

Conceptual Dynamics
Kinematics of Particles – Rectilinear Motion
Worksheet

Name: _____

General instructions:

- Go to the url indicated, listen to the lecture, and answer any questions related to the associated lecture content.
- Proceed to the next page and do the same.
- Pages may contain voice lecture, interactive questions, or video examples.
- You may also be asked to go to an external website and ask questions based on what you have viewed.

RECTILINEAR MOTION

1. Go to the following url, listen to the lectures and answer the following questions about what you have learned.

   http://www.engineeringessentials.com/dynamics/files/rec/rec_rec_page0.htm

   1.1) How many DOF's does a particle have undergoing rectilinear motion?
   - □ 1 dof
   - □ 2 dof
   - □ 3 dof

Rectilinear Coordinate Axis

1.2) A particle …. (check all that apply)
- □ has mass and size.
- □ has mass and negligible size.
- □ can rotate.
- □ can translate.

1.3) What is rectilinear motion?
- □ Motion along a line.
- □ Motion in a plane.
- □ Motion in 3 dimensions.

Position

1.4) Position is ….
- □ the total distance a particle travels in a specified period of time.
- □ the location of a particle in space (i.e. the coordinate system).
- □ the distance between where a particle ended up and where it started.

1.5) Position is a scalar.
- □ True
- □ False

1.6) Displacement is ….
- □ the total distance a particle travels in a specified period of time.
- □ the location of a particle in space (i.e. the coordinate system).
- □ the distance between where a particle ended up and where it started.

1.7) Total distance traveled is ….
- □ the total distance a particle travels in a specified period of time.
- □ the location of a particle in space (i.e. the coordinate system).
- □ the distance between where a particle ended up and where it started.

2. Go to the following url, complete Conceptual Example 2.1-1, and answer the following questions related to the example.

http://www.engineeringessentials.com/dynamics/files/rec/rec_rec_cex1.htm

2.1) Rank the graphs from greatest to least amount of *absolute particle displacement* over the time interval from 0 to 3 seconds.

Greatest ____
Next _____
Next _____
Next _____
Next _____
Least _____

2.2) Rank the graphs from greatest to least amount of *total distance traveled* over the time interval from 0 to 3 seconds.

Greatest ____
Next _____
Next _____
Next _____
Next _____
Least _____

Velocity

3. Go to the following url, listen to the lectures and answer the following questions about what you have learned.

   http://www.engineeringessentials.com/dynamics/files/rec/rec_rec_page3.htm

   3.1) Instantaneous velocity is ….
   - □ the time rate of change of position.
   - □ the change in position divided by the change in time.
   - □ the time rate of change of acceleration.

   3.2) In variable form, write down the equation for rectilinear velocity. _____

   3.3) Instantaneous velocity is the _____ of the tangent line of the position function evaluated at a particular instant of time.

   3.4) Velocity is a vector.
   - □ True
   - □ False

   3.5) Average velocity is ….
   - □ the time rate of change of position.
   - □ the change in position divided by the change in time.
   - □ the time rate of change of acceleration.

4. Go to the following url, complete Conceptual Example 2.1-2, and answer the following questions related to the example.

   http://www.engineeringessentials.com/dynamics/files/rec/rec_rec_cex2.htm

   4.1) List each case in order from greatest to least ball *average speed for the first time interval*.
   Greatest ____
   Next _____
   Next _____
   Least _____

   4.2) List each case in order from greatest to least ball *average speed for the last time interval*.
   Greatest ____
   Next _____
   Next _____
   Least _____

   4.3) Which cases have constant speed? _____

5. Go to the following url, complete Conceptual Example 2.1-3, and answer the following questions related to the example.

   http://www.engineeringessentials.com/dynamics/files/rec/rec_rec_cex3.htm

   5.1) Rank the graphs from greatest to least absolute achieved *instantaneous speed* over the time interval from 0 to 3 seconds.

   Greatest ____
   Next _____
   Next _____
   Next _____
   Next _____
   Least _____

   5.2) Rank the graphs from greatest to least absolute *average speed* over the time interval from 0 to 3 seconds.

   Greatest ____
   Next _____
   Next _____
   Next _____
   Next _____
   Least _____

6. Go to the following url, complete Conceptual Example 2.1-4, and answer the following questions related to the example.

   http://www.engineeringessentials.com/dynamics/files/rec/rec_rec_cex4.htm

   6.1) The graph of the position of the car indicates that ….

   □ the car speeds up with time.
   □ the car slows down with time.
   □ the car initially speeds up and then slows down.
   □ the car moves with a constant velocity.

Acceleration

7. Go to the following url, listen to the lectures and answer the following questions about what you have learned.

   http://www.engineeringessentials.com/dynamics/files/rec/rec_rec_page4.htm

   7.1) Instantaneous acceleration is ….

   □ the time rate of change of position.
   □ the change rate of change of velocity.
   □ How fast a particle is moving.

7.2) In variable form, write down the equation for rectilinear acceleration. _____

7.3) Acceleration is a scalar.
- □ True
- □ False

7.4) Instantaneous acceleration is the slope of the tangent line of the _____ function evaluated at a particular instant of time.

7.5) If the velocity of a particle is not changing, the acceleration is _____. (enter a number)

8. Go to the following url, complete Conceptual Example 2.1-5 and 2.1-6.

9. Go to the following url, complete Conceptual Example 2.1-7, and answer the following questions related to the example.

   9.1) Which case(s) have positive acceleration? _____

   9.2) Which case(s) have negative acceleration? _____

   9.3) Which case(s) have zero acceleration? _____

10. Go to the following url, complete Conceptual Example 2.1-8.

http://www.engineeringessentials.com/dynamics/files/rec/rec_rec_cex8.htm