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

Problem

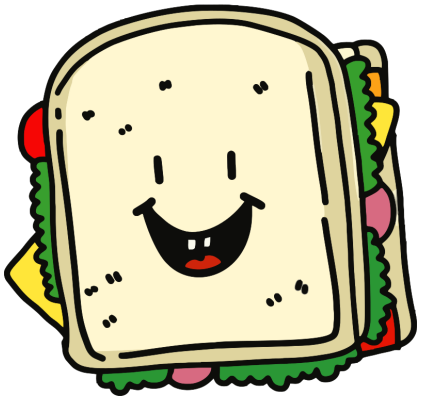
Sanji and his 34 classmates always bring sandwiches to school for lunch. One day, everyone brought either a jelly sandwich, or a ham and cheese sandwich, or a tuna salad sandwich.

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.

T	H	J	**Total**
1	2	4	7
2	4	8	14
3	6	12	21
4	8	16	28
5	10	20	35
6	12	24	42



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.