***Converting a Fraction to a Decimal***

To convert a fraction to a decimal, divide the numerator by the denominator.

To convert a fraction to a decimal, write an equivalent fraction (if possible) whose denominator is 10, 100, or 1000.

Remember that the numerator is the dividend and the denominator is the divisor.

**A terminating decimal** is a decimal with a finite number of digits after the decimal point.

**A repeating decimal** is a decimal in which one digit or a group of digits is repeated without end.

**Sample Problem 1**: **Convert each fraction to a decimal, then determine if its decimal expansion is repeating or terminating.**

|  |  |  |  |
| --- | --- | --- | --- |
| **a.**  | $$\frac{3}{4}$$ | **b.**  | $$\frac{3}{11}$$ |
|  | $$\frac{3}{4}=\frac{3\*25}{4\*25}=\frac{75}{100}=0.75$$$$\frac{3}{4}=0.75$$**A terminating decimal** |  | $$ 3÷11=0.27272………$$$$-0$$$$ 30$$$$-22$$$ 80$$$ -77 $$$$ 30$$$$ -22 $$$$ 80$$$$ -77 $$$$ 30$$$$ 22 $$$$ 3 $$$$\frac{3}{11}=0.27272………$$$$\frac{3}{11}=0.\overbar{27}$$**A repeating decimal** |
| **c.**  | $$\frac{12}{128}$$ | **d.**  | $$\frac{3}{16}$$ |
|  | $$12÷128=0.09375$$$$-0$$$$ 120$$$$ - 0$$$ 1,200$$$ -1,152 $$$$ 480$$$$ -384 $$$$ 960$$$$ -896 $$$$ 640$$$$ 640 $$$$ 0 $$$$\frac{12}{128}=0.09375$$**A terminating decimal** |  | $$ 3÷16=0.1875$$$$-0$$$$ 30$$$$- 16$$$ 140$$$ -128 $$$$ 120$$$$ -112 $$$$ 80$$$$ -80 $$$$ 0 $$$$\frac{3}{16}=0.1875$$**A terminating decimal** |

***Converting a Decimal to a Fraction***

A terminating decimal can be written as a fraction simply by writing it as decimal fractions.

**Sample problem 2: Convert each terminating decimal to a fraction.**

|  |  |  |  |
| --- | --- | --- | --- |
| **a.** | $$1.25$$ | **b.** | $$4.5 $$ |
|  | $$1.25$$$$1.25=1\frac{25}{100}=1\frac{1\*25}{4\*25}=1\frac{1}{4}$$$$1.25=1\frac{1}{4}$$ |  | $$4.5$$$$4.5=4\frac{5}{10}=4\frac{5\*1}{5\*2}=4\frac{1}{2}$$$$4.5=4\frac{1}{2}$$ |
| **c.** | $$0.04$$ | **d.** | $$-5.12$$ |
|  | $$0.04$$$$0.04=\frac{4}{100}=\frac{4\*1}{4\*25}=\frac{1}{25}$$$$0.04=\frac{1}{25}$$ |  | $$-5.12$$$$-5.12=-5\frac{12}{100}=-5\frac{4\*3}{4\*25}=-5\frac{3}{25}$$$$-5.12=-5\frac{3}{25}$$ |

A repeating decimal can be written as a fraction.

Follow these steps, to change each repeating decimal to a fraction.

 **Step 1:** Let **𝑥** equal the repeating decimal.

 **Step 2:** Multiply by powers of 1, 10, or 100 to create 2 equations that isolate the repeating part of the decimal.

 **Step 3:** Subtract the equations to remove the repeating part of the decimal.

 **Step 4:** Solve the resulting equation and simplify the fraction.

**Sample problem 3: Convert each repeating decimal to a fraction.**

|  |  |  |  |
| --- | --- | --- | --- |
| **a.** | $$0.666666…….$$ | **b.** | $$1.252525…….. $$ |
|  | $$0.666666$$$$10x=6.66666$$$$- x=0.66666$$***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***$$9x=6$$$$ x=\frac{6}{9}=\frac{2\*3}{3\*3}$$$$ x=\frac{2}{3}$$ |  | $$1.252525…….$$$$100x=125.2525$$$$ - x= 1.2525$$ ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***$$ 99x=124$$$$ x=\frac{124}{99}$$ |
| **c.** | $$0.181818…….$$ | **d.** | $$0.3717171717…….. $$ |
|  | $$0.181818$$$$100x=18.1818$$$$ - x= 0.1818$$***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***$$99x=18$$$$ x=\frac{18}{99}=\frac{9\*2}{9\*11}$$$$ x=\frac{2}{11}$$ |  | $$0.3717171717…….$$$$1,000x=371.7171717$$$$ - 10 x= 3.7171717$$ ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***$$ 990x=368$$$$x=\frac{368}{990}=\frac{2\*184}{2\*495}$$$$x=\frac{184}{495}$$ |