In[42]:=
```
Quiet@Remove["`*"]
```

In[43]:=
```
SetOptions[SelectedNotebook[],
 PrintingStyleEnvironment → "Printout", ShowSyntaxStyles → True]
```

Date and version

Notebook run / all data acquired from Wolfram's servers at time:

In[44]:=
```
Now[]
```

Out[44]= Wed 10 Jun 2015 19:42:38 [ ]

In[45]:=
```
$Version
```

Out[45]= 10.0 for Mac OS X x86 (64-bit) (June 29, 2014)

Raw data

Universal

In[46]:=
```
UnitConvert[Quantity[1, "GravitationalConstant"], "SIBase"]
```

Out[46]= $6.67 \times 10^{-11}\ \mathrm{m}^3/(\mathrm{kg\,s}^2)$

Earth

In[47]:=
```
PlanetData[ Earth (planet) , "Mass"]
```

Out[47]= 5.9721986×10^{24} kg

In[48]:=
```
PlanetData[ Earth (planet) , "Radius"]
```

Out[48]= 6367.4447 km

Moon

In[49]:=
```
PlanetaryMoonData[ Moon (planetary moon) , "Mass"]
```

Out[49]= 7.3459×10^{22} kg

In[50]:=
```
PlanetaryMoonData[ Moon (planetary moon) , "Radius"]
```

Out[50]= 1737.5 km

In[51]:=
```
PlanetaryMoonData[ Moon (planetary moon) , "Inclination"]
```

Out[51]= 5.16°

Earth-Moon

In[52]:= `PlanetaryMoonData[ Moon (planetary moon) , "AverageDistanceFromEarth"]`

Out[52]= 3.850×10^5 km

In[53]:= `PlanetaryMoonData[ Moon (planetary moon) , "OrbitPeriod"]`

Out[53]= 27.322 days

Derived Units

Unit velocities

In[54]:= $\text{unitTime} = \frac{1}{2\,\text{Pi}}\,\text{PlanetaryMoonData}[\text{Moon (planetary moon)}, \text{"OrbitPeriod"}]$

Out[54]= 4.3484 days

In[55]:= `unitLength = PlanetaryMoonData[ Moon (planetary moon) , "AverageDistanceFromEarth"]`

Out[55]= 3.850×10^5 km

In[56]:= $\text{unitVelocity} = \text{UnitConvert}\left[\frac{\text{unitLength}}{\text{unitTime}}, \text{"km/s"}\right]$

Out[56]= 1.025 km/s

Earth sphere of influence

In[72]:=

earth sphere of influence / average moon orbit distance

`PlanetData[ Earth (planet) , "SphereOfInfluenceRadius"] /`
`PlanetaryMoonData[ Moon (planetary moon) , "SemimajorAxis"]`

Out[72]= 2.41

Parking Velocities

Earth

In[57]:=

$$\text{earthParkingVelocity} = \text{UnitConvert}\left[\sqrt{\left(G\,\frac{\text{PlanetData}[\text{Earth (planet)}, \text{"Mass"}]}{\text{PlanetData}[\text{Earth (planet)}, \text{"Radius"}] + 160\ \text{km}}\right)}, \text{"km/s"}\right]$$

Out[57]= 7.814 km/s

In[58]:=
```
earthParkingVelocity / unitVelocity
```
Out[58]= 7.63

Moon

In[59]:=
```
moonParkingVelocity = UnitConvert[
  Sqrt[(G PlanetaryMoonData[Moon (planetary moon), "Mass"]) /
    (PlanetaryMoonData[Moon (planetary moon), "Radius"] + 100 km)], "km/s"]
```
Out[59]= 1.633 km/s

In[60]:=
```
moonParkingVelocity / unitVelocity
```
Out[60]= 1.594

Miscellaneous

In[61]:=
```
μ = G * PlanetData[Earth (planet), "Mass"]
```
Out[61]= 5.9721986×10^{24} kg G

In[62]:=
```
0.1 * unitVelocity
```
Out[62]= 0.102471 km/s

Apollo delta-v

In[69]:=
```
(*Trans-lunar injection*)
apolloEarth = UnitConvert[Quantity[10 000, "Feet per second"], "km/s"] // N
```
Out[69]= 3.048 km/s

In[71]:=
```
(*Lunar orbit insertion (PDF p. 27 in source*)
apolloMoon = UnitConvert[Quantity[3500, "Feet per second"], "km/s"] // N
```
Out[71]= 1.0668 km/s

In[67]:=
```
UnitConvert[apolloEarth + apolloMoon, "Km/s"] // N
```
Out[67]= 4.1148 km/s