You should be able to calculate the noon sun angle of a place during the solstices and equinoxes.

1. If you are in Sydney, Australia and the date is September 22, what is the declination of the sun?

2. It's June 21 and you're on vacation checking out the beaches just north of Mazatlan, Mexico, at latitude 23.5° N. What is the declination of the sun?

3. It's June 21 and you're in New York City, NY (40.5° N). What is the noon sun angle in New York?

4. It's March 23 and you're in Paris, France (49° N). What is the noon sun angle in Paris?

5. It's December 22 and you're an un-named location in Antarctica, latitude 66.5° S. What is the noon sun angle at this place?

6. It's September 23 and you're in Suva, Fiji (18° S). What is the noon sun angle?

7. Of all the cities on the South America map below, which city will have the smallest change in noon sun angle throughout the year, and which city will have the largest change in noon sun angle throughout the year? Why?

You should be able to explain how sun angle and insolation intensity change with latitude and season.

8. In which of the four cities listed below and shown on the South America map below, will a beam of sunlight be dispersed over the smallest surface area at noon on June 21? On December 22? On March 23? Why?

9. Which of the four locations in questions 3, 4, 5, and 6 (New York, Paris, Antarctica, Suva) will receive the most intense insolation on the dates listed? Why?

10. How will the noon sun angle change traveling from London (51.5° N) to Accra, Ghana (5.5° N), on June 21? How will the insolation intensity change traveling from London to Accra on June 21?

11. How will the noon sun angle change traveling from London (51.5° N) to Accra, Ghana (5.5° N), on December 21? Where (at what latitude) between London and Accra will insolation be most intense?

12. What is the noon sun angle in Honolulu, Hawaii (21.5° N) on the following dates:
   - March 23
   - June 21
   - September 23
   - December 22
   Describe the associated change in insolation intensity with season in Honolulu.

13. What is the noon sun angle in London (51.5N) on the following dates:
   - March 23
   - June 21
   - September 23
   - December 22
   Describe the associated change in insolation intensity with season in London.

14. Compare the change in noon sun angle and insolation intensity with season in Honolulu and London.

You should be able to explain how day length changes with latitude and season.

15. If the date is September 23, which of the four locations in questions 3, 4, 5, and 6 (New York, Paris, Antarctica, Suva) will have the most hours of sunlight (longest day)?
16. If the date is December 22, which of the four locations in questions 3, 4, 5, and 6 (New York, Paris, Antarctica, Suva) will have the fewest hours of sunlight (shortest day)?

17. Which of the following four cities (see map below) will have the longest day (most hours of sunlight) on June 21? Why?
   - Caracas
   - Quito
   - La Paz
   - Santiago

18. Which of the following four cities, shown on the map below, will have the longest day on December 22? Why?
   - Georgetown
   - Lima
   - Asuncion
   - Montevideo

19. Of all the cities on the South America map below, which city will have the smallest change in day length throughout the year, and which city will have the largest change in day length throughout the year? Why?

20. Describe how day length (hours of sunlight) will change traveling from Caracas to Tierra del Fuego (see map below) on June 21 and on December 22.

You should be able to explain how sun angle, insolation intensity, and day length affect temperature.

21. Which of the four locations in questions 3, 4, 5, and 6 (New York, Paris, Antarctica, Suva) should be hottest on the dates listed? Why?
   - March 23
   - June 21
   - September 23
   - December 22

22. You're trying to decide where to vacation over semester break (end of December) and have a choice of traveling to either Porto Alegre, Brazil (30° S) or Cairo, Egypt (30° N). Your primary concern is warm temperatures. Which place should be warmer based on earth-sun relations? Why?

23. If you lived in Honolulu, Hawaii (21.5° N) and stepped outside at noon on the four dates listed below, in what direction (north, south or directly overhead) would you look to see the sun?
   - March 23
   - June 21
   - September 23
   - December 22
   Will the direction you look have an impact on the temperature in Honolulu? If so, explain why, if not, state what factors would impact temperature in Honolulu.

24. Of all the cities on the South America map below, which city should have the smallest change in temperature throughout the year, and which city should have the largest change in temperature throughout the year? Why?

Study Aid: Visualizing Spatial and Temporal Change in Declination and Day Length