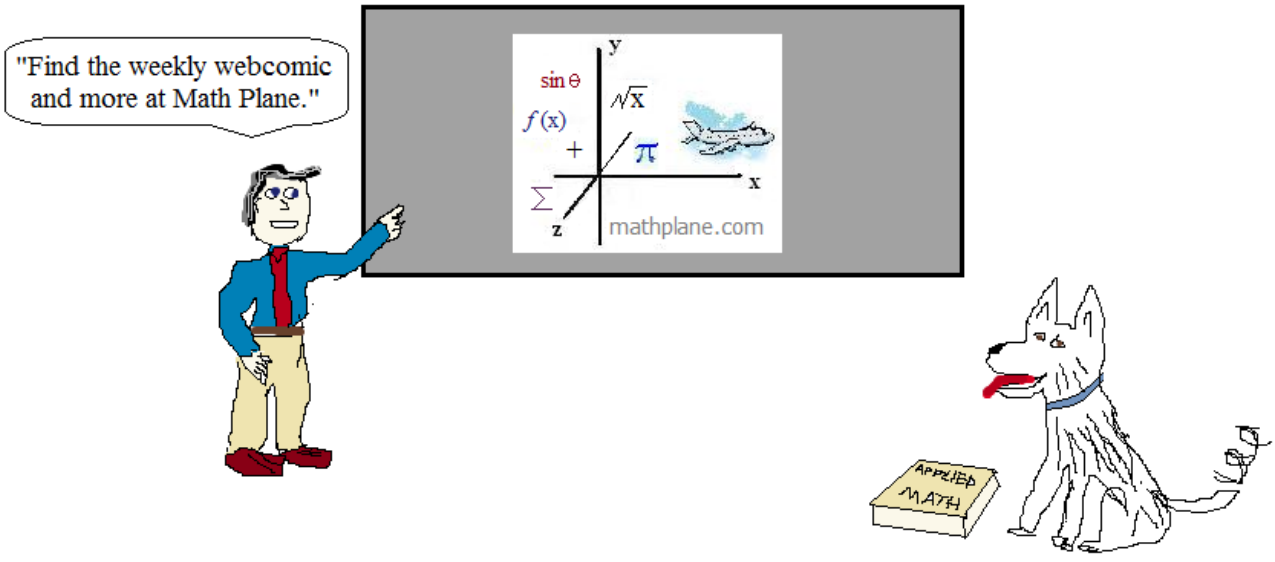
$$\begin{array}{r} .44444\ldots \\ -.40000\ldots \\ \hline .04444\ldots \end{array}$$

$.044\overline{}$

Thanks for visiting. (Hope it helped!)

If you have questions, suggestions, or requests, let us know.

Cheers



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One more thing…

Vinculum (Bar) and "Repeating Decimals"

Vinculum: A horizontal bar drawn over multiple quantities to indicate they are grouped together.

Examples include: radicals $\sqrt{9X^3}$

line segments $\overline{AB}$ (joining points A & B)

repeating decimals $0.776\overline{76}$

Repeating Decimals: A decimal number that eventually becomes periodic (i.e. "the end repeats indefinitely")

Examples: $\frac{1}{3} = 0.333333... = 0.\overline{3}$

$\frac{22}{7} = 3.\underbrace{142857}\underbrace{142857}... = 3.\overline{142857}$

$12.0340353535... = 12.034\overline{035}$

Converting Fractions to Decimals: Divide the numerator by the denominator

Examples: $\frac{42}{9}$

$$\begin{array}{r} 4.66\overline{6} \\ 9\,\overline{)\,42} \\ -\,36 \\ \hline 60 \\ -\,54 \\ \hline 60 \\ -\,54 \\ \hline \text{etc....} \end{array} \qquad 4.\overline{6}$$

$\frac{3}{700}$

$$\begin{array}{r} 0.00428571 \\ 700\,\overline{)\,3.0000000} \\ -\,2.800 \\ \hline .2000 \\ -\,.1400 \\ \hline 6000 \\ -\,5600 \\ \hline 4000 \\ -\,3500 \\ \hline 5000 \\ -\,4900 \\ \hline 1000 \\ -\,700 \\ \hline 3000 \end{array} \qquad 0.00\overline{428571}$$

etc...
(repeats indefinitely)

Converting 'Repeating Decimals' to Fractions: Using algebra

Examples: $.\overline{7}$ let $n = .7\overline{7}$ then, $10n = 7.7\overline{7}$

$$\begin{array}{r} 10n \\ -\ \ n \\ \hline 9n \end{array} \qquad \begin{array}{r} 7.7\overline{7} \\ -\,.7\overline{7} \\ \hline 7.0 \end{array}$$

substitution reveals that $9n = 7$ $\quad n = \frac{7}{9}$

$11.\overline{18}$ let $m = .\overline{18}$ then, $100m = 18.\overline{18}$

$$\begin{array}{r} 100m \\ -\ \ m \\ \hline 99m \end{array} \qquad \begin{array}{r} 18.\overline{18} \\ -\ .\overline{18} \\ \hline 18 \end{array}$$

$11.\overline{18} = 11 + m$

$m = \frac{18}{99}$

$11.\overline{18} = 11\frac{18}{99}$

$234.0017\overline{676}$

Separate the number into parts: $234 + .001 + .000\overline{76}$

Convert the parts to fractions: $234 + .001 = \frac{1}{1000} + \quad$ let $p = .0007\overline{676}$

$= \frac{99}{99000}$

$1000p = .76\overline{76}$

$100000p = 76.\overline{76}$

$$\begin{array}{r} 100000p \\ -\ 1000p \\ \hline 99000p \end{array} \qquad \begin{array}{r} 76.\overline{76} \\ -\ .\overline{76} \\ \hline 76 \end{array} \qquad p = \frac{76}{99000}$$

Combine the Fractions: $234 + \frac{99}{99000} + \frac{76}{99000} = 234\frac{175}{99000}$

$.000\overline{76} = \frac{76}{99000}$