1.1 The Study of Motion   (Text Pg 8 - 16 College)

Kinematics is the science of describing the motion of objects using words, diagrams, numbers, graphs, and equations. Kinematics is a branch of mechanics.

Dynamics is the study of the forces that produce motion.

Scalars are quantities which are fully described by a magnitude (or numerical value) alone.

Vectors are quantities which are fully described by both a magnitude and a direction.

Examples . . . See Board

Position is the distance and direction of an object from a reference point. d_1= 5 m North = 5m N   Or positive 5 m if North is defined positive

Distance is a scalar quantity which refers to "how much ground an object has covered" during its motion. Δ d

Displacement is a vector quantity which refers to "how far out of place an object is"; it is the object's overall change in position. $\Delta d = d_2 - d_1$

Consider the motion depicted in the diagram below. A physics teacher walks 4 meters East, 2 meters South, 4 meters West, and finally 2 meters North.

Even though the physics teacher has walked a total distance of 12 meters, her displacement is 0 meters. During the course of her motion, she has "covered 12 meters of ground" (distance = 12 m). Yet when she is finished walking, she is not "out of place" - i.e., there is no displacement for her motion (displacement = 0 m). Displacement, being a vector quantity, must give attention to direction. The 4 meters east is *canceled* by the 4 meters west; and the 2 meters south is *canceled* by the 2 meters north. Vector quantities such as displacement are *direction aware*. Scalar quantities such as distance are ignorant of direction. In determining the overall distance traveled by the physics teachers, the various directions of motion can be ignored.

Use the diagram to determine the resulting displacement and the distance traveled by the skier during these three minutes

A
t = 0 min

B
t = 1 min

|← 40 m →|←————— 100 m —————→|← 40 m →|

t = 2 min
C

t = 3 min
D
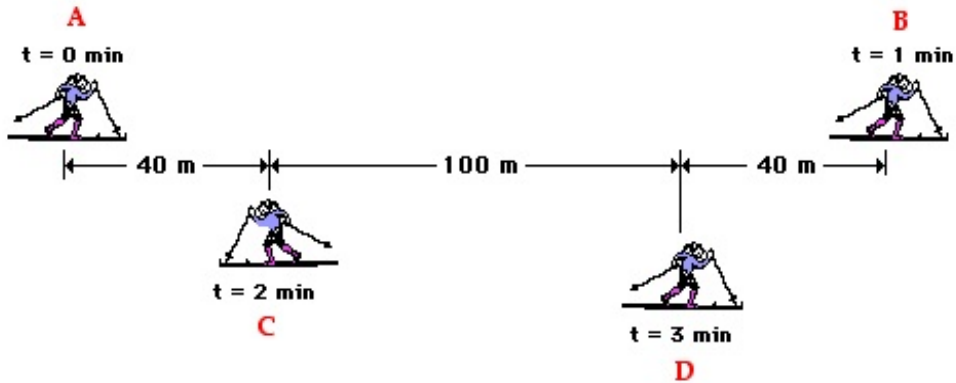
The skier covers a distance of

(180 m + 140 m + 100 m) = **420 m**

and has a displacement of **140 m, rightward**.

Question: What is the displacement of Mr. King if he begins at the school, run 10 miles and finishes back at the school?

Pg 10 # 1- 5 Grade 12 College
Pg 8 # 4,5,6   Pg 10 # 10,11,12

Read pgs 10 -11 : Do pg 11 #6,7   TTT Activity Tomorrow