DECIMALS: DIVISION

We use division of decimals in many areas of our lives. Any time we divide and the answer does not come out even, we could end up with a decimal answer. For example, decimal division may occur when we find averages. First we'll look at modeling decimal division to understand its meaning. We will use decimal squares to make the model.

We will practice dividing decimals by whole numbers using paper and pencil. To divide a decimal by a whole number, place the decimal point in the quotient right above the decimal in the dividend.
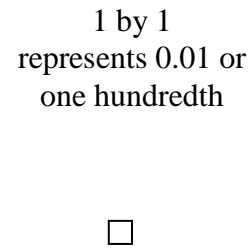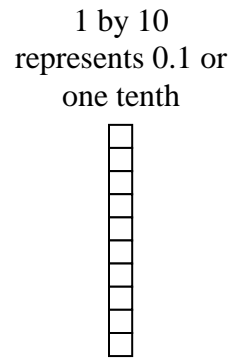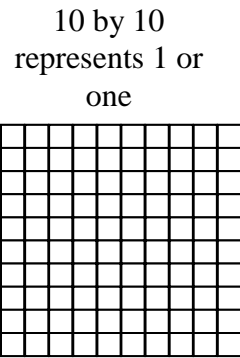
Then we'll practice dividing by tenths using paper and pencil. To divide a decimal by a decimal number, make the divisor a whole number by multiplying it by the power of ten needed to move the decimal to the right of all of the digits in the divisor, then multiply the dividend by the same power of ten. When dividing by tenths, we must move the decimal one place to the right.

Next we'll practice dividing by hundredths. To divide a decimal by a decimal number, make the divisor a whole number by multiplying it by the power of ten needed to move the decimal to the right of all of the digits in the divisor, then multiply the dividend by the same power of ten. When dividing by hundredths we must move the decimal point two places to the right.

We will also practice dividing whole numbers by decimals. In this case, we must put a decimal point after the whole number, add zeros as needed, and then move the decimal point.
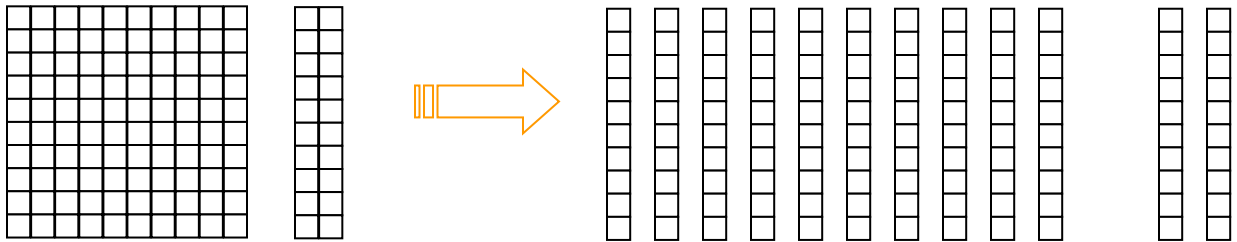
In division sometimes the answer does not come out even. That's when we divide until the quotient has one extra decimal place, then round to the given place. Finally we will practice dividing decimals and rounding quotients.
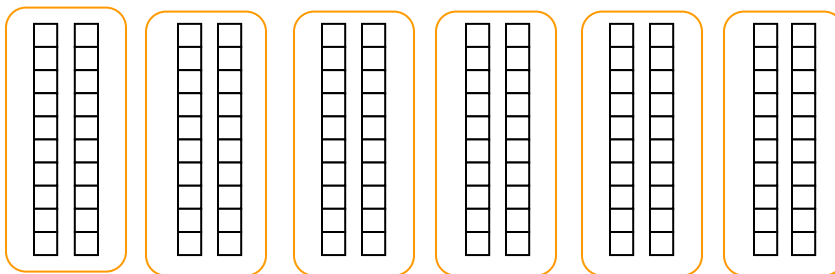
Modeling Decimal Division

10 by 10 represents 1 or one	1 by 10 represents 0.1 or one tenth	1 by 1 represents 0.01 or one hundredth

To Show 1.2 ÷ 0.2

First Show 1.2 with base-ten blocks, then trade the ones block in for tenths.

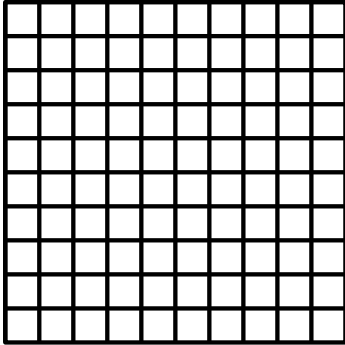**Group the tenths strips into groups of two-tenths (0.2)**

There are 6 groups.

Therefore 1.2 ÷ 0.2 = 6

Decimal Squares

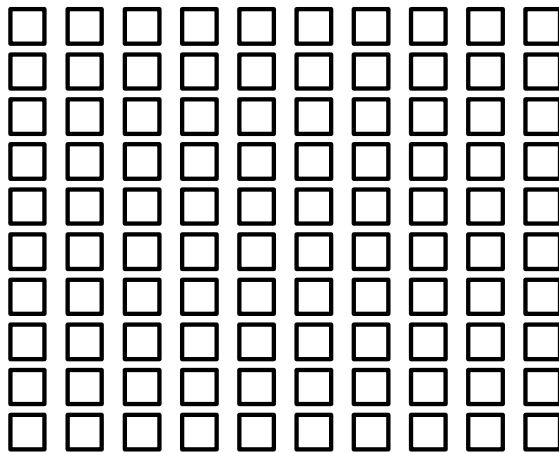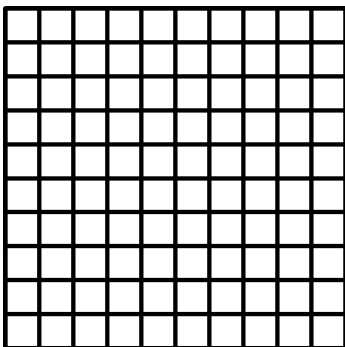1 Whole or $\dfrac{100}{100ths}$

$\dfrac{1}{10th}$

$\dfrac{1}{100th}$

□

0.01

1

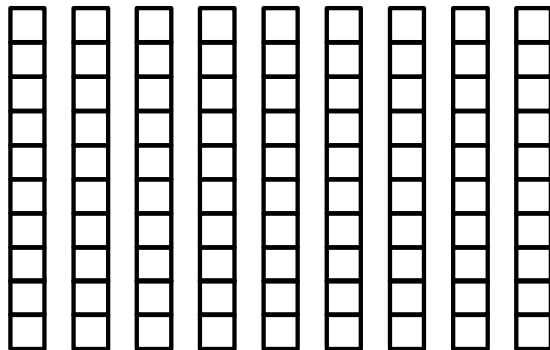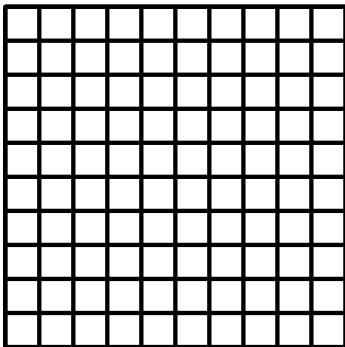**0.1**

Dividing Decimals by Whole Numbers

To divide a decimal by a whole number, **place the decimal point** in the *quotient* right **above the decimal** in the *dividend*.

Divide 16.8 by 24

Estimate

$20 \div 20 = 1$

Divisor

$$0.7 \leftarrow Quotient$$
$$24\overline{)16.8}$$
$$168$$

Dividend

Check: The estimate, 1, is close to 0.7.

Dividing Decimals in Tenths

To divide a decimal by a decimal number, make the divisor a whole number by multiplying it by the power of ten needed to **move the decimal to the right of all of the digits in the divisor**. Then multiply the dividend by the same power of ten.

Divide 29.24 by 3.4

Estimate
30 ÷ 3 = 10

The shortcut to multiply by ten is to move the decimal point right one place.

Place the decimal point first

$$3.4\overline{)29.24}$$

Check: The estimate, 10, is close to 8.6.

5 Steps for Division

Divide 34 into 292 to get 8
Multiply 8 × 34 to get 272
Subtract 272 from 292 to get 20
Compare 20 with 34
   (20 must be smaller than 34)
Bring Down 4

*Divide, Multiply,
Subtract, Compare*

$$
\begin{array}{r}
8. \\
34.\overline{)292.4} \\
\underline{272} \\
20
\end{array}
$$

*Bring down
and start over*

$$
\begin{array}{r}
8.6 \\
34.\overline{)292.4} \\
\underline{272} \\
20\ 4 \\
\underline{20\ 4}
\end{array}
$$

Dividing Decimals in Hundredths

To divide a decimal by a decimal number, make the divisor a whole number by multiplying it by the power of ten needed to **move the decimal to the right of all of the digits in the divisor**. Then multiply the dividend by the same power of ten.

Divide 8.0124 by 1.32

$$1.32 \overline{)8.0124}$$

$$\frac{8.0124}{1.32} \times \frac{100}{100} = \frac{801.24}{132}$$

$$
\begin{array}{r}
6. \\
132.\overline{)801.24} \\
\underline{792} \\
92
\end{array}
$$

$$
\begin{array}{r}
6.0 \\
132.\overline{)801.24} \\
\underline{792} \\
92 \\
\underline{0}
\end{array}
$$

$$
\begin{array}{r}
6.07 \\
132.\overline{)801.24} \\
\underline{792} \\
92 \\
\underline{0} \\
924 \\
\underline{924}
\end{array}
$$

Dividing Whole Numbers by Decimals

When the dividend is a whole number, place a decimal point after it and then move the decimal point to the right as many places as determined by the divisor.

Divide 75 by 0.25

$$
\begin{array}{r}
300. \\
0.25\overline{)75.00} \\
\underline{75} \\
00 \\
\underline{00}
\end{array}
$$

75 ÷ 0.25 = 300

Dividing Decimals and Rounding Quotients

In division, sometimes the answer does not come out even. That's when we divide until the quotient has one extra decimal place, then round to the given place.

Divide 95.8 by 0.24
Round the quotient to nearest hundredth.

$$0.24\overline{)95.80}$$

$$
\begin{array}{r}
399.166 \\
24\overline{)95800.000} \\
72 \\
238 \\
216 \\
220 \\
216 \\
40 \\
24 \\
160 \\
144 \\
160 \\
144 \\
16
\end{array}
$$

Rounds to 399.17

Do not continue division as the quotient has enough decimal places for rounding to nearest hundredths.