

Assignment# 1

APPLIED PHYSICS

Due Date: 16th September, 2022

before 4:30pm

Sections: 1F

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*Note: Plagiarism is **NOT** allowed. Copied assignment will get **NEGATIVE MARKS** for both source and destination*

Q1: Given the two displacements

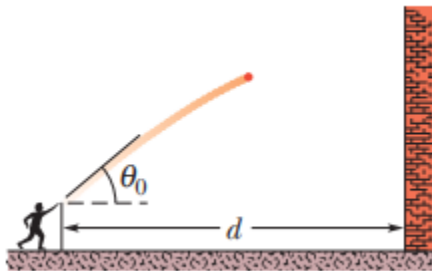
$$\vec{D} = (6\hat{i} + 3\hat{j} - \hat{k})m$$

$$\vec{E} = (4\hat{i} - 5\hat{j} + 8\hat{k})m$$

Find the magnitude of the displacement $2\vec{D} - \vec{E}$.

Q2: A proton initially has $\vec{v} = 4.0\hat{i} - 2.0\hat{j} + 3.0\hat{k}$ and then 4.0 s later has $\vec{v} = -2.0\hat{i} - 2.0\hat{j} + 5.0\hat{k}$ (in meters per second). For that 4.0 s, what are (a) the proton's average acceleration \vec{a}_{avg} in unit-vector notation, (b) the magnitude of \vec{a}_{avg} , and (c) the angle between \vec{a}_{avg} and the positive direction of the x axis?

Q3: You throw a ball toward a wall at speed 25.0 m/s and at angle $\theta_o = 40.0^\circ$ above the horizontal. The wall is distance $d = 22.0$ m from the release point of the ball. (a) How far above the release point does the ball hit the wall? What are the (b) horizontal and (c) vertical components of its velocity as it hits the wall? (d) When it hits, has it passed the highest point on its trajectory?



Q4: You throw a ball from your window 8.0 m above the ground. When the ball leaves your hand, it is moving at 10.0 m/s at an angle of 20° below the horizontal. How far horizontally from your window will the ball hit the ground? Ignore air resistance.

Q5: An Aston Martin V8 Vantage sports car has a “lateral acceleration” of $0.96g = (0.96)(9.8 \text{ m/s}^2) = 9.4 \text{ m/s}^2$. This is the maximum centripetal acceleration the car can sustain without skidding out of a curved path. If the car is traveling at a constant 40 m/s (about 89 mi/h, or 144 km/h) on level ground, what is the radius R of the tightest unbanked curve it can negotiate.

Q6: Passengers on a carnival ride move at constant speed in a horizontal circle of radius 5.0 m, making a complete circle in 4.0 s. What is their acceleration?