import math

import matplotlib.pyplot as plt

tau = float(input("Passo Temporale: "))

w = 2

N = round(int(input("Tempo Totale: "))/tau)

p = [0.2]

q = [0.3]

def f(x):

return [x[1], -(w\*\*2)\*x[0]]

for i in range(N):

h = [(tau/2)\*f([q[i],p[i]])[0], (tau/2)\*f([q[i],p[i]])[1]]

q.append(q[i]+tau\*f([q[i]+h[0],p[i]+h[1]])[0])

p.append(p[i]+tau\*f([q[i]+h[0],p[i]+h[1]])[1])

plt.plot(p,q)

plt.title('Tau: '+str(tau)+' Tempo Totale: '+str(int(N\*tau)))

plt.xlabel('p')

plt.ylabel('q')

plt.savefig('runge-kutta-'+str(tau)+'-'+str(int(N\*tau))+'.png')

plt.show()