Name \_\_\_\_\_

A. Obtain a piece of scrap paper.

B. Fold the paper in half and tear along the fold to make two halves.

C. Fold and tear BOTH halves into halves again (4 pieces of paper).

D. Fold and tear BOTH halves into halves again (8 pieces of paper).

E. Fold and tear BOTH halves into halves again (16 pieces of paper).

F. Fold and tear BOTH halves into halves again (32 pieces of paper).

G. Join with 3 other people or repeat to make 128 pieces total.

1. How many papers are left after one half life? \_\_\_\_\_

 (*Count half the papers and discard the rest*)

2. How many papers are left after two half lives? \_\_\_\_\_

 (*Count half the papers and discard the rest*)

3. How many papers are left after three half lives? \_\_\_\_\_

 (*Count half the papers and discard the rest*))

4. How many papers are left after four half lives? \_\_\_\_\_

 (*Count half the papers and discard the rest*))

5. How many papers are left after five half lives? \_\_\_\_\_

 (*Count half the papers and discard the rest*)

**SHOW WORK for all of the following: y = a (1/2) t**

##  y = the amount of the sample

 a = the original amount of the sample

 t = the number of half lives

1. A fossil starts with 400 g of carbon-14. How much is left after 4 half lives?

2. If each half-life in question one is 5700 years, how old is the organism?

3. A fossil only has 30 grams of potassium-40 (K-40) left in it when you discover it. It has been through 3 half lives. How many grams of K-40 were originally present?

4. A fossil starts with 40 grams of K-40. How much is left after 4 half lives?

**SHOW WORK for all of the following: y = a (1/2) t**

##  y = the amount of the sample

 a = the original amount of the sample

 t = the number of half lives

5. A fossil assumedly starts with 400 grams of Xenon. How much is left after 3 half lives?

6. A fossil is found and it only has 20 grams of Uranium 238 left. It has been through 4 half lives. How many grams of U-238 were originally present?

7. A fossil only has 10 grams of carbon-14 left in it when you discover it. It has been through 3 half lives. How many grams of C-14 were originally present?

8. If each half-life in question three took 5,700 years, how old is the organism?

9. If a rock starts with 200 grams of Potassium 40, but the rock has only 25 grams remaining, how many half lives did it go through?

10. If the half-life of K-40 in question five is 1.3 billion years, how old is the rock?

Worksheet 1 Answer Key

a. How many papers are left after one half life? 64

 (*Count half the papers and discard the rest*)

b. How many papers are left after two half lives? 32

 (*Count half the papers and discard the rest*)

c. How many papers are left after three half lives? 16

 (*Count half the papers and discard the rest*))

d. How many papers are left after four half lives? 8

 (*Count half the papers and discard the rest*))

e. How many papers are left after five half lives? 4

 (*Count half the papers and discard the rest*)

**SHOW WORK for all of the following: y = a (1/2) t**

##  y = the amount of the sample

 a = the original amount of the sample

 t = the number of half lives

1. A fossil starts with 400 g of carbon-14. How much is left after 4 half-lives?

**y = a (1/2) t = 400 (1/2)4 = 400 (1/16) = 25 grams**

**400 🡪 200 🡪 100 🡪 50 🡪 25 grams [notice 4 arrows means 4 half-lives]**

2. If each half-life in question one is 5700 years, how old is the organism?

**5700 years/half-life X 4 half-lives = 22,800 years**

**Carbon dating is not reliable past 10,000 years.**

3. A fossil only has 30 grams of potassium-40 (K-40) left in it when you discover it. It has been through 3 half-lives. How many grams of K-40 were originally present?

**y = a (1/2) t 🡪 30 = a (1/2)3 🡪 30 = a (1/8) 🡪 8(30) = 240 grams**

**30 🡪 60 🡪 120 🡪 240 [notice 3 arrows means 3 half-lives]**

4. A fossil starts with 40 grams of K-40. How much is left after 4 half-lives?

**y = a (1/2) t = 40 (1/2)4 = 40 (1/16) = 2.5 grams**

**40 🡪 20 🡪 10 🡪 5 🡪 2.5 grams [notice 4 arrows means 4 half-lives]**

**SHOW WORK for all of the following: y = a (1/2) t**

##  y = the amount of the sample

 a = the original amount of the sample

 t = the number of half lives

5. A fossil assumedly starts with 400 grams of Xenon. How much is left after 3 half-lives?

**y = a (1/2) t = 400 (1/2)3 = 40 (1/8) = 50 grams**

**400 🡪 200 🡪 100 🡪 50 grams [notice 3 arrows means 3 half-lives]**

6. A fossil is found and it only has 20 grams of Uranium 238 left. It has been through 4 half lives. How many grams of U-238 were originally present?

**y = a (1/2) t 🡪 20 = a (1/2)4 🡪 20 = a (1/16) 🡪 16(20) = 320 grams**

**20 🡪 40 🡪 80 🡪 160 🡪 320 [notice 4 arrows means 4 half-lives]**

7. A fossil only has 10 grams of carbon-14 left in it when you discover it. It has been through 3 half-lives. How many grams of C-14 were originally present?

**y = a (1/2) t 🡪 10 = a (1/2)3 🡪 10 = a (1/8) 🡪 8(10) = 80 grams**

**10 🡪 20 🡪 40 🡪 80 [notice 3 arrows means 3 half-lives]**

8. If each half-life in question three took 5,700 years, how old is the organism?

**5700 years/half-life X 3 half-lives = 17,100 years**

**Carbon dating is not reliable past 10,000 years.**

9. If a rock starts with 200 grams of Potassium 40, but the rock has only 25 grams remaining, how many half lives did it go through?

**y = a (1/2) t 🡪 25 = 200 (1/2)t 🡪 25/200 = 200/200 (1/2)t 🡪 3 = (1/2)t**

**t = 3 half-lives**

10. If the half-life of K-40 in question five is 1.3 billion years, how old is the rock?

**1.3 billion years/half-life X 3 half-lives = 3.9 billion years**