Chapter 3 Worksheet

Name: _________________

Provide a short and specific definition in YOUR OWN WORDS. Do not use the definition from the book

Scalar____

____

Vector ____

____

Resultant ____

____

Components of a Vector ____

____

Projectile Motion ____

____

Relative Motion ____

____

Additional Notes:

Section 3.1

1. What is the difference between a scalar and a vector?

2. Indicate is the following is an example of a scalar (S) or vector (V)

   45 m/s __________ 0.5 m/s^2 E _______ Number of ppl on a plane __________

   6.8 km/h N ______ 200 mph ________ Displacement for a trip ____________

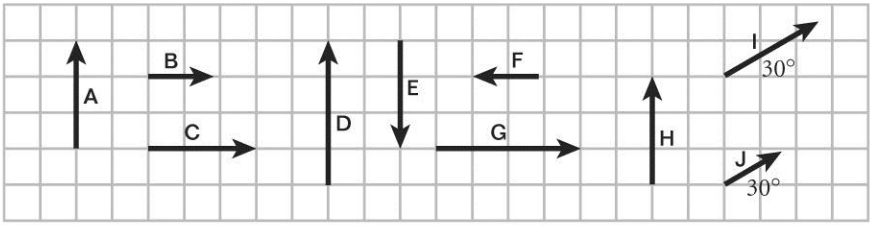
3. You walk 450 meters north and turn around and walk 385 m south. What is your resultant?

4. Using the following vectors, display (and then explain) why you can add vectors in any order.

<u>Vectors</u>
2 blocks N
4 blocks E
1 block N
2 blocks W
1 Block N

Explanation:

Use this diagram to answer questions 5 - 7



A = 3 m	C = 3 m	E = 3 m	G = 4 m	I = 3 m
B = 2 m	D = 4 m	F = 2 m	H = 3 m	J = 2 m

5. Which vectors have the same magnitude?

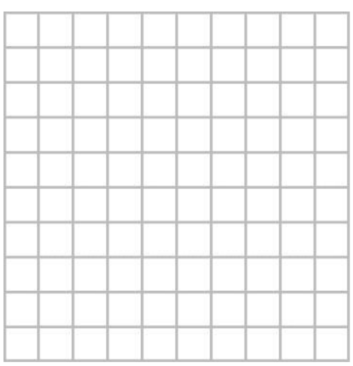
6. Which vectors have the same direction?

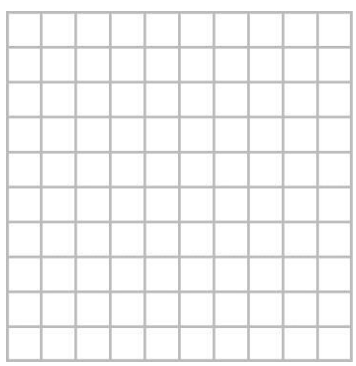
7. Which arrows, if any, represent the same vector?

8. In the space provided, construct and label a diagram that shows the vector sum 2**A** + **B**. Construct and label a second diagram that shows **B** + 2**A.** Also, construct and label a diagram that shows the vector difference **A** – (**B**/2). Construct and label a second diagram that shows (**B**/2) – **A**.

A = ___________________ squares

B = __________________ squares

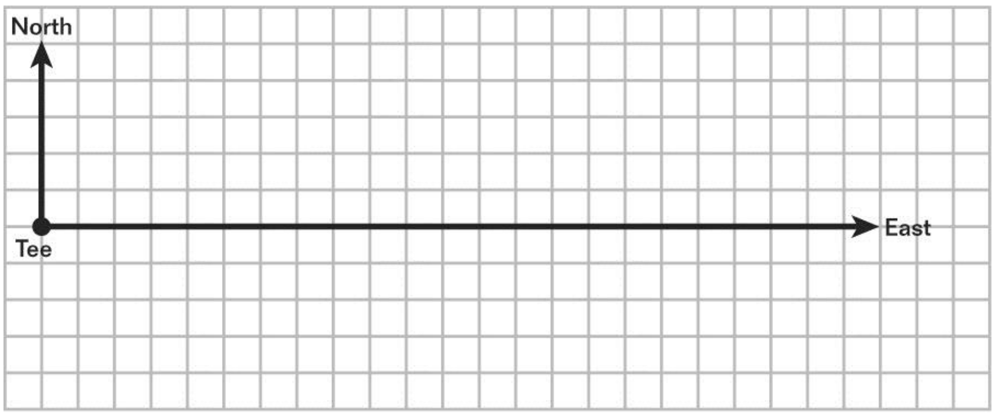




Section 3.2

One of the holes on a golf course lies due east of the tee. A novice golfer flubs his tee shot so that the ball lands only 64 m directly northeast of the tee. He then slices the ball 30° south of east so that the ball lands in a sand trap 127 m away. Frustrated, the golfer then blasts the ball out of the sand trap, and the ball lands at a point 73 m away at an angle 27° north of east. At this point, the ball is on the putting green and 14.89 m due north of the hole. To his amazement, the golfer then sinks the ball with a single shot.

1. In the space provided, choose a scale, then draw a sketch of the displacement for each shot the golfer made. Label the magnitude of each vector and the angle of each vector relative to the horizontal axis.



2. Use algebraic formulas to find the *x* and *y* components of each displacement vector.

Shot 1 *x* component ___________ *y* component ___________

Shot 2 *x* component ___________ *y* component ___________

Shot 3 *x* component ___________ *y* component ___________

Shot 4 *x* component ___________ *y* component ___________

3. Find the total displacement (to the nearest meter) the golf ball traveled from the tee to the hole. Assume the golf course is flat. (Hint: Which component of each displacement vector contributes to the total displacement of the ball between the tee and the hole?)

Section 3.3

1. Give an example of 3 projectiles. (Be specific i.e. are they moving?)
   a. ____
   b. ____
   c. ____

2. Explain (or draw) the difference between projectile motion with and without air resistance.

3. Assuming there is no air resistance and both balls are thrown/dropped at the same time and from the same distance from the ground; which ball hits the ground first, a ball dropped or a ball thrown perfectly horizontal at 15 m/s? Explain.

4. A car drives off a cliff with an initial horizontal speed of 80 km/h. If there is no air resistance, what happens to the horizontal speed as the car drops? If there IS air resistance, does this fact change your answer? Explain.

5. For the following questions be specific with your answer. I do not want it goes up or down. I want “it is double, triple, be ½, etc.)
   a. What happens to the range of a projectile if you double the initial speed?
   b. What happens to the range of a projectile if the gravity is 2 times larger?
   c. What happens to the hang time of a projectile if you double the initial speed?

6. Write down the equations for 2-dimentional motion: (with substitutions?)

7. A downed pilot fires a flare from a flare gun. The flare has an initial speed of 250 m/s and is fired at an angle of 35° to the ground.
    a. How long does it take for the flare to reach its maximum altitude?

    b. How high does it go?

    c. How far does it go?

After a snowstorm, a boy and a girl decide to have a snowball fight. The girl uses a large slingshot to shoot snowballs at the boy. Assume that the girl fires each snowball at an angle θ from the ground and that the snowballs travel with an initial velocity of v_0.

8. In terms of the initial velocity, v_0, and the launch angle, θ, for what amount of time, Δt, will a snowball travel before it reaches its maximum height above the ground? (Hint: Recall that $v_f = 0$ when an object reaches its maximum height.)

9. What is the maximum height, h, above the ground that a snowball reaches after it has been launched?

10. If the initial velocity, v_0, equals 50.00 m/s, find the maximum height and range for each of the launch angles listed in the table below.

Launch angle	**Maximum height (m)**
15°	
30°	
45°	
60°	
75°	

Section 3.4

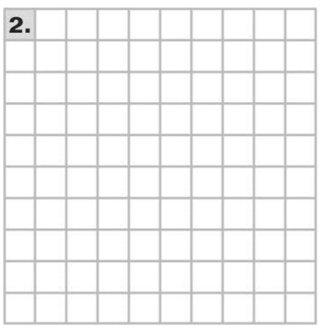
The water current in a river moves relative to the land with a velocity $\mathbf{v_{WL}}$, and a boat is traveling on the river relative to the current with a velocity $\mathbf{v_{BW}}$.

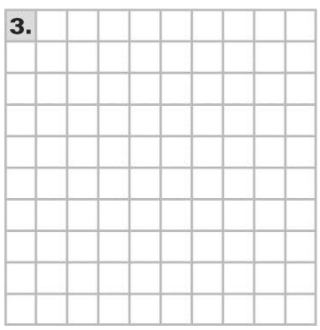
1. How is the velocity of the boat relative to the land ($\mathbf{v_{BL}}$) related to $\mathbf{v_{WL}}$ and $\mathbf{v_{BW}}$?

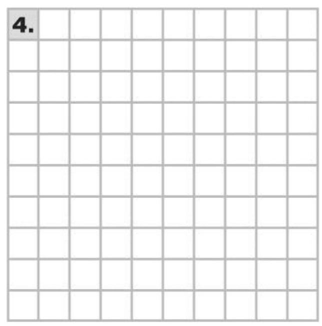
2. Suppose that both the boat and the water current move in the same direction and that the boat is moving twice as fast as the current. Draw a vector diagram to determine the velocity of the boat relative to the land, $\mathbf{v_{BL}}$.

3. Suppose that the boat travels in the opposite direction of the current and that the boat is moving twice as fast as the current. Draw a vector diagram to determine the velocity of the boat relative to the land, $\mathbf{v_{BL}}$.

4. Suppose that the boat travels in a direction perpendicular to the current and that the boat is moving twice as fast as the current. Draw a vector diagram to determine the velocity of the boat relative to the land, $\mathbf{v_{BL}}$.







5. Assume that the boat travels with a speed of 4.0 km/h relative to the current and that the current moves due east at a speed of 2.0 km/h relative to the land. Determine the velocity of the boat relative to the land for each of the situations described in items 2–4.

a. $\mathbf{v_{BL}}$ for item 2 ______________________

b. $\mathbf{v_{BL}}$ for item 3 ______________________

c. $\mathbf{v_{BL}}$ for item 4 ______________________

6. A plane moving east drops a crate from 2000 meters above the ground. Assuming there is no air resistance; draw the path of the crate from the perspective of someone on the ground and as the pilot.