

Name: _____

Date: _____

Period: _____

Addiction and the Brain

Week # _____

Directions: Read and annotate the passage below.

A drug is a chemical compound that can alter the structure and function of the body, specifically the brain. They can change the way neurons in our brain interact with each other, strengthening the connections in some places, while weakening the connections in other places. Today we will analyze an experiment to determine why drugs are addicting.

In this experiment, scientists hypothesized that drugs affect the reward center of the brain, which is responsible for feelings of satisfaction and pleasure. Scientists set up three identical cages. Each cage had a rat and two levers. In all three cages, one lever released food when pressed, but the second lever released different stimuli. The stimulus lever in Cage 1 released an addictive drug when pressed. The stimulus lever in Cage 2 released a pulse in the rat's brain that stimulated the reward center of the brain when pressed. The stimulus lever in Cage 3 was the same as the first lever, and released food. The rats were left in their cages for 30 minutes and the number of times the rats pressed each lever was recorded every 5 minutes.

Directions: Draw the experimental set-up below. Then answer the questions.

Cage 1	Cage 2	Cage 3

1. Write the hypothesis of the experiment in the If...then...because... format. _____

2. What is the purpose of Cage 3, with two levers that released food? _____

3. Predict what happens in each of the cages in the 30-minute period.
 - a. Cage 1: _____

 - b. Cage 2: _____

 - c. Cage 3: _____

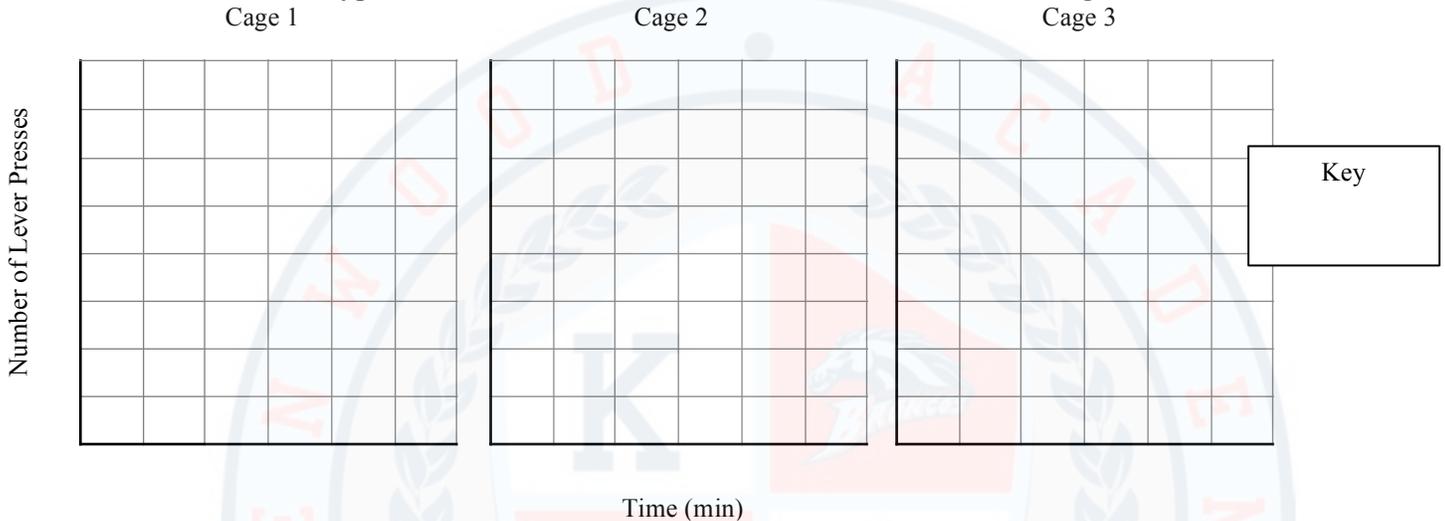
Name: _____ Date: _____ Period: _____

Directions: Figure 1 shows the total number of lever presses over time. Use Figure 1 to graph the data.

Cage	Lever	5 min	10 min	15 min	20 min	25 min	30 min
1	Food	2	3	4	6	6	6
	Stimulus	1	7	12	29	52	73
2	Food	1	1	2	4	4	4
	Stimulus	1	6	13	26	48	70
3	Food	1	3	4	6	8	11
	Stimulus	2	4	5	8	9	10

Figure 1

The Effect of the Type of Lever on the Number of Lever Presses for Each Cage Over Time



- Which two rats had similar results? Why did these rats have similar results? _____

- How might the health of the rats in Cage 1 and Cage 3 be negatively impacted by their behavior?

Upon further investigation, the scientists decided to take images of the neurons in the rats' brains.

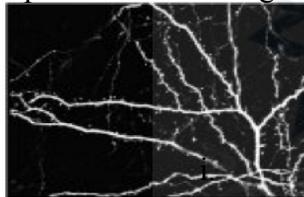


Figure 2.
Neuron from rat in Cage 3 showing normal connections to other neurons



Figure 3.
Neuron from rat in Cage 1 showing one strong connection but many weaker connections

- Why does the neuron from the rat in Cage 1 look so different than the neuron of the rat in Cage 3?

- How do the results explain the statement, "Drug addicts' brains are hard-wired for more drugs"?

