



Water Flea

STEM Sims

Lesson 2: Nicotine Effects

Nicotine is found in cigarettes and vaping products. Nicotine is a highly addictive substance. Nicotine is also found in some common pesticides. In this investigation you'll study nicotine's effects. And hopefully, you'll have enough water fleas left to complete this experiment involving nicotine.

Here are some definitions to help you in your investigation.

Water Flea -	a very small aquatic organism that makes up plankton
Plankton -	a group of organisms in water that provide food for other organisms
Substance -	a particular kind of matter with like properties
Drug -	a substance that changes the body or mind of a person
Nicotine -	a natural drug
Stimulant -	a drug that raises the level of activity in an organism
Depressant -	a drug that lowers the level of activity in an organism
Affect -	something that makes a difference to something else
Effect -	a change that is the result of an action

Doing the Science

1. Start the Water Flea Simulation by clicking on the "Simulation" tab.
2. You can use the Timer Counter on the left side of the screen to find the water flea's heart rate or you can use a stopwatch.

3. To use the Timer Counter, click the "Start" button, then click the "Click Me" button each time the flea's heart beats.
4. After getting in the rhythm of the beats, click the "Stop" button and the flea's heart rate will be displayed in beats per minute in the space below the buttons.
5. Record this value (normal heart rate) and the gender, feeding status, and mass of the flea in Table 1 below.
6. Click the "Nicotine" button, then select the "Single Dose" button. Count and record in Table 1 the flea's new heart rate. Click the "Clear" button.
7. Click the "Nicotine" button, then select the "Double Dose" button. Count and record in Table 1 the flea's new heart rate. Click the "Clear" button.
8. Click the "Feed Flea" button and repeat steps 3 - 7. Make sure to record your data in Table 1.
9. Select a Male water flea and repeat steps 3 - 7. Make sure to record your data in Table 1.

Table 1.

Flea	Heart Rate	Gender	Feeding Status	Mass
Normal				
After Single Dose Nicotine				
After Double Dose Nicotine				
Normal				
After Single Dose Nicotine				
After Double Dose Nicotine				
Normal				
After Single Dose Nicotine				
After Double Dose Nicotine				
Normal				

After Single Dose Nicotine				
After Double Dose Nicotine				

Do You Understand?

1. How should nicotine best be classified, as a depressant or as a stimulant? Please explain your response.
2. By what percent did the female water flea's heart rate change for the single dose of nicotine compared to the female's normal heart rate?
3. By what percent did the female water flea's heart rate change for the double dose of nicotine compared to the female's normal heart rate?
4. How did eating a meal impact the effects of nicotine on the water flea's heart rates?
5. Did the unfed male and unfed female respond exactly the same to the nicotine? If not, please provide one possible reason for this difference.

6. Use the terms "effect" and "affect" in a sentence or two to describe the results of your investigation.