DECIMAL NUMBERS

A DEFINITION

Definition Decimal Number

A **decimal number** is a number that has a decimal point. The decimal point separates the whole number part from the part that is smaller than one. We can write a decimal number in different ways:

- **Numeral form**:

$$35.48$$
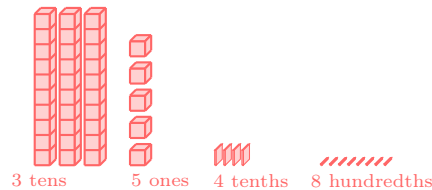
- **Decimal Fraction**:

$$\frac{3548}{100}$$

- **Expanded form** :

$$3 \text{ tens } + \quad 5 \text{ ones } + \quad 4 \text{ tenths}$$
$$30+ \qquad 5+ \qquad \frac{4}{10}$$
$$3 \times 10+ \quad 5 \times 1+ \quad 4 \times \frac{1}{10}$$

- **Table**:

Tens	Ones	.	Tenths	Hundredths
3	5	.	4	8

- **Blocks**:

3 tens · 5 ones · 4 tenths · 8 hundredths
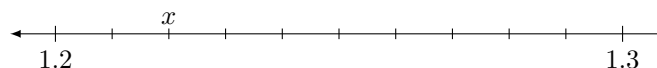

B ON THE NUMBER LINE

Method How to Draw a Number Line for a Decimal Number

Here's how to put a decimal number on a number line:

1. **Choose your range:** If your numbers are between 2.2 and 2.3, your number line starts at 2.2 and ends at 2.3.

2. **Divide into ten equal parts:** On a number line from 2.2 to 2.3, the first mark is 2.21, the second is 2.22, and so on, until you get to 2.30 (which is the same as 2.3).
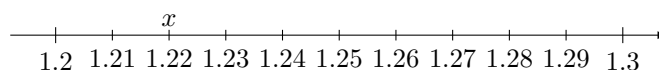

2.2 2.21 2.22 2.23 2.24 2.25 2.26 2.27 2.28 2.29 2.3
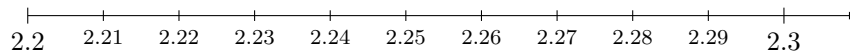
Ex: Find the value of x.

1.2 $\qquad\qquad\qquad\qquad\qquad\qquad$ 1.3

Answer:

- Each small division on the number line shows 0.01.

1.2 1.21 1.22 1.23 1.24 1.25 1.26 1.27 1.28 1.29 1.3

- So, $x = 1.22$

C ORDERING

Method Comparing by decimal alignment

1. Align the decimal points between the two numbers and add zeros if necessary.

2. Compare the digits from left to right. The first number to have a larger digit in any place value is the larger number.

Ex: Compare 6.22 and 6.3

Answer:

- Align the decimal points and add zeros:
  6.22
  6.30

- Compare from left to right: Both numbers have a 6 in the units place. Comparing the next digit (2 vs. 3) shows that
  $6.22 < 6.3$

6 ones	2 tenths	2 hundredths	<	6 ones	3 tenths

D ROUNDING

Method Rounding Numbers to a Place Value

1. Find the digit in the place you are rounding to.

2. Look at the digit to the right of it.

3. If this digit is 5 or more, add 1 to the digit in the place you are rounding to (**round up**).

4. If this digit is 4 or less, keep the digit the same (**round down**).

5. Replace all digits to the right with zeros.

Ex: Round the number 12.346 to the nearest tenth.

Answer:

- Find the digit in the tenths place: 12.346.

- Look at the digit to the right: 12.346.

- Since 4 is less than 5, keep the digit in the tenths place the same.

- Replace all digits to the right with zeros: 12.30.

The rounded number is 12.3.

E MULTIPLYING BY POWERS OF 10

When we multiply a number by 10, each digit shifts one place to the left, making the number ten times larger.

$$
\begin{aligned}
10 \times 2.3 &= 10 \times (2 \text{ ones} + 3 \text{ tenths}) \\
&= 2 \times 10 \text{ ones} + 3 \times 10 \text{ tenths} \\
&= 2 \text{ tens} + 3 \text{ ones} \\
&= 23
\end{aligned}
$$

- When multiplying by 10, we move the decimal point one place to the right.

- When multiplying by 100, we move the decimal point two places to the right.

- When multiplying by 1000, we move the decimal point three places to the right.

Ex: Calculate 10×5.24

Answer: $10 \times 5.24 = 52.4$

F DIVIDING BY POWERS OF 10

When we divide a number by 10, each digit shifts one place to the right, making the number ten times smaller.

$$23 \div 10 = (2 \text{ tens } + 3 \text{ ones}) \div 10$$
$$= (2 \times \text{tens} \div 10) + (3 \times \text{ones} \div 10)$$
$$= 2 \times \text{ones} + 3 \times \text{tenths}$$
$$= 2.3$$

Method **Dividing by powers of 10**

- When dividing by 10, we move the decimal point one place to the left.

- When dividing by 100, we move the decimal point two places to the left.

- When dividing by 1000, we move the decimal point three places to the left.

Ex: Calculate $23.2 \div 10$

Answer: $23.2 \div 10 = 2.32$