

## 21.1 Decimal Addition and Subtraction - Worksheet 1

1 Write the number 34.72 in expanded form and label each of the parts with the corresponding unit.

2 Write the number 20.709 in expanded form and label each of the parts with the corresponding unit.

Traditionally, expanded form does not include the zeros, but it doesn't hurt anything to include them.

3 Write the number 0.73 as a fraction.

4 Write the number 0.029 as a fraction.

5 Write the number 1.05 as an improper fraction. Explain why you think your answer is correct.

Mixed numbers and addition are two ideas you can use to help explain your answer.

## 21.2 Decimal Addition and Subtraction - Worksheet 2

1

Calculate  $2.3 + 3.08$ .

2

Calculate  $4.2 + 1.03$ .

3

Calculate  $4.6 - 2.22$ .

4

Calculate  $3.6 - 1.38$ .

5

A student calculates  $2.5 + 1.04$  and gets  $3.09$  as the result. How would you explain the error to them?

Just telling someone the correct way of doing a calculation does not *explain the error* to them.

### 21.3 Decimal Addition and Subtraction - Worksheet 3

1

Calculate  $2.03 + 1.98$ .

2

Calculate  $1.013 + 3.92$ .

3

Calculate  $11.11 + 1.111$ .

4

Calculate  $6.1 - 3.28$ .

5

Calculate  $4.28 - 1.005$ .

6

Calculate  $5.006 - 3.09$ .

## 21.4 Decimal Addition and Subtraction - Worksheet 4

1 The word *decimal* comes from the Latin root for ten. This is because numbers can be written in terms of powers of ten. This gives us a different way of writing the expanded form of a number:

$$\begin{aligned}238 &= 200 + 30 + 8 \\ &= 2 \cdot 100 + 3 \cdot 10 + 8 \cdot 1 \\ &= 2 \cdot 10^2 + 3 \cdot 10^1 + 8 \cdot 10^0\end{aligned}$$

With this framework in mind, write the number 21.84 using expanded form and showing the powers of ten.

Other examples:

- Decade: ten years
- Decathlon: ten events

You don't necessarily need to show all the steps, but you may find it helpful.

2 Write the number 107.509 using expanded form and showing the powers of ten.

3 Write the number 3100000000 using expanded form and showing the power of ten.

4 Write the number 0.00000079 using expanded form and showing the power of ten.

5 Describe some of the challenges that you faced in the last two calculations.

*Scientific notation* is a way of writing numbers that avoids these difficulties.

## 21.5 Decimal Addition and Subtraction - Worksheet 5

1 There are certain decimals that come up often enough that it is useful to be able to convert between decimals and fractions. Convert each of the decimals below into fractions, and then completely reduce them. Put the reduced fraction into the charts.

Decimal	0.2	0.4	0.6	0.8	0.25	0.5	0.75
Fraction							

Try to organize your work so that you don't just have fractions scattered all over the place.

2 There are fractions that lead to decimals that repeat a pattern forever. We can indicate repeating decimals in two different ways. One notation writes out enough of the number so that the pattern is "obvious" and then uses an ellipsis to indicate that the pattern continues. The other way uses a bar over the part of the number that repeats. Using a calculator or long division, complete the chart of values.

Fraction	$\frac{1}{6}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{5}{6}$
Ellipsis Notation	0.16666...			
Bar Notation	$0.1\overline{6}$			

3 Some decimals have interesting patterns that can be explored. One of the more surprising examples of this happens with fractions with 7 in the denominator.

Fraction	$\frac{1}{7}$	$\frac{2}{7}$	$\frac{3}{7}$	$\frac{4}{7}$	$\frac{5}{7}$	$\frac{6}{7}$
Decimal	$0.\overline{142857}$	$0.\overline{285714}$	$0.\overline{428571}$	$0.\overline{571428}$	$0.\overline{714285}$	$0.\overline{857142}$

What pattern do you observe in these decimals?

If you want to play with another one, try playing with fractions with 9, 99, and 999 in the denominator.