Writing Rational Numbers as Decimals

You can use long division to write any rational number as a decimal. When you write a rational number as a decimal, it will either terminate or repeat. Let's look at an example of each.

Example 1: Write $2\frac{5}{8}$ as a decimal.

You can write $2\frac{5}{8}$ as $2 + \frac{5}{8}$. Start by writing $\frac{5}{8}$ as a decimal. Divide **5** by **8** using long division.

$$
\begin{array}{r}
0.625 \\
8\overline{)5.000} \\
-48 \\
\hline
20 \\
-16 \\
\hline
40 \\
-40 \\
\hline
0
\end{array}
$$

If you continued to divide, this decimal would end in 0. So, it is a **terminating decimal**.

Terminating decimals have remainders of 0.

So, you can write $\frac{5}{8}$ as 0.625. Since you want to write $2\frac{5}{8}$ as a decimal, add 2 to 0.625.

$$2 + 0.625 = 2.625$$

So, $2\frac{5}{8}$ written as a decimal is 2.625.

Example 2: Write $\frac{4}{11}$ as a decimal.

Divide **4** by **11** using long division.

$$
\begin{array}{r}
0.3636 \\
11\overline{)4.0000} \\
-33 \\
\hline
70 \\
-66 \\
\hline
40 \\
-33 \\
\hline
70 \\
-66 \\
\hline
4
\end{array}
$$

Repeating decimals repeat the same digit or block of digits without end.

The products and differences repeat. This pattern will continue forever, so the remainder will never be 0.

If any digits in a decimal repeat, you can use a bar over those digits to show that they repeat. Since the digits 3 and 6 repeat in the quotient above, you can write it as $0.\overline{36}$.

So, $\frac{4}{11}$ written as a decimal is $0.\overline{36}$.

Try it yourself! Use long division to write each rational number as a decimal. Remember to write repeating decimals with a bar over any digits that repeat.

1. $\frac{9}{12} =$ 0.75

2. $\frac{8}{9} =$ $0.\overline{8}$

3. $-\frac{3}{5} =$ −0.6

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Keep going! Use long division to write each rational number as a decimal. Remember to write repeating decimals with a bar over any digits that repeat.

4. $-\frac{6}{11}$ = $-0.\overline{54}$

5. $\frac{23}{30}$ = $0.7\overline{6}$

6. $-3\frac{9}{40}$ = -3.225

7. $\frac{7}{15}$ = $0.4\overline{6}$

8. $6\frac{7}{8}$ = 6.875

9. $-\frac{5}{33}$ = $-0.\overline{15}$

10. $-1\frac{29}{60}$ = $-1.48\overline{3}$

11. $-\frac{261}{40}$ = -6.525

12. $-\frac{123}{50}$ = -2.46

13. $\frac{47}{90}$ = $0.5\overline{2}$

14. $4\frac{19}{80}$ = 4.2375

15. $-8\frac{27}{55}$ = $-8.4\overline{90}$