```
clear


G=6.7e-11;
mSun = 1.9e30;
rEarthOrbit = 150e9;
rSun=695500000;
mEarth = 5.9742e24;
rEarth = 6.378e6;

M=1000;        % save state every 1000th iteration;
Ii=0;          % index for saved date
IM=900;        % we will reserve space for saved data

XE=zeros(I,1); YE=zeros(I,1); VXE=zeros(I,1); VYE=zeros(I,1); T=zeros(I,1);


t=0; T(1)=0;

% set launch parameters for a earth orbit

xE=rEarthOrbit; XE(1)=xE;         % starting x coordinate
vxE=0; vXE(1)=vxE;                % starting x velocity
yE=0;  yE(1)=yE;                  %2*rEarthOrbit*pi/(365*60*60*24)
vyE=28500;  vYE(1)=vyE;

dt=60;                   % subinterval length
N=365*60*60*24 / dt;     % subintervals in 1 year

for i=2:N+1

   t = t+ dt;

   % project earth orbit

   % resolve the earth sun gravity vector
   rSE = sqrt(xE^2 + yE^2); % compute rE
   gSE = -G*mSun/rSE^2;             % compute gravity magnitude
   cosSE = xE/rSE;             % compute cos theta
   sinSE = yE/rSE;             % compute sin theta

   xE=xE+vxE*dt;        % project x position
   yE=yE+vyE*dt;        % project y position

   vxE= vxE+ gSE*cosSE*dt;  % project x velocity
   vyE = vyE+ gSE*sinSE*dt;  % project y velocity

% record data for graphs
if mod(i,M)== 0
      Ii=Ii+1;
      T(Ii)=t;
      XE(Ii)= xE;
      YE(Ii)= yE;
      end

end


II=1:Ii;
plot(XE(II),YE(II))
axis equal
```