

■ One Dim Motion with Constant Acceleration

■ Define the equation of motion and the initial conditions and then combine them

```
(Local) In[1]:=
    eq1 = x''[t] == a;

(Local) In[2]:=
    init = {x[0] == x0, x'[0] == v0};

(Local) In[3]:=
    eq2 = Append[init, eq1];
```

■ Now solve for x[t]

```
(Local) In[4]:=
    dsol = DSolve[eq2, x[t], t]

(Local) Out[4]=
    {{x[t] ==  $\frac{1}{2} (a t^2 + 2 t v_0 + 2 x_0)$ }}
```

■ Define the constants to some useful values (try v0->0, a->4)

```
(Local) In[5]:=
    val = {x0 == 0, v0 == 10, a == 2};
```

■ Define (t,x) coordinate pairs for the solution and constants

```
(Local) In[6]:=
    coord[t_] = {t, x[t]} /. dsol /. val // Simplify

(Local) Out[6]=
    {{t, t (10 + t)}}
```

■ Set up a plot of a coordinate pairs (t,x) as a function of t

```
(Local) In[7]:=
    Clear[plot1];
    plot1[t_] :=
    ListPlot[coord[t], PlotStyle == PointSize[0.03], GridLines == Automatic, Frame == True,
    PlotRange == {{0, 10}, {0, 200}}, FrameLabel == {"t", "x[t]"}, RotateLabel == False]
```

- **Make a set of plots for ten t values - you can animate by selecting them and using the Animate Selected Graphics**

```
(Local) In[9]:=  
plotarray = Table[plot1[tp], {tp, 0, 10, 1}];
```

- **Combine all the t plots into a single plot**

```
(Local) In[10]:=  
Show[plotarray];
```

