Print Name _____ Period _____ Date _____

CA1 2.6: Understanding Azimuth Handout

Purpose: To practice understanding of azimuth.

Homework: Azimuth Angles from your house

a. Draw a sketch of your house or apartment building seen from above, and indicate which way is north. Include nearby streets your teacher is likely to know.
b. Pick several objects near your house or apartment and give azimuth directions to them. For example, you could say "The big maple tree is south by southeast. The mailbox is due east. Our apartment building's laundry is northwest." Do at least 5 objects.
c. What is the approximate direction of the school from your house? Use cardinal directions.
d. From the school, which way is the nearest movie theatre? Use cardinal directions.
e. From the school's flagpole, what direction is your classroom for this class? Use azimuth angles. An answer must be within 20 degrees to be counted correct.
f. Draw a "treasure map" leading from your house to a park. Give directions strictly in terms of orienteering (go 3 blocks east, drive 1 mile south, etc.)
g. Make a table of all 16 cardinal directions and list the corresponding azimuth angle for each. Hint: Azimuth angles go from 0 to 360. Once you see how many degrees one direction is from the next, you will find they are all equally spaced like the slices of a pizza. (North = 0, North by northeast = 22.5, northeast = 45, east by northeast = 67.5, east = 90, east by southeast = 112.5, southeast = 135, south by southeast = 157.5, etc.)

North	0
North by Northeast	
Northeast	
East by Northeast	
East	90
East by Southeast	
Southeast	
South by Southeast	
South	180
South by Southwest	
Southwest	
West by Southwest	
West	270
West by Northwest	
Northwest	
North by Northwest	

CA1 2.6: Understanding Azimuth Handout

h. You will next make an official observation for your observing notebook. Note the azimuth of the setting sun from your house. In your observing notebook, record where you were standing, the exact clock time, and whether or not there were obstructions such as trees that prevented you from seeing the sun on the horizon. You must make an observation—but it is OK if you estimate or use the time when the sun disappears behind a building. Use your azimuth circle and point it north for this observation.

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CA1 2.7: Investigating Azimuth Changes Lab

Purpose: The purpose of this activity is to collect data to determine the maximum amount the sun shifts in azimuth over the course of a year.

Materials: Stellarium planetarium simulation software.

Procedure:
Hypothesis: The sun has a maximum and minimum azimuth as it rises throughout the year, and these positions are the same each year.
Independent variable: the day of the year

Dependent variable: _____
Interfering variables: latitude of observer, horizon obscured by trees, buildings, mountains

This experiment uses *azimuth*. Azimuth is a horizontal angle which starts with zero degrees pointing due North and increases to the east at 90 degrees, south at 180 degrees, and west at 270 degrees.

Measuring the azimuth of the sun at sunrise or sunset in practice is very difficult because it requires a low, flat horizon. We are therefore going to simulate the sunrise using planetarium software such as Stellarium.

Information on how to use Stellarium for measuring altitude and azimuth, as well as other functions, is located in Appendix A-7. An installer for the software is included on the teacher disk that came with the teacher's guide. Stellarium is also downloadable for free from www.Stellarium.net.

1. Start the program. Make sure the location of the observer is set to a city near your school. The default horizon is fairly flat, but you can be more precise by turning off the ground view and activating the horizon scale.
2. Using the time controls, adjust the program until the sun is half up and half down at sunrise. Stop the clock.
2. Use the program's heads up display to specify that azimuth should be displayed.
3. Center on the sun.
4. Record the azimuth and the local time.
5. Repeat this process, changing the date every two weeks, twenty-six times so that an entire year is covered. Record your data in the table on the next page.

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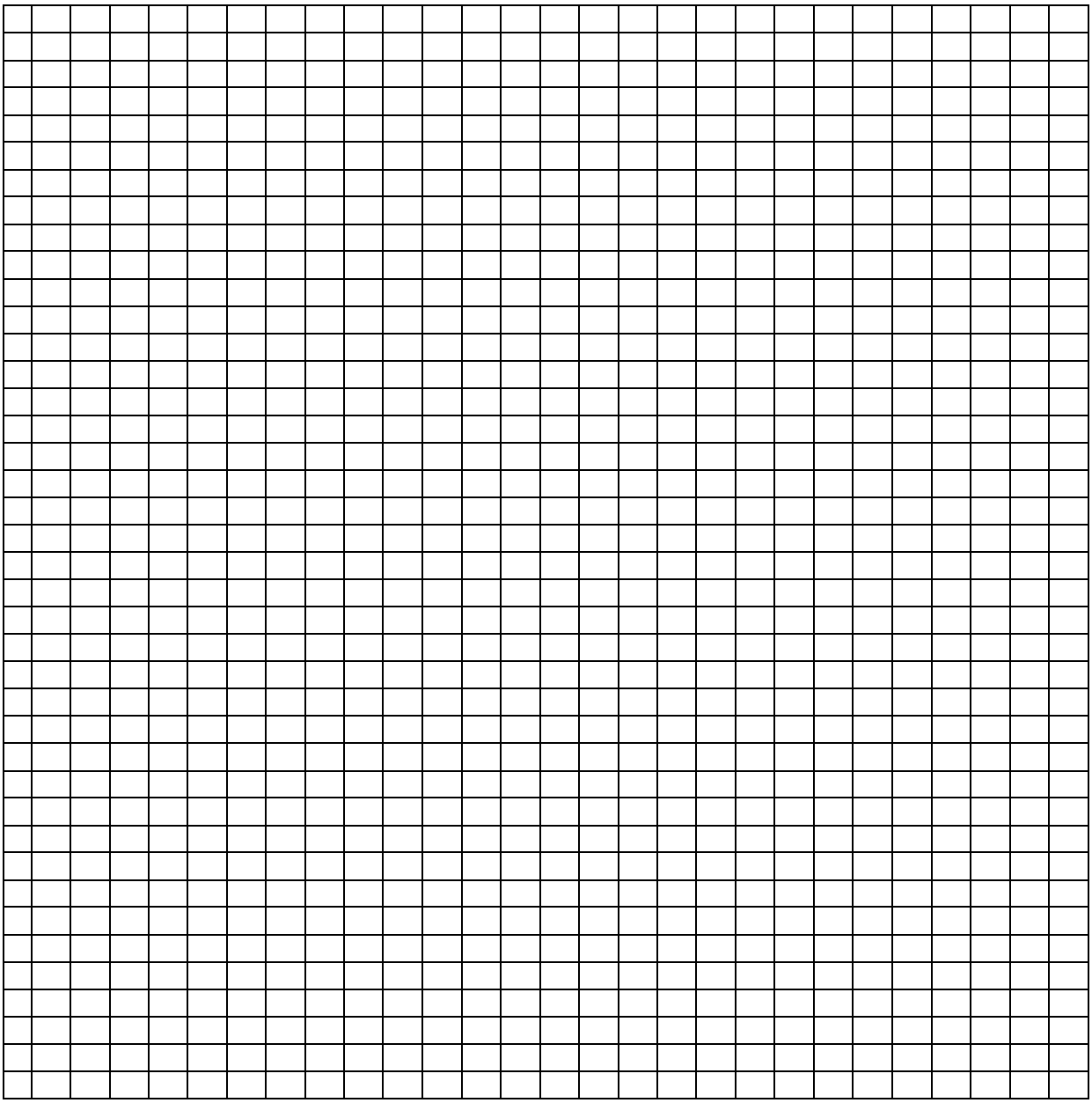
CA1 2.7: Azimuth Change Data Table

Date of observation	Time	Azimuth

Print Name _____ Period _____ Date _____

CA1 2.7: Investigating Azimuth Changes Lab

7. Graph the azimuth of the sun at sunrise over the course of a year using the grid provided. Note: change the y-axis scale if necessary to make the graph take up the entire space. Don't forget to label your axes! Use the x-axis for the date, and the y-axis for the azimuth angle.



Print Name _____ Period _____ Date _____

CA1 2.7: Investigating Azimuth Changes Lab

Questions:

1. At what date was the sun's azimuth farthest north?

_____

2. What was the azimuth on that date?

_____

3. At what date was the sun's azimuth farthest south?

_____

4. What was the azimuth on that date?

_____

5. On what date(s) was the sun's azimuth due east?

_____

6. What is the significance of these dates? (Hint: look up the definition of the seasons)

_____

_____

_____

_____

7. What are the corresponding azimuths for sunset on the same days? Fill in the table below. You should check to see if your answers are correct using Starry Night.

_____

_____

_____

_____

_____

The answers to this activity can be used to design a Stonehenge for your location.