When Was the Mole Last Here

Jacklyn Bonneau

Activity overview

A great activity for mole day (10 / 23) or with radioactive decay! In this activity, students will predict when a "mole of a substance" was presence. Based upon radioactive decay rate of a substance, the initial amount found, and the mole concept students will create a graph and interpolate within the graph. Teachers can customize this activity so each student has a different mole they are in seeking.

Concepts

- *Exponential growth or decay*
- *Mole concept*
- *Radioactive decay*
- *Interpolation*

Teacher preparation

This activity is designed for an Introductory Chemistry class or Algebra class studying exponential functions. It can be introduced when studying the mole, radioactive decay or as a Mole Day game.

- *Prior to beginning this activity students should know how to graph on the TI Nspire, what the function for radioactive decay is and how many objects are in a mole of anything.*
- *The screen shots included represent the expected results.*
- *Although the directions are in the tns file you should also print out the accompanying worksheet for students to follow.*
- *Download the tns file.*
- *Print the Student Worksheet*
- *Assign different isotopes and numbers of atoms initially found to each student.*

Classroom management tips

- This activity is designed to have student work individually or in pairs.
- Teachers can assign unique isotopes to students so that all answers and work are slightly different or choose a common one.
- Teachers need to be ready to help students in the understanding of the TI Nspire and its functions to create and generate data tables as well as window settings.

TI-Nspire Applications

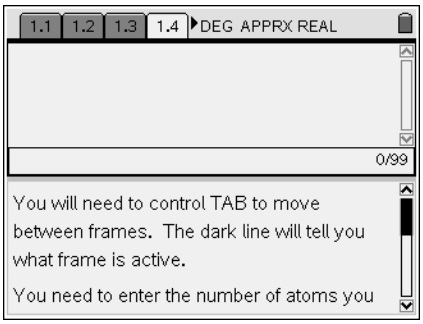
Appropriate for TI Nspire or TI Nspire CAS.

©2007 Texas Instruments Incorporated

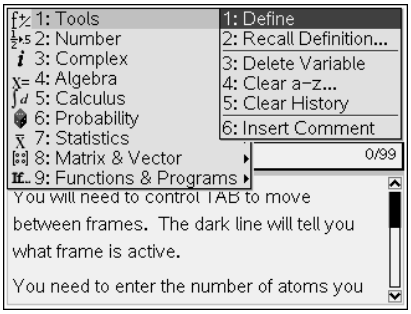
Step-by-step directions

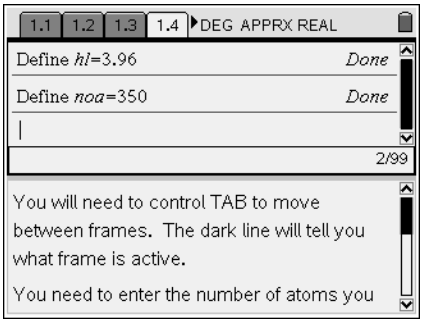
Problem: How long ago did you have a mole?

- Turn on the TI Nspire and go to the home page. Open my documents and then mole.
- Read tab 1.2, to get there press CTR >,
- Enter you assigned information on Tab 1.3, you may need to calculate, look in a book or on the internet to get some of the answers.

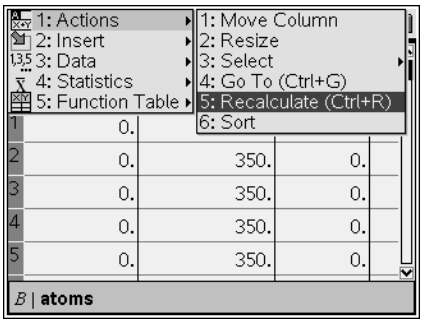


- Tab 1.4 is a split screen, a calculator on the top and notes on the bottom. To move between screens hit control tab. You need to define two things in the calculator window. To do this, when the window is selected press menu>. tools> define then type in hl= _____and enter the half-life of you isotope. Repeat the define command and enter noa= ___ and enter your number of initial atoms you teacher told you.



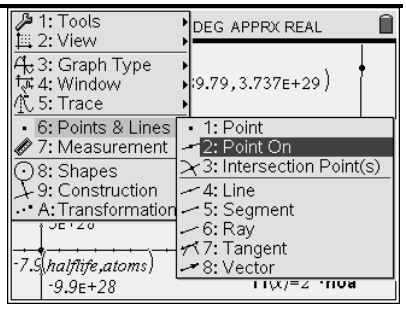


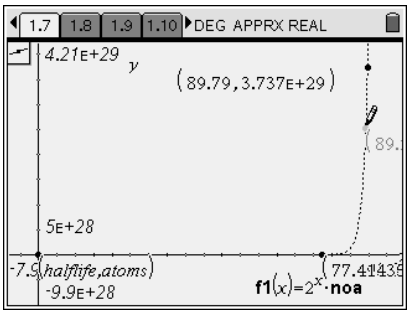
- You now need to get the data into your spread sheet. Type1 2 3 enter into column A, pressing enter after each value. Highlight those numbers by holding the CAPs key and down arrow and hit control had now arrow down to 100.
- You may need to hit recalculate now to have the columns fill in.
- Look at the curve and trace the curve by dragging the top dot. To do this move your mouse until the dot flashes then hit Control hand to grab it. Move it until your x is as close to 6.023 x 10^{23} as possible. Note the y value as well. To un-hold the dot hit escape but first move the dot back to the upper corner.



©2006 Texas Instruments Incorporated

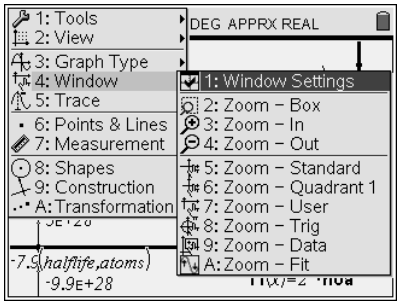
- IF you do not have a moveable dot in the upper corner of your graph , you can place one there. Go to go to menu > Points and Lines > Point On hit enter. You now have a Pencil on your graph put it on the upper part of you line hit enter wait until you see its coordinates then escape. You now can move the dot and see the coordinates.





- You now need to set the next window to zoom in on the region where the mole first appears. You want this window to have at least 7 or 8 values with the desired value in the middle.

- Now do the point on as above and find exactly where the mole first was!



Activity extensions

- *This activity could be rewritten easily as a forensic activity using radioactive decay of C - 14*
- *This activity can also be used to investigate radioactive decay.*

©2006 Texas Instruments Incorporated

STUDENT WORKSHEET

Name Class Period Lab Partners

Element assigned	
Isotope	
Number of Protons	
Number of Neutrons	
Number of Electrons	
Half-life (hl)	
Beginning Number of Atoms Assigned (NOA)	

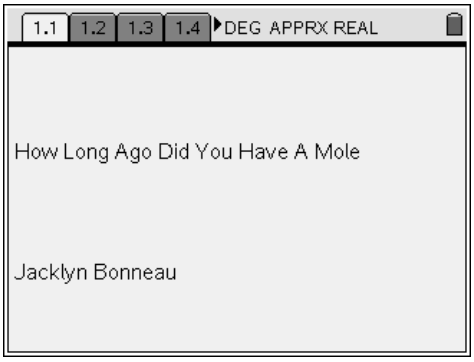
Data Table readings surrounding the mole point (3 before and after)

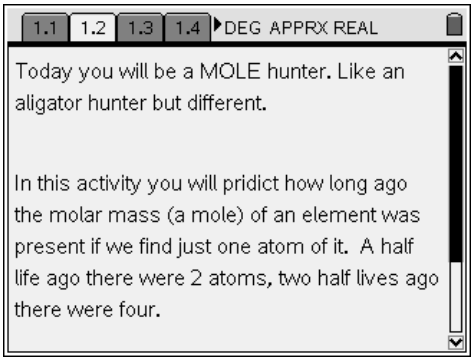
Half-life	Atoms	Time

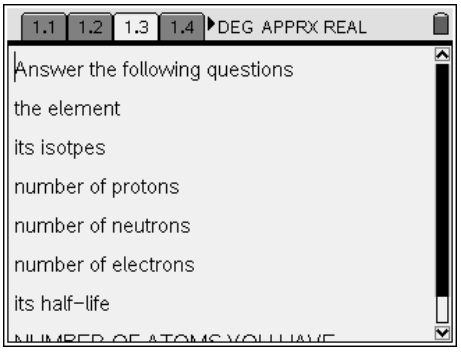
When was the mole last here??

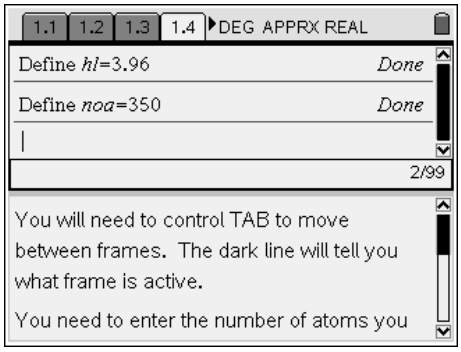
©2006 Texas Instruments Incorporated

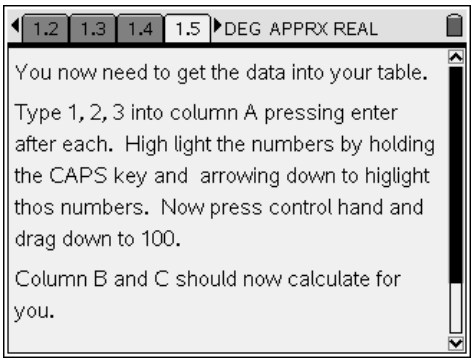
Student TI-Nspire Document

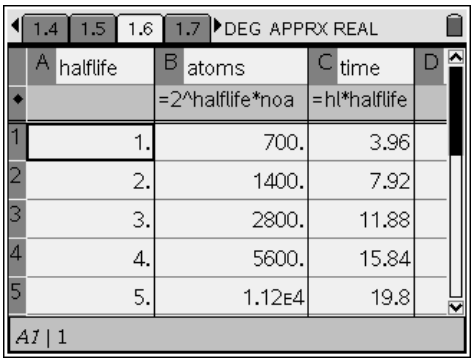












©2006 Texas Instruments Incorporated