**What phenomena are we seeing?**

* Free-fall
  + - Air drag negligible
    - Air drag not negligible
    - Near Earth’s surface
    - Not near Earth’s surface
* Motion on an inclined surface
  + - Friction negligible
    - Friction not negligible
    - Gravity is only force pulling
    - Some force (other than gravity) pushing/pulling?
* Motion on a horizontal surface
  + - Friction negligible
    - Friction is not negligible
* Motion described as a function of time
* One dimensional
* Multidimensional
* Projectile motion (in two dimensions)
  + - Air friction negligible
    - Air friction not negligible
    - Something (other than gravity) pushing/pulling
* Circular motion
* Horizontal circle
* Vertical circle
  + Gravity is only force pulling
* Something (other than gravity) pushing/pulling
  + - Parallel to path
    - Perpendicular to path
    - Has components both parallel and perpendicular

**Important quantities, definitions and special cases**

* Position
* *Equal to location of dot/point on graph or motion diagram*
* Horizontal
  + Initial horizontal position is zero
  + Initial horizontal position of both objects are the same
* Vertical
  + Initial vertical position is zero
  + Initial vertical position of both objects are the same
* Angular
  + Initial angular position is zero
  + Initial angular position of both objects are the same
* Distance
* *Equal to sum of the displacement values*
* Displacement
* *Equal to the difference in position*
* *Equal to the area under a velocity graph*
* Speed
* *Related to distance between dots on a motion diagram*
* *Equal to steepness of position function*
* *Speed decreases when velocity and acceleration are in opposite directions*
* *Speed increases when velocity and acceleration are in the same direction*
* Velocity
* Horizontal
  + Initial horizontal velocity is zero
  + Initial horizontal velocity of both objects are the same
  + Initial horizontal velocity of both objects are different
* Vertical
  + Initial vertical velocity is zero
  + Initial vertical velocity of both objects are the same
  + Initial vertical velocity of both objects are different
* Angular
  + Initial angular velocity is zero
  + Initial angular velocity of both objects are the same
  + Initial angular velocity of both objects are different
* Average (1D only)
  + Equal to displacement/time interval
  + Related to distance between dots on a motion diagram
* Instantaneous
  + Equal to slope of position graph
  + Equal to derivative of position function
* Constant
* Not constant
* Acceleration
* Average (1D only)
  + *Equal to change in velocity/time interval*
  + *Related to the change in distance between dots on a motion diagram*
* Instantaneous
  + *Equal to derivative of velocity function*
  + *Equal to slope of velocity graph*
  + *Equal to curvature of position function*
* Object is slowing
  + *Direction of acceleration and velocity are opposite*
* Object is speeding up
  + *Direction of acceleration and velocity are parallel*
* Constant
  + - has magnitude = g
    - has magnitude = 0
    - has magnitude = g sin**θ**
    - has magnitude = v2/R
* Constant during intervals but changes suddenly in-between
* Not constant