Name: _____ Mark: _____

Decimals to fractions

To convert a terminating decimal to a fraction, we simply multiply by an appropriately large power of 10 to turn the decimal into an integer for the numerator over that power of 10 as the denominator, then simplify if necessary (simplification is only necessary if the numerator is a multiple of 2 or 5).

Example 1.

$$16.1 = \frac{161}{10},$$

$$0.05 = \frac{5}{100} = \frac{1}{20},$$

$$2.064 = \frac{2064}{1000} = \frac{258}{125}$$

To convert a repeating decimal to a fraction, we use the following algebraic trick: Multiply the original decimal by 10 to the power of the period length, so that the repeating part lines up in place value to the original decimal. Upon subtraction, the repeating portion disappears, and we can use simple algebra to solve for the original decimal. Remember to simplify the fraction, including place value shifting so that the numerator and denominator are integers.

Example 2.

$$x = 0.\overline{3} \quad \Rightarrow \quad 10x = 3.\overline{3}$$

Subtracting the first from the second,

$$9x = 3 \quad \Rightarrow \quad x = \frac{3}{9} = \frac{1}{3}$$

Example 3.

$$x = 3.1\overline{14}$$
$$100x = 311.4\overline{14}$$

Subtracting the first from the second,

$$99x = 308.3$$
$$x = \frac{308.3}{99} = \frac{3083}{990}$$

Example 4.

$$x = 5.45\overline{57}$$
$$100x = 545.57\overline{57}$$

Subtracting the first from the second,

$$99x = 540.12$$
$$x = \frac{540.12}{99} = \frac{54012}{9900} = \frac{4501}{825}$$

1. Write the following terminating decimals as fractions.

   (a) (1 point) 1.375

   (b) (1 point) 2.84

   (c) (1 point) 0.85

   (d) (1 point) 2.7125

   (e) (1 point) 11.4608

   (f)* (1 point) 6.1953125

2. Write the following repeating decimals as fractions.

   (a) (1 point) $2.\overline{8}$

   (b) (1 point) $0.\overline{72}$

   (c) (1 point) $3.\overline{39}$

   (d) (1 point) $1.6\overline{31}$

   (e) (1 point) $0.\overline{0402}$

   (f)* (1 point) $1.0\overline{732}$