Absolute Age Dating LAB /41 Name_____hr__

Materials

- scissors
- stopwatch
- one sheet of plain white paper
- calculator

Objective

- Investigate absolute age dating techniques and the use of half lives.

Procedure/ Questions

- Use the stopwatch to record time.
- Wait 30 seconds and then use scissors to carefully cut a sheet of paper in half. Select one piece and set the other aside.
- Repeat the previous step until ten 30 second intervals have elapsed.

Answer all questions. Use your book to help you.

1. What is the difference between a parent isotope and a daughter isotope?

_____

2. What does the whole piece of paper used in this investigation represent?

_____

3. What do the pieces of paper that you set aside in each step represent?

_____

4. What is a half-life?

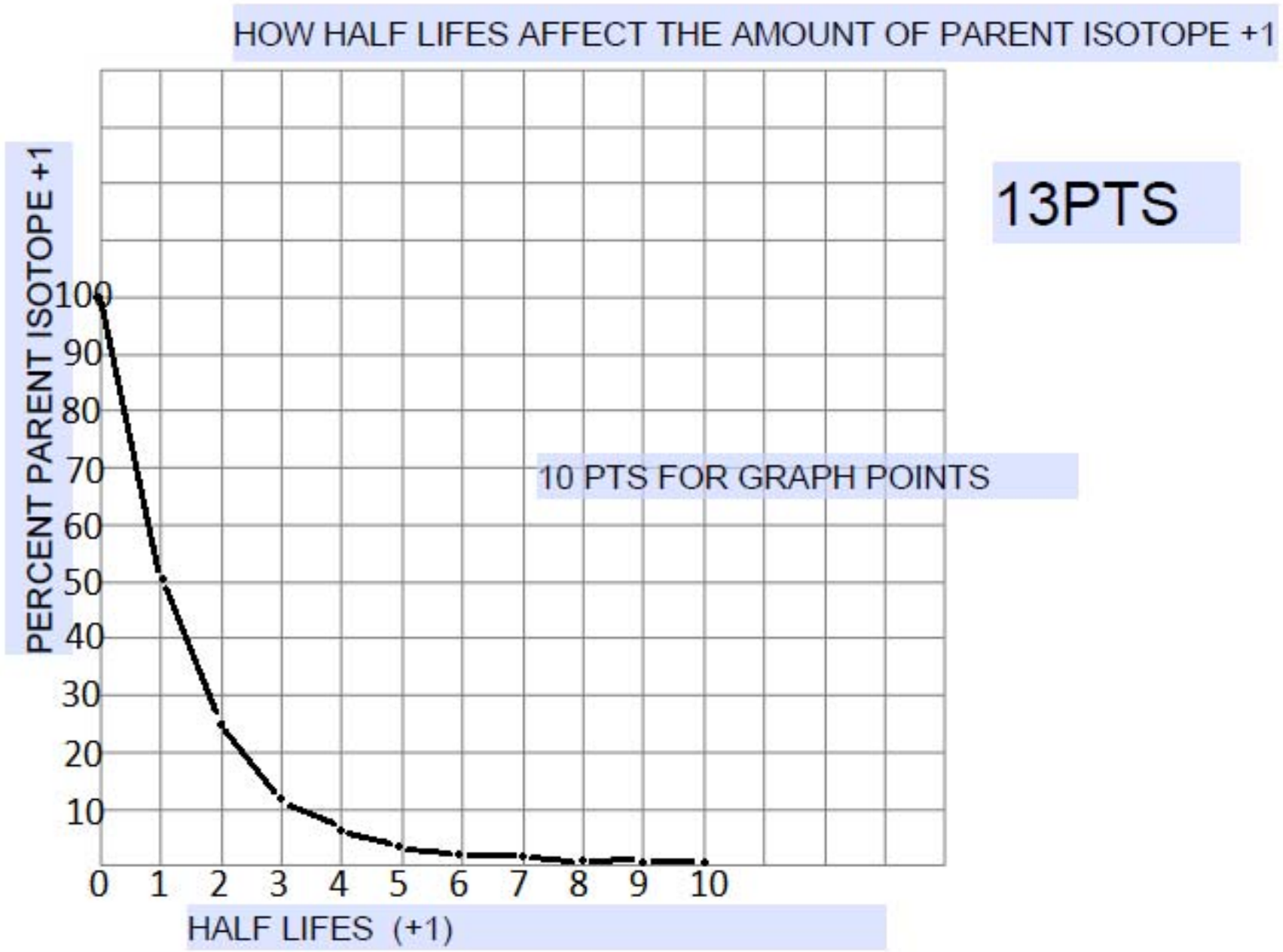
_____

5. What is the half-life of your paper isotope?

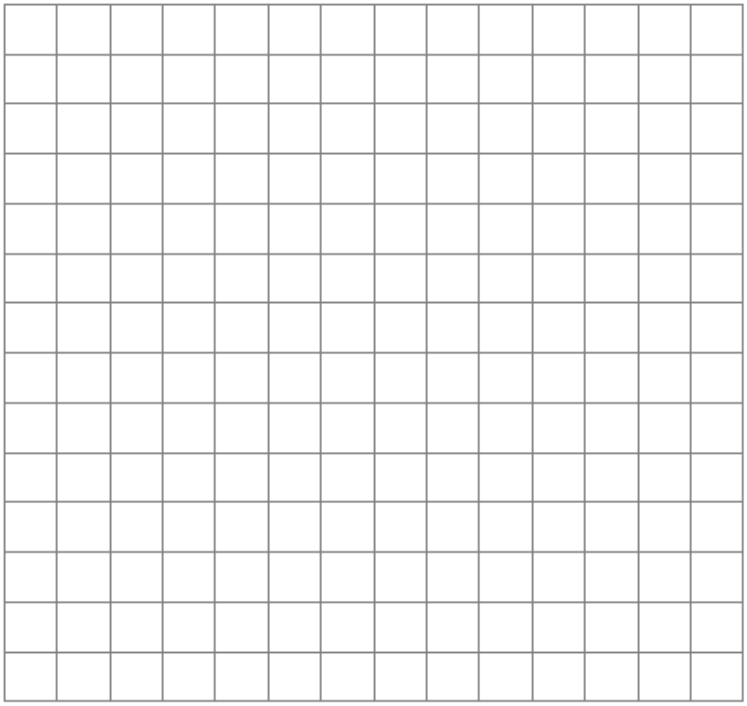
_____

6. What percentage of parent isotope was left after each interval? Place answers in the chart below.

Interval (Half-life)	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Percentage of Parent Isotope left											


HOW HALF LIFES AFFECT THE AMOUNT OF PARENT ISOTOPE +1
13PTS
10 PTS FOR GRAPH POINTS
PERCENT PARENT ISOTOPE +1
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
6
7
8
9
10
HALF LIFES (+1)

7. Create a graph below showing half life vs. percentage of parent isotope. Make sure to label each axis (2pts) and include a title (1pt). Accurate plotting of points = 10pts



8. What two factors must remain constant so that your model is accurate? Explain your answer.
   1_____
   2_____
9. What is the difference between relative age dating and radiometric dating?
   _____
   _____

NOW, USING YOUR GRAPH ABOVE…

10. Your paper rock fossil is found with 50% parent material and 50% daughter material. How many seconds old is it?

_____

11. Your paper rock fossil undergoes radiometric dating in a lab. It has 20% parent material and 80% daughter material. How many seconds old is it?

_____

Look at the table below to answer the following questions.

Radiometric Dating Methods				
Radiometric dating method	**Parent Isotope**	**Daughter isotope**	**Half-life**	**Effective dating range**
Radiocarbon dating	carbon-14, ^{14}C	nitrogen-14, 14N	5,730 years	less than 70,000 years
Argon-argon dating, $^{39}Ar/^{40}Ar$	potassium-40, ^{40}K irradiated to form argon-39, ^{39}Ar	argon-40, ^{40}Ar	1.25 billion years	50,000 to 4.6 billion years
Potassium-argon dating, $^{40}K/^{40}Ar$	potassium-40, ^{40}K	Argon-40, ^{40}Ar	1.25 billion years	50,000 to 4.6 billion years
Rubidium-strontium dating, $^{87}Rb/^{87}Sr$	rubidium-87, ^{87}Rb	strontium-87, ^{87}Sr	48.8 billion years	10 million to 4.6 billion years
Uranium-lead dating, $^{235}U/^{207}Pb$	uranium-235, ^{235}U	lead-207, ^{207}Pb	704 million years	10 million to 4.6 billion years
Uranium-lead dating, $^{238}U/^{206}Pb$	uranium-238, ^{238}U	lead-206, ^{206}Pb	4.5 billion years	10 million to 4.6 billion years
Thorium-lead dating	thorium-232, ^{232}Th	lead-208, ^{208}Pb	14.0 billion years	less than 200 million years

1. If the Earth is 4.6 billion years old, why is the Thorium-lead dating technique not useful?
_____
2. What atom (isotope) does potassium decay into?
_____

3. If you found a dinosaur bone and wanted to determine its absolute age, which radiometric dating method would be the most accurate: Radiocarbon dating or Uranium-Lead dating ($^{238}U/^{206}Pb$)? Why? [DINOSAURS BECAME EXTINCT 65 MILLION YEARS AGO]
   A _____
   B_____

4. What is the parent isotope of lead 207? _____

5. Modern humans have only been around for about 50,000 years. What method would work best for determining the age of a human bone? Why?
   A _____
   B _____