While most people will be admiring Comet ISON as it passes close by Earth and the Sun in the fall of 2013, other robotic observers on Mars will marvel as this same comet lights up the martian sky.

For the first time in human history, we will get to see the same comet from two different outposts of humanity in the solar system!

As a warm up, here is an image of Earth in the martian sky as seen by the Spirit Rover in 2004!

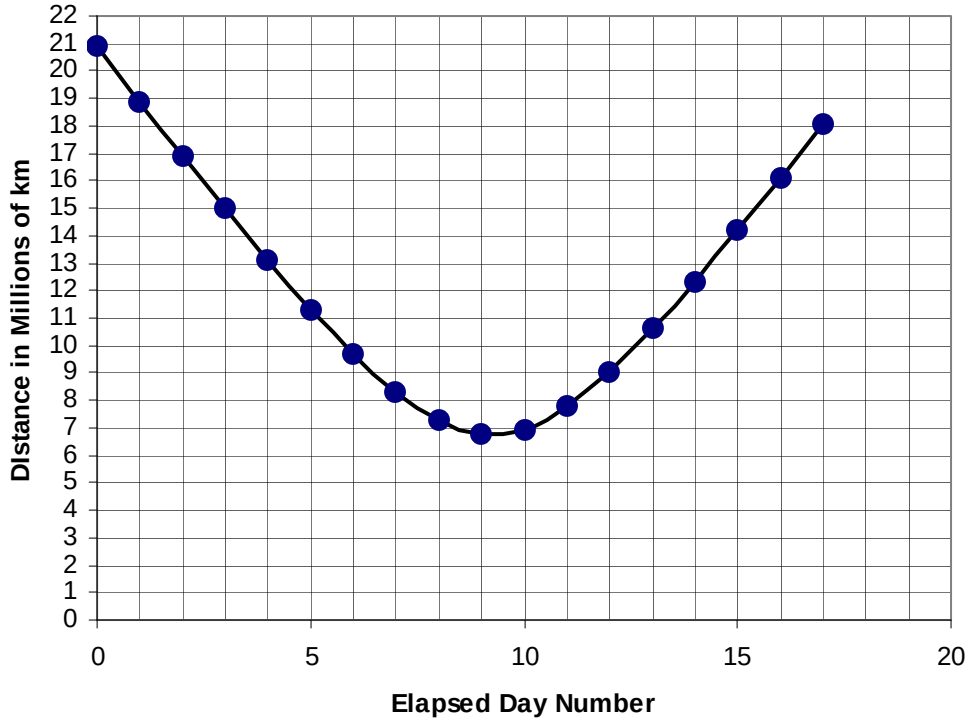
We can use the NASA, *Eyes on the Solar System* simulator to explore the positions of Comet ISON and Mars during the time of the encounter. Click on the following link to set up the program. http://eyes.nasa.gov/index.html. You will need to 'Launch' and download the software as instructed. Under 'Visual Controls' make sure the 'Small Bodies' and 'Metric' dots are white by selecting them. Right click on the label for Comet ISON and select 'Measure distance from' then click on the label for Mars to open the measurement window. Now open the 'Date and Time' menu and select the date and time using the sliders. Click on the UT ball to select Universal Time. No hit 'Submit' and the scene will move to the first location at URL: 1.usa.gov/18PtDeF for September 20 at 05:34 PM, UT. As you move forward in time, notice that the distance changes, beginning near 27 million km for this first scene. The table below gives a set of distance measurements (in millions of kilometers) during the close approach period at the same time of the day (13:00 UT). Select these, or create your own set using *Eyes on the Solar System*.

Date	Distance	Date	Distance	Date	Distance
9-22	20.9	9-28	9.7	10-4	9.0
9-23	18.9	9-29	8.3	10-5	10.6
9-24	16.9	9-30	7.3	10-6	12.3
9-25	15.0	10-1	6.8	10-7	14.2
9-26	13.1	10-2	6.9	10-8	16.1
9-27	11.3	10-3	7.8	10-9	18.1

Problem 1 - Graph the data with elapsed day number (9-11 = 0.0) on the horizontal axis, and the distance in millions of kilometers on the vertical axis. Draw a smooth curve through the data points.

Problem 2 – At what day and time will the distance be at its minimum?

Problem 1 - Graph the data with elapsed day on the horizontal axis, and the distance in millions of kilometers on the vertical axis. Draw a smooth curve through the data points. Answer: See below:



Problem 2 – At what day and time will the distance be at its minimum?

Answer: Although the point for October 1 (Day number 9) looks like the closest distance (10.8 million km), students will see that the curve reaches a slightly smaller distance value between Day 9 and Day 10., which correspond to October 1 at 13:00 UT and October 2 at 13:00 UT, 24-hours later. Invite the students to create a better estimate between these two dates and times using their graphs, or by using Eyes on the Solar System. **Answers close to October 1 near 19:00 UT are acceptable. The distance will be close to 6.75 million km**.

Note: The orbit for Comet ISON will be updated as new data is obtained, so the actual numbers used in these problems are only current for July 28, 2013. Students will be using the updated values and will need to use Eyes on the Solar system to get the most up to date values.