

AP Physics 1
Instructor: Mr. Butler

Practice Quiz
Rectilinear Kinematics I
General Motion Principles

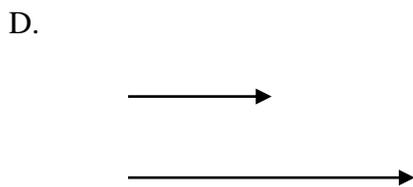
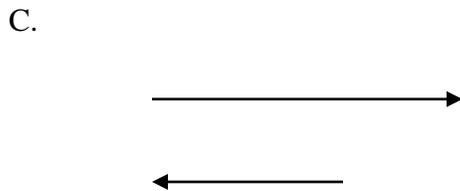
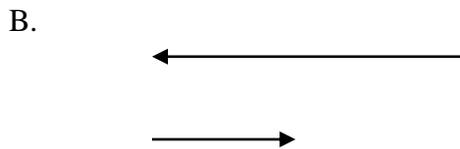
1. True or False: The first step in applying kinematic principles to analyze the motion of an object is to determine whether the object is moving.

- a) True b) False

2. True or False: An object's instantaneous speed must always be equal to the magnitude of its instantaneous velocity, but the magnitude of its average speed is not always equal to the magnitude of its average velocity over a given time interval.

- a) True b) False

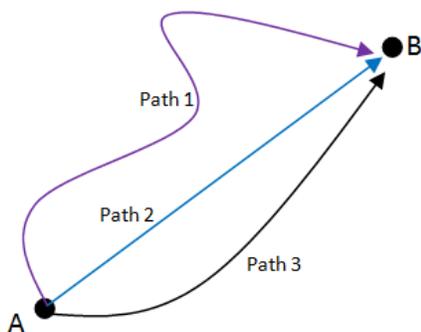
3. Examine the figure below which indicates sets of velocity and acceleration vectors of four objects moving with rectilinear motion. In each set the top arrow is velocity and bottom arrow is acceleration. The length of the arrows indicate relative magnitude.



How many objects are speeding up?

- a) 1 b) 2 c) 3 d) 4 e) None

4. An object makes three trips between points **A** and **B**, as shown in the figure below. Which path in the figure correctly indicates the object's displacement in travelling from **A** to **B**?



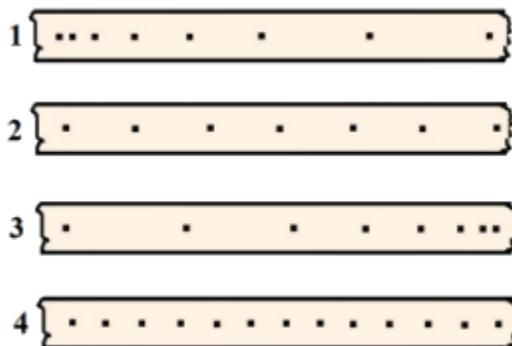
- (a) Path 1 (b) Path 2 (c) Path 3 (d) Either Path 1 or 3 (e) None

5. True or False: Distance is used when calculating an object's average velocity, but displacement is used when calculating an object's average speed.

- a) True
b) False

6. Shown below is the ticker tape data of four objects moving with rectilinear motion.

Assume that the right side of the ticker tape went through the tick timer first and that the positive direction of motion is to the right.



Which statement regarding the motions of the objects is correct?

- I Objects 1 and 4 show accelerated motion.
 II Object 1 has negative velocity and positive acceleration.
 III Object 3 has both positive velocity and positive acceleration.

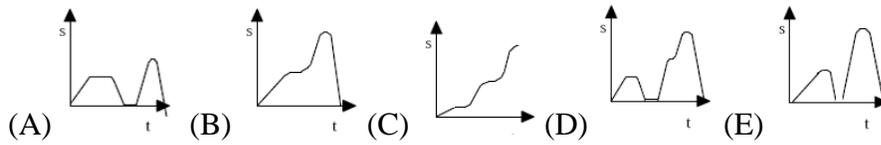
- a) I only b) II only c) III only d) II and III only e) I, II and III

7. Which statement regarding an object's motion is correct?

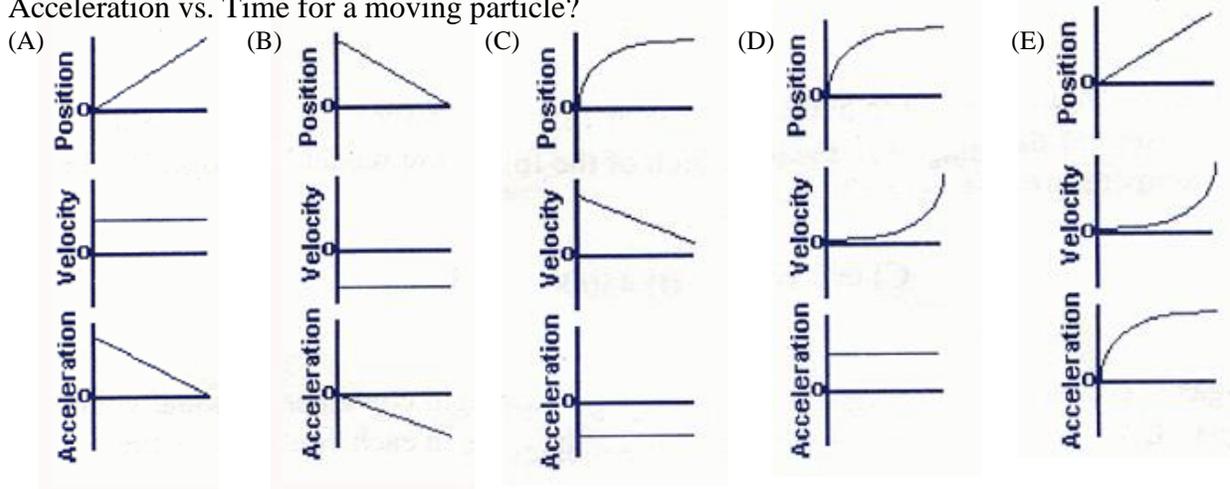
- I An object accelerates if its speed is changing.
- II An object accelerates if its direction is changing.
- III The change in an object's velocity will always be equal to its acceleration.

a) I only b) II only c) III only d) I and II only e) I, II and III

8. A child left her home and started walking at a constant velocity. After a time she stopped for a while and then continued on with a velocity greater than she originally had. All of a sudden she turned around and walked very quickly back home. Which of the following graphs best represents the distance versus time graph for her walk?

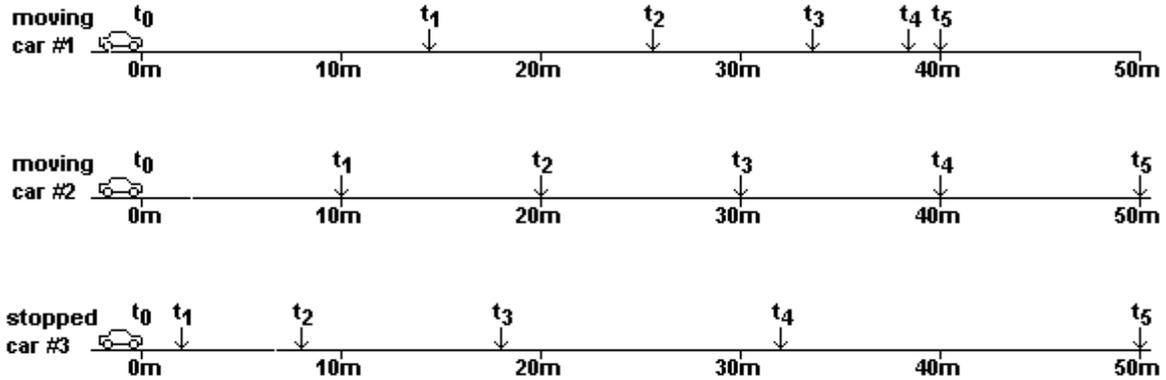


9. Which of the following sets of graphs might be the corresponding graphs of Position, Velocity, and Acceleration vs. Time for a moving particle?



10. At t_0 , two cars moving along a highway are side-by-side as they pass a third car stopped on the side of the road. At this moment the driver of the first car steps on the brakes while the driver of the stopped car begins to accelerate. The diagrams below show the positions of each car for the next 5 seconds.

Right is considered the positive direction



a) Which of the three cars had the greatest average speed during these 5 seconds?

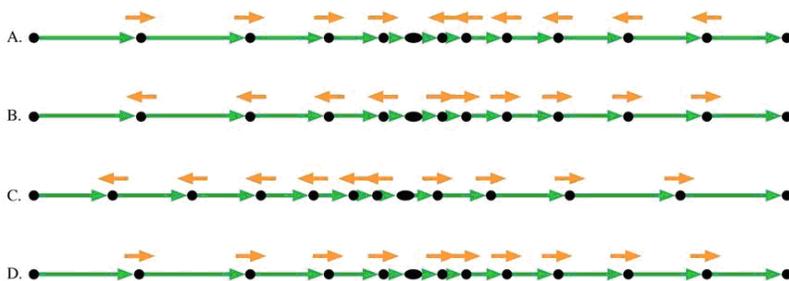
- (A) car #1
- (B) car #2 and car #3 had the same average speed
- (C) car #2
- (D) all three cars had the same average speed
- (E) car #3

b) Which car has a negative acceleration?

- (A) Car #1
- (B) Car #2
- (C) Car #3
- (D) Car 1 and Car 3
- (E) None of the cars have a negative acceleration

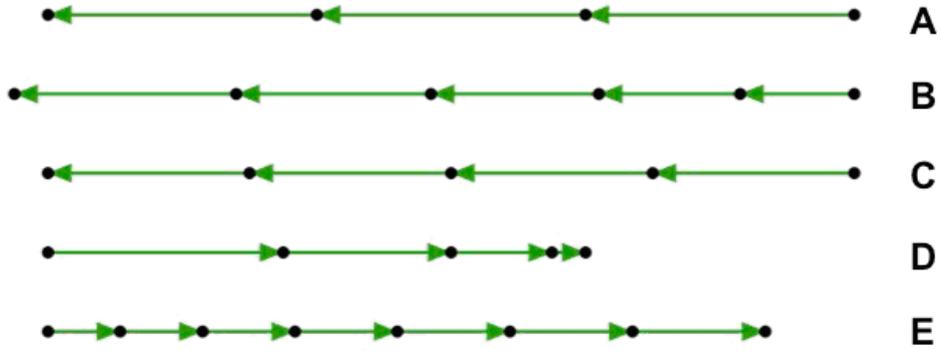
11.

A cyclist riding at 20 mph sees a stop sign and actually comes to a complete stop in 4 s. He then, in 6 s, returns to a speed of 15 mph. Which is his motion diagram?



Green arrows represent velocity. Yellow arrows represent acceleration.

12. Which of the five motion diagrams shown below, if any, correctly corresponds to an object that has a decreasing velocity and positive acceleration.



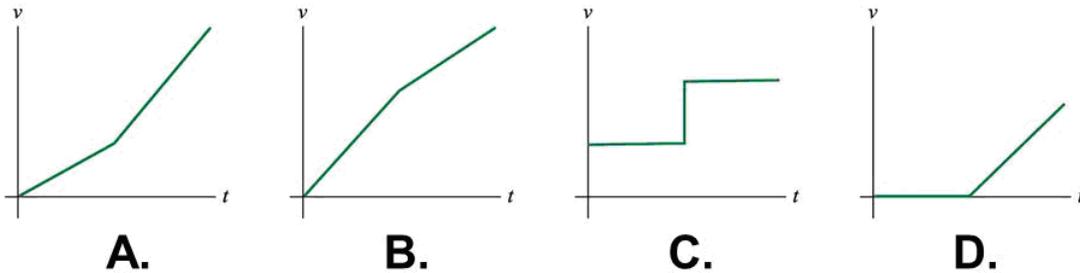
The green arrows represent velocity vectors.

13.

Here is a motion diagram of a car moving along a straight stretch of road:



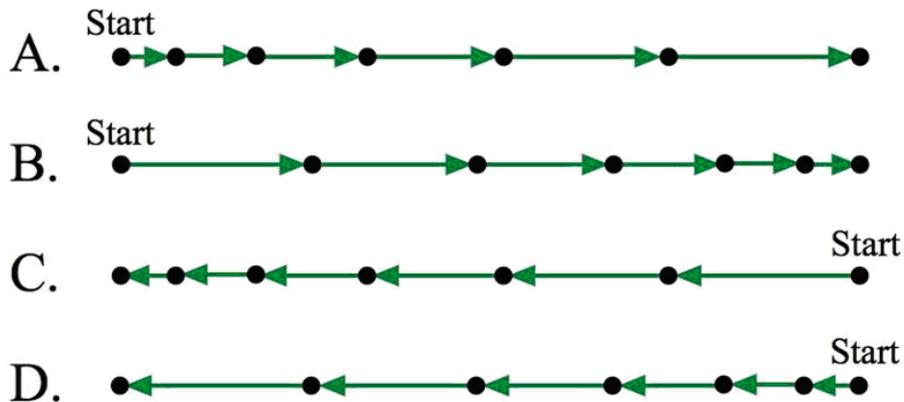
Which of the following velocity-versus-time graphs matches this motion diagram?



The green arrows represent velocity vectors.

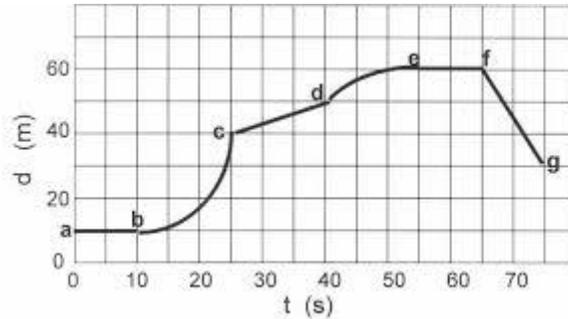
14.

These four motion diagrams show the motion of a particle along the x-axis. Rank these motion diagrams by the magnitude of the acceleration. There may be ties.



The green arrows represent velocity vectors.

15. Use the graph below of a car travelling along a straight road to answer the following questions.

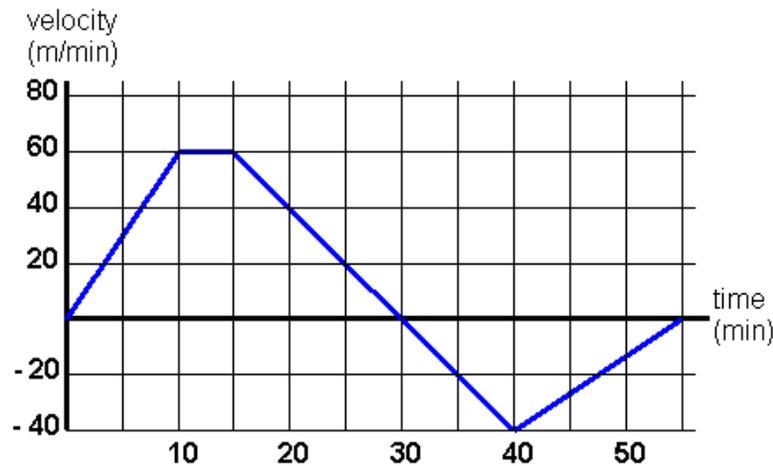


- Between which two points does the car have a positive velocity and a negative acceleration?
- Between which two points does the car have a negative displacement and a zero acceleration?
- How many sections show the car having positive acceleration?

16. It is possible for an object to

- move in a curved path and have a zero acceleration.
- have a position that is changing at a non-constant rate while having an acceleration that is zero.
- decreasing velocity and an increasing displacement.

17. The graph below shows a plot of the velocity of an object as it moves along a linear path.

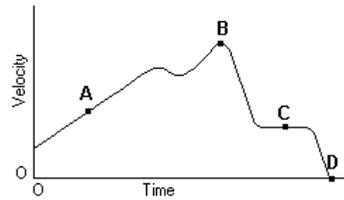


If the object starts at the origin at $t = 0$, what is the position of the object at 55 min?

- 0
- Positive
- Negative
- Can't be determined without having the x position graph for the object.

18. Is the following statement correct? If so, provide an example you learned from the class thus far. If not, explain why it isn't and reword the statement so it is correct.

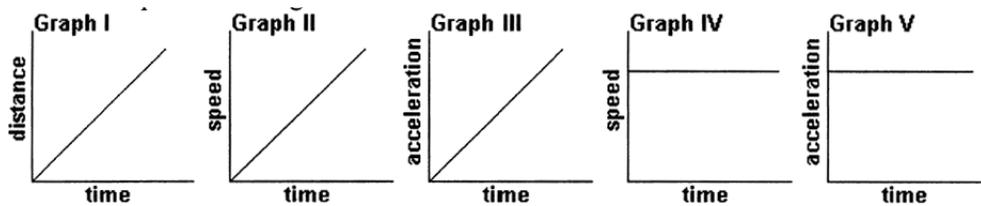
Use the slope of the secant line to find the instantaneous velocity.



19. Given the graph above of the velocity-time of a duck flying due south for the winter. At what point did the duck stop its forward motion?

- (A) A (B) B (C) C (D) D (E) none of these points

20. Which of the following graphs could correctly represent the motion of an object moving with a constant speed in a straight line?



- (A) Graph I only (B) Graphs II and V only (C) Graph II only (D) Graphs I and IV only
(E) All of the above graphs represent constant velocity

Answer Key

- | | | | | |
|------|------|------------------|---------------|--|
| 1. b | 5. b | 9. c | 12. none | 15. a) d and e
b) f and g
c) 1 (between b and c) |
| 2. a | 6. c | 10. a) b
b) a | 13. c | |
| 3. a | 7. e | 11. b | 14. all equal | 16. III only |
| 4. b | 8. b | | | |

17. b (Positive)

18. Not correct: Reword to "Use the slope of the secant line to find the average velocity.

or

Reword to "Use the slope of the tangent line to find the instantaneous velocity.

19. d 20. d