Pseudo Code 2.2

Define the variable
$G = 6.67 \times 10^{-11}$
$M = 5.97 \times 10^{24}$
$R = 6371 km \to$ km to M so it's 6371000
$P_i = \pi$

- Ask the user to enter value of T

T = input

- Use T to solve for h using the formula

$$h = \left(\frac{(G \cdot M \cdot T^2)}{(4 \cdot \pi^2)} \right)^{1/3} - R$$

Finally print the value of h

Nuclear 2^3 .66 ← float

for part b)

Do the same except instead of T being an input, we write 3 more variables

T_1 = Once a day 24·60·60
T_2 = Every 90 min 90·60
T_3 = Every 45 min

Pseudo Code 2.6

First Define the variables

$G = 6.6738 \times 10^{-11}$
$M = 1.9891 \times 10^{30}$

Then ask the user to input the distance & velocity
l_1 = input
V_1 = input

Now we need to find V_2, and to do that we need to use the quadratic formula $\frac{(-b \pm \sqrt{b^2 - 4ac})}{2a}$

To do that need to set variable a, b, c

$a = 1$

$b = -\frac{2GM}{v_1 l_1}$

$c = V_1^2 - 2GM l_1)$

Then we need to use the given formulas to find the other quantities

$l_2 = \frac{l_1 V_1}{V_2}$

$T = \frac{2\pi \left(\frac{l_1 + l_2}{2}\right)\left(\sqrt{l_1 l_2}\right)}{l_1 v_1}$

$e = \frac{l_2 - l_1}{l_2 + l_1}$

Then print the quantities for l_2, v_2, T, and e

For part c

Do the same but use properties for the orbits of the Earth & Halleys Comet instead of user input.

Pseudo Code 2.10

a) Find binding energy of an atom w/ A=58 & Z=28

Start

Define variables (constant)

$a_1 = 15.8$
$a_2 = 18.3$
$a_3 = 0.714$
$a_4 = 23.2$
$a_5 = [\,]$ ← empty set

$$a_5 = \begin{cases} 0 & \text{if } A \text{ is odd} \\ 12.0 & \text{if } A \text{ and } Z \text{ are both even} \\ -12.0 & \text{if } A \text{ is even and } Z \text{ is odd} \end{cases}$$

Take as its input the values of A & Z

```
A = int (input ("Enter a value for A")
Z = int (input ("Enter a value for Z")
```

To get a_5 make an if statement

```
if (A %2 != 0 ):
    return 0
    print (a5)

  elif (A % == 0) and (Z% 2==0):
    return 12.0

  else:
    return -12.0
```

- Then use the given formula to find the nuclear binding energy B

$$B = a_1 A - a_2 A^{2/3} - a_3 \frac{Z^2}{A^{1/3}} - a_4 \frac{(A-2Z)^2}{A} + \frac{a_5}{A^{1/2}}$$

```
print (B ,"MeV")
```

Part B

Use the same code, and then to find the binding energy per nucleon do

b_e_nucleon = B/A

Part C

Add a range of (Z, 3·Z) before the if statement so that it goes throug all values of A from A=Z to A=3·Z

then, add anothe if statement at the end

```
if (b_e_nucleon > l_b_e):
    l_b_e = b_e_nucleon
    l_b_e_n = A
```

to get l_b_e, the largest energy per nucleon