

Metabolizing Caffeine



People of many cultures enjoy coffee as part of their daily routine. All coffee, in its original state, contains a substance called caffeine. It takes 4 to 6 h for the human body to reduce the amount of caffeine to half the initial amount ingested. The elimination of caffeine from the human body can be modelled by either an exponential decay function or a logarithmic growth function.

Every weekday, on her way to school, Maria drinks a triple espresso. Maria is concerned about the amount of caffeine that is present in her body, so she does not drink coffee on Saturday.

- ?** How much caffeine will be present in Maria's body on a Saturday morning?
- Use research to determine the amount of caffeine in one triple espresso.
 - Should you use the elapsed time after the caffeine has been ingested as the independent or dependent variable? Explain. How does this decision affect the type of function you can use to model the data?
 - Estimate the time you think it will take Maria's body to reduce the amount of caffeine in a triple espresso to half the initial amount. Generate a table of values using this factor.
 - Create a scatter plot of your data and then determine the equation of the exponential or logarithmic regression function that best models your data.
 - How much caffeine will be present in Maria's body 24 h after her first triple espresso? Explain how you determined this value.
 - How much caffeine will be present in Maria's body on a Saturday morning? Explain how you determined this value.

Task Checklist

- ✓ Did you explain your solution clearly?
- ✓ Did you explain any assumptions you made?
- ✓ Did you use correct mathematical language?
- ✓ Did you reference your sources of information?