Modeling Half-Life & Radioactive Decay

In this activity, you will become more familiar with the term *half life*. When we talk about half life, half life is the time that it takes for a radioactive element to decrease by ½ in size. Radioactive elements can be pretty dangerous, so to model nuclear decay, we will use M&M candy to represent our fictitious radioactive isotope, *Chocolonium*.

1. Count out 50 plain M&Ms (to represent a sample of the radioactive isotope, *Chocolonium*.

2. The half life of Chocolonium is 60 seconds. Every 60 seconds, ½ of your radioactive element (M&M candy) will keep up with time. Every 60 seconds, ½ of your radioactive element (M&M candy) will "disappear."

3. Record chart on your student answer document as your sample decays.

Place 50 M&M candies here

Modeling Half-Life & Radioactive Decay
Student Answer Document

# of activity	Total Time Elapsed	# of M&Ms Eaten
	0 seconds	0

Radioactive Decay &
Half-Life
PARTNER ACTIVITY

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MC

EDUCLIPS Clip Art

Digital Version

Click HERE
to access the digital of this resource.

*Please note: Students will still need 20 M&M candies to complete the digital version of the activity. If students do not have access to M&Ms, they may replace the candies with any item that they have 20 of.

Teacher Instructions:

Materials Needed:

- ❑ **20 M&Ms**
- ❑ **Stopwatch**
- ❑ **Student Answer Document**

Instructions:

- ❑ Print instruction cards and make copies of the student answer document. I like to laminate the instruction cards so that I can use them from class to class.
- ❑ Assign students to work with a partner for this activity.
- ❑ Issue 20 M&M candies to each partnership
- ❑ Students will read the instructions on the *Objectives & Procedures* sheet to complete the activity
- ❑ For every half life (60 seconds) students will eat ½ of their remaining sample and record the number of M&M candies left after each decay period. *It may be difficult for students to break the M&M's in half after the 3rd Half-Life. Assure the students that it's okay- their data will reflect accurate information.
- ❑ *I have included an answer key for easy grading ☺
- ❑ Students will complete the table and then answer the analysis questions.

MODELING HALF LIFE AND RADIOACTIVE DECAY
Instruction Card

Objective:

In this activity, you will become more familiar with the term *half life*. When referring to **radioactive decay**, half life is the time that it takes for a radioactive element to decrease by half its size. Radioactive elements can be pretty dangerous, so to model nuclear decay, we will use M&M candy to represent our fictitious radioactive isotope, *chocolorium.*

Procedure:

A. With a partner, count out 20 plain M&Ms (to represent a sample of the radioactive isotope, *Chocolorium.*

B. **Fact:** the half life of *chocolorium* is 60 seconds

C. Use a timer to keep up with time. Every 60 seconds, ½ of your radioactive element (M&M sample) should "disappear."

D. Complete the chart on your student answer document as your sample decays.

PLACE 20 M&M CANDIES HERE

MODELING HALF LIFE AND RADIOACTIVE DECAY

Student Answer Document

	Total Time Elapsed	# of M&Ms Eaten	# of M&Ms Remaining
Beginning of activity	0 seconds	0	20
1st Half Life			
2nd Half Life			
3rd Half Life			
4th Half Life			
5th Half Life			

Analysis Questions:

1. How many half-lives would it take to break 20 M&Ms down into 0.31 M&Ms?_____

2. How many half-lives would it take to break 20 M&Ms down into 0.08 M&Ms?_____

3. How many M&Ms would be left after 7 half lives? _____

4. How many M&Ms would be left after 10 half lives?_____

5. How much time would it take to decay 20 M&Ms into 0.04 M&Ms? _____

Graph the Data:

6. Create a line graph that represents the half life of *chocolorium*. Use your data chart as a guide that will help you answer question #7.

Sample Remaining (# of M&M candies)

Time (in seconds)

7. What trend do you notice between the time that passes and the amount of sample that remains?

Answer Key

MODELING HALF LIFE AND RADIOACTIVE DECAY
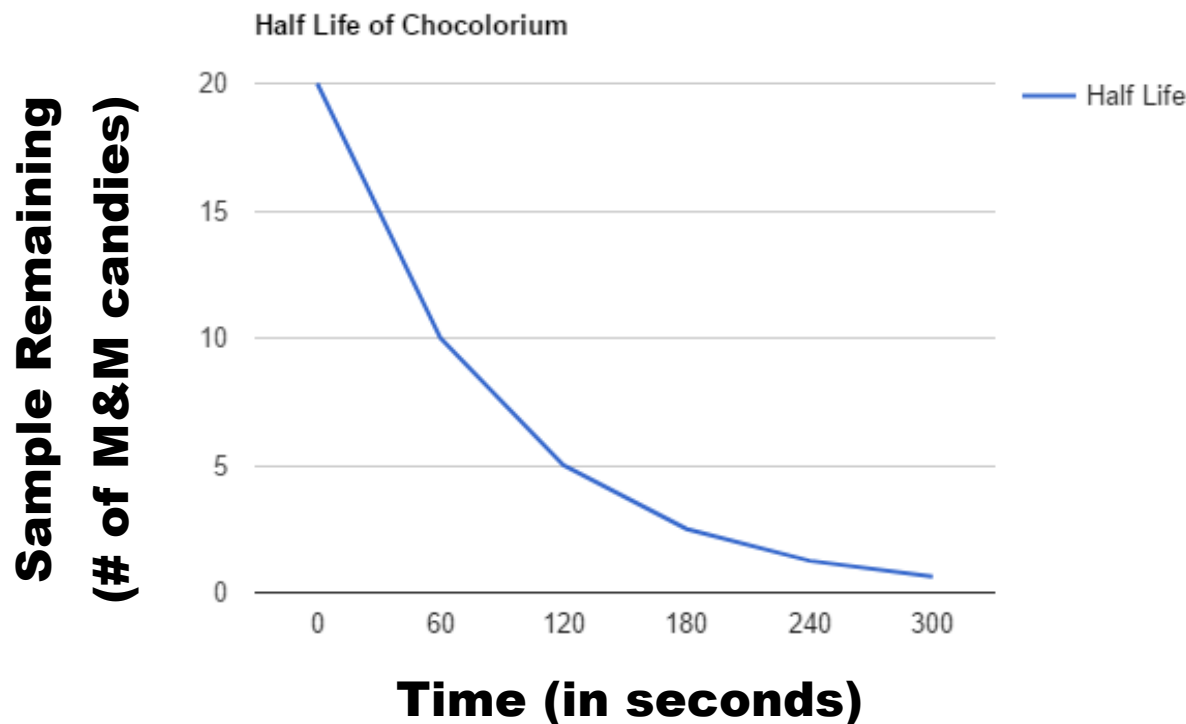## Student Answer Document

	Total Time Elapsed	# of M&Ms Eaten	# of M&Ms Remaining
Beginning of activity	0 seconds	0	20
1st Half Life	60	10	10
2nd Half Life	120	5	5
3rd Half Life	180	2.5	2.5
4th Half Life	240	1.25	1.25
5th Half Life	300	0.625	0.625

Analysis Questions:

1. How many half-lives would it take to break 20 M&Ms down into 0.31 M&Ms? **6**

2. How many half-lives would it take to break 20 M&Ms down into 0.08 M&Ms? **8**

3. How many M&Ms would be left after 7 half lives? **0.16**

4. How many M&Ms would be left after 10 half lives? **0.02**

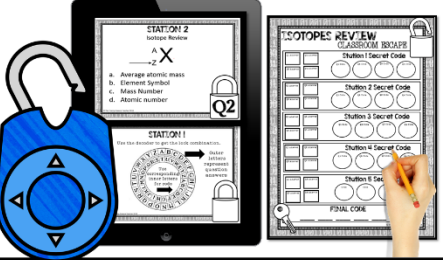5. How much time would it take to decay 20 M&Ms into 0.04M&Ms? **540 seconds**

Graph the Data:

6. Create a line graph that represents the half life of *chocolorium*. Use your data chart as a guide that will help you answer question #7.

Half Life of Chocolorium

Sample Remaining (# of M&M candies) [y-axis]

Time (in seconds) [x-axis]

— Half Life

7. What trend do you notice between the time that passes and the amount of sample that remains? **As time increase, the amount of the sample of chocolorium decreases.**
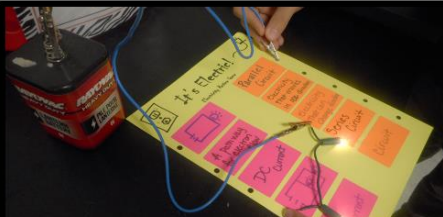
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