Subtracting Negative Numbers

Objective 1 Understand how to Subtract a Negative Number

It can be difficult to fully understand what happens when you subtract a negative number. But with enough practice it will eventually become easy.

Let first talk about subtraction and the phrase "take away". Think about the phrase "4 take away 4" which means "$4-4$". In both cases it makes sense that the result is 0. Next, look at the number line below which visually shows "4 take away 4" is 0.

"4 take away 4"

-7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7
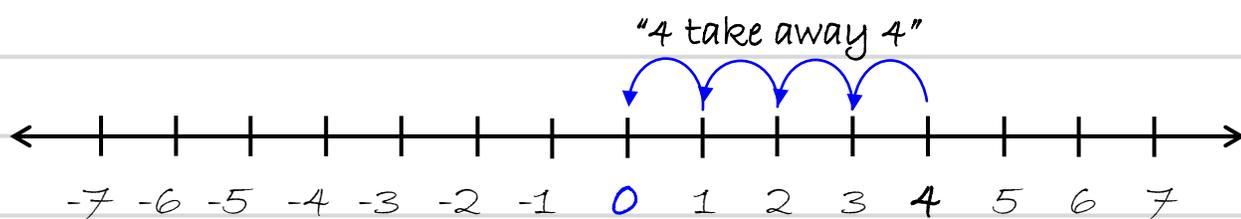
Now let's think about the phrase "-4 take away -4" which means "$-4-(-4)$". In both cases it makes sense that the result is 0.

So how should this be represented on the number line?

If "-4 take away -4" which means "$-4-(-4)$" is equal to 0, then here is how we represent this on the number line.

"-4 take away -4"

$$\begin{array}{c}\leftarrow \;|\;\;|\;\;|\;\;|\;\;|\;\;|\;\;|\;\;|\;\;|\;\;|\;\;|\;\;|\;\;|\;\;|\;\;|\; \rightarrow\\ \;\;\text{-7 -6 -5 }\textbf{-4}\text{ -3 -2 -1 }\;0\;\text{ 1 2 3 4 5 6 7}\end{array}$$
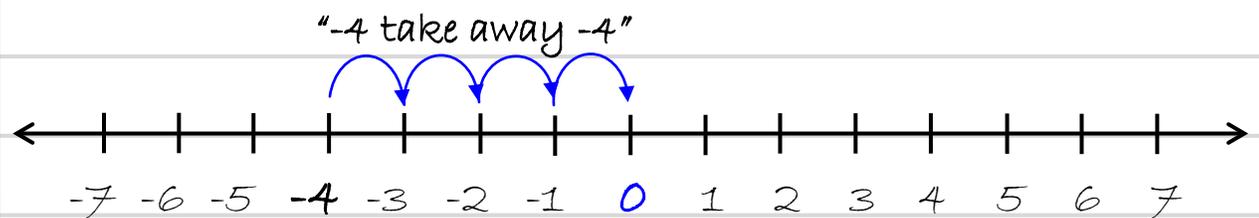
Notice how the number line above shows that "**-4 take away -4**" or "$-4-(-4)$" is the same as performing $-4+4$! In all three cases the result is zero! We can therefore conclude that

$$-4-(-4) = -4+4.$$

Conclusion: Subtracting a negative number is the same as adding its opposite.

Rewriting the subtraction of a negative quantity to adding its opposite, is a necessary skill for algebra!

Remember that rewriting the addition of a negative quantity to subtracting its opposite, is also a necessary skill for algebra!

Example 1: Rewrite the following subtraction problems as equivalent addition problems. Next, find the value of the expression if possible.

    a) $a - (-b)$

    b) $x - (-y)$

    c) $-3 - (-2)$

    d) $5 - (-8)$

Example 2: Evaluate each expression.

a) $5 - (-5)$ e) $-2 - (-4) + (-6)$

b) $-5 - (-5)$ f) $-10 + (-20) - (-30)$

c) $0 - (-8)$ g) $17 - (-4) - 15$

d) $-4 - (-6)$ h) $11 - (-13) - (-6)$

Example 3: Evaluate each expression.

a) $(-4-10)-(-8+2)$ b) $-4-(-5)+9-(-7)$

Example 4: Write an expression for each word statement. Next, evaluate the expression.

a) Subtract negative twelve from the product of three and four.

b) Subtract negative three from the sum of eight and negative seven.

Answer the following homework questions.

In Exercises 1 - 15, use the number line to evaluate each expression.

$$\longleftarrow \quad \underset{-7}{|} \quad \underset{-6}{|} \quad \underset{-5}{|} \quad \underset{-4}{|} \quad \underset{-3}{|} \quad \underset{-2}{|} \quad \underset{-1}{|} \quad \underset{0}{|} \quad \underset{1}{|} \quad \underset{2}{|} \quad \underset{3}{|} \quad \underset{4}{|} \quad \underset{5}{|} \quad \underset{6}{|} \quad \underset{7}{|} \quad \longrightarrow$$
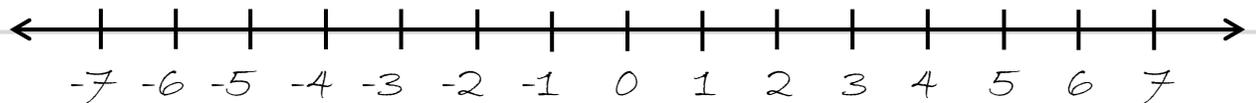
1) $-5 - (-8)$ 6) $0 - (-6)$ 11) $5 - 4 - (-6)$

2) $-2 - (-7)$ 7) $0 - (-4)$ 12) $3 - 8 - (-2)$

3) $-7 - (-12)$ 8) $2 - (-2)$ 13) $4 + (-10) - (-3)$

4) $-1 - (-5)$ 9) $3 - (-3)$ 14) $-2 + (-5) - (-13)$

5) $2 - (-3)$ 10) $-3 - (-3)$ 15) $-3 + (-3) - (-6)$

In Exercises 16 – 18, write an expression for each word statement.

Next, evaluate the expression.

16) Find the difference of negative fifteen and negative thirty-one.

17) Find the difference of negative thirty-one and negative fifteen.

18) Subtract negative twenty-one from the sum of negative nineteen and seven.