

# Review of Basic Concepts

- Position (vector):  $\vec{\mathbf{d}}$
- Distance (scalar):  $\Delta \mathbf{d}$
- Displacement(vector):  $\Delta \vec{\mathbf{d}} = \vec{\mathbf{d}}_f - \vec{\mathbf{d}}_i$
- Speed (scalar):  $v = \frac{\Delta d}{\Delta t}$
- Velocity (vector):  $\vec{v} = \frac{\Delta \vec{d}}{\Delta t}$
- Average Speed:  $v = \frac{\text{total distance}}{\text{total time}} = \frac{\Delta d_T}{\Delta t_T}$

# Displacement in 1 Dimension

There are two ways to determine displacement

## 1. Displacement as a Change of Position

- When a problem gives you the starting and ending positions...
- Use the formula:  $\vec{\Delta d} = \vec{d}_f - \vec{d}_i$

## 2. Displacement as a Sum of Displacements

- When a problem gives you a number of movements (displacements)...
- Use the formula:  $\vec{\Delta d} = \vec{\Delta d}_1 + \vec{\Delta d}_2 + \vec{\Delta d}_3 + \dots$

# Activity Instructions

1. Working in groups
2. Solve your assigned question with a full solution on the white board.
3. Swap your question sheet and whiteboard answer with the group having the same example number.
4. Check their answer.
5. Answer the consolidation questions.

# Consolidation Questions

1. How do you decide what version of the displacement equation to use to solve a given problem?
2. How do movements in the middle of a trip affect distance and speed?
3. How do movements in the middle of a trip affect displacement and velocity?

# Change of Position (Ex #1)

1. A student starts at a position of 10 m [East] and finishes at a position of 30 m [East]. The student completes this motion in a time of 4 seconds.
  - a) Draw a diagram showing the student's starting position, ending position, and displacement.
  - b) Determine the distance moved
  - c) Determine the student's displacement
  - d) Determine the average speed of the student
  - e) Determine the velocity of the student
  - f) Explain how your answers would change if the student moved to a position of 40 m [East] in the middle of their trip.

# Change of Position (Ex #2)

2. A student starts at a position of 30 m [West] and finishes at a position of 10 m [West]. The student completes this motion in a time of 4 seconds.
  - a) Draw a diagram showing the student's starting position, ending position, and displacement.
  - b) Determine the distance moved
  - c) Determine the student's displacement
  - d) Determine the average speed of the student
  - e) Determine the velocity of the student
  - f) Explain how your answers would change if the student moved to a position of 40 m [West] in the middle of their trip.

# Change of Position (Ex #3)

3. A student starts at a position of 30 m [West] and finishes at a position of 10 m [East]. The student completes this motion in a time of 5 seconds.
  - a) Draw a diagram showing the student's starting position, ending position, and displacement.
  - b) Determine the distance moved
  - c) Determine the student's displacement
  - d) Determine the average speed of the student
  - e) Determine the velocity of the student
  - f) Explain how your answers would change if the student moved to a position of 40 m [West] in the middle of their trip.

# Change of Position (Ex #4)

4. A student starts at a position of 30 m [East] and finishes at a position of 10 m [West]. The student completes this motion in a time of 5 seconds.
  - a) Draw a diagram showing the student's starting position, ending position, and displacement.
  - b) Determine the distance moved
  - c) Determine the student's displacement
  - d) Determine the average speed of the student
  - e) Determine the velocity of the student
  - f) Explain how your answers would change if the student moved to a position of 40 m [East] in the middle of their trip.



# Sum of Displacements (Ex #1)

1. Starting at the origin a student first moves a distance of 10 m [East], then moves a distance of 30 m [East], and finally moves a distance of 10 m [West]. The student completes this motion in a time of 4 seconds.
  - a) Draw a diagram showing the student's starting position, ending position, and displacement.
  - b) Determine the distance moved
  - c) Determine the student's displacement
  - d) Determine the average speed of the student
  - e) Determine the velocity of the student

# Sum of Displacements (Ex #2)

2. Starting at the origin a student first moves a distance of 30 m [West], then moves a distance of 10 m [West], and finally moves a distance of 30 m [East]. The student completes this motion in a time of 4 seconds.
  - a) Draw a diagram showing the student's starting position, ending position, and displacement.
  - b) Determine the distance moved
  - c) Determine the student's displacement
  - d) Determine the average speed of the student
  - e) Determine the velocity of the student

# Sum of Displacements (Ex #3)

3. Starting at the origin a student first moves a distance of 10 m [West] then moves a distance of 30 m [West], and finally moves a distance of 50 m [East]. The student completes this motion in a time of 5 seconds.
  - a) Draw a diagram showing the student's starting position, ending position, and displacement.
  - b) Determine the distance moved
  - c) Determine the student's displacement
  - d) Determine the average speed of the student
  - e) Determine the velocity of the student

# Sum of Displacements (Ex #4)

4. Starting at the origin a student first moves a distance of 30 m [East], then moves a distance of 10 m [East], and finally moves a distance of 50 m [West]. The student completes this motion in a time of 5 seconds.
  - a) Draw a diagram showing the student's starting position, ending position, and displacement.
  - b) Determine the distance moved
  - c) Determine the student's displacement
  - d) Determine the average speed of the student
  - e) Determine the velocity of the student