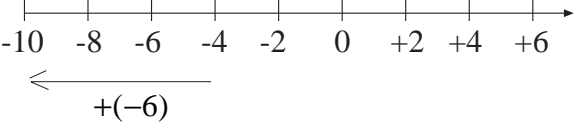


## 7: Calculations with Negative Numbers

**Question:** What is the value that satisfies  $-4 + ? = -10$ ?

Misconception	Correct
There are several possible misconceptions including	The correct answer is $-6$ as this satisfies the sum $-4 + (-6) = -10$ . It can be shown on a number line as given below.
$? = 6$	 <p style="text-align: center;"><math>+(-6)</math></p>
and	
$? = 14$	
or even	Starting at negative 4 and adding negative 6 you get the answer negative 10.
$? = -14$	Hence $-4 + (-6) = -10$

### Further Explanation

As with the previous misconception (number 6), it is important to realise that there is no guessing, no doubts but straightforward logic. Here we can associate the meaning *owning* when the quantity is positive and *owing* if it negative.

Also, as before, we associate the *minus* sign with *opposite*.

In this example,

I start by owing 4 ( i.e. the ' $-4$ ' )

What is this '+?' that must have happened if I ended up 'owing 10' ?  
( i.e. the ' $-10$ ' )

Another *debt* of 6 must have been added to my plight

We write 'adding a debt of 6' as ' $+(-6)$ '

So in  $-4 + ? = -10$  the ? must be  $-6$

This is equivalent to the use of a number line as shown above; it does not matter which way you argue as long as you get the logic correct!

**Follow-up Exercises**

You might find a number line helpful when making or checking your calculations.

1. Complete the following:

(a)  $-5 - 3 = \square$

(b)  $-7 - 2 = \square$

(c)  $-9 - 8 = \square$

(d)  $-4 - 4 = \square$

(e)  $-3 - 8 = \square$

(f)  $-5 - 9 = \square$

2. Complete these calculations:

(a)  $-5 + \square = -9$

(b)  $-3 + \square = -7$

(c)  $-7 + \square = -10$

(d)  $-8 + \square = -6$

(e)  $-4 + \square = -1$

(f)  $-10 + \square = -6$

3. Calculate the value of each of these expressions:

(i)  $a + b$

(ii)  $a - b$

(iii)  $-a + b$

(iv)  $-a - b$

when

(a)  $a = -3$  and  $b = -7$

and

(b)  $a = 5$  and  $b = -6$

**Answers**

1. (a)  $-8$  (b)  $-9$  (c)  $-17$  (d)  $-8$  (e)  $-11$  (f)  $-14$

2. (a)  $-4$  (b)  $-4$  (c)  $-3$  (d)  $2$  (e)  $3$  (f)  $4$

3. (a)  $-10, 4, -4$  and  $10$  (b)  $-1, 11, -11$  and  $1$