# RECOMMENDATIONS ON PRESENTING MATHEMATICAL SOLUTIONS

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# RECOMMENDATIONS

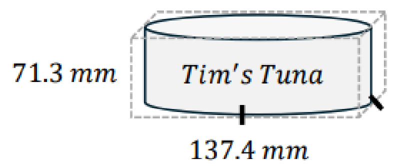
When a teacher or marker reads our solutions to mathematical problems, arguably what is most important to them should not be whether or not our final answer is correct, but instead whether or not *the way* that we reached our final answer is correct.

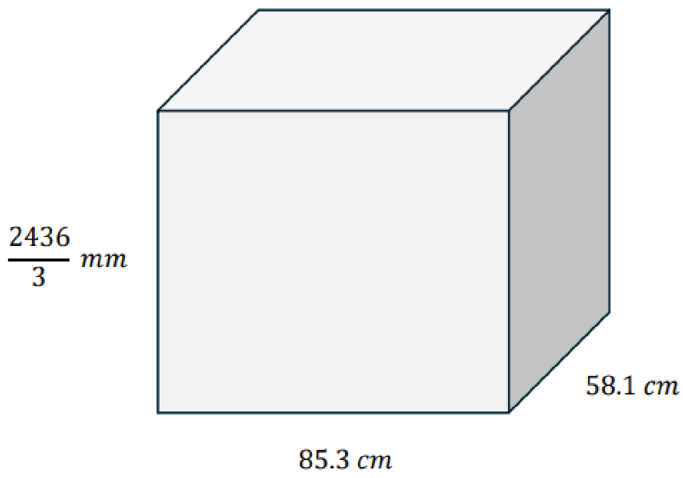
So, we should ensure that we present the steps that we took in order to reach our final answer in a way that is easy for our marker to follow.

Let us learn how to do this by answering the following example problem.

**Example 1**

Determine the number of cans of $Tim's\ Tuna$ that will fit inside the packing box.

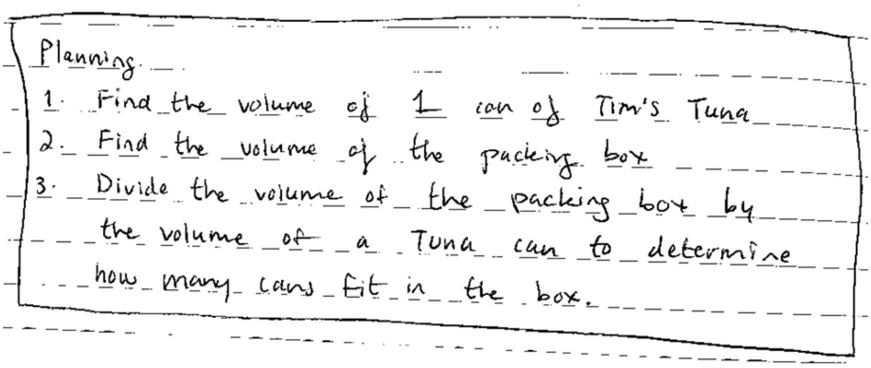


# PLAN YOUR ANSWER

This can be done in your head, or on a separate piece of paper. To 'plan', note what steps you will need to make in order to solve the problem.

For the tuna question, this might look like:



Planning

1. Find the volume of 1 can of Tim's Tuna
2. Find the volume of the packing box
3. Divide the volume of the packing box by the volume of a Tuna can to determine how many cans fit in the box.

Figure 1. Planning

# USE HEADINGS

Once you have planned the steps that you will make, use each step as a *heading* within your solution, and perform your calculations underneath.

It may be useful to your marker if you write each step as a question and use your calculations to answer said question.

1. What is the volume of 1 can of Tim's Tuna? Q

$V = \text{length} \times \text{width} \times \text{height}$

$V_{can} = 137.4\ \text{mm} \times 137.4\ \text{mm} \times 71.3\ \text{mm}$

$= 18{,}878\ \text{mm}^2 \times 71.3\ \text{mm}$

$= 1{,}346{,}001.4\ \text{mm}^3$

A

Figure 2. Heading

2. What is the volume of the packing box?

$V = \text{length} \times \text{width} \times \text{height}$

$V_{box} = \frac{2436}{3}\ \text{mm} \times 85.3\ \text{cm} \times 58.1\ \text{cm}$

$= 812\ \text{mm} \times 853\ \text{mm} \times 581\ \text{mm}$

$= 692{,}636\ \text{mm}^2 \times 581\ \text{mm}$

$= 402{,}421{,}516\ \text{mm}^3$

Figure 3. Another heading

# STATE FORMULAE USED

If you need to use a formula in order to do your calculations, ensure that you write out the *general form* of the formula first, before you apply the numbers from your problem question.

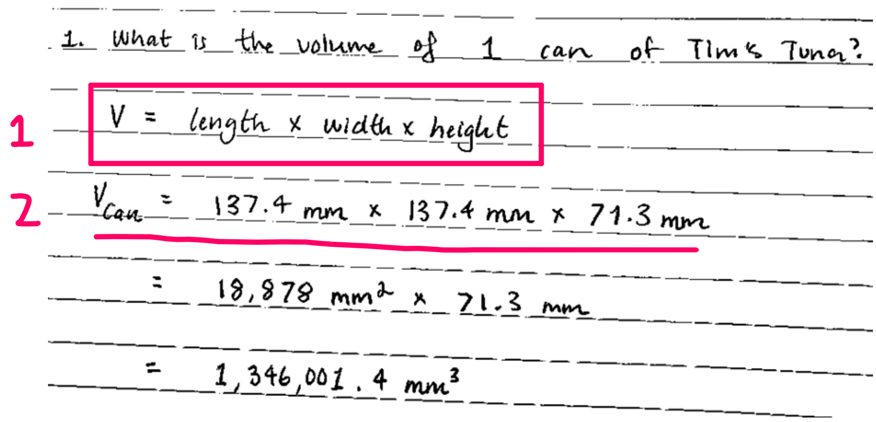



Figure 4. Stating the volume formula

# NEW LINES AND LINE SPACING

In order to keep our calculations neat and easy for our marker to follow, we can leave one line of space between our steps.

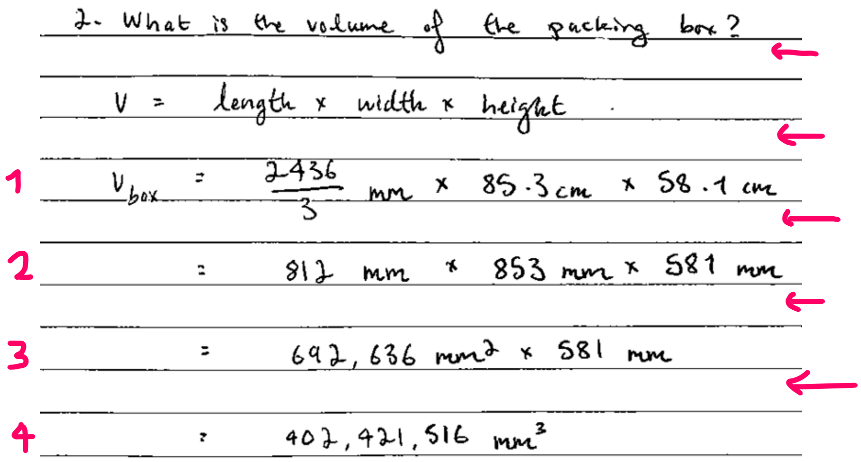



Figure 5. Line spacing

It will also be easier for our marker to follow our calculations if we do only 1-2 calculations per line.

**EXERCISE 1**

Can you identify what calculations were done on each line in **Figure 5?**

| Line Number | Calculation |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |

# VARIABLE LABELS

When solving for *variables* (meaning, values that can change) such as *area* or *volume* in our calculations, we should add *labels* to these variables where possible.

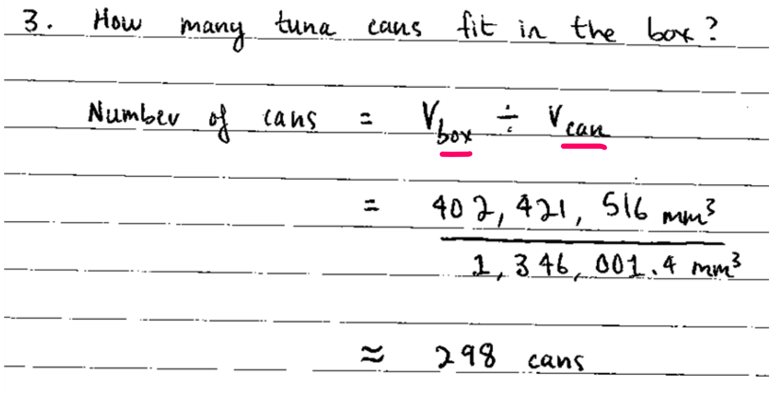



Figure 6. Variable labels

Because, if I were to write $V = 2 \times 3 \times 4$ , my marker will know that I am calculating volume, but they may ask

*"What is he calculating the volume of?"*

Whereas if I write $V_{Can} = 2\ cm\ \times 3cm \times 4cm$, my marker will know that I am calculating the volume of the can! (and roughly how large the can is, but we will discuss that next ...)

# UNITS

If the problem question provides us with *units* for the quantities that we are doing calculations with (e.g. $3\ cm$ or $4\ kg$), we should make sure to continue to write them in each line of our calculations.

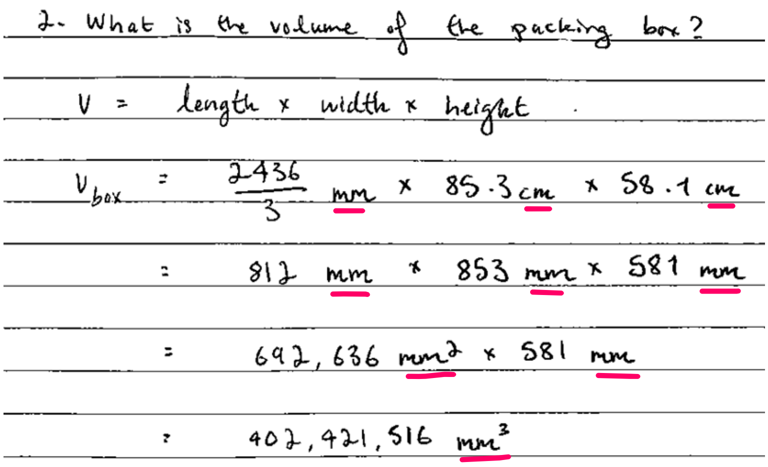



Figure 7. Units

Writing units on each line also prevents us from making small errors which may lose us marks in a test or exam. For example,

- Forgetting to write units in our final answer
  E.g. 298 instead of 298 *cans*

- Forgetting to convert numbers to the same units

  E.g. to find the area of a rectangle with a length of $3\ cm$ and a width of $20\ mm$, we do not do $20 \times 3$, as these represent different units ($cm$ vs $mm$)
  But if we write units the entire way, we can avoid this mistake!

$$\begin{aligned} A_{rectangle} &= 3\ cm \times 20\ mm \\ &= 3\ cm \times 2cm \\ &= 6\ cm^2 \end{aligned}$$

# OTHER CALCULATIONS

If we need to do addition, subtraction, multiplication or division by hand (i.e. without a calculator) in order to solve our problem, we should do these calculations on a scratch piece of paper, or *clearly* off to the side of our main calculations, so that we do not confuse our marker.

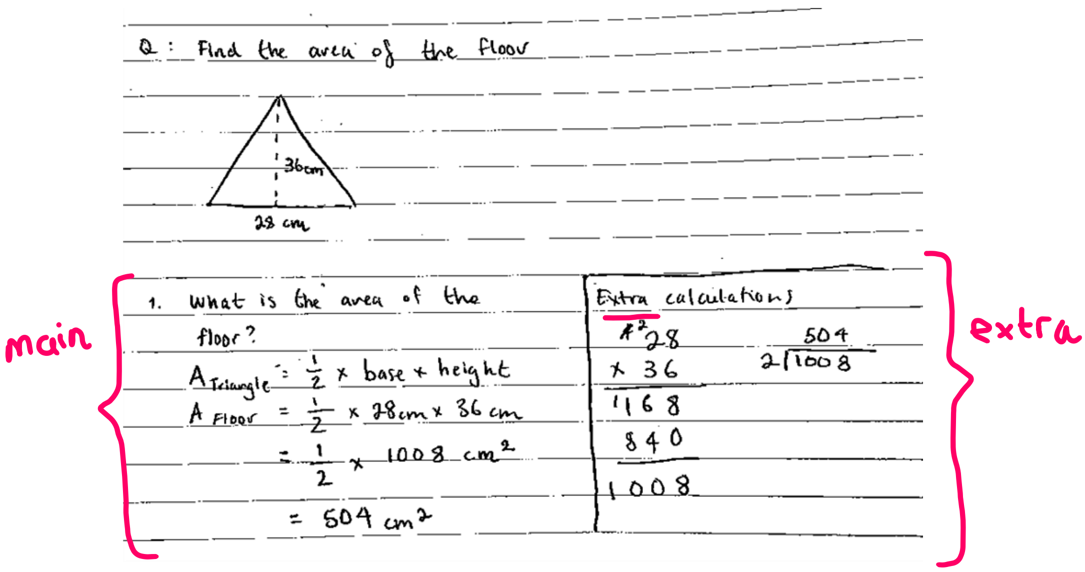



Figure 8. Separating main and extra calculations