



# Answers

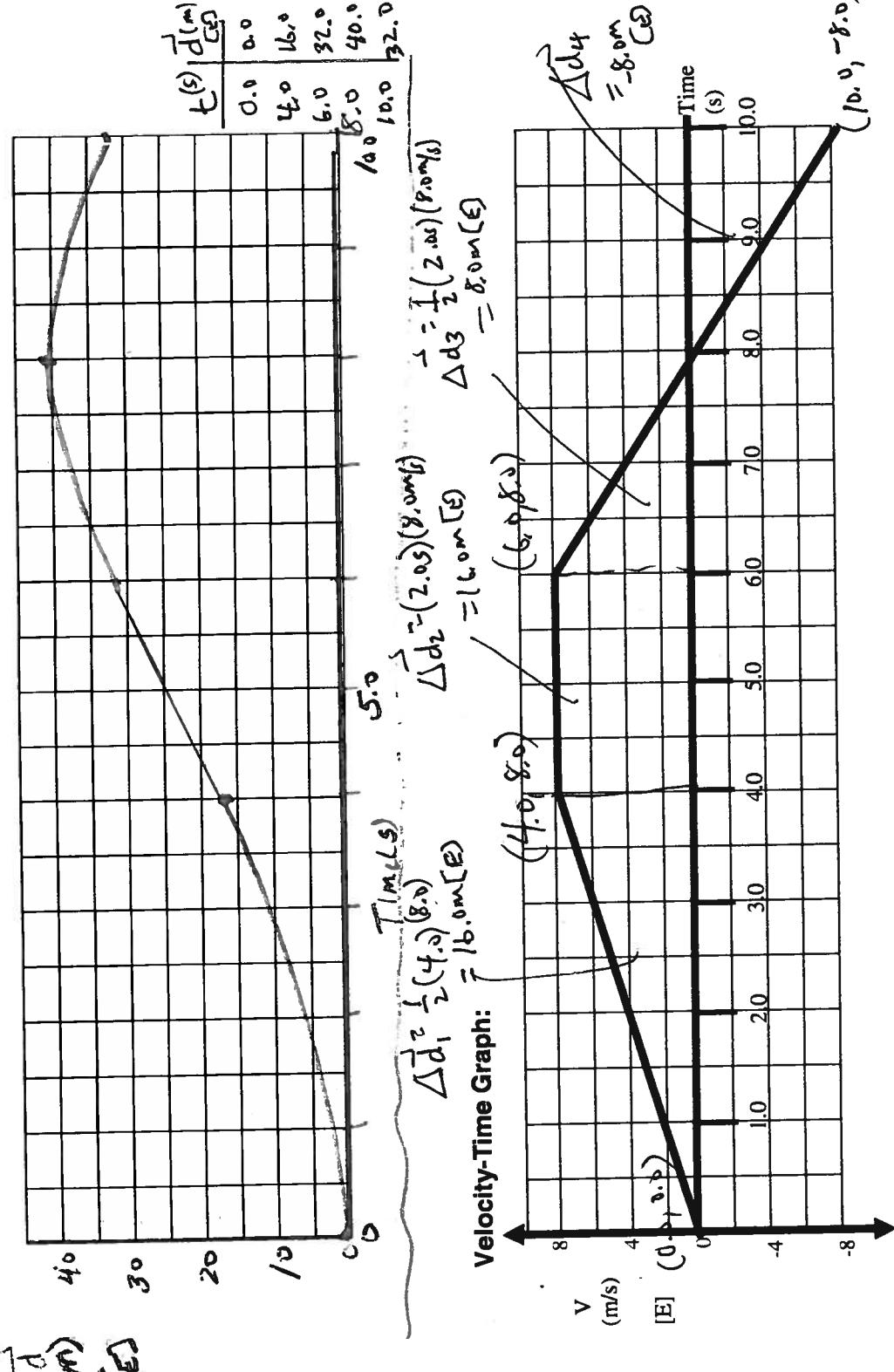
Name: \_\_\_\_\_  
Total: \_\_\_\_\_ /47 marks [K/U]

SPH4U0-Feb. 2013

Kinematics Review Quest.

1. The motion of a train engine moving along a straight track in a railyard is shown on the velocity-time graph below.  
 i) Draw the corresponding acceleration-time graph for the train.  
 ii) Assuming that the train starts at the station (origin), draw the corresponding position-time graph.

**Position-Time Graph:**



- Useful Equations:  
 $v_{av} = \frac{\Delta d}{\Delta t}$        $a = \frac{\Delta v}{\Delta t} = \frac{v_2 - v_1}{\Delta t}$        $\Delta d = \frac{1}{2} (v_1 + v_2) \Delta t$        $\Delta d = v_2 \Delta t - \frac{1}{2} a (\Delta t)^2$

$$\Delta d = v_1 \Delta t + \frac{1}{2} a (\Delta t)^2 \quad \Delta d = \frac{v_2^2 - v_1^2}{2a}$$

- Part A: Multiple Choice Answers [10 marks]:**  
 Write the letter representing the best answer for each question in the table below:

1	2	3	4	5	6	7	8	9	10
E	E	A	D	B	D	E	A	E	B

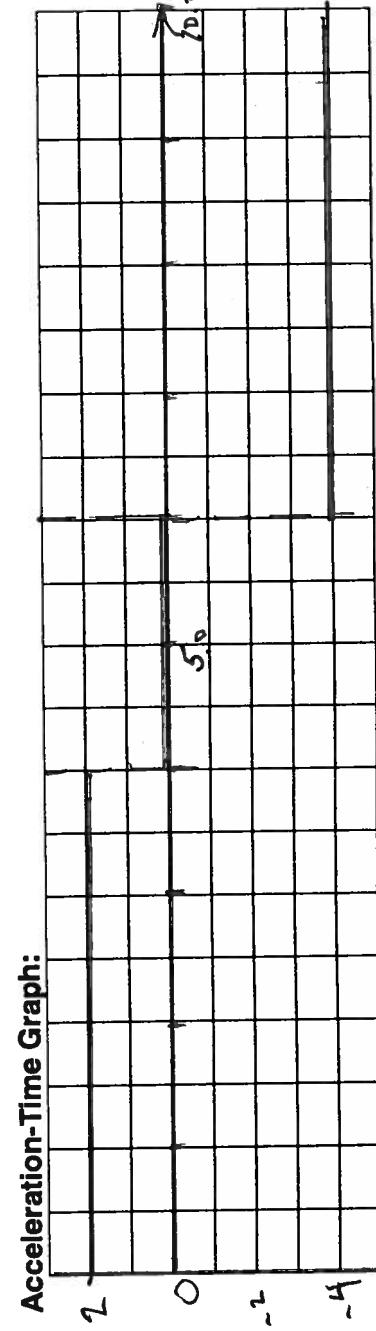
- Part B: Short Answer and Problem Solving [28 marks]:**

1. Compare average speed and average velocity when a runner runs completely around an oval track (400.0 m in length) in a time of 2.00 minutes. [4]

$$\begin{aligned} \Delta d &= 400 \text{ m} & \bar{v}_{av} &= \frac{\Delta d}{\Delta t} \\ \Delta t &= 2.00 \text{ minutes} = 120 \text{ s} & &= \frac{400 \text{ m}}{120 \text{ s}} \\ \bar{v}_{av} &= ? & &= 3.33 \text{ m/s} \end{aligned}$$

- The average velocity was 0.0 m/s and the average speed was 3.33 m/s.
2. After a slapshot, a hockey puck is moving at an initial velocity of 18.0 m/s [forward] towards the goalie. It travels 25.0 m over rough ice reaching a final velocity of 12.0 m/s [Forward] before being stopped by the goalie's stick. Find the acceleration of the puck as it slides along. [5]

$$\begin{aligned} \bar{v}_i &= 18.0 \text{ m/s [F]} \\ \Delta d &= 25.0 \text{ m [F]} \end{aligned}$$



$$\begin{aligned} a_i &= \frac{8.0 - 0.0}{4.0 - 0.0} = \frac{-8.0 - 8.0}{10.0 - 4.0} = -1.2 \\ a_f &= 5.0 \end{aligned}$$

$$\begin{aligned} \Delta a &= \frac{\bar{v}_f^2 - \bar{v}_i^2}{2(\Delta d)} \\ &= \frac{(12.0 \text{ m/s})^2 - (18.0 \text{ m/s})^2}{2(25.0 \text{ m})} \\ &= -3.6 \text{ m/s}^2 \end{aligned}$$

[Backward]

$$\begin{aligned} a_3 &= \frac{8.0 - 0.0}{4.0 - 0.0} = \frac{-8.0 - 8.0}{10.0 - 4.0} = -1.2 \end{aligned}$$