Name(s): _____ _____

_____ _____

Date: _____ Course/Section: _____

Grade: _____

Comet ISON

Objectives:

Students will animate images of the comet ISON and calculate the size of the comet, tail, and its velocity.

Checklist:

- ☐ **Complete the pre-lab quiz with your team (if required).**
- ☐ **Compile a list of resources you expect to use in the lab.**
- ☐ **Work with your team to complete the lab exercises and activities.**
- ☐ **Record your results and mark which resources you used.**
- ☐ **Share and discuss your results with the rest of the class.**
- ☐ **Determine if your team's answers are reasonable.**
- ☐ **Submit an observation request for next week (if required).**

Resources:

Pre-Lab Quiz

Record your group's answers to each question, along with your reasoning. These concepts will be relevant later in this lab exercise.

1.
2.
3.
4.
5.

Part 1: All About Comets

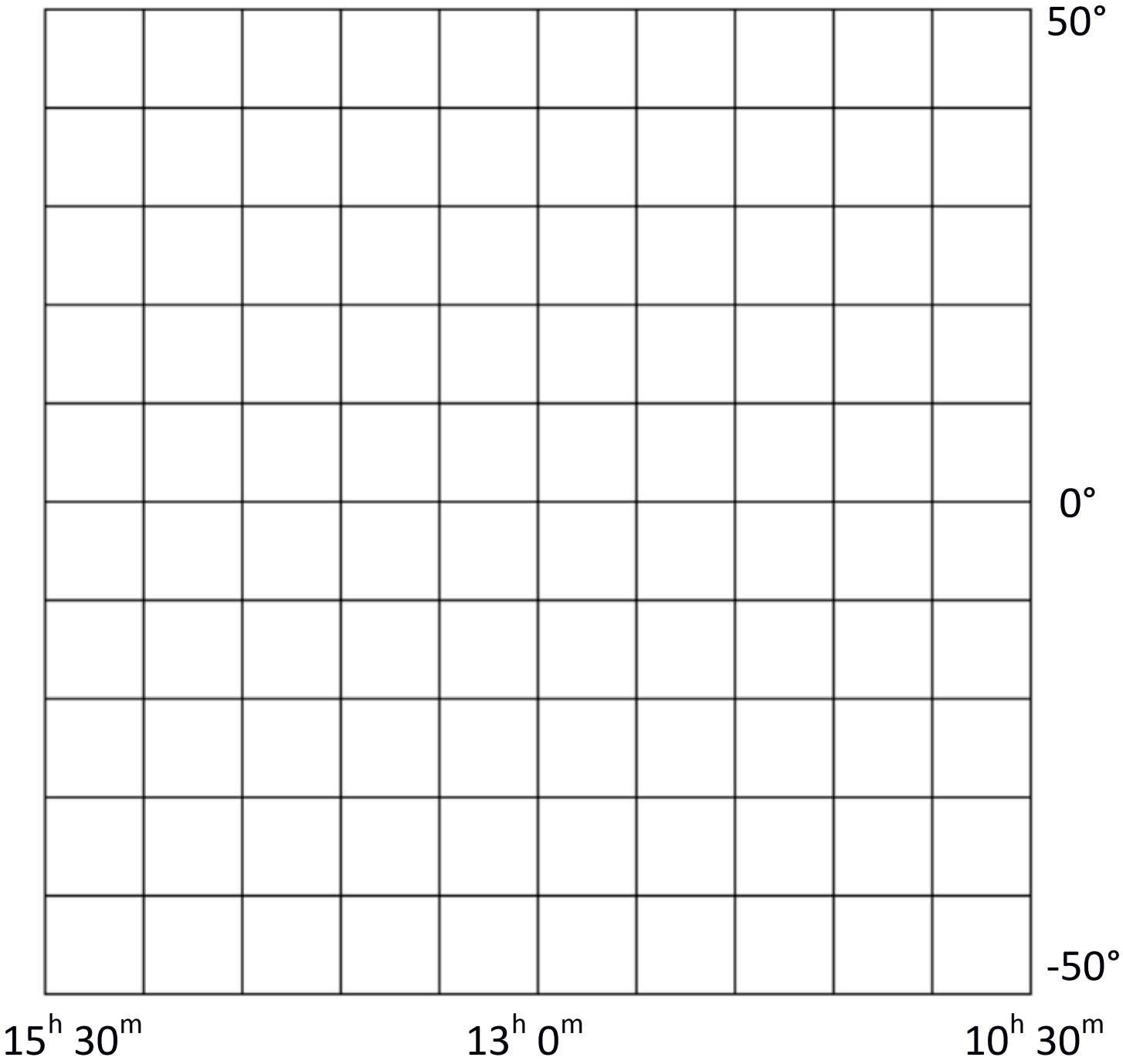
Study the animated GIFs of the comets on the lab website to answer the questions below.

1. Describe the orientation of the comet's tails with respect to the comet's motion.

2. Do you observe something strange in these GIFs? What is it? Suggest a hypothesis to explain what you observe.

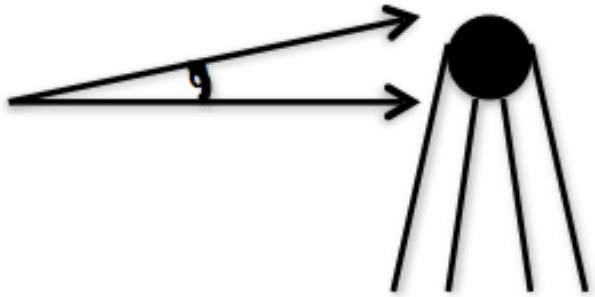
3. Using Maxim, animate the three images of Comet ISON from the website.
   a. Using the coordinate grid on the next page, plot the position of the comet and its tail orientation. (Hint: In the FITS header (crt+f), you can find the coordinates)

   b. Using your hypothesis from question 2, plot another relevant celestial object on the coordinate grid at the date of observation. What is the orientation of the comet's motion and tail direction with respect to this object?


50°
0°
-50°
15h 30m
13h 0m
10h 30m

Part 2: Measuring the Size and Velocity of Comet ISON

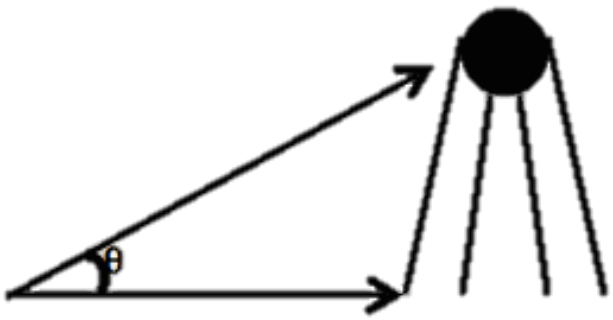
1. Measure the diameter of the coma of the comet. Do not include the tail. Make this measurement in units of pixels and show your work. (Hint: The graph tool in Maxim will be handy for this measurement)



ISON

2. The previous measurement is the angular size of ISON's coma. Now, convert this angular size into a linear size using the Small Angle Formula and a pixel scale of 0.725 arcsec per pixel. Show your work and give your answer in km.

3. Now, find both the angular size and linear size of ISON's tail in km. Show your work.



4. Measure the distance traveled between two images of ISON in pixels. Then, find what this is in angular distance using the image pixel scale from question 2. Show your work.

5. Using the Small Angle Formula and the distance to ISON, determine how far the comet traveled in km. Show your work.

6. Using the FITS header, determine how much time passed between your two measurements.

7. Now, calculate the speed of the comet in km/s. Show your work.

8. Is this the true velocity of the comet? Explain and be sure to include any assumptions you made in this calculation.