

Data Management
Unit 1 Line Master 24a**Stepping Through the Mathematical
Modelling Process**

Display **Slide 4**. Discuss the importance of oil and why we would want to understand how sustainable it is. A brief conversation regarding the term “sustainability” will likely be needed so all students can be successful in this lesson. Have students gather in small groups for 2–5 min to create their lists, then record their ideas on **Slide 5**, being careful not to filter their ideas (see **Slide 6** for examples). Once all ideas have been captured, lead a discussion regarding which of the ideas are most important in determining the sustainability of oil.

Display **Slide 7**. In the same small groups, give students 2–5 min to come up with a formula they could use to determine how much longer oil will last. Show the list on **Slide 5** for student reference. The formulas students are developing are their “mathematical models” which will continue to be refined throughout this lesson (see **Slide 8** for possible formulas/models).

Teachable Moment

In this lesson, the term “formula” is used as it is likely a term students are familiar with and because formulas can be used to model future events. If needed, unpack the different aspects of a formula. For example, a formula can include variables and constants. In this lesson, a constant could be the number of days in a year, while the amount of oil or the amount of oil used are variables that differ between countries and from year to year.

Students will also need to keep track of the units of measurement as they develop their formulas (e.g., will their formula give the number of barrels per day or per year or some other time? Will they continue to use large numbers or factor in million barrels or billion barrels to simplify things?)

Using the data on **Slide 9**, engage students in a short “notice and wonder” to help them become familiar with the complexities of these data.

In small groups, give students 5–10 min to use their formulas/models and the data on **Slide 9** (or Master 25) to determine the sustainability of oil in various countries. Encourage each student in the group to select a different country. Students may need other information beyond the data shown. Direct students to these websites if needed:

- [The World Factbook: Petroleum](#)
- [Worldometers : Oil Production by Country/](#)
- [Worldometers: Oil Consumption by Country](#)

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See **Slide 10** for sample responses. Lead the class in a discussion about what they noticed. Students will likely be surprised as some countries have more than 300 years of oil left, and others have very few years left. They may now be questioning their data or calculations. In small groups, have students generate a list of assumptions they have made (**Slide 11**) You may want to generate a few together first. See **Slide 12** for sample answers.

Note: This is a key moment to assess students' understanding of the mathematical modelling process. Take note of which students are:

- thinking critically and about which pieces of data
- noticing which data are constant/changing
- identifying which variables could affect their predictions the most
- recognizing other potential factors that will affect the outcome of their models

Display **Slide 13** and have students gather back into their groups to refine their formulas/models (sample responses are on **Slide 14**).

Note: This is a key moment to assess students' understanding of the variables at play within this context.

At this point, you may wish to offer students opportunities to research additional information needed to predict the sustainability of oil for a specific country (see [The World Factbook: Petroleum](#)). You may also decide that the development of the revised formulas is sufficient, and then lead a conversation about the mathematical modelling process you have engaged in.