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| --- | --- |
|  | The effects of caffeine can only be felt when the caffeine is present in sufficient amounts. For most people, from 32 to 200 mg of caffeine acts as a minor stimulant. Steadiness of the hand has been shown to be worse after 200 mg of caffeine. More than 300 mg is enough to produce temporary insomnia. Amounts over 5 g (5000 mg) could result in death because of a caffeine overdose.Our bodies eliminate caffeine primarily by the functioning of the kidneys. On average, about 13% of the caffeine in the body is eliminated each hour. |

As a group

1. Choose a caffeine source and look up the caffeine for 1 serving at Caffeineinformer.com.
2. Investigatethe amount of caffeine a person would have in his/her body if he/she drank a serving every hour.
3. Answer the following question: would a person who actually consumed the caffeine source you chose every hour for a long period of time die of an overdose of caffeine?
4. Use your mathematical work and multiple representations (tables, graphs, and equations) to support your reasoning.

This is due tomorrow, be ready to share your findings with the class.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **1** | **2** | **3** | **4** |
| **Answer:** Would a person who consumed this every hour overdose? When? | I wrote an answer, but without any justificationORAnswer doesn’t make sense. | I wrote a mathematically correct answer, but I didn’t justify it.ORMy answer is wrong because of small mathematical errors. | I wrote a mathematically correct answer, and I justified my answer with a mathematical process | 3 + I justified my work using two methods! |
| **Representations:**  | I only used one accurate representation in my explanation. (tables, graphs, equations). | I used two accurate representations in my explanation. (tables, graphs, equations). | I used at least three accurate representations in my explanation (tables, graphs, equations). | 3 +Identify the points on the graph that correspond to shaky hands and temporary insomnia. |
| **Professionalism:** Someone not in Advanced Algebra should be able to interpret your results | My justification is incomplete, work is scattered and doesn’t flow sequentially. | Writing is clear and organized but parts aren’t labeled. If equations are used their elements aren’t explained. | Graph is labeled and made accurately using graph paperTable is labeled and At least 3 sample calculations are included show how the table was created | 3 +Equations that are used are annotated providing evidence that students understand the meaning of the parts. |

**Teacher Notes:**

Caffeineinformer.com is now unblocked.

Once students pick a caffeine source, they can use a shifted geometric sequence to create a table of values.

$a\_{0}=$ amount of caffeine in one serving of XXX

$$a\_{n}=a\_{n-1}\left(1-0.13\right)+a\_{0}$$

To find the explicit equation that models the data:

Create a system of exponential equations to find A and C by substituting (0, f(0)) and (1, f(1)) into the equation



Enter table of data into Desmos and do an exponential regression (Note: Calculator can not be used for this regression because the asymptote is not y = 0)