

# Mixing Carefully: "Scientific" Jello Preparation: Problem Handouts



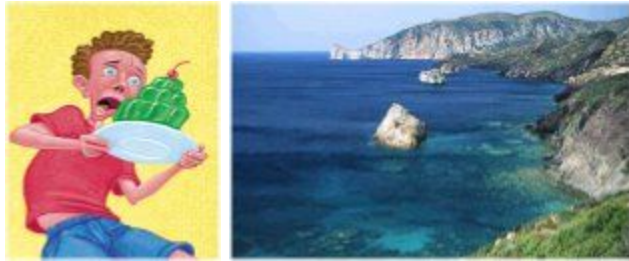
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# Mixing Carefully: "Scientific" Jello Preparation

## Part 1



Did you have fun traveling last summer? Yes, of course! But even when traveling, it's not easy to stay away from what you like.

Your friend, Leslie, went camping in Europe. She is an experienced traveler, but this time she forgot to stuff her backpack with Jell-O boxes. You know how that Leslie has an addiction to Jello. For her, "A day doesn't start right" without a cup of coffee and a bit (quite a bit) of jello. You might think: "Just go to the store and get it". Not so easy! Southern Europeans don't often eat jello; they sometimes place it on cakes, meat, and even on cheese, but it's rare and Leslie has to work hard to start her day without her beloved food ... and a smile.

Imagine yourself in her shoes:

Remote province in Southern Europe, shining sun, beautiful beaches... only a few "weird" grocery stores. It seems that these people never eat jello! Leslie feels trapped in a world without her favorite food but suddenly realizes that the best jello she ever had was grandma's, and grandma didn't get it from a box. It's possible! Leslie runs to the phone and calls grandma; after half an hour on the phone, they are still talking about the weather and Leslie realizes, "No way grandma is going to tell me the secret recipe." She has an idea! Leslie calls her friend at home to find out how to prepare jello from scratch. You are the friend. "Hi. It's Leslie. I'm here in Europe. I'm camping and I'm going crazy without my jello. Could you please look for a recipe to make it?"

This is your first task... and remember Leslie doesn't have any boxes of jello mix. Try to anticipate what information Leslie may need to prepare her jello and collect it (these are what we call learning issues). By the way: What is jello?

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## Part 2



Here we are:

- granulated gelatin, 2 tablespoons
- cold water, 1/2 cup
- boiling water, 1 cup
- sugar, 1/3 cup
- boiled coffee, 2 cups

This is the recipe you found and passed on to Leslie. She went out and bought the ingredients (not without trouble, especially granulated gelatin). Unfortunately she couldn't find the right measuring cups ... she just got a few plastic boxes hoping to use them to measure the ingredients. "This is Europe ... roads are kilometers long and you buy fruit and vegetables by the kilogram. Maybe I'll start by changing to the units used here!" Leslie thinks. The table with the conversion you sent her together with the recipe may come handy. (If you don't have such a table, please search for one.)

How does the recipe look now? What would you do in Leslie's place to carefully measure out the ingredients that go in coffee flavored jello? " ... I have my boxes ... what else do I need to measure the correct quantity of the ingredients?"

Notes: Two main strategies may be used at this point; identify them and follow both routes.

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### ***Microteaching: Measurements, errors and error propagation***

- Physical quantity: "feature of a phenomenon that can be measured with a rigorous reproducible approach."
- Units and measurements
- Precision and accuracy: errors
- Systematic and random errors
- Repeated measurements: average
- Absolute and relative errors
- Propagation of errors in mathematical formulas, e.g. area of a table

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## Part 3

Leslie is a bit puzzled; her grandma used a scale. "Am I doing something wrong?"

- Discuss a bit why units like cubic milliliters and grams can be used interchangeably.
- Identify the way to transform one into the other and convert your recipe into "European format", such as:
  - Orange gelatin
  - granulated gelatin, 10 grams
  - oranges, 200 grams
  - sugar, 80 grams
  - water, 1 glass



Using the scale, figure out how to do this and write down a table you can keep for future use.

It is very important to know the amount of jello Leslie can prepare. Make a "scientific" prediction and verify it.

## *Jello gallery*

