Converting Fractions to Decimals

The simplest way to convert a fraction to a decimal is to divide its numerator (top digit) by its denominator (bottom digit). For example:

$\frac{1}{8}$ = 1 ÷ 8 = 0.125 $\frac{7}{12}$ = 7 ÷ 12 = 0.58$\overline{3}$ $\frac{22}{7}$ = 22 ÷ 7 = 3.$\overline{142857}$

The bars above the “3” and “142857” in the previous example are called ***vinculums*** (from a Latin word meaning “something that ties or binds things together”). This bar indicates that the number (or sequence of numbers) beneath it are repeated infinitely. Such numbers are called ***repeating decimals***. Fractions that divide evenly with no repeating numerals (such as $\frac{1}{8}$ = 0.125) produce numbers called ***terminating decimals***. All fractions produce either repeating or terminating decimals.

Fun Fact

Some fractions produce repeating decimals that go on for a while before they start repeating. For example: $\frac{1}{29}$ = 0.$\overline{0344827586206896551724137931}$ . $\frac{1}{97}$ goes for 96 digits before it starts to repeat! Sometimes you may convert a fraction that looks like it is never going to repeat. But remember—all fractions, when converted to decimals, will eventually terminate or repeat.

Converting Percentages to Decimals

To convert from a percentage to a decimal, divide the percentage by 100 and remove the “%” sign. The easiest way to divide a number by 100 is to move its decimal point two places to the left. For example: 25.55 ÷ 100 = .2555

Some more examples:

50 % = 0.50

8.25 % = 0.0825

375 % = 3.75

0.008 % = 0.00008

Converting Decimals to Percentages

To convert from a decimal to a percentage, multiply the decimal by 100 and add a “%” sign. The easiest way to multiply a number by 100 is to move its decimal point two places to the right. For example:

25.55 x 100 = 2555 = 2555 %

0.0083 x 100 = 0.83 = 0.83 %

0.237925 x 100 = 23.7925 = 23.79 %

Notice that you can round your answer to the nearest hundredth, or however many places the problem requests. Some contest problems will require you to be more specific than others.

Converting Fractions to Percentages

The simplest way to convert a fraction to a percentage is to divide its numerator (top digit) by its denominator (bottom digit) and then convert the resulting decimal to a percentage. For example:

$\frac{1}{80}$ = 1 ÷ 80 = 0.0125 = 1.25 %

$\frac{7}{12}$ = 7 ÷ 12 = 0.58$\overline{3}$ = 58.3 %

$\frac{22}{7}$ = 22 ÷ 7 = 3.$\overline{142857}$ = 314.3 %

Again, notice that you can round your answer to the nearest tenth or hundredth, or however many places the problem requires.

Converting Decimals to Fractions

The simplest way to convert a decimal to a fraction is to first read the number, then write it out as a fraction. For example:

0.625 = six hundred and twenty-five thousandths = $\frac{625}{1000}$

Next, factor out the common factors of the numerator and denominator and reduce the fraction to its lowest terms:

$\frac{625}{1000} $ = $\frac{5\*5\*5\*5}{2\*2\*2\*5\*5\*5}$ = $\frac{5}{2\*2\*2}$ = $\frac{5}{8}$

Converting Percentages to Fractions

To convert a percentage to a fraction, first convert the percentage to a decimal (see above), then convert that decimal to a fraction. For example:

50 % = 0.50 = $\frac{5}{10}$ = $\frac{1}{2}$

8.25 % = 0.0825 = $\frac{825}{10000}$ = $\frac{33}{400}$

375 % = 3.75 = 3 $\frac{75}{100}$ = 3 $\frac{3}{4}$

Remember to always reduce the fraction to its lowest terms.

Cool Trick: Converting Repeating Decimals to Fractions

If a number has a repeating decimal, you can use a little algebra to convert it into a fraction. Here’s how:

1. Look at the number and determine which digits repeat. Call the original number “x”.

|  |  |
| --- | --- |
| x = 0.$\overline{48}$ | x = 0.06$\overline{24}$ |

1. Multiply the number by a power of 10 to move the repeating digits to the left of the decimal point. Call this new number $10^{y}\* $x, where “y” is the power of 10 used to multiply the number.

|  |  |
| --- | --- |
| $10^{2}$ \* x = **100x = 48.**$\overline{48}$ | $10^{4}$ \* x = **10,000x = 624.**$\overline{24}$ |

1. Multiply the original number by a different power of 10 to move the repeating digits immediately to the right of the decimal point. Call this new number $10^{z}\* $x, where “z” is the power of 10 used to multiply the number.

|  |  |
| --- | --- |
| $10^{0}$ \* x = 1x = **x = 0.**$\overline{48}$ | $10^{2}$ \* x = **100x = 6.**$\overline{24}$ |

1. Next, subtract the second equation from the first. This step eliminates the repeating digits.

|  |  |
| --- | --- |
|  100x = 48.$\overline{48}$- x = 0.$\overline{48}$------------------------------------ 99x = 48.00 |  10,000x = 624.$\overline{24}$- 100x = 6.$\overline{24}$ -------------------------------------- 9900x = 618.00  |

1. Solve for x and reduce the resulting fraction to its lowest terms.

|  |  |
| --- | --- |
| 99x = 48x = $\frac{48}{99}$ = $\frac{16}{33}$ | 9900x = 618x = $\frac{618}{9900} $ = $\frac{103}{1650}$ |

Twelve Handy Conversions

An Extremely Useful List to Memorize

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| $$\frac{1}{2}$$ | = | 0.50 | = | 50 % |
| $$\frac{1}{3}$$ | = | 0.3$\overline{3}$ | = | 33 $\frac{1}{3} $% |
| $$\frac{2}{3}$$ | = | 0.6$\overline{6}$ | = | 66 $\frac{2}{3}$ % |
| $$\frac{1}{4}$$ | = | 0.25 | = | 25 % |
| $$\frac{3}{4}$$ | = | 0.75 | = | 75 % |
| $$\frac{1}{6}$$ | = | 0.$16\overline{6}$ | = | 16 $\frac{2}{3}$ % |
| $$\frac{5}{6}$$ | = | 0.$83\overline{3}$ | = | 83 $\frac{1}{3}$ % |
| $$\frac{1}{8}$$ | = | 0.125 | = | 12 $\frac{1}{2}$ % |
| $$\frac{3}{8}$$ | = | 0.375 | = | 37 $\frac{1}{2}$ % |
| $$\frac{5}{8}$$ | = | 0.625 | = | 62 $\frac{1}{2}$ % |
| $$\frac{7}{8}$$ | = | 0.875 | = | 87 $\frac{1}{2}$ % |
| $$\frac{1}{10}$$ | = | 0.10 | = | 10 % |