**Constant Velocity Particle Model Worksheet 1:**

**Motion Maps and Position vs Time Graphs**

1. Given the following position vs time graph, draw a motion map with one dot for each second.



Describe the motion of the object with words:

*The object starts at the origin and moves right at 2 m/s for 2 s. I stops for 1 sec and then moves left at 1 m/s for 4 sec where it stops at the origin.*

1. Given the following motion map, where positions have been recorded with one dot each second, draw a position vs time graph.



Describe the motion of the object in words:

*The object starts 5 m right of the origin and moves left at 1m/s for 3 s. It stops for 2 s and then moves left at 1 m/s for 2 more seconds. The object remains at rest at the origin for 2 s and then moves right at 2 m/s for 2 s.*

1. Consider the position vs time graph below for cyclists A and B.



* 1. Do the cyclists start at the same point? How do you know? If not, which is a head?

*No. initial position for B is more positive than A which is at origin.*

* 1. At t = 7 s, which cyclist is a head? How do you know?

*A, because the line for A’s position is above B’s line, meaning A is further away from the origin.*

* 1. Which cyclist is travelling faster at t = 3 s? How do you know?

*A, the slope of line A is greater than line B, so A is going faster since slope of Pos vs t is speed.*

* 1. Are their velocities equal at any time? How do you know?

*No, velocity is equal to slope of the position vs time line and slope A is always greater.*

* 1. What is happening at the intersection of lines A and B?

*Cyclist A is overtaking cyclist B and they are at the same position.*

* 1. Draw a motion map for cyclists A and B.



1. Consider the position vs time graph for cyclists A and B.



* 1. How does the motion of cyclist A in this graph compare to that of A in question 3?

*It looks the same as they have the same slope*

* 1. How does the motion of cyclist B in this graph compare to that of B in question 3?

*This B is moving left, or toward the origin and starts further away from the origin if the scales are even remotely close to the same*

* 1. Which cyclist has the greatest speed? How do you know?

*A, has the greatest slope.*

* 1. Describe what is happening at the intersections of lines A and B.

*A is passing B and they are moving in opposite directions*

* 1. Which cyclist travelled further in the first 5 s? How do you know?

*A has the larger change in position. (Has a bigger slope for a longer time)*

* 1. Draw a motion map for cyclist A and B.



1. Consider the difference between displacement and odometer (distance) readings for the following situations.



* 1. Rank the graphs according to which show the **greatest displacement** from the beginning to the end of the motion.

Greatest 1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4\_\_\_\_\_ 5\_\_\_\_\_ 6 \_\_\_\_\_ Least

 *C > D > F > A = B > E*

*C = + 10, D = + 7, F = + 5, A and B = 0 and E = – 15*

* 1. Rank the graphs according to which show the greatest distance travelled.

Greatest 1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4\_\_\_\_\_ 5\_\_\_\_\_ 6 \_\_\_\_\_ Least

 *F = E > C > D > A = B*

*F and E both 15 m, C 10 m, D 7 m, A and B zero m*

1. Sketch **velocity vs time** graphs and **motion maps** corresponding to the following descriptions of the motion of an object.







