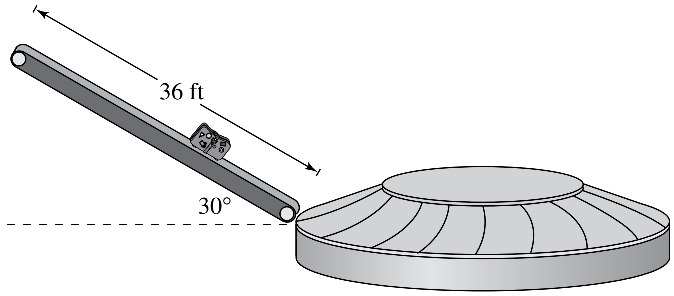
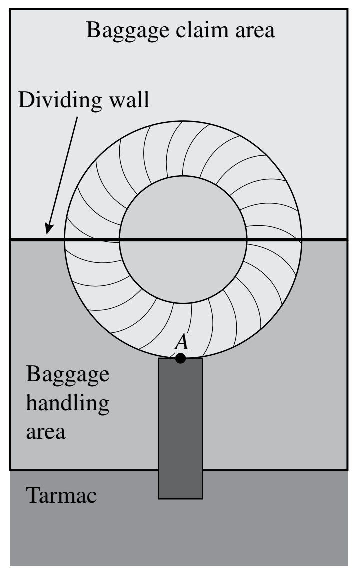
Collaborative Project – Trigonometric Functions

The figure shows how luggage travels down a 36-foot ramp from an airport tarmac to a circular carousel that conveys luggage through a baggage claim area.



1. Find the vertical distance that the luggage moves down the ramp.

The carousel makes 2 clockwise revolutions every 3 minutes. The diameter of the carousel is 40 feet. A wall through the center of the carousel separates the baggage claim area from the baggage handling area.



2. Find the number of revolutions the carousel makes per minute.

3. Find the angular speed of the carousel in radians per minute and degrees per second.

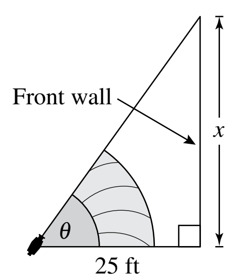
4. A bag enters the conveyor at point A at time $t = 0$ (t in seconds). As the conveyor revolves, the bag's position P (in feet) relative to its distance from the dividing wall is periodic. Write a function that models $P(t)$, where the negative values of P are in the baggage handling area. Identify the amplitude and period of P. Sketch the graph of P. (Include two full two periods.)

5. How far from the wall is the bag after 25 seconds, 60 seconds, and 80 seconds? During which of these times is the bag in the baggage claim area?

6. Describe the first full interval of time in which the bag will be in the baggage claim area.

7. At what time t will the unclaimed bag re-enter the baggage claim area for the *second* time?

A security camera is mounted on the dividing wall at the center of the carousel, 25 feet from the front wall. The camera pans the front wall, at an angle of θ with the dividing wall.



8. Find x when $\theta = 22°$.

9. Write θ as a function of x. Then find θ when $x = 25$ feet and when $x = 40$ feet.