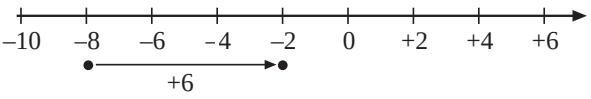
6: Adding with Negative Numbers

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

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

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,

$6-8=-2$ and $-6-8=-14$

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) $-5+3=$ ☐ (b) $-7+2=$ ☐ (c) $-9+8=$ ☐

   (d) $-4+4=$ ☐ (e) $-3+8=$ ☐ (f) $-5+9=$ ☐

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