

Lesson 11.1 - Distance & Displacement Notes
Unit A - One Dimensional Kinematics
Lesson 11.1 – Distance and Displacement

(A) Terms

- a. **Kinematics** is the science of describing the motion of objects using words, diagrams, numbers, graphs, and equations.
- b. The mathematical quantities which are used to describe the motion of objects can be divided into two categories.
 - i. **Scalar quantities** are quantities which are fully described by a magnitude (or numerical value) alone. (Ex: mass, time, temperature)
 - ii. **Vector quantities** are quantities which are fully described by both a magnitude and a direction. (force, velocity, displacement)

(B) Distance and Displacement

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

(C) Describing Motion – Mathematically using Vector Diagrams

We can show an objects distance & displacements using vector diagrams → we will use SCALE diagrams

- a. show a vector diagram showing a person traveling 4 m [E]
- b. show a vector diagram showing a person traveling 28 m [N]
- c. show a vector diagram showing a person traveling 5 m in a direction of N30°W
- d. show a vector diagram showing a person traveling 8 m in a direction of S25°E
- e. show a vector diagram showing a person traveling 5 m in a direction of E50°N
- f. show a vector diagram showing a person traveling 4 m [E] and then another 3 m [E]
→ determine BOTH the distance traveled and the displacement of the person
- g. show a vector diagram showing a person traveling 4 m [W] and then another 3 m [E]
→ determine BOTH the distance traveled and the displacement of the person
- h. show a vector diagram showing a person traveling 4 m [E] and then another 3 m [W]
→ determine BOTH the distance traveled and the displacement of the person
- i. show a vector diagram showing a person traveling 4 m [E] and then another 3 m [N]
→ determine BOTH the distance traveled and the displacement of the person

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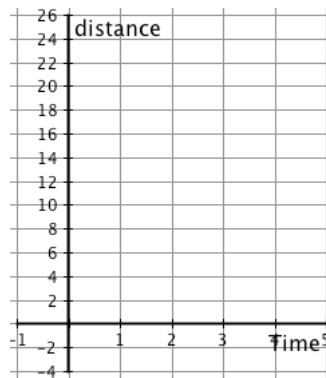
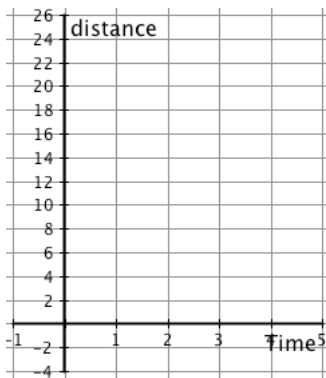
(D) Describing Motion → Using Graphs

We will use 2 types of graphical representations of motion → “ticker tape” diagrams as well as d/t graphs

- ticker tape diagrams simply show a series of “points” at regular time intervals (corresponding to distances traveled in the regular time interval (have students create several “ticker tape diagrams” – 30 m tape in 10 seconds)
- we can create a table of values from experimental data or from motion detectors to illustrate on a 2D graph how the position of an object changes with time.

Time (s)	Position (m)
0	0
1	6
2	12
3	18
4	24

Time (s)	Position (m)
0	0
1	1
2	4
3	9
4	16



(E) Position – Time Graphs from Motion Detectors

(F) asd

