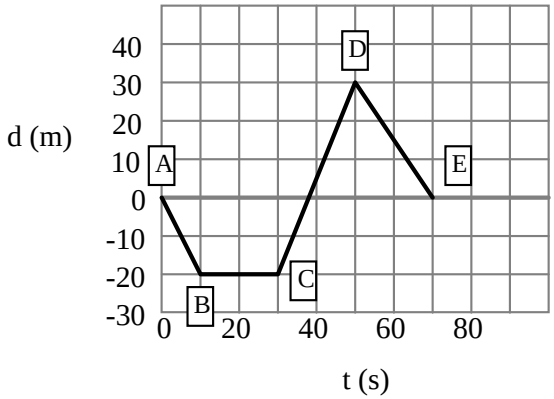
Unit 2: Kinematics in 1-D
Exam Preparation

1. 1. A bike first accelerates from 0.0 m/s to 5.0 m/s in 4.5 s, then continues at this constant speed for another 4.5 s. What is the total distance traveled by the bike?

2. A car traveling at 20 m/s when the driver sees a child standing in the road. He takes 0.80 s to react, then steps on the brakes and slows at 7.0 m/s^2. How far does the car go before it stops?

3. Answer the following questions about the car whose motion is graphed below:



   a. When was the car 20 m west of the origin?
   b. where was the car at 50 s?
   c. The car suddenly reversed direction. When and where did that occur?

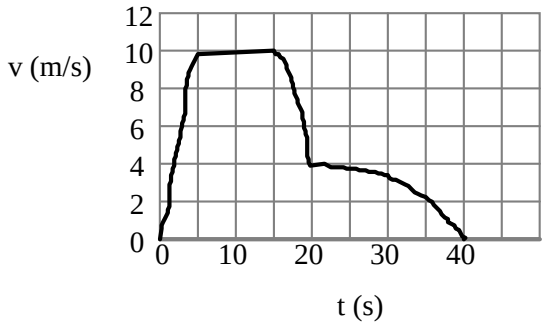
4. A car starts 200 m west of the town square and moves with a constant velocity of 15 m/s toward the east. Draw a graph that represents the motion of the car
   a. Where will the car be 10 minutes later?
   b. When will the car reach the town square?

5. At the same time the car in #4 left, a truck was 400 m east of the town square moving west at a constant velocity of 12 m/s.
   a. Add the truck's motion to the graph you drew for question #4.
   b. Find the time where the car passed the truck.

6. A car is coasting backwards downhill at a speed of 3.0 m/s when the driver gets the engine started. After 2.5 s, the car is moving uphill at 4.5 m/s. Assuming that uphill is positive direction, what is the car's average acceleration?

7. A car slows from 22 m/s to 3.0 m/s at a constant rate of 2.1 m/s^2. How many seconds are required before the car is traveling 3.0 m/s?

8. Look at the velocity-time graph given



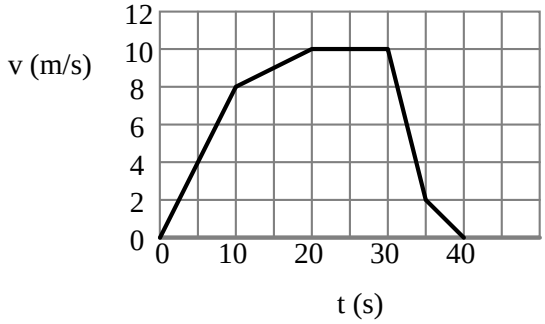
a. During which time interval or intervals is the speed constant?
b. During which interval or intervals is the train's acceleration positive?
c. During which time interval is its acceleration most negative?
d. Find the average acceleration during the following time intervals:
i. 0 to 5 s. ii. 15 to 20 s. iii 0 to 40 s.

9. An airplane starts from rest and accelerates at a constant rate of 3.00 m/s^2 for 30.0 s before leaving the ground.
a. How far did it move?
b. How fast was it going when it took off?

10. A brick is dropped from a high scaffold.
a. What is its velocity after 4.0 s?
b. How far does the brick fall during this time?

11. A tennis ball is thrown straight up with an initial speed of 22.5 m/s. It is caught at the same distance above the ground.
a. How high does the ball rise?
b. How long does the ball remain in the air?

12. Consider the following velocity-time graph.



Determine the displacement after t = ...
a. 10 s. b. 20 s. c. 30 s. d. 40 s.

13. A bag is dropped for a hovering helicopter. When the bag has fallen for 2.00 s,
a. what is the bag's velocity?
b. how far has the bag fallen?

1) 33.8 m 2) 44.6 m 3) a. Between B and C b. 30 m East c. D 4) a. 8800 m b. 13.3 s 5) b. 22.2 s 6) 3.0 m/s 7) 9.04 s 8) a. Between 5 and 15 s b. Between 0 and 5 s c. Between 15 and 20 s d. i. 2.0 m/s^2 ii. 1.2 m/s^2 iii 0 m/s^2 9) a. 1350 m b. 96 m/s 10) a. 39.2 s b. 78.4 m 11) 25.8 m b. 4.6 s 12) a. 40 m b. 130 m c. 230 m d. 265 m 13) a. 19.6 m/s b. 19.6 m