Single-step Vector Worksheet – **Key**
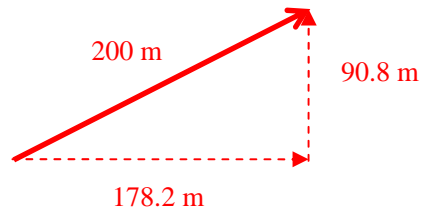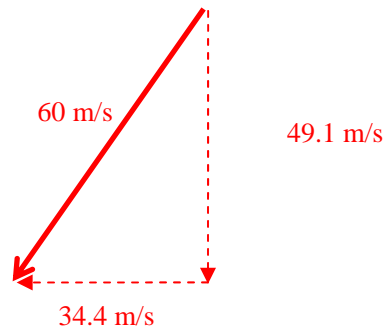
10-7-2004

I. *For the first six problems, draw the indicated vector and show the components into which it is resolved. Calculate (after estimating) all answers.*
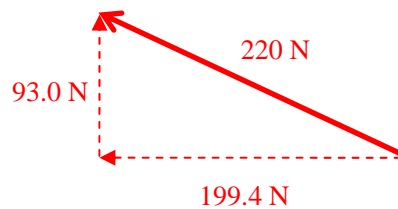
1. A person walks 200 meters at 27° degrees North of East

200 m
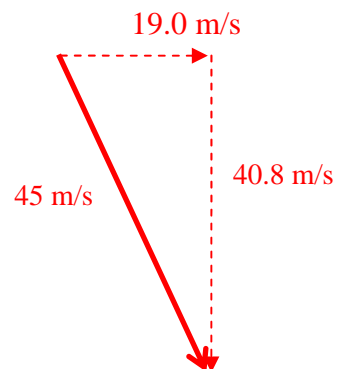90.8 m
178.2 m

2. A car moves 60 m/s at an angle of 35° degrees West of South

60 m/s
49.1 m/s
34.4 m/s

3. A magnet attracts a steel ball with a force of 220 Newtons at 25° North of West

220 N
93.0 N
199.4 N

4. A rocket accelerates at 45 m/s^2 at 65 degrees South of East

19.0 m/s
45 m/s
40.8 m/s

5. A cannonball is launched with a speed of 170 m/s at 40° above the horizontal

170 m/s

109.3 m/s

130.3 m/s
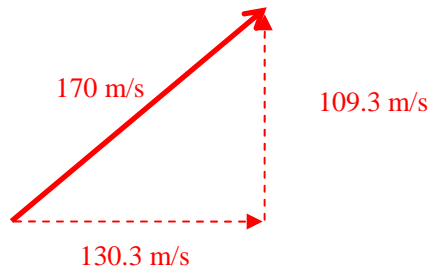
6. The momentum of an ocean liner is 3.75 x 10^9 N-s at 30° North of East

3.75×10^9 N-s

1.88×10^9 N-s

3.25×10^9 N-s
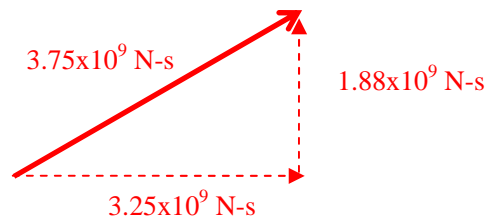
II. For the next six problems, you are given two components of a vector. Calculate (after estimating) and draw the resultant of the vectors. Include direction.

1. A man walks 45 meters East, then 23 meters South. What is his displacement?

45 m

50.5 m
27°S of E

23 m
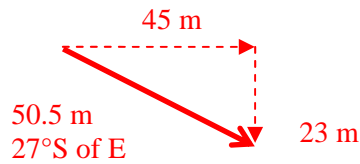
2. A small plane is seen moving at 90 m/s East while drifting North at a speed of 30 m/s due to high winds. What is its overall velocity?

94.9 m/s

30 m/s

90 m/s
18.4°N of E
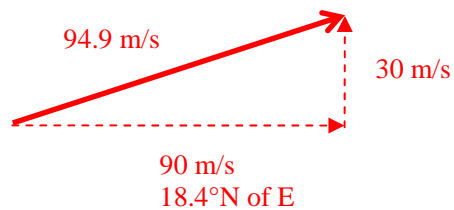
3. Jane pushes a box with 60 Newtons due West, while Jim pulls the same box due South with a force of 42 Newtons. What is the total force on the box?

73.2 N
55° W of S

42 N

60 N
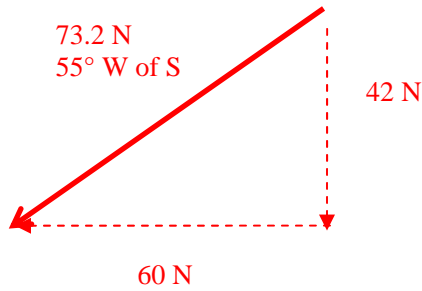
4. A rocket accelerates horizontally at 25 m/s^2 while at the same time gravity accelerates the rocket downward at 10 m/s^2. What is the total acceleration of the rocket?

25 m/s^2

10 m/s^2

26.9 m/s^2
21.8° below
horizontal
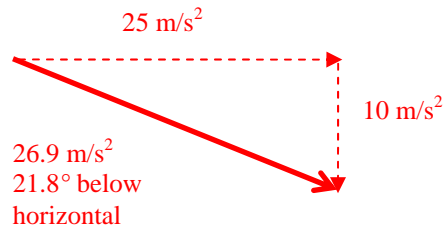
5. A car's momentum is 20,000 N-s North, and a truck's momentum is 30,000 N-s West. If their momenta were combined (if they collided, for example) what would the total be?

36 056 N-s
33.7° N of W

20 000 N-s

30 000 N-s
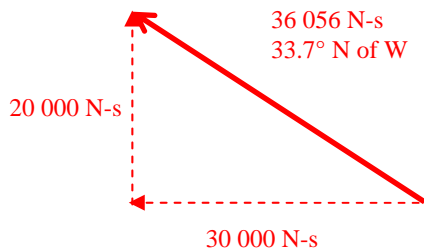
6. A boat sails North at 10.4 m/s (relative to the water) while a current carries it due East at 6.7 m/s. What is its velocity relative to an observer fixed on the dock?

12.4 m/s

10.4 m/s

6.7 m/s