

CLASS: PHY _____

STUDENT #: _____

NAME: _____

Assignment 1:

KINEMATICS 1-D Motion

Assigned: Sept 8 Due: September 15 18:00 (Monday)

- 1 By algebraic manipulation of the first two kinematic equations for one-dimensional motion:

$$1) v_f = v_i + at \quad 2) x_f = x_i + v_i t + \frac{1}{2} at^2$$

Obtain the other two kinematic equations: $3) v_f^2 - v_i^2 = 2a\Delta x$ $4) x_f = x_i + \frac{1}{2}(v_i + v_f)t$

/Provide full solution to this problem on opposite side of this page/(4p)

- 2 A fast car, driving at 30.0 m/s, enters a one-lane tunnel. The driver observes a slow-moving truck 140 m ahead traveling at 6.00 m/s. She applies her brakes but can accelerate only at -2.00 m/s^2 because the road is wet. Will there be a collision? If yes, determine how far into the tunnel and at what time the collision occurs. If no, determine the distance of closest approach between Sue's car and the van. (4p)

3. The height of a helicopter above the ground is given by $h = 2.00t^3$, where h is in meters and t is in seconds. After 2.00 s, the helicopter releases a small mailbag. How long after its release does the mailbag reach the ground? (4p)

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Assignment 1:

KINEMATICS 1-D Motion CONT

Assigned: Sept 8 14:30 Due: September 15 19:00

- 4 Two railroad tracks intersect at right angles at station O . At 10AM the train A, moving west with constant speed of 50 km/h, leaves the station O . One hour later train B, moving south with the constant speed of 60 km/h, passes through the station O . Find minimum distance between these trains. (4p)

- 5 John who is member of NGO missed the meeting of his protest group at the refinery and now needs to get to the oil rig in the shortest time to join the demonstrators trying to disrupt the work of the petroleum company. John can run at 10km/h but can paddle only 3km/h.

a) How far from the refinery should John enter the water

b) What is the minimum time it will take to get to the oil rig? / $L=12\text{km}$, $d=4\text{km}$ /

(use the opposite side of this page for your solution)

