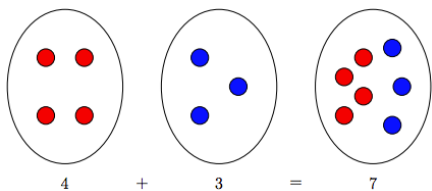# Adding Whole Numbers

Palomar College

2015

Objectives

- Introduce specific vocabulary
- Define properties of addition
- Learn how to use carrying to add
- Learn how to use number lines to add

Adding two numbers is finding out how many there are in total after combining two numbers. For example,

$$4 \quad + \quad 3 \quad = \quad 7$$

If we combine 4 circles with 3 circles, we now have 7 circles in total. 4 and 3 are called the **addends** and 7 is called the **sum**.

Properties of Addition

- **Additive Identity Property:**
  Adding zero to a number does not change it.
  $$0 + 3 = 3 \text{ and } 3 + 0 = 3$$

- **Commutative Property of Addition:**
  Changing the order of the addends does not change the sum.
  $$3 + 4 = 7 \text{ and } 4 + 3 = 7$$

- **Associative Property of Addition:**
  When adding three numbers, you may add the first two numbers together and then add in the third or you may start by adding the last two numbers together and then add in the first. Both will give you the same result.
  $$(2 + 1) + 5 = 3 + 5 = 8$$
  $$2 + (1 + 5) = 2 + 6 = 8$$

Using Carrying to Simplify the Addition Process

When numbers are large we add by place value to make it easier. We start by adding the ones place, then the tens place, and so on. First we try this by writing the numbers out in expanded form.

$$15,678 + 7,784 = (10,000 + 5,000 + 600 + 70 + 8) + (7,000 + 700 + 80 + 4)$$
$$= 10,000 + (5,000 + 7,000) + (600 + 700) + (70 + 80) + (8 + 4)$$
$$= 10,000 + 12,000 + 1,300 + 150 + 12$$
$$= 23,462$$

We can also do this vertically by placing the numbers on top of each other and adding digits with the same place value downwards.
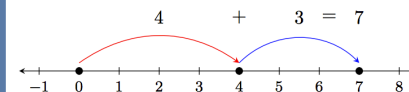
$$
\begin{array}{r}
15,678 \\
+ \ 7,784 \\
\hline
12 \\
150 \\
1,300 \\
12,000 \\
+10,000 \\
\hline
23,462
\end{array}
$$

However, the most common and compact way to do this is to a process called **carrying**. In this process you bring just the first digit down when adding and then carry the rest of the number to the top of the next place value.

$$
\begin{array}{r}
\overset{1}{1}\overset{1}{5},\overset{1}{6}\overset{1}{7}8 \\
+ \ 7,784 \\
\hline
23,462
\end{array}
$$

Examples with Number Lines

Use the number line to find the sum.

a) $6 + 2$

$$6 \quad + \quad 2 \quad = \quad 8$$

b) $3 + 3$

$$3 \quad + \quad 3 \quad = \quad 6$$
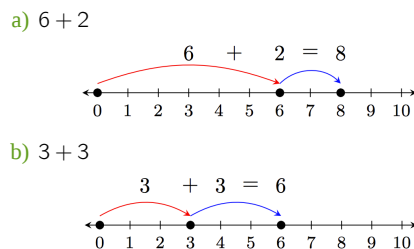
Examples with Carrying

Add using carrying.

$$
\begin{array}{r}
\overset{1}{\ } \ \overset{1}{\ } \ \\
2,639 \\
+ 1,845 \\
\hline
4,484
\end{array}
\qquad
\begin{array}{r}
\overset{1}{\ } \ \ \overset{1}{\ }\overset{1}{\ } \\
46,597 \\
+ 25,308 \\
\hline
71,905
\end{array}
$$

Let's Try It

Use the number line to find the sum.

a) $3 + 6$

b) $4 + 1$

c) $2 + 5$
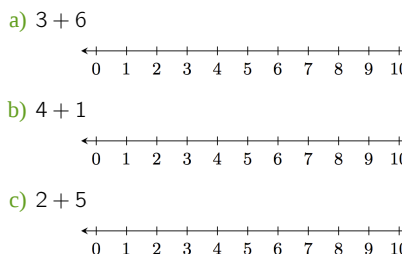
Let's Try It

Add using carrying.

$$
\begin{array}{r}
2,358 \\
+ 1,515 \\
\hline
\end{array}
\qquad
\begin{array}{r}
31,678 \\
+ \ \ 9,482 \\
\hline
\end{array}
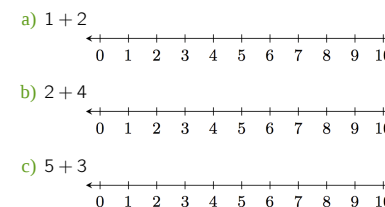$$

Adding with Number Lines

We can use number lines to help find sums. We start at zero and move to the right for each addend. Instead of thinking about counting objects, we can think of total distance traveled.

$$4 \quad + \quad 3 \quad = \quad 7$$

Practice

1) Identify what property is being used.
   a) $115 + 500 = 500 + 115$
   b) $(2 + 3) + 5 = 2 + (3 + 5)$
   c) $28 + 0 = 28$
   d) $(1 + 3) + 7 = (3 + 1) + 7$

2) Use the number line to find the sum.
   a) $1 + 2$

   b) $2 + 4$

   c) $5 + 3$

3) Add.
   a) $28 + 0$
   b) $(2 + 3) + 5$
   c) $115 + 500$
   d) $1 + (3 + 7)$
   e) $1,259 + 742$
   f) $12,579 + 10,351$
   g) $78,987 + 8,274$
   h) $852,976 + 148,037$

Adding Whole Numbers

Answers to Practice

1. Identify what property is being used.

   (a) $115 + 500 = 500 + 115$
   commutative property of addition
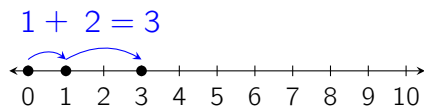
   (b) $(2 + 3) + 5 = 2 + (3 + 5)$
   associative property of addition

   (c) $28 + 0 = 28$
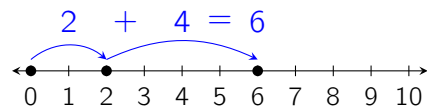   additive identity property

   (d) $(1 + 3) + 7 = (3 + 1) + 7$
   commutative property of addition
   (The grouping did not change, $1 + 3$
   changed to $3 + 1$.)
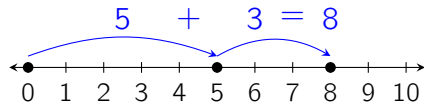
2. Use the number line to find the sum.

   (a) $1 + 2$

   $1 + 2 = 3$

   (b) $2 + 4$

   $2 + 4 = 6$

   (c) $5 + 3$

   $5 + 3 = 8$

3. Add.

   (a) $28 + 0 = 28$

   (b) $(2 + 3) + 5 = 5 + 5 = 10$

   (c) $115 + 500$

   $$\begin{array}{r} 1\,1\,5 \\ +\,5\,0\,0 \\ \hline 6\,1\,5 \end{array}$$

   (d) $1 + (3 + 7) = 1 + 10 = 11$

   (e) $1,259 + 742$

   $$\begin{array}{r} 1{,}2\,5\,9 \\ +\,7\,4\,2 \\ \hline 7\,4\,3{,}2\,5\,9 \end{array}$$

   (f) $12,579 + 10,351$

   $$\begin{array}{r} {}^{1\,\,1} \\ 1\,2{,}5\,7\,9 \\ +\,1\,0{,}3\,5\,1 \\ \hline 2\,2{,}9\,3 \end{array}$$

   (g) $78,987 + 8,274$

   $$\begin{array}{r} {}^{1\,\,1} \\ 7\,8{,}9\,8\,7 \\ +\,1\,0{,}3\,5\,1 \\ \hline 8\,9{,}3\,3\,8 \end{array}$$

   (h) $752,976 + 148,037$

   $$\begin{array}{r} {}^{1\,1\,1\,1\,1} \\ 7\,5\,2{,}9\,7\,6 \\ +\,1\,4\,8{,}0\,3\,7 \\ \hline 9\,0\,1{,}0\,1\,3 \end{array}$$