

Astronomy 101
Tutorial A – The Altitude of the Sun

2 September, 2016

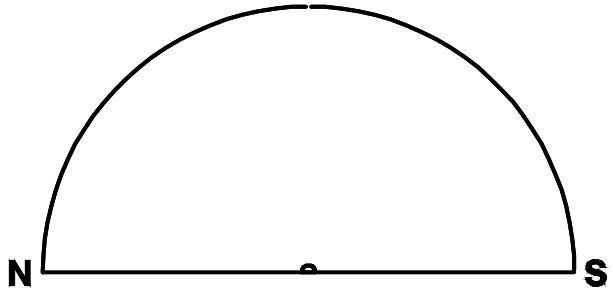
Treat this tutorial just like one in your tutorial book. Work on it with a classmate, understand the material, but don't turn it in.

In this exercise, we will calculate the altitude of the Sun at different times of the year from various locations on the Earth. For each location below, calculate θ , the altitude of the celestial equator over the southern horizon, and the maximum altitude of the Sun on the equinoxes (A_E), the summer solstice (A_S) and the winter solstice (A_W). In addition, draw in the angles in the diagram given. Also mark the location of the NCP (or SCP). You may find it useful to consult the equations and example in the handout titled *An Introduction to Angles in the Sky*.

1. Fort Yukon, Alaska.

Latitude $\lambda = 66.5^\circ\text{N}$.

- a. $\theta = \underline{\hspace{2cm}}^\circ$.
- b. $A_E = \underline{\hspace{2cm}}^\circ$.
- c. $A_S = \underline{\hspace{2cm}}^\circ$.
- d. $A_W = \underline{\hspace{2cm}}^\circ$.

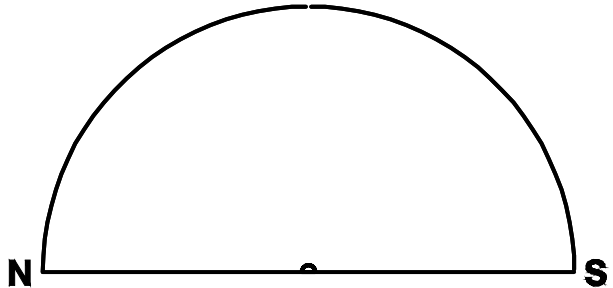


e. Explain your answer to d. What happens at Fort Yukon on the Winter Solstice?

2. Clarence Town, Bahamas

Latitude $\lambda = 23.5^\circ\text{N}$.

- a. $\theta = \underline{\hspace{2cm}}^\circ$.
- b. $A_E = \underline{\hspace{2cm}}^\circ$.
- c. $A_S = \underline{\hspace{2cm}}^\circ$.
- d. $A_W = \underline{\hspace{2cm}}^\circ$.



e. Does the Sun ever get directly overhead in Clarence Town? If so, for how many days?

3. Kisumu, Kenya.

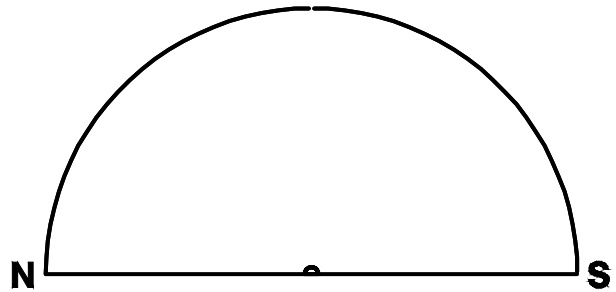
Latitude $\lambda = 0^\circ$.

a. $\theta = \underline{\hspace{2cm}}^\circ$.

b. $A_E = \underline{\hspace{2cm}}^\circ$.

c. $A_S = \underline{\hspace{2cm}}^\circ$.

d. $A_W = \underline{\hspace{2cm}}^\circ$.



e. Explain your answer to c. What does this angle really mean?

4. Armidale, NSW, Australia.

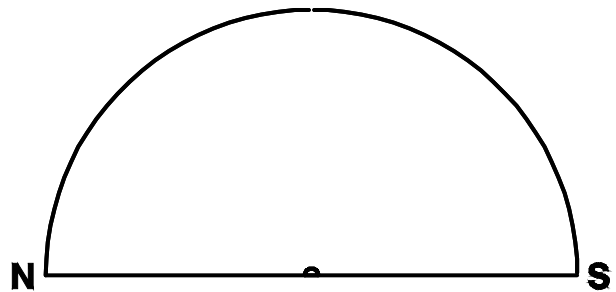
Latitude $\lambda = 30.5^\circ \text{ S}$.

a. $\theta = \underline{\hspace{2cm}}^\circ$.

b. $A_E = \underline{\hspace{2cm}}^\circ$.

c. $A_S = \underline{\hspace{2cm}}^\circ$.

d. $A_W = \underline{\hspace{2cm}}^\circ$.



e. What happens when the latitude is south of the equator? Keep this in mind when answering the above questions and drawing in the angles and celestial poles.