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? **33.8 m**
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/s2. How far does the car go before it stops? **44.6 m**
3. Answer the following questions about the car whose motion is graphed below:



a. When was the car 20 m west of the origin? **Between B and C**

b. where was the car at 50 s? **30 m east**

c. The car suddenly reversed direction. When and where did that occur? **At D**

1. 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 **sorry, no graph.**

a. Where will the car be 10 minutes later? **8800 m**

b. When will the car reach the town square? **13.3 s**

1. 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. **sorry, no graph.**

b. Find the time where the car passed the truck. **22.2 s**

1. 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? **3.0 m/s2**
2. A car slows from 22 m/s to 3.0 m/s at a constant rate of 2.1 m/s2. How many seconds are required before the car is traveling 3.0 m/s? **9.04 s**

8. Look at the velocity-time graph given



a. During which time interval or intervals is the speed constant? **Between 5 to 15 s**

b. During which interval or intervals is the train’s acceleration positive? **Between 0 to 5 s**

c. During which time interval is its acceleration most negative? **Between 15 to 20 s**

d. Find the average acceleration during the following time intervals:

i. 0 to 5 s. **2.0 m/s2** ii. 15 to 20 s. **-1.2 m/s2** iii 0 to 40 s. **0 m/s2**

9. An airplane starts from rest and accelerates at a constant rate of 3.00 m/s2 for 30.0 s before leaving the ground.

a. How far did it move? **1350 m**

b. How fast was it going when it took off? **96 m/s**

10. A brick is dropped from a high scaffold.

a. What is its velocity after 4.0 s? **39.2**

b. How far does the brick fall during this time? **78.4 m**

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? **25.8 m**

b. How long does the ball remain in the air? **4.6 s**

12. Consider the following velocity-time graph.



Determine the displacement after t = ...

1. 10 s. **40 m** b. 20 s. **130 m** c. 30 s. **230 m** d. 40 s. **265 m**
2. A bag is dropped for a hovering helicopter. When the bag has fallen for 2.00 s,

a. what is the bag’s velocity? **19.6 m/s**

b. how far has the bag fallen? **19.6 m**

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/s2 ii. 1.2 m/s2 iii 0 m/s2  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