

ARE ALL RARE EARTH ROCKS CREATED EQUAL? NAMES _____ PERIOD _____

Below are the rare earth contents of 6 rocks found at Bull Hill, the future site of RER mining site. *

Element	Lanthanum (La)		Cerium (Ce)		Praseodymium (Pr)		Neodymium (Nd)		Thorium (Th)		Yttrium (Y)			
Rock	kg	Price \$62/kg	kg	Price \$80/kg	kg	Price 250/kg	kg	Price 280/kg	kg	Price \$5000/kg	kg	Price \$170/kg	Mass of the rock kg	Total Value of Rock
A	1.71	106.02	2.235	178.8	0.278	69.5	0.94	263.2	0.089	445	0.105	17.85	5.357	1080.37
B	0.267	16.554	0.229	18.32	0.045	11.25	0.168	47.04	0.074	370	0.031	5.27	0.814	468.434
C	4.357	270.134	8.192	655.36	0.874	218.5	3.053	854.84	0.079	395	0.076	12.92	16.631	2406.754
D	6.927	429.474	9.058	724.64	0.991	247.75	2.595	726.6	0.057	285	0.147	24.99	19.775	2438.454
E	3.966	245.892	5.779	462.32	0.686	171.5	1.871	523.88	0.04	200	0.087	14.79	12.429	1618.382
F	1.299	80.538	1.774	141.92	0.206	51.5	0.584	163.52	0.036	180	0.032	5.44	3.931	442.918

(*Contents based on actual data, but simplified for this activity. Data was collected using a Niton XL3t x-ray fluorescence (XRF) analyzer by RER on 6/21/2012. MineralPrices.com - 12/31/2011 prices were used)

Calculate the mass of each rock (add all of the masses together) and record it on the chart.

Which rock was the largest? D Smallest? B

Calculate the value of each rock (multiply the mass x price, then add the six values together). Record the value on the chart.

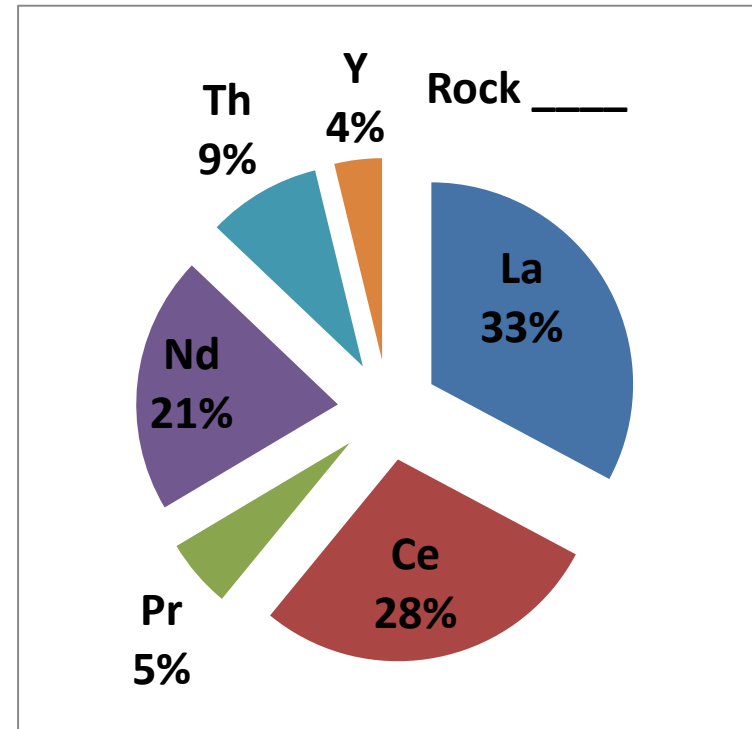
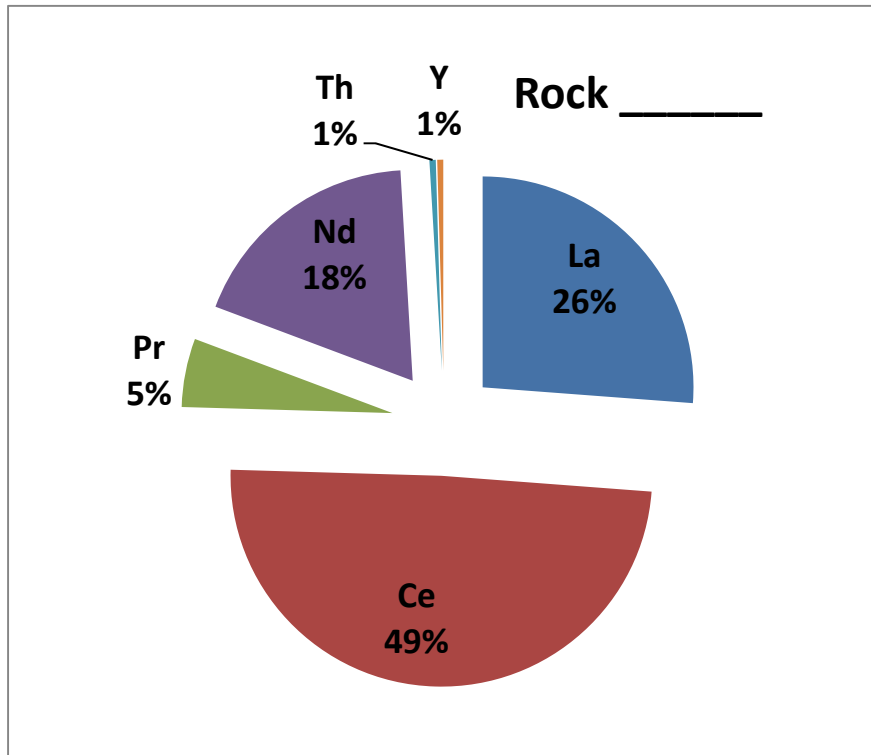
Which rock was most expensive? D Least expensive F

Was there a correlation between size and price? generally yes Explain your answer. **In 4 of the 6 rocks, the larger the rock, the larger the value. B and F didn't fit the pattern due to the fact that B had more Thorium which was the more expensive element.**

Look at the prices of the elements and find their atomic numbers. Is there a correlation between the location on the periodic table and the cost per kg? generally yes Explain your answer. **As atomic number increases, so does the price (with the exception of Ytterium that has the lowest atomic #, but not the lowest price.)**

Rare Element Resources (<http://www.rareelementresources.com>) is the company that analyzed the rocks. After mining the rocks, they need to decide which ones to use. Is the most expensive rock necessarily the most valuable to the company? No Explain your answer.

RER needs to decide which specific element they are looking for. If they are looking for Thorium to use as a possible future nuclear fuel, Rock A would be selected. If they are looking to make very strong magnets to be used in wind turbines, Rock C would be selected because of the high amounts of Neodymium. Neither of those two rocks were the most expensive.



Look at the pie graphs. Based on the data on the previous page, determine which rock is represented by each graph and record in the blank. What was your strategy to figure this out?

In rock C, Ce was almost 50% of the total mass.

In rock B, La, Ce and Nd were fairly close together matching the 33%, 28% and 21% in the graph.

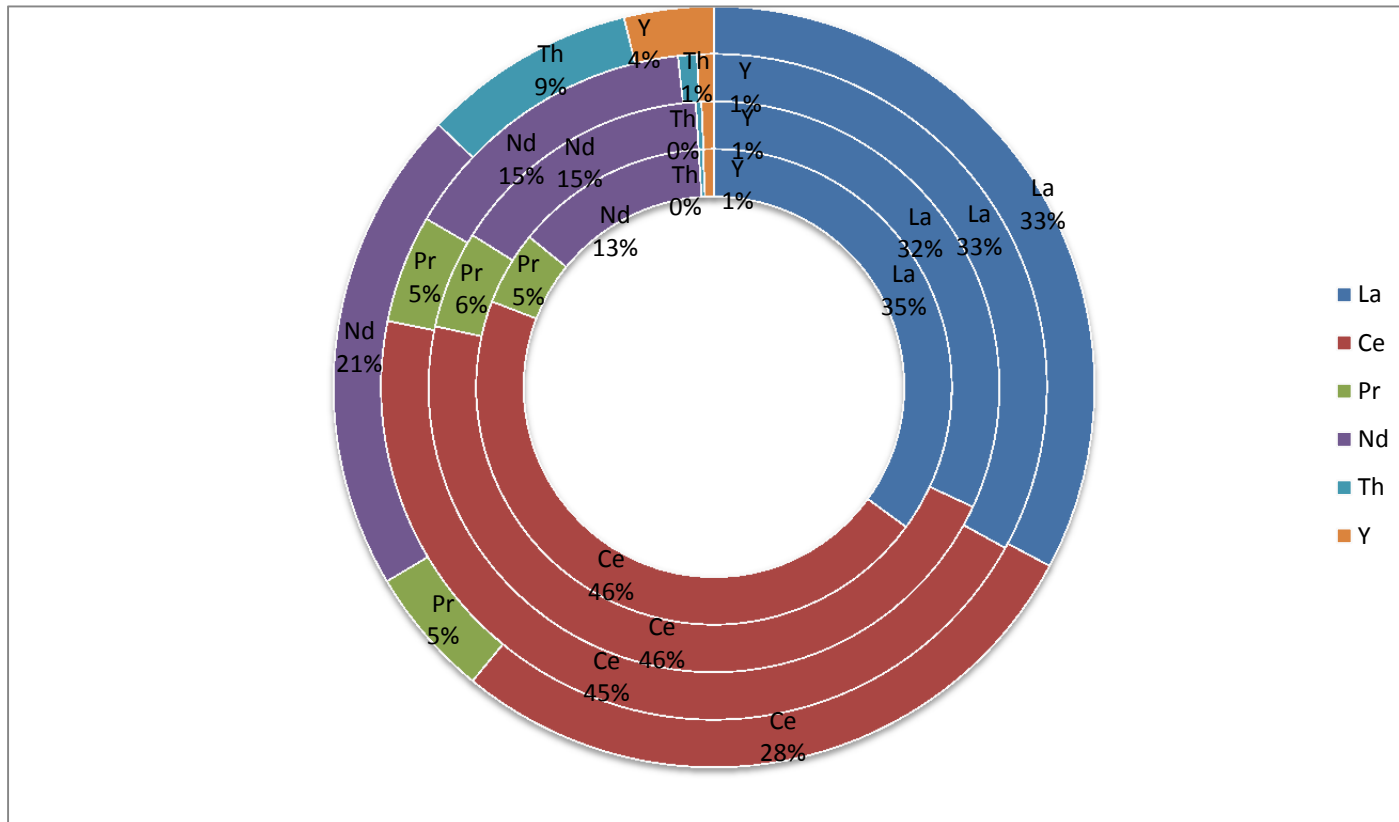
When representing rock contents, why are pie graphs the best choice vs. line or bar graphs?

Pie graphs are best to use when you are trying to compare parts of a whole. They do not show changes over time like a line graph. Bar graphs are used to compare things between different groups.

All of the rocks were found very close to each other. Did the rocks begin as one large rock and break off into smaller rocks? **NO**

Explain your answer.

No two rocks have the same content. Some are close to each other, but if they were from the same rock, all of them would be identical.



The graph above is called a bubble graph. Each ring is a different rock. Which two rings do you think are the most similar and why?

I believe the middle two rings are the closest in contents. The outer ring is way off. In the inner ring, Lanthanum is too high and Neodymium is too low.

List one advantage and one disadvantage of a bubble graph.

Advantage, lots of data in a small area, a comparison between the contents of each rock is possible. Disadvantage, because of the arc, the same % may be a different size (ex. 5%). With small percentages, it is not easy to read the data. The rings are not labeled or identified.