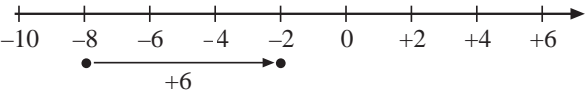


## 6: Adding with Negative Numbers

**Question:** What is the value of  $-8 + 6$ ?

| Misconception   | Correct  |
|---|--|
| <p>There are several possible misconceptions including</p> $-8 + 6 = 2$ <p>and</p> $-8 + 6 = -14$ | <p>The correct answer is <math>-2</math> as this sum results from adding positive 6 to negative 8, as can be seen from the number line below.</p>  <p>Starting at negative 8 and adding 6 you get the answer negative 2.</p> <p>Hence <math>-8 + 6 = -2</math></p> |

### Further Explanation

With mathematics, everything is logical; there is no "guessing" and no "maybe", only logical reasoning.

We associate the *minus* sign with *opposite* (as in *give* and *take*).

For example,

$-8$  means *taking away* 8, while  $(+)6$  means *giving* 6

So  $-8 + 6$  translates to

*taking away* 8 and *giving back* 6

which is equivalent to *taking away* only 2

But taking away 2 is what is meant by  $-2$ . That is why  $-8 + 6 = -2$ .

You can argue in a similar way, or do the calculation on a number line, to show that, for example,

$$6 - 8 = -2 \quad \text{and} \quad -6 - 8 = -14$$

Note that the order of giving/taking does not matter.

**Follow-up Exercises**

You might find the number line below 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. Calculate these values:

(a)  $9 - 7$       (b)  $3 - 5$       (c)  $-4 - 3$

(d)  $5 - 8$       (e)  $-5 - 8$       (f)  $4 - 9$

3. Calculate the value of each of these expressions:

(i)  $a + b$       (ii)  $a - b$       (iii)  $-a + b$       (iv)  $-a - b$

when

(a)  $a = 4$  and  $b = 5$

and

(b)  $a = -4$  and  $b = 3$

**Answers**

1. (a)  $-2$  (b)  $-5$  (c)  $-1$  (d)  $0$  (e)  $5$  (f)  $4$

2. (a)  $2$  (b)  $-2$  (c)  $-7$  (d)  $-3$  (e)  $-13$  (f)  $-5$

3. (a)  $9, -1, 1$  and  $-9$       (b)  $-1, -7, 7$  and  $1$