Due Mon., Oct 4 (B-day)
Due Tues., Oct 5 (A-day)

2010-11 PreAP Two Dimensions 4

1. * If A = 22 at 215°, then −3A =
2. * If B = 18 at 112°, then −5B =
3. If C = 21 at 312°, then −2C =
4. If D = 21 at 65°, then −6D =

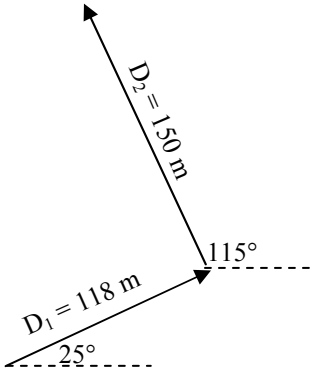
5. A person walks 25 m west, then 18 m south. What is their total displacement (*which always includes magnitude and direction*)?

6. A person walks 5 m east, then 10 m south, then 12 m west, then 3 m north. What is their total displacement (*always*)?

7. A projectile is shot going 145 m/s at an angle of 35º, what is the projectile's initial x and y velocities?

8. * A polar bear walks 3.5 km/hr along the frozen ice at 85° for 3.2 hours. Calculate its x and y displacement.

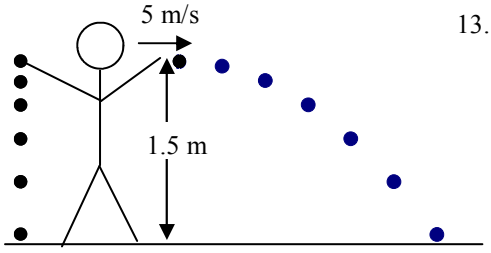
9. A group of penguins is waddling 1.6 km/hr at 65° for 15 hours. Calculate how far they went in the x and y directions. (*Challenge: how long does it take to reach the polar bear?**)



10. * Add the two vectors together at the left. (*Follow the "Adding Vector" notes exactly*).

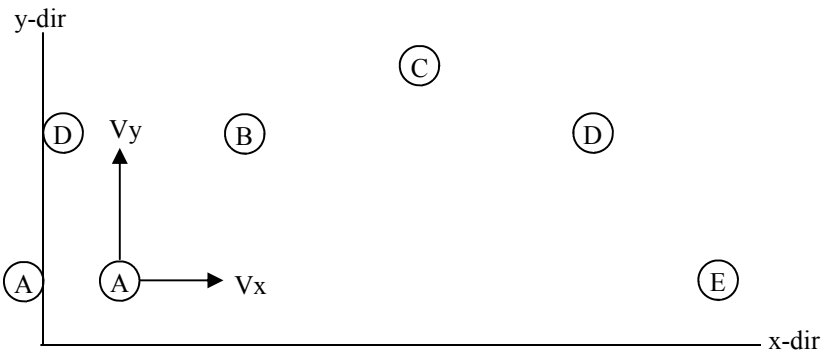
11. * A plane flies 200 mph for 2 hours going 20º. Then it flies 250 mph for 1.5 hours going 120º. Calculate the planes total displacement (*magnitude and direction, please*).

12. A boat is moving at 3 m/s for 100 seconds at 215°. It then turns to 100° going 4.5 m/s for 80 seconds. Calculate the boats total displacement.



13. Slim Jim throws a ball at 5 m/s horizontally from 1.5 m. At the exact same moment he drops an identical ball from the same height.
    A. What is the acceleration due to gravity for the dropped ball?
    B. What is the acceleration due to gravity for the thrown ball?
    C. *Which ball hits the ground first?
    D. Calculate the time for the right ball to hit the ground. (*help? Q9, last hw*)

    E. Calculate how far away the right ball lands.



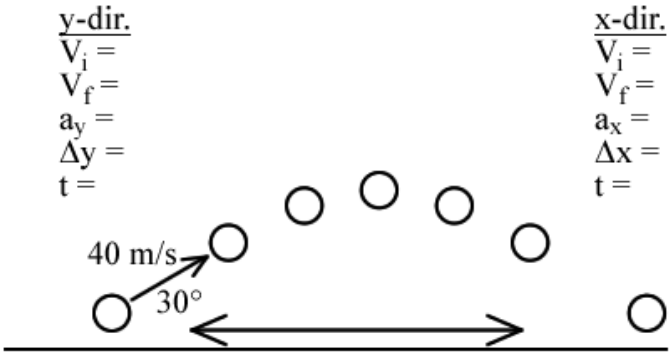
See your "Projectile Motion" notes.

14. The graphic at the right shows the path of a projectile.
    A. On the y-direction line, put the letters to show where they are. (*A and D are done for you.*)
    B. Do the same on the x-direction line.
    C. What do you notice about the distance between each x-direction letter?
    D. What does the y-direction show?
    E. Draw the x and y velocities on each letter. Longer arrows show greater velocity.
    F. Draw the total velocity (the speed) of the projectile at each point (*Vx and Vy are "crazy" the speed is "Lazy"*).

15. At which point or points above? (*"None" or "All" is also possible.)*

A. ____ Vx = 0 m/s
B. ____ The vertical velocity is zero.
C. ____ The horizontal velocity is nonzero.
D. ____ The vertical acceleration is zero.
E. ____ The horizontal acceleration is zero.
F. ____ The vertical velocity is positive.
G. ____ The vertical acceleration is nonzero.
H. ____ The horizontal velocity is zero.
I. ____ The total speed is zero.
J. ____ The horizontal component of V is zero.

At this point I have to assume that you can do ground to ground and horizontally launched.



16. * A projectile is launched 40 m/s at an angle of 30°. How high does the projectile go?
    A. "How high"… Is this an x or y-direction question?
    B. Calculate how high the projectile goes.

17. A different projectile is launched at 15° going 120 m/s. It is shot from the ground, to the ground.
    A. Calculate how far away it lands.
    B. Calculate how high it goes.

18. What is the weight of a 12 kg object?

19. How much mass has a weight of 158 N?

Q1 −3A = 66 at 35°. 2. −5B = 90 at 292 Q8 D = (3.5 km/hr)3.2hr = 11.2 km at 85°. x = 11.2cos85° = .976 km (so small because D is almost vertical); y = 11.2sin85° = 11.16 km.
(Q9 challenge: never. Penguins live at the s pole; polar bears at the north, except in Coke commercials.
Q10 x_1 = 106.9m y_1 = 49.9m; x_2 = −63.4m y_2 = 136m x_{total} = 43.6 m y_{total} = 185.8 m; Displacement total = 190.9 m at 76.8°.
Q11 Calculate displacements first: D_1 = 400 mi at 20º; D_2 = 375 mi at 120º. x_1 = 375.9 mi y_1 = 136.8 mi; x_2 = −187.5 mi y_2 = 324.8 mi; x_{total} = 188.4 mi y_{total} = 461.6 mi; Resultant = 498.5 mi at 67.8°
Q13C = same time. Q16—in the y-direction only. 20.4 m. Vyi = 20 m/s. Vyf = 0 m/s (top).