

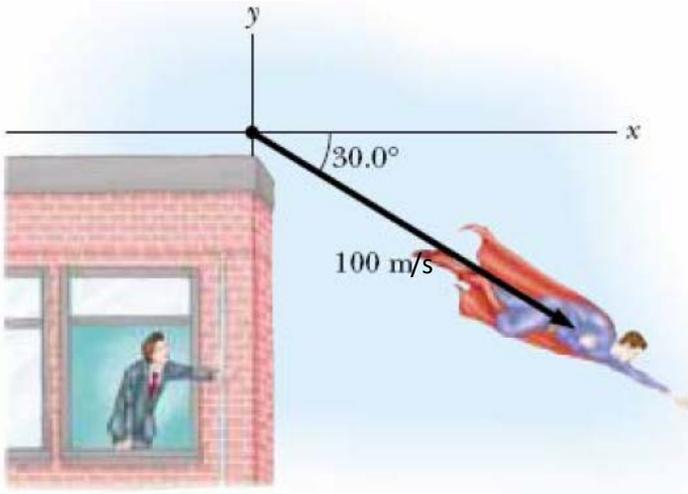
Name: \_\_\_\_\_ Teacher: \_\_\_\_\_

# AP Physics 1 Summer Work: Vectors

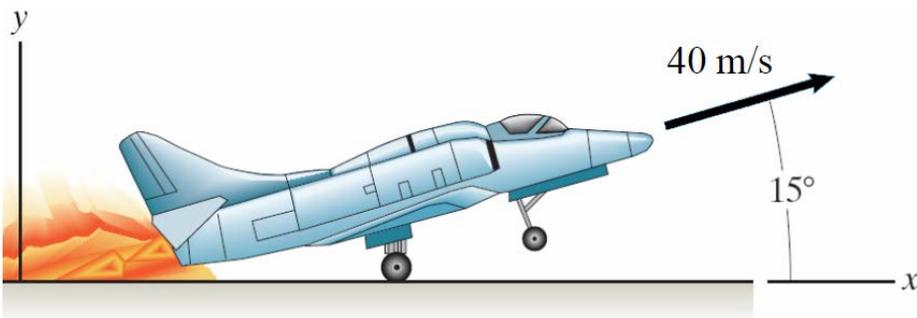
Use chapter 1 of the textbook and your skills at finding information on the web to teach yourself how to solve these problems. Also, see the Powerpoint in this Google Classroom: 3ebpt6

1. Find the X Y component form of the following vectors:
  - a. 35 m/s at  $57^\circ$  N of E
  
  
  
  
  
  
  
  
  
  
  - b. 12 m at  $34^\circ$  S of W
  
  
  
  
  
  
  
  
  
  
  - c. 8 m/s due South
  
  
  
  
  
  
  
  
  
  
  - d. 20m/s  $5^\circ$  E of S
  
  
  
  
  
  
  
  
  
  
  - e. 17m at  $35^\circ$  W of S
  
2. Find the magnitude and direction form of the following vectors:
  - a.  $5.7_x + 3.4_y$
  
  
  
  
  
  
  
  
  
  
  - b.  $-10_x + -3_y$
  
  
  
  
  
  
  
  
  
  
  - c.  $12_x + -20_y$
  
  
  
  
  
  
  
  
  
  
  - d.  $-30_x + 27_y$
  
  
  
  
  
  
  
  
  
  
  - e.  $-13_x + 9_y$

3. What is Superman's velocity in component form?

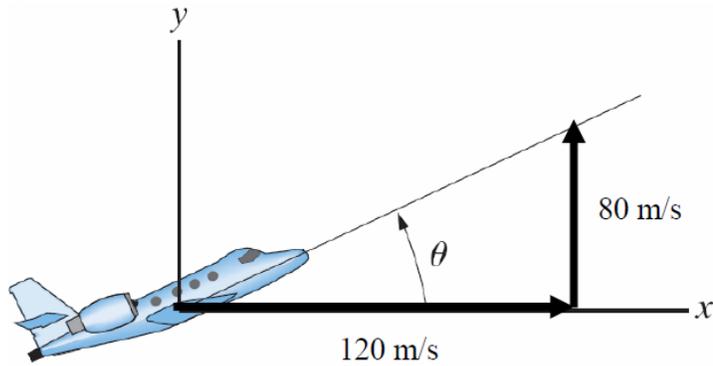


4. What is the plane's velocity in component form?

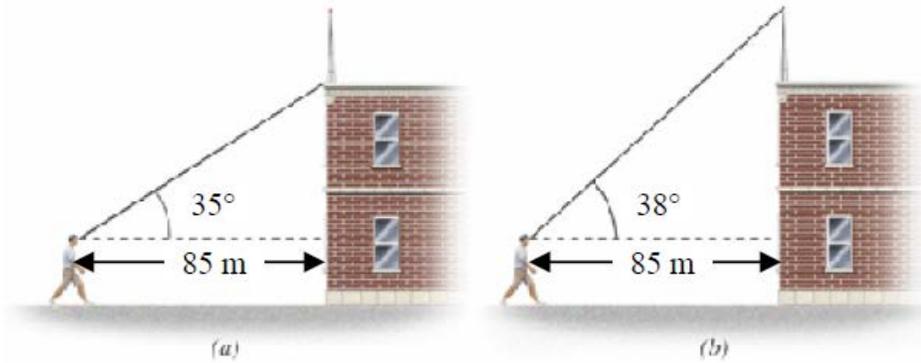


5. A hiker travels 16km North and 12km West. What is the magnitude and direction of the hiker's displacement?
6. The bank is 30km South and 9km West of the school. If a bird flies directly from the school to the bank, what is the magnitude and direction of its displacement vector?

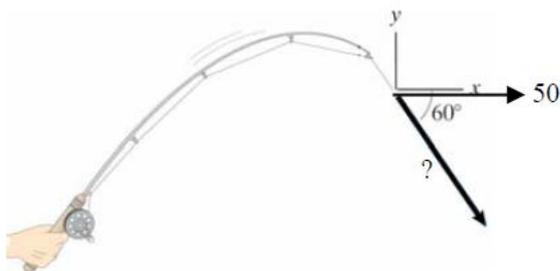
7. How fast is this plane traveling? (What is the magnitude of the plane's velocity?) What is the angle  $\theta$ ?



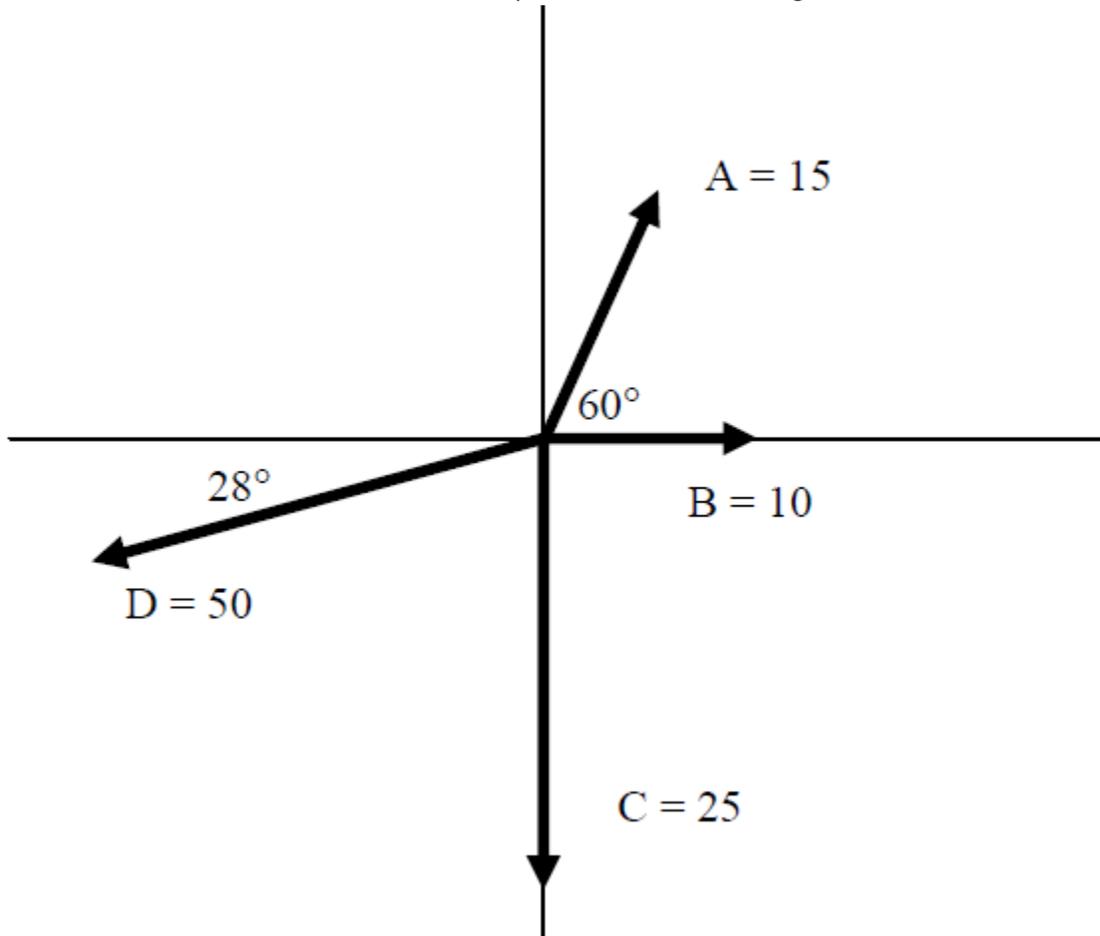
8. How high above the person's head is the roof? The antenna?



9. If the X component of the force on the fishing line shown below is equal to 50 Newtons, find the magnitude of the force



10. Fill in the chart below with the X and Y components of the following vectors:



	X	Y
A		
B		
C		
D		

11. Find the resultant vector in magnitude and direction form of the following:  
(use vectors A B C D from the previous page)

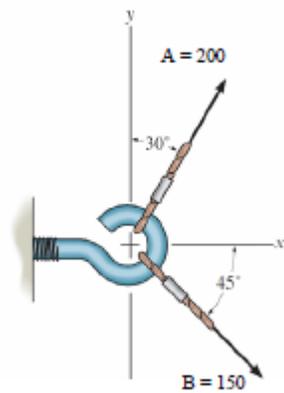
a.  $A + B + C + D$

b.  $A - C$

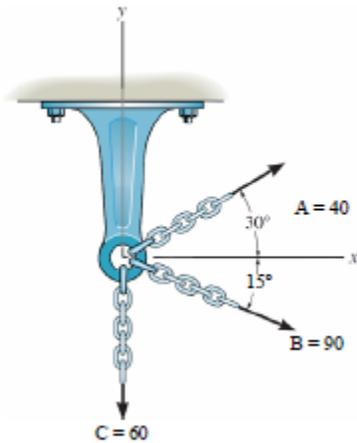
c.  $D + (A - C)$

d.  $B - A + C$

12. Determine  $A + B$  for the scenario below:



13. Determine  $A + B + C$  for the scenario below:



14. A cannon is placed on a train traveling at  $17\text{m/s}$  E. The cannon is fired, launching a cannonball at  $50\text{m/s}$  W relative to the cannon. What is the resultant velocity of the cannonball to a viewer on the ground?

15. A plane flies at a rate of  $600\text{km/hr}$  E into a sustained wind of  $10\text{km/hr}$  W. What is the resultant velocity of the plane? How far will it go in 3 hrs?

16. A pitcher can throw a ball at a velocity of  $125\text{ km/h}$  straight ahead. If he throws the ball straight when a cross-wind is blowing at  $28\text{ km/h}$  to the left, what will the magnitude of the ball's resultant velocity be? By what angle will the direction of the ball be off?

17. A sailor heads out on a lake at  $2.5\text{m/s}$  with a bearing of  $30^\circ$  north of east. A wind headed directly south west is blowing at  $1.0\text{ m/s}$ . What is the resultant velocity of the sailor? (mag and dir)

18. A boat crosses a 50m river with a velocity of 0.5m/s. The current of the river is 0.1 m/s downstream. How far downstream will the boat land from where it started?
19. A triathlete swims across a river with a velocity of 1.7m/s. The river has a current of 0.1m/s downstream and she lands 10m downstream from where she started. What is the width of the river?
20. You are rowing a boat eastward across a river at 4m/s. The current pushed you downstream at a rate of 1.8m/s. If the river is 100m wide, how far downstream from where you started do you land?
21. A pilot flies at 500 km/hr due north when she encounters a steady wind. After flying 250 km North, the plane is 30 km West of where it intended to be. What was the velocity of the wind?
22. A plane wants to fly 250 km/hr due north. There is a crosswind of 20 km/hr W. What angle must it take (relative to due north) to maintain a due north resultant? What is the necessary magnitude of velocity relative to the air?
23. A captain drives a boat with a maximum speed of 30km/hr W directly across a body of water with a current downstream of 7km/hr. At what angle has the captain positioned the boat to maintain his direction due W? What is the resultant velocity of the boat?