1 and 2D Kinematics Board Questions

1. A car is travelling at 12m/s left. The car accelerates at 2.0m/s2 left. Does the car speed up or slow down?
2. A bus is traveling at -12m/s **x**. The bus accelerates at -2.0m/s2 **x**. Does the bus speed up or slow down?
3. A train is traveling at -12m/s **x**. The train accelerates at +2.0m/s2 **x**. Does the train speed up or slow down?
4. A boat is traveling at +12m/s **x**. The boat accelerates at +2.0m/s2 **x**. Does the boat speed up or slow down?
5. A banana is traveling at -12m/s **x**. The banana accelerates at +2.0m/s2 **x**. Does the banana speed up or slow down?
6. A bowl of corn chowder is traveling at +12m/s **west**. The bowl of corn chowder accelerates at -2.0m/s2 **north**.

a. Does the corn chowder speed up or slow down?

b. Find the velocity of the car after 3.0s. Include a vector diagram.

1. A diaper filled with ricotta cheese and golden raisins has an initial velocity of 18m/s **y** and accelerates at -6.0m/s2 **x**.
2. Does the diaper speed up or slow down?
3. Find the velocity after 4.0s. Include a vector diagram.

1. A car accelerates at 4.00m/s2 **right**. The car has an initial velocity of 3.00m/s **right**.
2. Sketch a graph showing the car’s velocity vs. time for 5.00s. (use a table of values)
3. What shape is the graph?
4. What does the y-intercept represent?
5. What does the slope represent?
6. A car accelerates at 4.00m/s2 **left**. The car has an initial velocity of 3.00m/s **left**.
7. Sketch a graph of displacement vs. time for the first 5.00s of travel. Use a table of values.
8. What is the car’s average velocity for the first 5.00s?
9. Draw a line on the graph that indicates the average velocity.
10. At what point in time does the average velocity equal the instantaneous velocity?
11. What is the car’s displacement for the first 5.00s?
12. A car accelerates at 4.00m/s2 **left**. The car has an initial velocity of 24.0m/s **right**.
13. Sketch a graph of displacement vs. time for the first 5.00s of travel. Use a table of values.
14. What is the car’s average velocity for the first 5.00s?
15. Draw a line on the graph that indicates the average velocity.
16. At what point in time does the average velocity equal the instantaneous velocity?
17. What is the car’s displacement for the first 5.00s?
18. A car has an initial velocity of -8.00m/s **x**. The car slows to a stop over a distance of 12.0m.
19. What is the average velocity?
20. What is the acceleration?
21. Imagine two cars. One is blue the other is green. The blue car has an initial velocity of 2.0m/s **x**, a small crack in the lower passenger side of the windshield, and accelerates at 3.0m/s2 **x**. The green car has an initial velocity of 13m/s **x** and accelerates at 1.0m/s2 **x**. Its windshield is in good repair. **Use a graph** to determine the time at which the two cars have the same velocity.
22. A truck has a velocity of 12m/s **x**. It accelerates at -1.5m/s2 **y** for 6.0s. Find the final velocity. Include a vector diagram.
23. A bicycle has an initial velocity of 3.0m/s west. The bicycle then turns, changing its velocity to 4.0m/s north. The turn takes 1.2s.

a. Find the average velocity of the bicycle.

b. Find the displacement of the bicycle.

c. Make a sketch showing both the path of the bicycle and the displacement vector.

1. A grilled cheese sandwich has a velocity of 4.0m/s [28o below +x] and accelerates at 1.6m/s2 [51o above –x] for 2.0s. Find the final velocity including a vector diagram.
2. A paper bag full of guacamole and raw hamburger has a velocity of 16m/s [68o north of west]. The bag accelerates at 2.4m/s2 [18o south of west] for 10.0s. Find the displacement including a vector diagram.
3. A car (this one’s yellow) has an initial velocity of 4.0m/s **x**. The car accelerates at 2.0m/s2 **x**.

a. Find the velocity of the car after 1.0s, 2.0s, 3.0s, 4.0s, 5.0s, 6.0s, 7.0s, 8.0s, 9.0s and 10.0s.

b. Find the average velocity of the car for the first 1.0s, 2.0s… , 10.0s.

c. Find the displacement of the car at 1.0s, 2.0s… , 10.0s.

d. Draw a graph of **v** vs t.

e. Draw a graph of **d** vs t.

1. A car (this one’s red) has an initial velocity of 32.0m/s **x**. The car accelerates at -4.0m/s2 **x**.

a. Find the velocity of the car after 1.0s, 2.0s, 3.0s, 4.0s, 5.0s, 6.0s, 7.0s, 8.0s, 9.0s and 10.0s.

b. Find the average velocity of the car for the first 1.0s, 2.0s… , 10.0s.

c. Find the displacement of the car at 1.0s, 2.0s… , 10.0s.

d. Draw a graph of **v** vs t.

e. Draw a graph of **d** vs t.

1. A car drives completely around a circular path with a radius of 10.0m in 6.0s find:

a. The average speed. b. The average velocity.

1. A cheese Danish is thrown horizontally off of a tall building. The Danish has an initial velocity of -10.0m/s **x**. The Danish accelerates at -10.0m/s2 **y**.
2. What is the velocity of the Danish after 2.0s?
3. How long will it take the Danish to travel 40.0m *horizontally*?
4. How far *vertically* will the Danish travel in that same time?