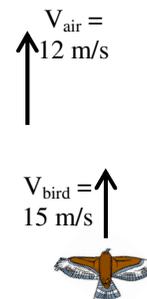
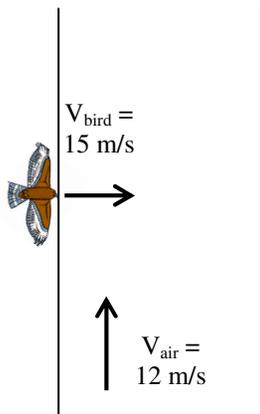


2011 PreAP Two Dimensions 9

1. *Given these vectors: $A = 425 \text{ m at } 75^\circ$; $B = 68 \text{ m at } 130^\circ$; $C = 91 \text{ m at } 319^\circ$; $D = 213 \text{ m at } 234^\circ$. If $R = A - 3B + 2C + D$, Give R in meters and degrees: $R =$

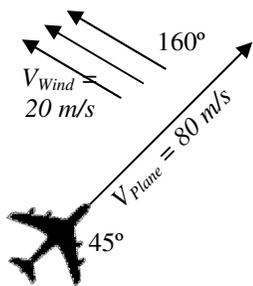
2. Given these vectors: $A = 125 \text{ m at } 125^\circ$; $B = 48 \text{ m at } 330^\circ$; $C = 100 \text{ m at } 28^\circ$; $D = 210 \text{ m at } 212^\circ$. If $R = -2A + B - 3C + 2D$, Give R in meters and degrees: $R =$

3. A bird has a velocity of 15 m/s in still air. The bird enters a canyon that has an airstream with a velocity of 12 m/s north. (*Let me walk you thru this.*)
 - A. * What is the velocity of the bird relative to the ground if the bird flies with the air?
 - B. * What is the velocity of the bird relative to the ground if the bird flies against the air?
 - C. What if the bird enters the air stream moving directly east? (*Magnitude and direction, of course.*) (*You have two vectors at 90° to each other: add them together.*)

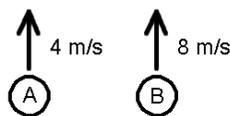


- D. * If the canyon is 48 m wide, how long does it take the bird get across? (*Realize that this is just an x-direction question, so only use x-direction #s.*)

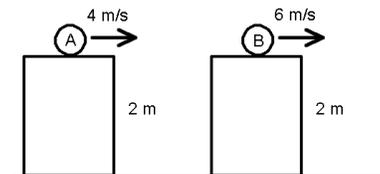
- E. How far up the canyon has the bird been pushed by the air? (*"..up the canyon" tells you that this is a y-direction question, so only use y-direction #s AND the x-direction time you just calculated.*)



4. A plane moving 80 m/s at 45° encounters a wind moving 20 m/s at 160° .
 - A. Is the x-direction of the wind blowing with the plane or against the plane?
 - B. So, is the plane's x-velocity faster or slower when in the wind?
 - C. Is the y-direction of the wind blowing with the plane or against the plane?
 - D. So, is the plane's y-velocity faster or slower when in the wind?
 - E. * Realizing that this is just adding vectors, calculate the plane's total speed relative to the ground. (*Follow the "Adding Vector" notes exactly if you need help.*)



5. Object A or B?
 - A. ___ Which has the greatest vertical acceleration?
 - B. ___ Which has the greater maximum height?



6. Object A or B?
 - A. ___ Hits the ground first?
 - B. ___ Has the greatest initial y-velocity?
 - C. ___ Has the greatest range (greatest Δx)?
 - D. ___ Has the greatest magnitude of velocity when it hits the ground (moving fastest)?

Q1: $-3B = 204$ at 310° ; $2C = 182$ at 319° . So, $R = (425 \text{ m at } 75^\circ) + (204 \text{ at } 310^\circ) + (182 \text{ at } 319^\circ) + (213 \text{ m at } 234^\circ)$
3A) 27 m/s (they are flowing in the same direction) 3B) 3 m/s south or -3 m/s (bird is faster than the air)
3D) 3.2 sec
4E) Just do sin and cos as always. Totals: $V_x = 37.8 \text{ m/s}$ $V_y = 63.4 \text{ m/s}$. Find the mag and direction.