

## PreCalculus: Chapter 17 Homework Assignment: Due next Monday, 4/11.

Read over the chapter ...

...then do the following problems at the end of the chapter: 17.5a-d, 17.11, and 17.10 (hard one).

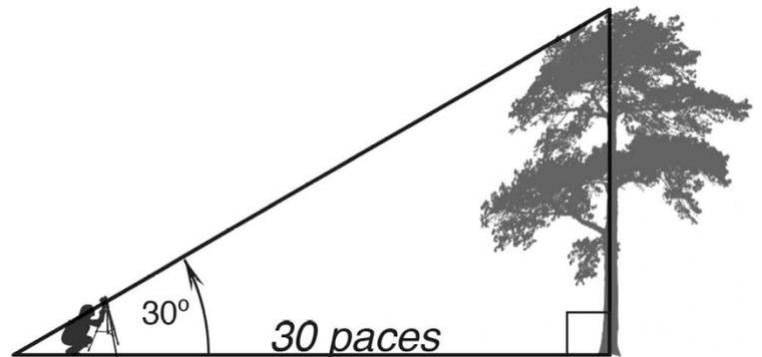
**Turn in 17.11** with a nice side-view drawing/diagram.

Then do the following problems below: [Most have answers at the end.]

From these, **Turn in number 7.**

### Using Trigonometry.

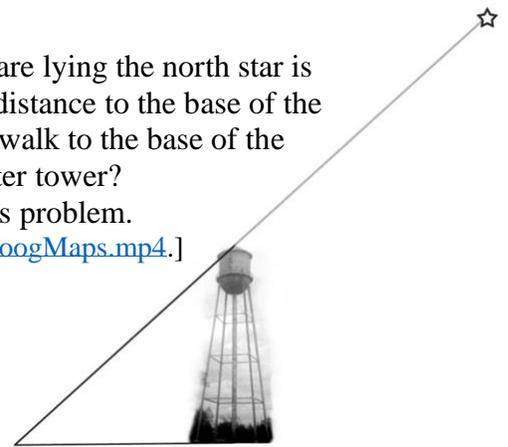
1) How tall is the tree (in feet)? [1 pace is 30"].



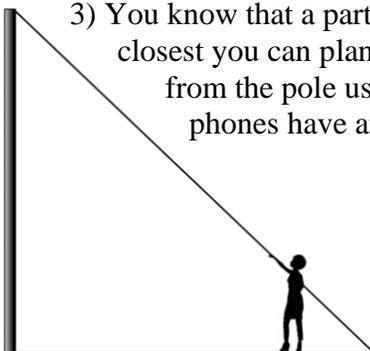
2) You are lying down in Tivoli and you notice that from where you are lying the north star is exactly at the top of the water tower. You then think, "If I knew the distance to the base of the water tower, I could estimate the height of the water tower." So you walk to the base of the water tower and count 44.5 paces. Approximately how tall is the water tower?

[1 pace is 30".] Hint: You'll need the latitude of Tivoli to answer this problem.

[Here is a short video on how to find latitude in GoogleMaps: [\[LatitudeInGoogMaps.mp4.\]](#)]



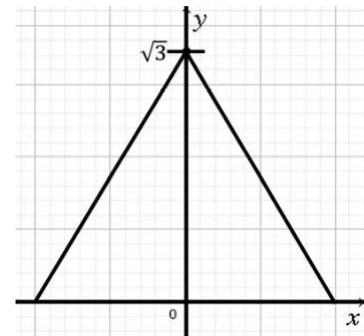
3) You know that a particular telephone pole is 40' tall. The electric company told you that the closest you can plant your garden is 40' from the pole. How can you determine your distance from the pole using a level-gizmo to measure the angle? For example, most modern cell phones have an inclinometer. On the iPhone it is in the Measure app.



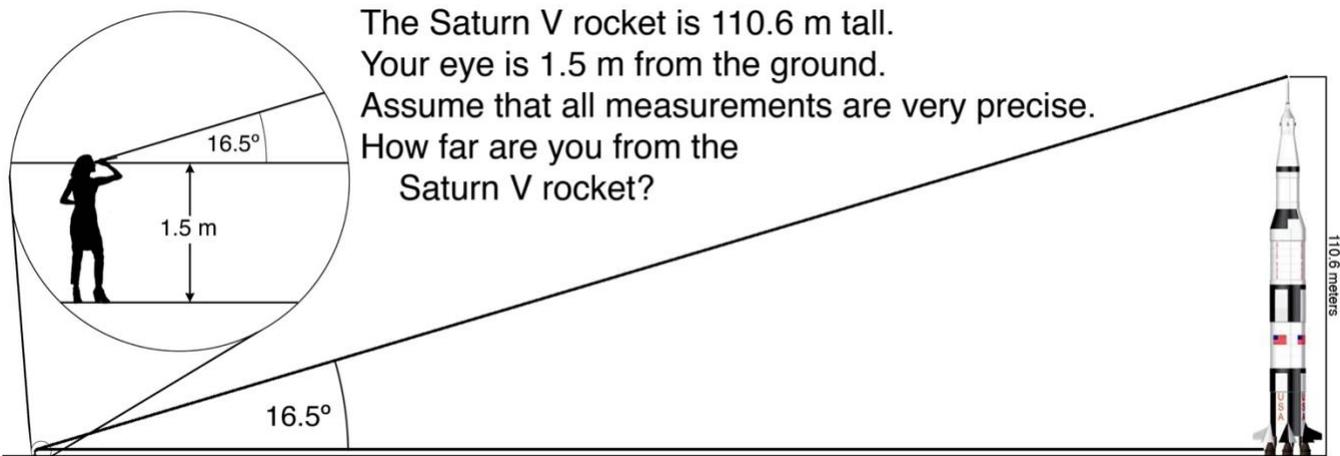
4. Construct an equilateral triangle in which the tippy top point is  $y = \sqrt{3}$  and the base is on the x-axis. See diagram.

What are the coordinates of the two corners on the x-axis?

Hint:  $\sin 60^\circ = \frac{\sqrt{3}}{2}$ .



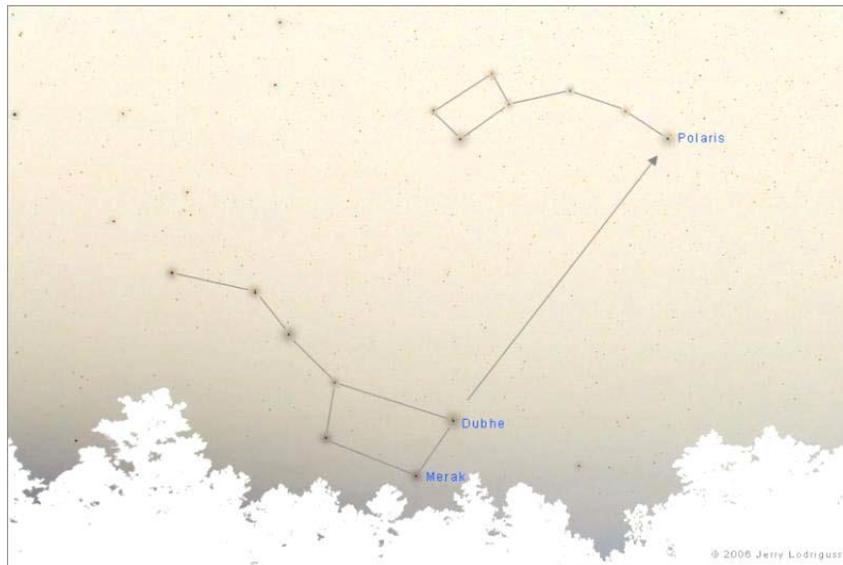
5)



- 6a. You are on the NE corner of 24th St and 9th Avenue in Manhattan looking at the building known as London Terrace. You paced it off and estimate that you are 120 feet from the building. Using your phone you measure the angle to the top at  $63.5^\circ$ . How tall is the building?

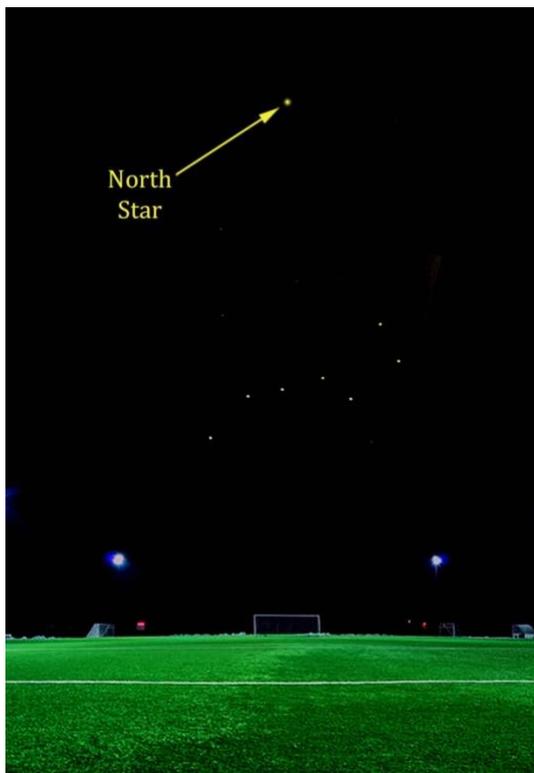


- 6b. What will the angle be if you move back another 120 ft?

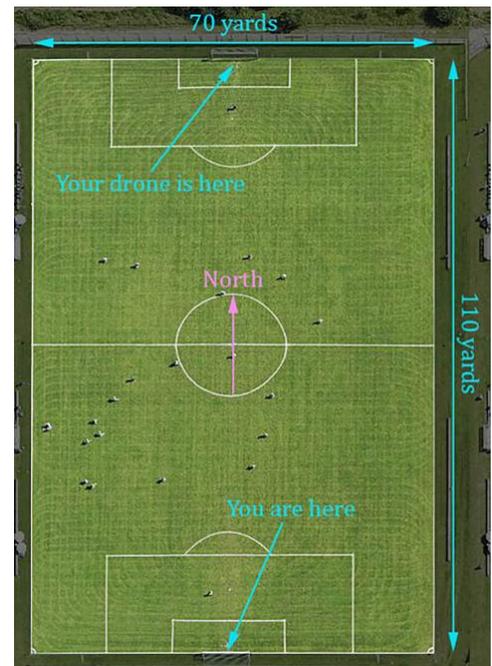


*Big Dipper, Little Dipper, and the North Star (Polaris)*

The North Star is located approximately on the line made by the stars *Merak* and *Dubhe* and is about 5 times the distance between those two stars.



7) It is midnight on a clear, star-studded night. You are located where you are for real. E.g. I am near Bard. You are wherever you are. More specifically you are at the south end of a soccer field [See diagram.] and your fancy new drone is at the north end. Using your remote control you order the drone to rise up vertically. After a few seconds you notice that your drone eclipses the North Star. [If you are in the southern hemisphere, your drone eclipses the Southern Cross.] **What is the altitude (in feet and in meters) of your drone at the moment that it eclipses the North Star [or Southern Cross]?**



To do this problem you need to determine your latitude. This is easily found on most mapping programs like

GoogleMaps or GoogleEarth or even Wikipedia (look up the nearest city). Your latitude is the angular altitude from horizontal to the North Star. [Here is a short video on how to find latitude in GoogleMaps: [\[LatitudeInGoogMaps.mp4.\]](#) [1 yard equals 3 feet.]

Once you know your latitude you can determine the altitude of your drone since you know how far the drone was from you at lift-off and you also know the angle it makes to horizontal when it blocks out the North Star.

Draw a side view of this situation, indicating the right triangle formed by you, the drone lift-off point, and the drone's location when it blocks out the North Star. Then solve for the altitude using sin, cos, or tan.

Answers:

1) approx. 43.3 feet

2) about 100 feet.

3) At 40' from the pole, the angle will be 45°.

4)  $(\pm 1, 0)$

5) about 368m, not 373m.

6a) about 240 feet.

6b) 45°

7) The answer will depend on your latitude.