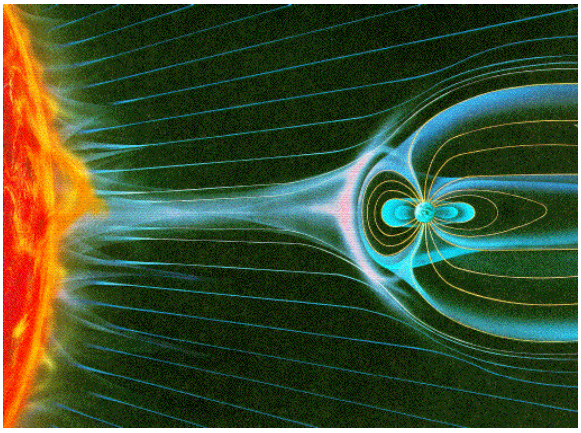
What causes a solar storm?

A solar flare as a violent explosion of magnetic energy on the sun. A Coronal Mass Ejection is a billion-ton cloud of gas exploding from the solar surface. Scientists can detect these 'solar storms' and measure how Earth's environment changes.

What scientists would like to learn is, how do you predict what will happen near Earth by looking at events taking place on the Sun, or in space?



Storms from the Sun sometimes make their way to Earth. Space physicists try to predict what will happen when these storms arrive, and forecast their arrival.

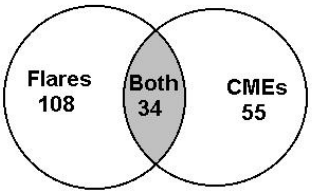
Statistical data can be used to draw conclusions about cause-and-effect relationships, even though the details of the process are unknown.

- Venn diagrams help astronomers sort out statistical information.

Here's how to do it!

In 2000, 142 solar flares, and 89 Coronal Mass Ejections were spotted on the Sun. 34 flares happened at nearly the same time as CMEs. What percent of CMEs are not accompanied by solar flares?

Now you try!



$$\frac{89-34}{89} = 0.62$$

or 62 %

1) In the sample problem above, what percentage of solar flares do not happen during CMEs? A news reporter says that solar flares produce CMEs. Is this an accurate statement? Explain.

2) A NASA satellite called ACE measures changes in the magnetism of the gas flowing away from the sun. During 2000 it detects 56 severe magnetic changes. Another satellite called SOHO detects 55 CMEs of which 29 happen at the same time as the ACE disturbances. The IMAGE satellite detects aurora in the polar regions of Earth. A total of 63 bright Aurora are detected during the 56 ACE magnetic 'storms'. There are 31 cases where aurora are seen at the same time as the magnetic disturbances. a) What percentage of CMEs cause magnetic disturbances? b) What fraction of magnetic disturbances lead to major aurora on Earth?

3) Can CME's be reliably used to predict when the next Aurora will occur? Explain.