Sun's Apparent Path

Purpose: To determine how the motion of the Earth about the Sun causes the apparent path of the Sun to vary throughout the year at different latitudes.

Procedure:

1. Examine the data in Table 1 (below) which shows solar altitude data for three locations in the northern hemisphere over a one year period.
2. Plot a graph of **Maximum Daily Solar Altitude** (y-axis) vs. **Date** (x-axis) for the Equatorial (0° Latitude) location. The y-axis scale should extend from 0º to 90º. Connect these points freehand using a **blue** marker.
3. Repeat Procedure 2 for the Houston (30° Latitude) and Vancouver (49 º Latitude) data. Draw the Houston line in **red** and the Vancouver line in **black**.

Table 1: Maximum Daily Noontime Solar Altitude (in degrees above the horizon)

Date	**0° Latitude** (Equator)	**30o Latitude** (Houston, TX)	**49o Latitude** (Vancouver, BC)
Jan. 1	66.3	36.3	17.3
Jan. 20	69.2	39.2	20.2
Feb. 10	74.9	44.9	25.9
Mar. 1	82.0	52.0	33.0
Mar. 20	90.0	60.0	41.0
Apr. 10	82.0	67.1	48.1
Apr. 30	76.0	74.0	55.1
May 20	70.7	79.3	60.3
June 10	67.5	82.5	63.5
June 30	67.3	82.7	63.7
July 20	68.7	80.3	61.3
Aug. 10	74.7	75.3	56.3
Aug. 30	81.2	68.8	49.8
Sept. 20	89.0	61.0	42.0
Oct. 10	83.2	53.2	34.2
Oct. 30	76.0	46.0	27.0
Nov. 20	70.0	40.0	21.0
Dec. 10	66.7	36.7	17.7
Dec. 30	66.3	36.3	17.3

Student Exercise

Questions:

Refer to the blue Equatorial Latitude line on your graph for questions 1 and 2.

1. a) During what date(s) is the Sun highest in the sky?

_____

b) For the date(s) you have listed, what is the Sun's position in the sky?

_____

2. During which date(s) is the Sun lowest in the noon sky? Hint: Refer to Figure 25.5, p. 385 of the text.

_____

3. What happens to the noontime (maximum) altitude of the Sun at Houston and Vancouver, as the year progresses from January through December?

_____

4. a) What are the dates of maximum and minimum noontime altitude for both Houston and Vancouver?

_____

b) Does the Sun ever pass directly overhead for these two latitudes (Houston, Vancouver)? Explain your answer.

_____

Table 2: Path Length (in degrees of arc) **and Duration of Daylight** (in hours)

Date	**0° Latitude** (Equator)		**30° Latitude** (Houston, TX)		**49° Latitude** (Vancouver)	
	Path	**Duration**	**Path**	**Duration**	**Path**	**Duration**
Mar 21	180	12.0	180	12.0	180	12.0
Jun 21	180	12.0	205	13.7	245	16.3
Sep 21	180	12.0	180	12.0	180	12.0
Dec 21	180	12.0	155	10.3	115	17.7

Refer to Table 2 for questions 5-8

Student Exercise

5. On which date(s) is the duration of daylight period 12 hours for
   a) the equator?_____
   b) Houston? _____
   c) Vancouver? _____

6. During which months of the year is the duration of daylight greater than 12 hours for
   a) the equator?_____
   b) Houston?_____
   c) Vancouver? _____

7. During which months of the year is the duration of daylight less than 12 hours for
   a) the equator? _____
   b) Houston? _____
   c) Vancouver? _____

8. Which one of three locations sees the most sunlight on
   a) March 21? _____ b) June 21? _____
   c) September 21? _____ d) December 21? _____

9. a) What is the longest day of the year in the northern hemisphere? (See p. 385, Fig. 25.5.)

   _____

   b) On this date, where on the Earth is the Sun directly overhead at noon?

   _____

10. Refer back to the March 20 data in Table 1. Examine the data carefully and predict the noontime altitude of the Sun at latitude

    a) 60^{o} _____ b) 90^{o} (North Pole) _____