Problem of the Week
Problem B and Solution
What’s for Lunch?

Problem
Sanji and his 34 classmates always bring sandwiches to school for lunch. One day, everyone brought either a jelly sandwich, or a ham and cheese sandwich, or a tuna salad sandwich.

If the number of students who brought jelly sandwiches \( J \) was twice the number who brought ham and cheese \( H \), and four times the number who brought tuna salad \( T \), how many sandwiches were there of each type?

**HINT:** What should the total number of sandwiches be?

You may find the table useful for the ‘guess and check’ method.

<table>
<thead>
<tr>
<th>( T )</th>
<th>( H )</th>
<th>( J )</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>12</td>
<td>21</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>16</td>
<td>28</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>20</td>
<td>35</td>
</tr>
<tr>
<td>6</td>
<td>12</td>
<td>24</td>
<td>42</td>
</tr>
</tbody>
</table>

Solution

**Solution 1:**
There are a total of 34 + 1 = 35 students. Therefore, there must be 35 sandwiches. The completed table reveals that the only possible combination is 5 tuna salad, 10 ham and cheese, and 20 jelly sandwiches, in order to give the correct total number of 35 sandwiches.

**Solution 2:**
An alternate, algebraic solution is presented below. The algebra used in this solution may be beyond what students at this age have typically seen.

We are given that \( J = 4 \times T \) and \( J = 2 \times H \). This means that \( H = 2 \times T \).

We now have

\[
J + H + T = 4 \times T + 2 \times T + T = 7 \times T
\]

But \( J + H + T = 7 \times T \) is also equal to the total number of students.

Thus, \( 35 = 7 \times T \), which gives \( T = 5 \).

Since \( T = 5 \), we get \( H = 2 \times 5 = 10 \), and \( J = 4 \times 5 = 20 \).

Therefore, 5 students brought a tuna salad sandwich, 10 students brought a ham and cheese sandwich, and 20 students brought a jelly sandwich.