1. (1 pt)
Let \( \mathbf{a} = (-5, -2, -5) \) and \( \mathbf{b} = (8, -8, -8) \) be vectors. Compute the following vectors.
A. \( \mathbf{a} + \mathbf{b} = (\_, \_, \_) \)
B. \( 10\mathbf{a} = (\_, \_, \_) \)
C. \( \mathbf{a} - \mathbf{b} = (\_, \_, \_) \)
D. \( |\mathbf{a}| = \_ \)

2. (1 pt)
A child walks due east on the deck of a ship at 4 miles per hour. The ship is moving north at a speed of 5 miles per hour.
Find the speed and direction of the child relative to the surface of the water.
Speed = \_ mph
The angle of the direction from the north = \_ (radians)

3. (1 pt)
A horizontal clothesline is tied between 2 poles, 18 meters apart. When a mass of 3 kilograms is tied to the middle of the clothesline, it sags a distance of 3 meters.
What is the magnitude of the tension on the ends of the clothesline?
Tension = \_ N

4. (1 pt)
Find \( \mathbf{a} \cdot \mathbf{b} \) if
\[ |\mathbf{a}| = 6, \]
\[ |\mathbf{b}| = 7, \]
and the angle between \( \mathbf{a} \) and \( \mathbf{b} \) is \( \frac{\pi}{3} \) radians.
\( \mathbf{a} \cdot \mathbf{b} = \_ \)

5. (1 pt)
If \( \mathbf{a} = (10, 10, -10) \) and \( \mathbf{b} = (-10, -1, 9) \), find \( \mathbf{a} \cdot \mathbf{b} = \_ \).

6. (1 pt)
What is the angle in radians between the vectors \( \mathbf{a} = (1, 5, -9) \) and \( \mathbf{b} = (-5, 6, 3) \)?
Angle: \( \_ \) (radians)

7. (1 pt)
Find a unit vector in the same direction as \( \mathbf{a} = (4, -9, -9) \).
\( \_ \)

8. (1 pt)
Let \( \mathbf{a} = (-1, 10, -2) \) and \( \mathbf{b} = (-10, 7, 0) \) be vectors. Find the scalar, vector, and orthogonal projections of \( \mathbf{b} \) onto \( \mathbf{a} \).
Scalar Projection: \( \_ \)
Vector Projection: \( \_ \)
Orthogonal Projection: \( \_ \)

9. (1 pt)
A constant force \( \mathbf{F} = 2\mathbf{i} - 1\mathbf{j} - 7\mathbf{k} \) moves an object along a straight line from point \( (8, 6, 1) \) to point \( (3, -2, 0) \).
Find the work done if the distance is measured in meters and the magnitude of the force is measured in newtons.
Work: \( \_ \) Nm

10. (1 pt)
A woman exerts a horizontal force of 7 pounds on a box as she pushes it up a ramp that is 5 feet long and inclined at an angle of 30 degrees above the horizontal.
Find the work done on the box.
Work: \( \_ \) ft-lb

11. (1 pt)
Gandalf the Grey started in the Forest of Mirkwood at a point with coordinates \( (-3, -2) \) and arrived in the Iron Hills at the point with coordinates \( (-2, 1) \). If he began walking in the direction of the vector \( \mathbf{v} = 3\mathbf{i} + 2\mathbf{j} \) and changes direction only once, when he turns at a right angle, what are the coordinates of the point where he makes the turn.
\( \_ \)

12. (1 pt)
If Yoda says to Luke Skywalker, “The Force be with you,” then the dot product of the Force and Luke should be:
- A. positive
- B. negative
- C. any real number
- D. zero