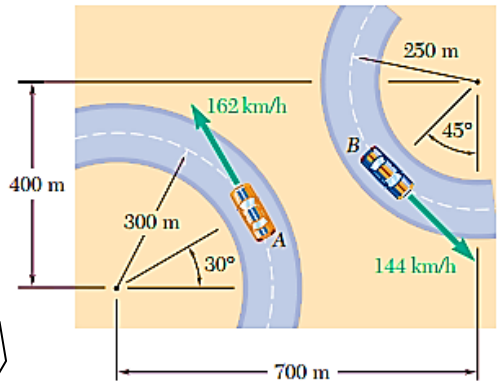
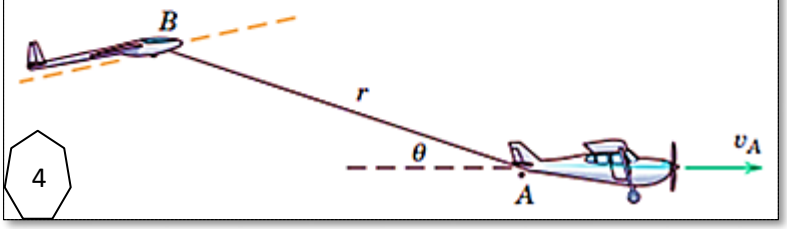
Racing cars A and B are traveling on circular portions of a race track. At the instant shown, the speed of A is decreasing at the rate of 7 m/s^2, and the speed of B is increasing at the rate of 2 m/s^2. For the positions shown, determine (*a*) the velocity of B relative to A, (*b*) the acceleration of B relative to A.



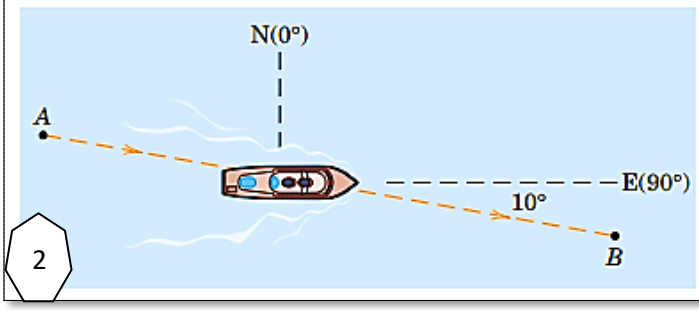
1

Airplane A is flying horizontally with a constant speed of 200 km/h and is towing the glider B, which is gaining altitude. If the tow cable has a length $r = 60$ m and θ is increasing at the constant rate of 5 degrees per second, determine the magnitudes of the velocity **v** and acceleration **a** of the glider for the instant when $\theta = 15°$.



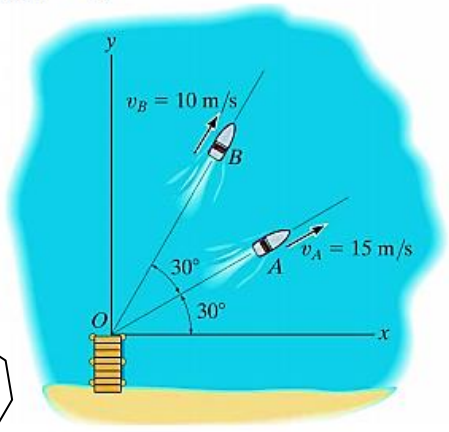
4

A small ship capable of making a speed of 6 knots through still water maintains a heading due east while being set to the south by an ocean current. The actual course of the boat is from A to B, a distance of 10 nautical miles that requires exactly 2 hours. Determine the speed v_C of the current and its direction measured clockwise from the north.



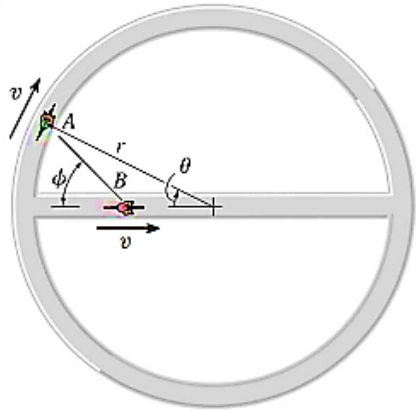
2

The boats A and B travel with constant speeds of $v_A = 15$ m/s and $v_B = 10$ m/s when they leave the pier at O at the same time. Determine the distance between them when $t = 4$ s.



5

Two cyclists A and B travel at the same constant speed v. Determine the velocity of A with respect to B if A travels along the circular track, while B travels along the diameter of the circle.



3

A man walks at 5 km/h in the direction of a 20-km/h wind. If raindrops fall vertically at 7 km/h in *still air*, determine the direction in which the drops appear to fall with respect to the man. Assume the horizontal speed of the raindrops is equal to that of the wind.

6