

High-level computing languages +

Powerful computers

Using the computer as a tool to model,
to simulate, and / or to visualize a
physical problem.

Some programming is necessary.

Computing in physics is:

Implementing and assessing computational modeling in introductory mechanics

Marcos D. Caballero,^{1,*} Matthew A. Kohlmyer,^{2,†} and Michael F. Schatz^{1,‡}

¹*Center for Nonlinear Science and School of Physics, Georgia Institute of Technology, Atlanta, Georgia 30332, USA*

²*Department of Physics, North Carolina State University, Raleigh, North Carolina 27695, USA*

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```
1  from __future__ import division
2  from visual import *
3
4  craft = sphere(pos = vector(10e7,0,0), color = color.white, radius = 1e6)
5  Earth = sphere(pos = vector(0,0,0), color = color.blue, radius = 6.3e6)
6  trail = curve(color = craft.color)
7
8  G = 6.67e-11
9  mcraft = 1500
10 mEarth = 5.97e24
11
12 vcraft = vector(0,2400,0)
13 pcraft = mcraft*vcraft
14
15 t = 0
16 deltat = 60
17 tf = 365*24*60*60
```

Initial Conditions

```
18
19 while t < tf:
20
21     r = craft.pos-Earth.pos
22     rhat = r/mag(r)
23     Fgrav = -G*mEarth*mcraft/mag(r)**2*rhat
```

Force Calculation

```
24
25     pcraft = pcraft+Fgrav*deltat
26     craft.pos = craft.pos + pcraft/mcraft*deltat
```

Newton's Second Law

Position Update

```
27
28     trail.append(pos = craft.pos)
29     t = t + deltat
30
31 print 'Craft final position: ', craft.pos, 'meters.'
```





2012

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