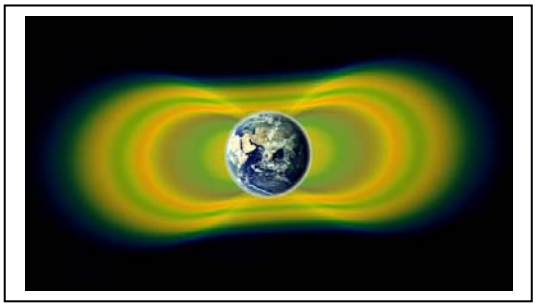
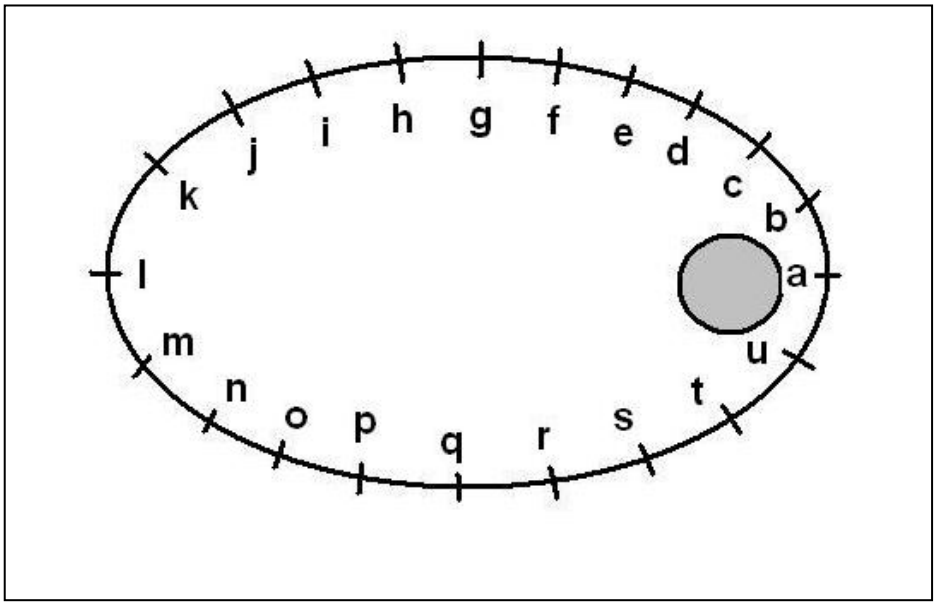


Soon after launch, NASA's Van Allen Probes detected a new Third Belt in the Van Allen Radiation Belts that encircle Earth. Located between the Inner and Outer Belts, which have been known to scientists for decades, the third belt is very temporary. It only appears for a few weeks at a time when conditions in space are just right!



Problem 1 – The Van Allen Probe satellites travel along the elliptical orbit shown above, and in the sequence shown by the letters. At each point, the instruments make the following measurements:

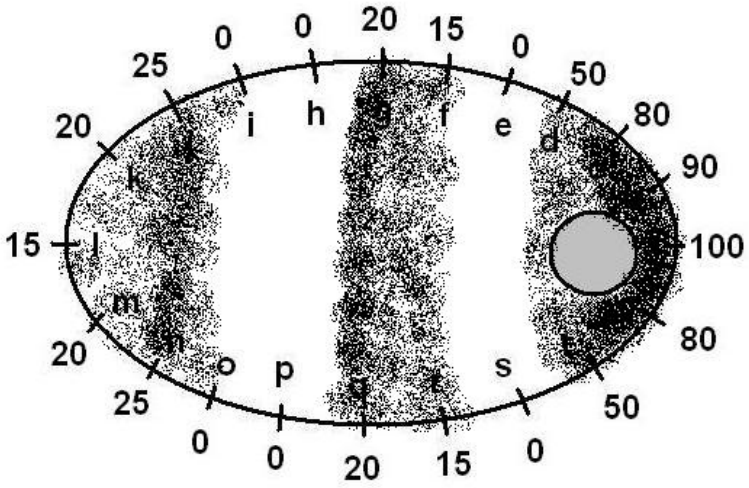
Point	Value	Point	Value	Point	Value	Point	Value
a	100	g	20	m	20	s	0
b	90	h	0	n	25	t	80
c	80	i	0	o	0	u	90
d	50	j	25	p	0		
e	0	k	20	q	20		
f	15	l	15	r	15		

Shade-in the shapes of the belts by connecting data measured at points A through L with the corresponding points M through U. (Hint: J and N are connected because they have similar values and are opposite each other in the orbit). Use dark colors for large values and light colors for small values.

Problem 2 – About what percentage of the elliptical path is covered by each of the belts that you discovered?

Note: The twin satellites orbit Earth every 9 hours. A very sensitive instrument on the satellite called the Relativistic Electron and Proton Telescope (REPT) can detect electrons and protons in space along the orbit of the satellite at points A, B, C etc. After numerous orbits, these data tracks can be stitched together to build up an image of the belts, and capture the fleeting existence of the third belt.

Problem 1 – The Van Allen Probe satellites travel along the elliptical orbit shown above, and in the sequence shown by the letters. At each point, the instruments make the following measurements. Shade-in the shapes of the belts by connecting data on opposite halves of the orbit. Use dark colors for large values and light colors for small values.



Problem 2 – About what percentage of the elliptical path is covered by each of the belts that you discovered?

Answer: Students will count the total letters along the full orbit as 21 from a to u.

Outer Belt covers the 5 letters J, k, l, m and n which is about 5/ 21 or 100x5/21 = **24%** of the full orbit path perimeter.
The
Middle Belt covers about 4 letters f, g and q, r for a percentage of 100x4/21 =**19%** and the
Inner Belt covers the 6 letters a, b, c, d and t, u or 100 x 6/21 = **29%** of the elliptical area.