Orbit of the International Space Station

In[1]:= `G = Quantity[1, "GravitationalConstant"];`

In[2]:= `rE = UnitConvert[PlanetData["Earth", "Radius"], "SI"]`

Out[2]= 6371.008 km

In[3]:= `mE = UnitConvert[PlanetData["Earth", "Mass"], "SI"]`

Out[3]= 5.9721986×10^{24} kg

In[4]:= `h = Quantity[400, "Kilometers"] (* Average height of orbit above surface *);`

In[5]:= `r = rE + h`

Out[5]= 6771.008 km

In[7]:= `v = UnitConvert[Sqrt[G mE / r], "SIBase"]`

Out[7]= 7672. m/s

In[12]:= `{period = 2 π r / v, UnitConvert[period, "Minutes"]}`

Out[12]= $\{ 5545. \, s \, , \, 92.42 \, min \}$

The acceleration due to gravity is not very different from that on Earth's surface.

In[13]:= `g = UnitConvert[G mE / r², "SIBase"]`

Out[13]= $8.694 \, m/s^2$

Energy

In[15]:= `mISS = Quantity[4.196 * 10⁵, "Kilograms"];`

In[16]:= `KE = UnitConvert[(1/2) mISS v^2, "Joules"]`

Out[16]= 1.23503×10^{13} J

In[17]:= `PE = UnitConvert[- G mE mISS / r, "Joules"]`

Out[17]= -2.47006×10^{13} J

In[18]:= `KE / PE`

Out[18]= −0.5