The work in GREEN is required work.
The work in PURPLE is helpful hints.

Name _____ **A** Date _____

Honors Physics
Period _____

Vectors/Projectiles WS #4H
Mrs. Nadworny

(14 pts)

Equilibrants and Resultants

Directions – Read each question carefully and select the choice that best answers the question.

1. A 5.0 newton force and a 7.0 newton force act concurrently on a point. As the angle between the forces is increased from 0° to 180°, the magnitude of the resultant of the two forces changes from
   sum → difference
   A) 0.0 N to 12.0 N B) 2.0 N to 12.0 N C) 12.0 N to 2.0 N D) 12.0 N to 0.0 N

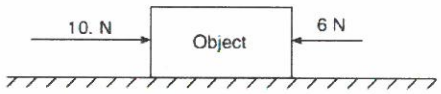
2. As the angle between two concurrent forces decreases, the magnitude of the force required to produce equilibrium
   R increases
   A) increases (balances the R) B) decreases C) remains the same

3. An object is in equilibrium. Which force vector diagram could represent the force(s) acting on the object?

A) B) C) D)

The forces balance

4. Two forces act concurrently on an object on a horizontal, frictionless surface, as shown in the diagram below



Horizontal, frictionless surface

What additional force, when applied to the object, will establish equilibrium?

A) 16 N toward the right B) 4 N toward the right C) 16 N toward the left D) 4 N toward the left

Directions – Solve the following problem using the scale method. Be sure to use a ruler and protractor and to show all units. Be **NEAT**! Use the GUESS method to show any calculations necessary.

5. In 1952, the ocean liner *United States* crossed the Atlantic Ocean in less than four days, setting the world record for commercial ocean-going vessels. The average speed for the trip was 60.0 kilometers/hour. Suppose the ship moves in a straight line eastward at this speed for 2.50 hr. Then, due to a strong current, the ship's course begins to deviate northward by 30.0° North of East and the ship follows the new North-East course at the same speed for another 1.50 hours.
   a. Calculate the component displacements (in kilometers) for the two legs of the trip using the GUESS method.
   b. Find the resultant displacement (in kilometers) for the 4.00 hour period using the scale method. You should use the back of this sheet for the diagram.

a) $\bar{V} = 60.0\ km/hr$

$t_1 = 2.50\ hr$

$t_2 = 1.50\ hr$

$d_1 = V_1 t$

$= (60.0 \frac{km}{hr})(2.50\ hr)$

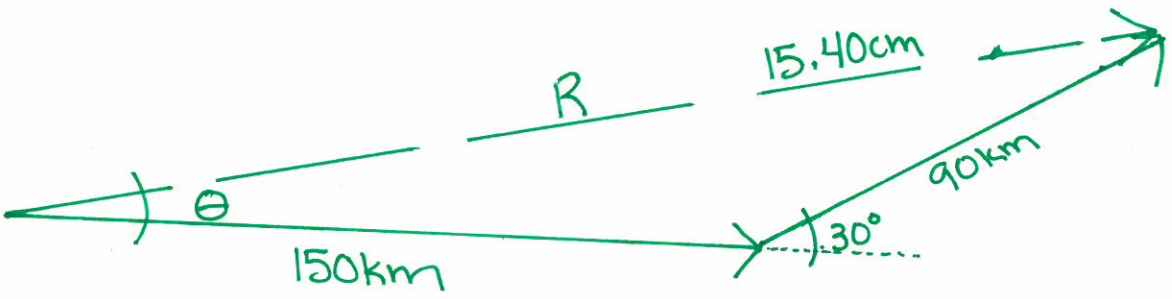
$= 150\ km$ East

$d_2 = \bar{V} t_2$

$= (60.0 \frac{km}{hr})(1.50\ hr)$

$= 90\ km\ @\ 30°$ N of E

b) $1\ cm = 15\ km$



- Draw d_1 & d_2 to scale
- Draw in R
- Measure R & convert
- Measure θ by start

$15.40\ cm \left(\frac{15\ km}{1\ cm}\right) = 231\ km$

@ 12°

N of E