

Answer Sheet

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____
- 7. _____
- 8a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____
- 9a. see graph
- b. _____
- c.i _____
- c.ii _____
- d. _____
- e. see graph
- 10a. _____
- b. _____
- c. _____
- d. _____
- e. _____

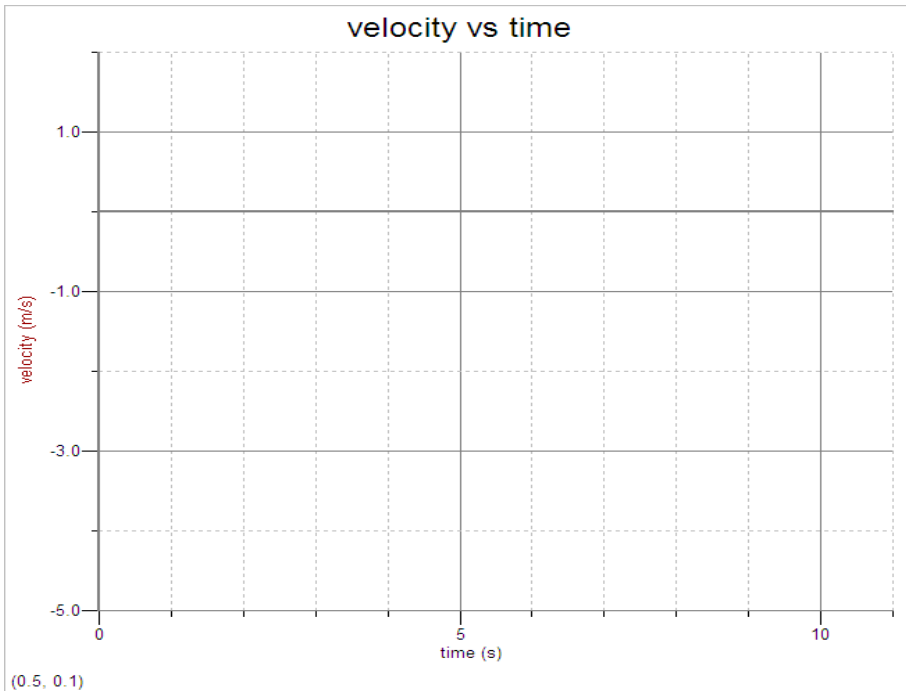
NAME _____ DATE _____ PER _____

Show all your work on this paper.

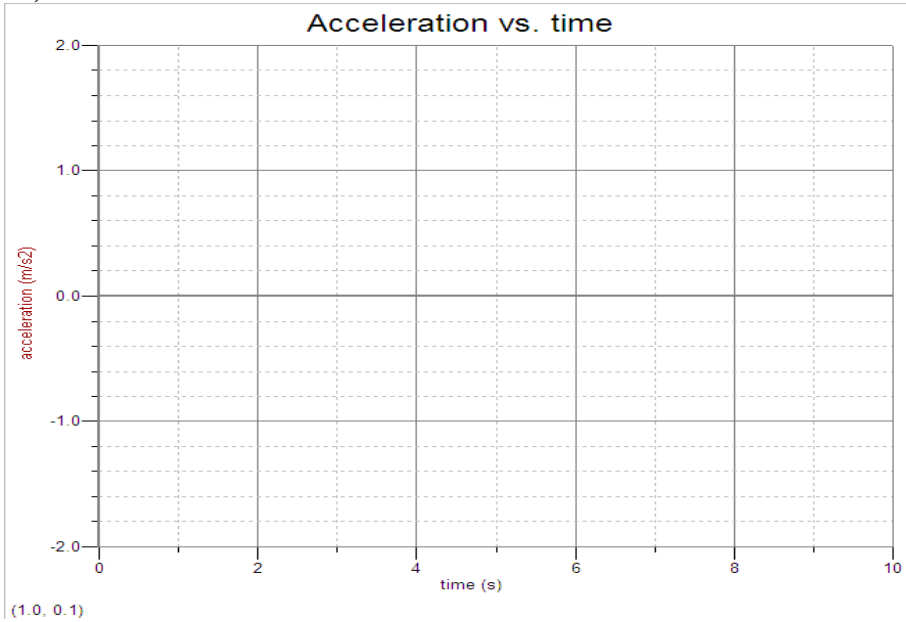
Use an extra sheet if needed and staple together.

Write your final answer in the space provided.

9(a) Plot these data points on the v vs t graph below, and draw the best-fit straight lines between each data point, that is, connect each data point to the one before it. The acceleration is constant or zero during each interval listed in the data table.



9e)



**AP Physics B
Kinematics Test**

Each MC question is worth points.
Do NOT write on the test.

- _____ 1. A jogger runs 4 km in 0.4 hr, then 8 km in 0.8 hr. What is the average speed of the jogger?
- (A) 10 km/hr
(B) 3 km/hr
(C) 1 km/hr
(D) 0.1 km/hr
(E) 100 km/hr

- _____ 2. A football player starts from rest 10 meters from the goal line and accelerates away from the goal line at 5 m/s^2 . How far from the goal line is the player after 4 s?
- (A) 6 m
(B) 30 m
(C) 40 m
(D) 50 m
(E) 60 m

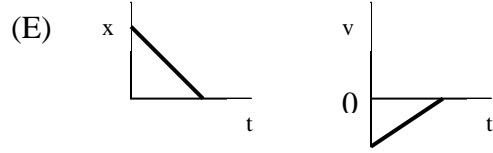
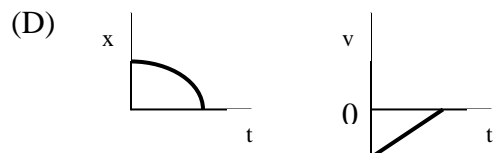
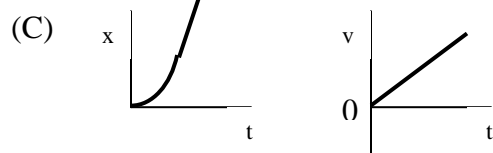
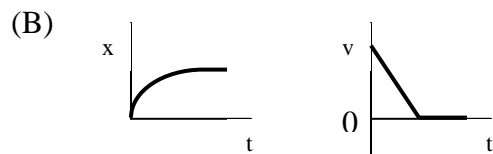
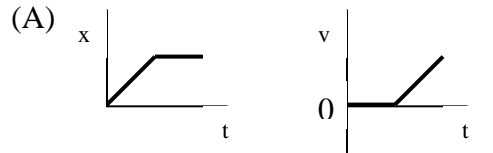
Questions 3 – 4:

A ball is thrown straight upward with a speed of +12 m/s.

- _____ 3. How much time does it take for the ball to rise to its maximum height?
- (A) 24 s
(B) 12 s
(C) 10 s
(D) 2 s
(E) 1.2 s

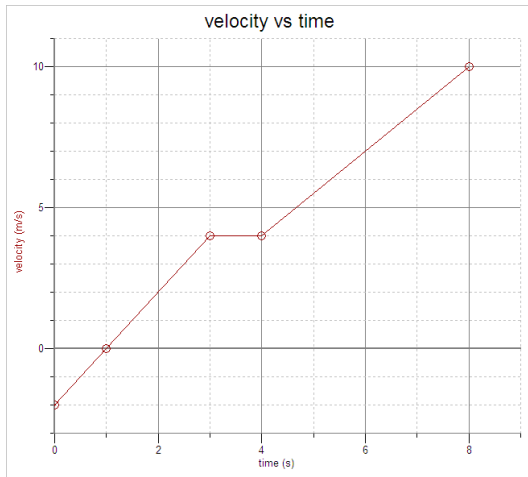
- _____ 4. What is the approximate maximum height the ball reaches?
- (A) 24 m
(B) 17 m
(C) 12 m
(D) 7 m
(E) 5 m

- _____ 5. Which two of the following pairs of graphs are equivalent?



Questions 6 – 7:

Consider the *velocity vs time* graph below:



_____ 6. At which time(s) is the object at rest?

- (A) zero
- (B) 1 s
- (C) 3 s to 4 s
- (D) 4 s only
- (E) 8 s

_____ 7. During which interval is the speed of the object decreasing?

- (A) 0 to 1 s
- (B) 1 s to 3 s
- (C) 3 s to 4 s
- (D) 4 s to 8 s
- (E) the speed of the object is never decreasing in this graph

Directions: Show all work in working the following questions. Each question is worth 15 points, but the parts within a question may not have equal weight.

8. A girl is holding a ball as she steps onto a tall elevator on the ground floor of a building. The girl holds the ball at a height of 1 meter above the elevator floor. The elevator begins accelerating upward from rest at 3 m/s^2 . After the elevator accelerates for 5 seconds, find

(a) the speed of the elevator

(b) the height of the floor of the elevator above the ground.

At the end of 5 s, the girl lets go of the ball from a height of 1 meter above the floor of the elevator. If the elevator continues to accelerate upward at 3 m/s^2 , describe the motion of the ball

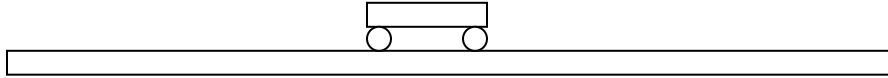
(c) relative to the girl's hand,

(d) relative to the ground.

(e) Determine the time after the ball is released that it will make contact with the floor.

(f) What is the height above the ground of the ball and floor when they first make contact?

9.



A cart on a long horizontal track can move with negligible friction to the left or to the right. During the time intervals when the cart is accelerating, the acceleration is constant. The acceleration during other time intervals is also constant, but may have a different value. Data is taken on the motion of the cart, and recorded in the table below.

Displacement $x(\text{m})$	Velocity $v(\text{m/s})$	time $t(\text{s})$
2	- 4	0
	- 2	1
	- 2	2
	- 2	3
	1	6
	1	7
	0	9
	0	10

(a) Plot these data points on the v vs t graph on your answer sheet, and draw the best-fit straight lines between each data point, that is, connect each data point to the one before it. The acceleration is constant or zero during each interval listed in the data table.

(b) List all of the times between $t = 0$ and $t = 10$ s at which the cart is at rest.

(c) i. During which time interval is the magnitude of the acceleration of the cart the greatest?

ii. What is the value of this maximum acceleration?

(d) Find the displacement of the cart from $x = 0$ at a time of 10 s.

(e) On the graph on your answer sheet, sketch the *acceleration vs. time* graph for the motion of this cart from $t = 0$ to $t = 10$ s.

10. Carla drives along a straight stretch of roadway at a constant velocity of 35 m/s. At the exact same time she passes a police car it begins to uniformly accelerate after her, from rest, at 4.5 m/s^2 .

- a. How much time passes before the police car catches up to Carla?
- b. How far has Carla driven before the police car passes her?
- c. How far has the police car driven before passing Carla?
- d. Graph Carla's and the police officer's displacement vs. time on the same graph. What does the intersection point represent, in terms of their displacement and the time?
- e. Graph Carla's and the police officer's velocity vs. time on the same graph. What does the intersection point represent, in terms of the velocity and the time?