

IMPORTANT TERMS:

- Acceleration
- Average speed
- Elapsed time
- Free fall
- Instantaneous speed
- Rate
- Relative
- Speed
- Velocity

UNIT I: MECHANICS

Chapter 4: Linear Motion

I. Motion Is Relative (4.1)

A. Everything moves. Even things that appear to be at rest move.

1. Motion is described by-

a. Relative to the sun, the center of the galaxy, etc.

b. We will discuss motion (things in our environment) relative to the surface of the Earth.

II. *Speed* (4.2)

A. **Speed** is a measure of how _____ something is moving (_____ at which _____ is covered)

1. _____ – term used to describe something divided by _____.

2. **Speed** = Units of _____ / units of _____ (distance covered per unit of time)

3. Common Units

a. miles/hour (mi/h)

b. kilometers/hour (km/h)

c. _____ (____/____) Used in physics

B. **Instantaneous Speed**– the speed at any _____ (What you see on a car's _____)

C. **Average Speed**–

1. Does not indicate _____ in speed over time.

2. still describes rate at which distance traveled

D. **Velocity** (4.3)

1. Velocity and speed are often used interchangeably, but in physics are different.

a. **Velocity** is-

b. Speed is how fast object moves

(_____ does not matter)

E. **Constant Velocity**– must have constant _____

and _____

1. Object moves in _____

2. Object's path **does not** _____

F. **Changing Velocity**

1. Velocity will change if either _____ or _____ changes.

2. Constant speed and constant velocity are _____ the same.

III. **Acceleration** (4.4)

A. **acceleration** is the rate at which the velocity is changing

1. applies to _____ as well as _____ in velocity.

2. decrease in velocity often called _____ or _____ **acceleration**

B. Acceleration applies to changes in _____ as well as speed

1. When motion is in _____ line the term speed and velocity are often used interchangeably.

2. Units for acceleration a bit more complicated

IV. Free Fall: How Fast (4.5)

A. The **force of** _____ causes object to accelerate downward

1. If we disregard air resistance (air friction) then free falling objects only affected by gravity. Called

2. Use letter (_____) to represent gravity

3. gravity varies slightly around the Earth. Average value is about _____

4. More accurately, g is _____

B. The instantaneous speed of an object falling from rest is equal to the acceleration multiplied by the amount of time it falls.

(v symbolizes both speed and velocity)

1. speed decreases at the _____ rate with an object moving _____ as it increases when moving _____

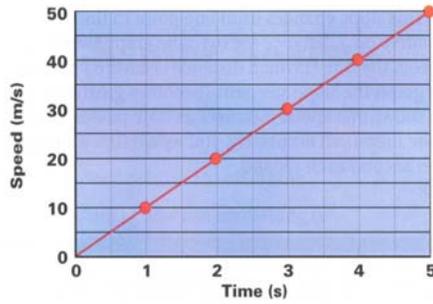
2. An object thrown upward will reach a velocity of _____ when it gets to its _____ point

V. Free Fall: How Far (4.6)

A. Relationship between distance traveled, acceleration, and velocity

VI. Graphs of Motion

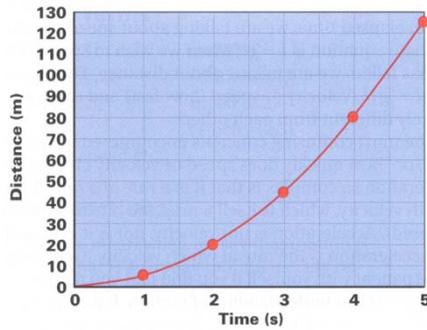
A. Equations and tables not the only way to describe relationships such as velocity and acceleration.



1. **Linear relationship**- e.g. speed and time

a. Forms _____ curve.

b. Has _____ slope (direct proportion)



2. **Parabolic relationship**- e.g. distance versus time

a. Not straight line. _____ line

b. _____ at any point gives **slope** at that point (slope of this curve is **instantaneous speed**.)

Remember that slope is rise/run or change in y over change in x. Distance/time = speed

VII. Air Resistance and Falling Objects (4.8)

A. _____ noticeably alters the motion of things (like feathers, paper, etc.)

B. Less effect on more _____ (compact) objects

C. Air resistance is small enough to be _____ in most cases.

VIII. How Fast, How Far, How Quickly. How Fast Changes (4.9)

A. speed and velocity-used to describe **how** _____ something free falls from rest.

equation to use:

B. To specify **how far** the object has fallen we are talking about _____.

equation to use:

C. Acceleration-

1. Very complex concept

2. _____ of a _____