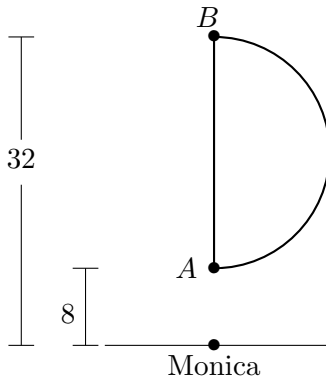


11. [10 points] Chandler wants to lose some weight after Thanksgiving and he asks Monica to coach him. His task for today is to jog **once around** a semicircular path shown in the picture below.



Chandler starts running along the arc from point A to point B and then along the straight path back to point A . He runs at a constant speed of $\frac{2\pi}{3}$ meters per second the whole time. Monica is standing 8 meters away from point A and 32 meters away from point B .

Suppose t represents the number of seconds after Chandler began to jog.

- a. [3 points] For what values of t is Chandler running along the **arc** AB ? You can use interval notation or inequalities.
- b. [4 points] While Chandler runs along the **arc** AB , $d(t)$ is the **vertical** distance between his location and the line Monica is standing on t seconds after he started jogging. Find a formula for $d(t)$. (Note that the domain of $d(t)$ should be the t values you found in part (a).)

$$d(t) = \text{_____}, \text{ for } \text{_____} \leq t \leq \text{_____}.$$

- c. [3 points] While Chandler runs along the **straight path** BA , $\ell(t)$ is the **vertical** distance between Chandler and the line Monica is standing on t seconds after he started jogging. Find a formula for $\ell(t)$.

$$\ell(t) = \text{_____}, \text{ for } \text{_____} \leq t \leq \text{_____}.$$