Constant Velocity Particle Model LGT

By the end of this unit, students will be able to:

1. Define and provide examples of all vocabulary and concepts
2. Distinguish between vectors and scalars
3. Draw accurate scaled diagrams of 1 dimensional vectors
4. Solve 1-dimensional vector addition problems and simple 2-dimensional problems
5. Use vectors to determine relative velocity in various frames of reference
6. Use precise language to describe motion
7. Interpret the slope of a position-time graph
8. Interpret the area of a velocity-time graph
9. Use a position-time graph to
    a. Generate a mathematical model of the motion
    b. Describe the motion of an object with precise language
    c. Draw a corresponding **velocity-time** graph
    d. Draw an accurate motion map that represents position and velocity (dots and vectors/arrows)
    e. Determine **displacement** during specific time intervals
    f. Determine **distance** during specific time intervals
    g. Determine average **velocity** and average **speed**
10. Use a velocity-time graph
    a. Describe the motion of an object with precise language
    b. Draw a corresponding **position-time** graph
    c. Draw an accurate motion map with position dots and velocity arrows
    d. Determine **displacement** during specified time-intervals
    e. Determine the units of the area underneath a curve of a velocity-time graph
11. Determine the area “under ” a velocity-time graph when the velocity is negative
12. Apply a mathematical model and graphing to determine where and when two objects will meet

Vocabulary and Concepts

Area "under" a curve
Average speed
Average velocity
Direction
Displacement
Distance
Frame of reference
Horizontal
Magnitude
Meters
Meters per second
Moving away
Moving towards
Motion detector
Motion map
Negative slope
Position
Positive slope
Quantitative
Qualitative
Reference point
Relative velocity
Resultant
Scalar
Second
Slope
Starting position
Speed
Tangent line to a curve
Time
Vector
Velocity

Derived Mathematical Models

Textbook Assignments

Read
pg 44-55 (not bottom of 55)

pg 85-88 (note that the textbook uses d_o and d to represent position whereas we use x_o and x)

Answer questions on pg 60-61
#1-6, 12-14
(answer and draw a motion map) #17, 24

Conceptual Questions

1. What does it mean when it is said “motion is relative”? What is everyday motion usually relative to?
2. If the speedometer of a car reads a constant speed of 40 km/hr, can you say that the car has constant velocity? Why or why not?
3. What physical quantity describes how quickly you change how fast you’re traveling, or how quickly you change your direction?
4. How does a vector differ from a scalar?
5. Why is speed classified as a scalar and velocity as a vector?
6. If a vector that is 1 cm long represents 5 kilometers, how many kilometers does a vector 12 cm long, drawn to the same scale, represent?
7. What is the maximum possible result of two vectors with magnitudes of 4 and 5 units? What is the minimum possible resultant?
8. You’re driving behind a car and wish to pass, so you turn to the left and pull into the passing lane without changing speed. Why does the distance **increase** between you and and the car you’re following?
9. When you see people on a treadmill, why must they run/walk at the same rate and in the opposite direction as the treadmill is moving? Explain this using vector addition and relative velocity.
10. Why does walking in the same direction as a moving walkway get you to your destination quicker?
11. What does the slope of the curve on a position-time graph represent?

Mastery Standards

The following standards are the basis of your grade in this unit. Each standard, unless noted is worth 4 points. The scoring system is as follows:

4= your work is perfect and free of all errors
3=your work contains one or a few minor errors in calculation
2=your work contains major errors in either calculation or concepts
1=your work shows little to no signs of mastery.

A	I can represent constant velocity with accurate positioning
B	I can represent constant velocity with accurate sized arrows in the correct direction
C	I can accurately describe in detail an object moving with constant velocity
D	I can determine displacement and distance from the position-time graph
E	I can determine velocity and speed from the position-time graph
F	I can determine displacement and distance from the velocity-time graph of an object moving with constant velocity
G	I can accurately draw a position-time graph of an object moving with constant velocity when given a velocity-time graph
H	I can accurately draw a velocity-time graph of an object moving with constant velocity when given a position-time graph
I	I can generate and use a mathematical model for an object moving with constant velocity