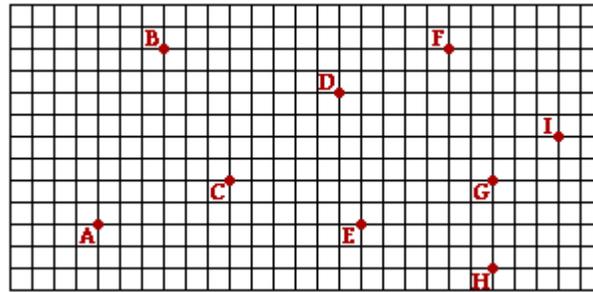Name: _____

Vector Practice Problems

Use the diagram below to answer **Questions #1-3**. Each square on the diagram represents a 20-meter x 20-meter area.

1. _____If a person walks from D to H to G to C, then the direction of the displacement is ___ degrees (as measured counterclockwise from East).

|			
a. 39	b. 51	c. 53	d. 217
e. 219	f. 231	g. 233	h. None of these

2._____ If a person walks from H to E to C to G, then the distance walked is _____ meters.

a. 80.	b. 240.	c. 253	d. 333
e. 493	f. 560.	g. 640.	h. None of these

3. _____If a person walks from H to E to C to G, then the magnitude of the displacement is _____ meters.

a. 80.	b. 240.	c. 253	d. 333
e. 493	f. 560.	g. 640.	h. None of these

Use the following diagram for **Questions #4-7**. In the diagram, a riverboat is shown starting at position A on the east bank of a river. The boat heads towards position B (a point directly across the river from A) with a speed of 3.8 m/s. But because of a current with a speed of 1.8 m/s, the boat lands on the west bank of the river at position C, a location downstream from B. The width of the river (d_{across}) is 86.4 meters.
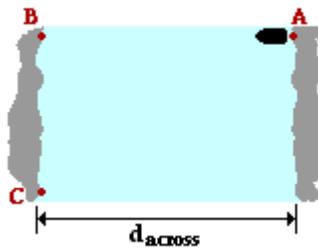
4. _____The magnitude of the resultant velocity of the boat is _____ m/s.

a. 1.8	b. 2.0	c. 3.4	d. 3.8
e. 4.2	f. 5.6	g.11	h. None of these

5. _____The direction of the resultant velocity of the boat is _____ m/s.

a. 0   b. 18.   c. 712   d. 90.
e. 108   f. 162   g. 342   h. None of these

6. _____Location C is the location where the boat ultimately lands on the opposite shore. What is the distance from location B to location C.

a. 37   b. 41   c. 78   d. 86
e. 96   f. 180   g. 2.0×10^2 h. None of these

7. _____If the current on a particular day was flowing with two times the velocity, then the time to cross the river would be _____.

    a. two times greater   b. one-half as great
    c. greater, but not two times greater   d. less, but not one-half the original time
    e. the same as it was when the current flowed at 1.8 m/s.

8. _____An object is undergoing free fall motion. As it falls, the object's _____.

a. speed increases   b. acceleration increases
c. both of these   d. none of these

9. _____A football is kicked into the air at an angle of 45 degrees with the horizontal. At the very top of the ball's path, its velocity is _____.

    a. entirely vertical   b. entirely horizontal
    c. both vertical and horizontal   d. not enough information given to know.

10. _____A football is kicked into the air at an angle of 45 degrees with the horizontal. At the very top of the ball's path, its acceleration is _____. (Neglect the effects of air resistance.)

    a. entirely vertical   b. entirely horizontal
    c. both vertical and horizontal   d. not enough information given to know.

11._____ At what point in its path is the vertical component of the velocity (v_y) of a projectile the smallest?

    a. The instant it is thrown.   b. Halfway to the top.   c. At the top.
    d. As it nears the top.   e. It is the same throughout the path.

12._____ An airplane that flies at 100 km/h in a 100 km/h hurricane crosswind has a speed (relative to the ground) of __.

    a. 0 km/h   b. 100 km/h   c. 141 km/h   d. 200 km/h

13._____ An airplane moves at 141 km/h toward the northeast (45 degrees). What is its component velocity in the northward direction?

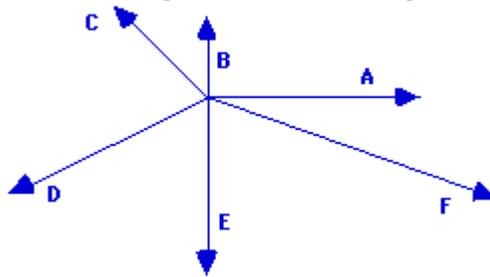   a. 41 km/h   b. 100 km/h   c. 110 km/h   d. 141 km/h

14._____ A bullet is fired horizontally and hits the ground in 0.5 seconds. If it had been fired with twice the speed in the same direction, it would have hit the ground in ____. (Assume no air resistance.)

     a. less than 0.5 s.   b. more than 0.5 s.   c. 0.5 s.

15. Express the direction of each of the following vectors in the diagram below.

A: _____	**B:** _____	**C:** _____	**D:** _____	**E:** _____	**F:** _____

16._____ In the following diagrams, two vectors are being added and the resultant is drawn. For each diagram, identify which vector is the resultant and write the equation (e.g., A + B = C).

a.

The resultant is vector _____.

The equation is ____ + _____ = _____

b.

The resultant is vector _____.

The equation is ____ + _____ = _____

c.

The resultant is vector _____.

The equation is ____ + _____ = _____

d.

The resultant is vector _____.

The equation is ____ + _____ = _____

17. If a projectile is launched horizontally with a speed of 12.0 m/s from the top of a 24.6-meter high building. Determine the horizontal displacement of the projectile.

18. Consider the five vectors shown below; they are labeled A, B, C, D and E.
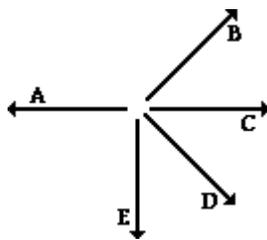
Use the stated magnitude and direction of these vectors to sketch a vector addition diagram for the following vector operations and determine the resultant. You only need to construct an approximate sketch; there is no need to do a scaled diagram.

A + B + C	A + C + B	A + E + D
E + D + C	C - D	B + E - C

19. A projectile is launched horizontally from the top of a 45.2-meter high cliff and lands a distance of 17.6 meters from the base of the cliff. Determine the magnitude of the launch velocity.

20. A boat heads straight across a river which is 100. meters wide. For the following two combinations of boat velocities and current velocities, determine the resultant velocity, the time required to cross the river, and the distance traveled downstream.

a.	b.
Given:	**Given:**
Boat velocity = 10.0 m/s, East	Boat velocity = 8.0 m/s, East
River velocity = 4.0 m/s, North	River velocity = 5.0 m/s, South
Calculate:	**Calculate:**
Resultant Vel. (mag. & dir'n): _____	Resultant Vel. (mag. & dir'n): _____
Time to cross river: _____	Time to cross river: _____
Distance traveled downstream: _____	Distance traveled downstream: _____