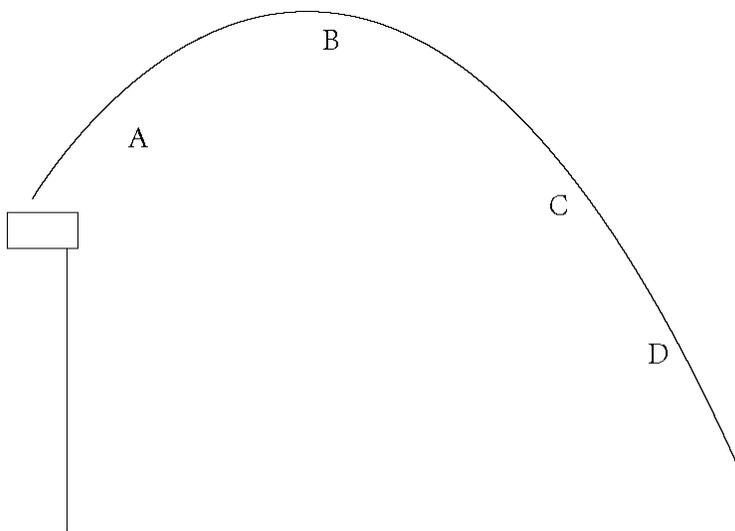# Ph. Q1W3-Test 1

Multiple Choice
Identify the choice that best completes the statement or answers the question.

_____ 1. Multiplying or dividing vectors by scalars results in
    a. vectors.
    b. scalars.
    c. vectors if multiplied or scalars if divided.
    d. scalars if multiplied or vectors if divided.

_____ 2. For the winter, a duck flies 10.0 m/s due south against a gust of wind with a speed of 2.5 m/s. What is the resultant velocity of the duck?
    a. 12.5 m/s south   c. 7.5 m/s south
    b. −12.5 m/s south   d. −7.5 m/s south

_____ 3. Identify the following quantities as scalar or vector: the speed of a snail, the time it takes to run a mile, the free-fall acceleration.
    a. vector, scalar, scalar   c. vector, scalar, vector
    b. scalar, scalar, vector   d. scalar, vector, vector

_____ 4. A piece of chalk is dropped by a teacher walking at a speed of 1.5 m/s. From the teacher's perspective, the chalk appears to fall
    a. straight down.   c. straight down and forward.
    b. straight down and backward.   d. straight backward.

_____ 5. Which of the following is the best coordinate system to analyze a painter climbing a ladder at an angle of 60° to the ground?
    a. *x*-axis: horizontal along the ground; *y*-axis: along the ladder
    b. *x*-axis: along the ladder; *y*-axis: horizontal along the ground
    c. *x*-axis: horizontal along the ground; *y*-axis: up and down
    d. *x*-axis: along the ladder; *y*-axis: up and down

The figure above shows the path of a ball tossed from a building. Air resistance is ignored.

_____ 6. In the figure above, the magnitude of the ball's velocity is least at location
    a. A.   c. C.

b. B.   d. D.

_____ 7. In the figure above, the horizontal component of the ball's velocity at A is
- a. zero.
- b. equal to the vertical component of the ball's velocity at C.
- c. equal in magnitude but opposite in direction to the horizontal component of the ball's velocity at D.
- d. equal to the horizontal component of its initial velocity.

_____ 8. In the figure above, at which point is the ball's speed about equal to the speed at which it was tossed?
- a. A   c. C
- b. B   d. D

_____ 9. Which displacement vectors shown in the figure above have vertical components that are equal?
- a. d_1 and d_2 c. d_2 and d_5
- b. d_1 and d_3 d. d_4 and d_5

_____ 10. A passenger on a bus moving east sees a man standing on a curb. From the passenger's perspective, the man appears to
- a. stand still.
- b. move west at a speed that is less than the bus's speed.
- c. move west at a speed that is equal to the bus's speed.
- d. move east at a speed that is equal to the bus's speed.

_____ 11. Identify the following quantities as scalar or vector: the mass of an object, the number of leaves on a tree, wind velocity.
- a. vector, scalar, scalar   c. scalar, vector, scalar
- b. scalar, scalar, vector   d. vector, scalar, vector

_____ 12. Which of the following is a physical quantity that has both magnitude and direction?
- a. vector   c. resultant
- b. scalar   d. frame of reference

_____ 13. A car travels down a road at a certain velocity, v_{car}. The driver slows down so that the car is traveling only half as fast as before. Which of the following is the correct expression for the resulting velocity?
- a. $2v_{car}$ c. $-\frac{1}{2}v_{car}$
- b. $\frac{1}{2}v_{car}$ d. $-2v_{car}$

_____ 14. In a coordinate system, the magnitude of the x component of a vector and θ, the angle between the vector and x-axis, are known. The magnitude of the vector equals the x component
- a. divided by the cosine of θ.   c. multiplied by the cosine of θ.
- b. divided by the sine of θ.   d. multiplied by the sine of θ.

_____ 15. Find the resultant of these two vectors: 2.00×10^2 units due east and 4.00×10^2 units 30.0° north of west.
- a. 300 units, 29.8° north of west   c. 546 units, 59.3° north of west
- b. 581 units, 20.1° north of east   d. 248 units, 53.9° north of west

_____ 16. Which of the following is the motion of objects moving in two dimensions under the influence of gravity?
- a. horizontal velocity   c. vertical velocity
- b. directrix   d. projectile motion

_____ 17. The written abbreviation, $\vec{a}$, represents a quantity that has which of the following abbreviations in the text?
- a. a   c. **a**
- b. a d. *a*

_____ 18. A track star in the long jump goes into the jump at 12 m/s and launches herself at 20.0° above the horizontal. What is the magnitude of her horizontal displacement? (Assume no air resistance and that $a_y = -g = -9.81$ m/s^2.)
- a. 4.6 m   c. 13 m

b. 9.2 m   d. 15 m

____ 19. In the figure above, which diagram represents the vector subtraction $\mathbf{C} = \mathbf{A} - \mathbf{B}$?
a. I   c. III
b. II   d. IV

____ 20. How many displacement vectors shown in the figure above have horizontal components?
a. 2   c. 4
b. 3   d. 5

Problem

21. An airplane flying at 180 km/h due west moves into a region where the wind is blowing at 60 km/h due east. If the plane's original vector velocity is $\mathbf{v}_{plane}$, what is the expression for the plane's resulting velocity in terms of $\mathbf{v}_{plane}$?

A- 1/3 Vertical plane
B- 2/3 Vertical plane
C- 13   Vertical plane
D- 4/3 Vertical plane

22. A duck waddles 2.3 m east and 7.0 m north. What are the magnitude and direction of the duck's displacement with respect to its original position?

A- 4.3 m at 72° north of east
B- 5.3 m at 72° north of east
C- 6.3 m at 72° north of east
D- 7.3 m at 72° north of east

23. A quarterback takes the ball from the line of scrimmage and runs backward for 1.9×10^{1} m. He then runs sideways, parallel to the line of scrimmage, for 17 m. Next, he throws the ball forward 7.8×10^{1} m, perpendicular to the line of scrimmage. The receiver is tackled immediately. How far is the football displaced from its original position?

A- 62.0 m
B- 72.0 m
C- 82.0 m
D- 92.0 m

24. A small airplane flies at a velocity of 106 km/h toward the south as observed by a person on the ground. The airplane pilot measures the velocity of the plane with respect to the air as 129 km/h south. What is the velocity of the wind that affects the plane?

A- 13 km/h north
B- 23 km/h north
C- 33 km/h north
D- 43 km/h north

25. While grazing, a caribou treks 136 m at 53.0° west of south, and then 129 m west. What is the caribou's resultant displacement?

A- 1.00 x 10^2 m , 62.7$^{\,\circ}$ west of south
B- 1.37 x 10^2 m , 62.7$^{\,\circ}$ west of south
C- 2.00 x 10^2 m , 62.7$^{\,\circ}$ west of south
D- 2.37 x 10^2 m , 62.7$^{\,\circ}$ west of south

26. A cow ambles through a break in the barnyard fence and wanders 34 m at 60.1° north of east, and then 21 m east. If the cow's wanderings last 3.4 minutes, what is the cow's average velocity?

A- 0.23 m/s, 37° north of east
B- 0.15 m/s, 37° north of east
C- 0.103 m/s, 37° north of east
D- 0.05 m/s, 37° north of east

27. A lightning bug flies at a velocity of 0.15 m/s due east toward another lightning bug seen off in the distance. A light easterly breeze blows on the bug at a velocity of 0.15 m/s. What is the resultant velocity of the lightning bug?

A- 0.00 m/s
B- 1.00 m/s
C- 2.00 m/s
D- 3.00 m/s

28. A model rocket flies horizontally off the edge of a cliff at a velocity of 70.0 m/s. If the canyon below is 110.0 m deep, how far from the edge of the cliff does the model rocket land? ($a_y = -g = -9.81$ m/s^2)

A- 1.31 x 10^2 m
B- 2.31 x 10^2 m
C- 3.31 x 10^2 m
D- 4.31 x 10^2 m

29. A stone is thrown at an angle of 30.0° above the horizontal from the top edge of a cliff with an initial speed of 15 m/s. A stopwatch measures the stone's trajectory time from the top of the cliff to the bottom at 6.30 s. What is the height of the cliff? (Assume no air resistance and that $a_y = -g = -9.81$ m/s^2.)

A- 138 m
B- 148 m
C- 158 m
D- 168 m

30. A dog walks 17 steps north and then walks 51 steps west to bury a bone. If the dog walks back to the starting point in a straight line, how many steps will the dog take? Use the graphical method to find the magnitude of the net displacement.

A- 34 steps
B- 44 steps
C- 54 steps
D- 64 steps

============