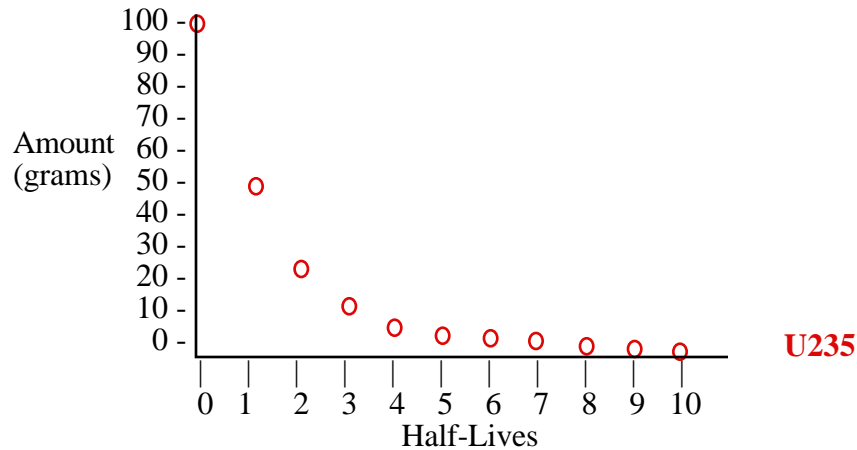


# DEEP TIME worksheet

10. ACTIVITY GRAPH: Showing the plotted points (as red circles) for U235 decaying through 10 half-lives, from 100 grams to less than 1 gram. On this same graph, show the plotted points (as black dots) showing the corresponding increase of new **Pb207** from 0 grams. Label this growth curve as "**Pb207**" in black. Connect the plotted points lightly with the appropriate colors.



11. \_\_\_\_\_

12. \_\_\_\_\_

13. \_\_\_\_\_

16. \_\_\_\_\_

17. \_\_\_\_\_

18. \_\_\_\_\_

19. \_\_\_\_\_

WHEN FINISHED, PLEASE RETURN PAPER STRIPS TO ENVELOPE

## DATING A ROCK

20. \_\_\_\_\_

22.[on diagram]

23. \_\_\_\_\_

25Q. \_\_\_\_\_

26. \_\_\_\_\_

27. \_\_\_\_\_

## THE ISOCHRON METHOD

31-Q1. \_\_\_\_\_

31-Q2. \_\_\_\_\_

33. VIRTUAL AGE DATING: Did you do the online tutorial? \_\_\_\_\_ Did it help? \_\_\_\_\_

34. CARBON-14 METHOD: Q1. \_\_\_\_\_ Q2. \_\_\_\_\_ years.

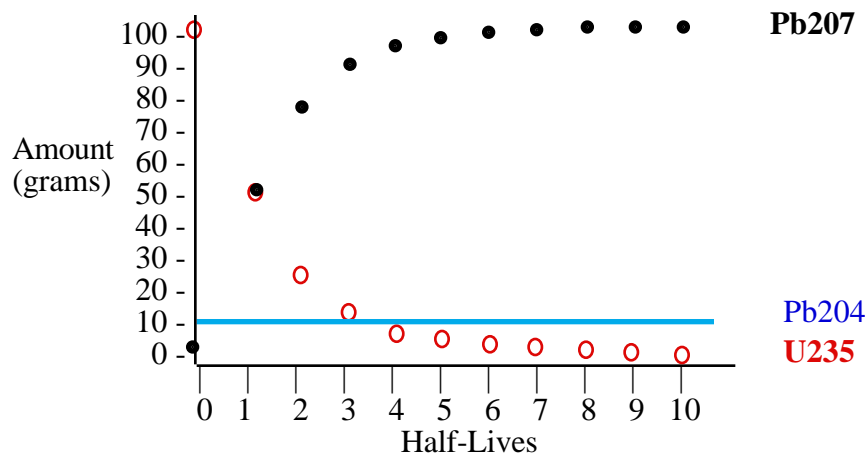
Did you do the online tutorial? \_\_\_\_\_ Did it help? \_\_\_\_\_

36. ASSESSMENT: Reflect on your understanding and confidence in geological age dating. Are you more confident, or less confident in the ages (than before this activity)? Why? What related questions do you have? What additional information would you need to increase your confidence?

## DEEP-TIME: WORKSHEET KEY

Answers are probably best brought out in class discussion, calling on different reps from different teams. They should come close to the following answers/results, presented here as guidelines. Be sure to discuss any matters of confusion before going on.

10. ACTIVITY GRAPH: (black dots; connect with thin black line)



11. a            12. b or c            13. b or c

16. All radioisotopes with half-lives of more than 80 million years are **found in nature**;  
(none of the original radioisotopes with half-lives of less than 80 million years are found in nature.)

17. They all disappeared (decayed away), since they have passed through 10-20 half-lives, taking 1.4 billion years or less.

18. It takes longer for them to disappear. Their half-lives are too long, so there has not been sufficient time for them to decay away. (They must have been formed at least 1.6 billion years ago, or even much earlier. This suggests that they must have been formed during or just before the time the solar system formed, not an infinite time ago, otherwise we would find none of these radioisotopes.)

19. It must be several billion years old (at least 1.6 billion), not thousands, or even millions or hundreds of millions of years ago.

### DATING A ROCK

20. c (both a and b)            23Q. c (or b)            25Q. b            26. e            27. a  
22 ACTIVITY: [See horizontal blue line in diagram above, labeled Pb204]

### THE ISOCHRON METHOD

31-Q1. b            31-Q2. a

33. VIRTUAL AGE DATING TUTORIAL: [Did online tutorial? Did it help?]

34. CARBON-14 METHOD: Q1) wood and bones (organic material); Q2) about 50,000 years back in time.  
[Did online tutorial? Did it help?]

36. ASSESSMENT: [Student / team reflection on what was learned, and their confidence in geological age dating.]