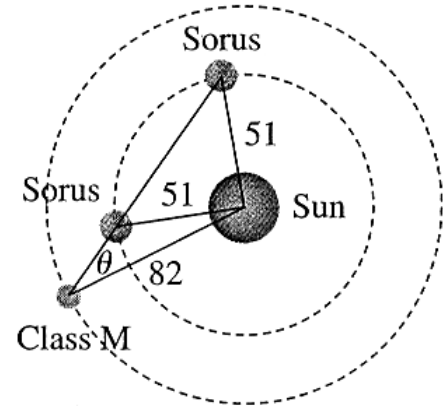


Directions: Work in groups of 2-3 people. You may need extra paper.

1 In a solar system that parallels our own, the planet Sorus can be seen from a class M planet, but the position of Sorus is uncertain from the sighting. (The two possible positions of Sorus are both shown in the diagram.) Assume the orbits around the sun are circular and that the viewing angle θ from the sun is measured to be $\theta = 20^\circ$. If the class M planet is 82 million miles from the sun and Sorus is 51 million miles from the sun, determine the two possible distances separating Sorus from the class M planet.



2 Hugo bakes world famous brownies. The secret to his success is a special oven whose temperature varies according to a sinusoidal function. On one occasion the temperature T of the oven t minutes after inserting the brownies is given by

$$T = 15 \sin\left(\frac{\pi}{5}t - \frac{3\pi}{2}\right) + 415 \text{ } ^\circ\text{F}$$

(a) List the amplitude, phase shift, vertical shift, and period of the function. Then sketch the graph of this function on the domain $0 \leq t \leq 20$ minutes without using your calculator (except to check at the end).

(b) What is the minimum temperature of the oven? Give all of the times that the oven reaches this minimum temperature during the first 20 minutes.

(c) During the first 20 minutes of baking, calculate the total amount of time that the temperature is at least 410°F