Brand A lawn fertilizer is 22% nitrogen. Brand B lawn fertilizer is 4% nitrogen. James, who is the manager of lawn services at the Brighton Campus, wants his employees to apply a mixture of 1200 pounds of lawn fertilizer that is 10% nitrogen. How many pounds of each fertilizer should he mix together?
Solution

Brand A lawn fertilizer is 22% nitrogen. Brand B lawn fertilizer is 4% nitrogen. James, who is the manager of lawn services at the Brighton Campus, wants his employees to apply a mixture of 1200 pounds of lawn fertilizer that is 10% nitrogen. How many pounds of each fertilizer should he mix together?

Let A = the number of pounds of brand A fertilizer
Let B = the number of pounds of brand B fertilizer

In order to obtain equations in the variables A & B, we make a table:

<table>
<thead>
<tr>
<th>Fertilizer</th>
<th>% of Nitrogen</th>
<th>Number of pounds</th>
<th>Amount of nitrogen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand A</td>
<td>22%</td>
<td>A</td>
<td>0.22A</td>
</tr>
<tr>
<td>Brand B</td>
<td>4%</td>
<td>B</td>
<td>0.04B</td>
</tr>
<tr>
<td>Mixture</td>
<td>10%</td>
<td>1200</td>
<td>(0.10)(1200)</td>
</tr>
</tbody>
</table>

From the “Number of pounds column” we can write:

(1) \( A + B = 1200 \)

From the “Amount of nitrogen column” we can write:

(2) \( 0.22A + 0.04B = 120 \)

We now solve this 2 by 2 system:

\[
A + B = 1200 \rightarrow \text{multiply both sides by } -0.22
\]

\[-0.22A - 0.22B = -264 \rightarrow \text{underneath this, write equation (2)}
\]

\[
0.22A + 0.04B = 120 \rightarrow \text{now solve by using addition}
\]

\[-0.18B = -144 \rightarrow \text{now divide both sides by } -0.18
\]

\[B = 800 \text{ pounds}\]

And since \( A + B = 1200 \), it follows that \( A = 400 \) pounds.

So, in summary, James must mix 400 pounds of brand A fertilizer with 800 pounds of brand B fertilizer to obtain a mixture of 1200 pounds that is 10% nitrogen.