

Materials Engineering 201 Lab

Computer Assignment

A falling object with the properties below can be described by the equations below.

Given:

$$\begin{aligned}m &= 100 \text{ (kg)} \\g &= 9.8 \text{ (m/s}^2\text{)} \\h_0 &= 20 \text{ (m)} \\v_0 &= 0 \text{ (m/s)}\end{aligned}$$

Equations:

$$\begin{aligned}v &= v_0 + gt \text{ (m/s)} \\h &= h_0 - v_0t - gt^2/2 \text{ (m/s)} \\KE &= mv^2/2 \\PE &= mgh \\KE + PE &= \text{constant (J)}\end{aligned}$$

Using MS-Excel

1. Tabulate t, v, h, KE, PE, and KE+PE for t at 0.1 second intervals until h=0
2. Plot KE and PE vs. time (Use X-Y Scatter Plot with points connected by smooth lines)

Using MS-Word

1. Create a neat and well-organized document which contains:
 - a. Your Name, Student ID, Date in upper right hand corner (Do NOT right justify. Change the left margin)
 - b. Computer Assignment (centered)
 - c. Given values listed above (make sure subscripts are correctly shown)
 - d. Equations (make sure subscripts and superscripts are correctly shown)
 - e. Table pasted in from Excel (label this table #1 with an appropriate description)
 - f. Graph pasted in from Excel (label this figure #1 with an appropriate description)

Computer Assignment

Given:

$$m = 100 \text{ (kg)}$$
$$g = 9.8 \text{ (m/s}^2\text{)}$$
$$h_o = 20 \text{ (m)}$$
$$v_o = 0 \text{ (m/s)}$$

Equations:

$$v = v_o + gt \text{ (m/s)}$$
$$h = h_o - v_o t - gt^2/2$$
$$KE = mv^2/2 \text{ (J)}$$
$$PE = mgh \text{ (J)}$$
$$KE + PE = \text{constant}$$

Results:

t (sec)	v (m)	h (m)	KE (J)	PE (J)	KE + PE (J)
0.00	0.00	20.00	0	19600	19600
0.10	0.98	19.95	48	19552	19600
0.20	1.96	19.80	192	19408	19600
0.30	2.94	19.56	432	19168	19600
0.40	3.92	19.22	768	18832	19600
0.50	4.90	18.78	1201	18400	19600
0.60	5.88	18.24	1729	17871	19600
0.70	6.86	17.60	2353	17247	19600
0.80	7.84	16.86	3073	16527	19600
0.90	8.82	16.03	3890	15710	19600
1.00	9.80	15.10	4802	14798	19600
1.10	10.78	14.07	5810	13790	19600
1.20	11.76	12.94	6915	12685	19600
1.30	12.74	11.72	8115	11485	19600
1.40	13.72	10.40	9412	10188	19600
1.50	14.70	8.97	10805	8795	19600
1.60	15.68	7.46	12293	7307	19600
1.70	16.66	5.84	13878	5722	19600
1.80	17.64	4.12	15558	4042	19600
1.90	18.62	2.31	17335	2265	19600
2.00	19.60	0.40	19208	392	19600

Table 1: Calculated Values for a Falling Object at Various Times

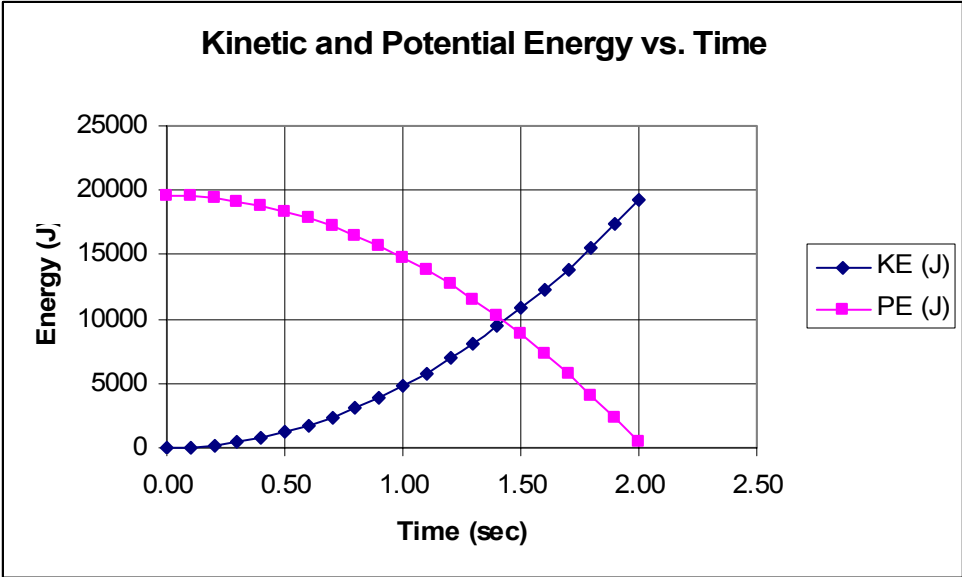


Figure 1: Kinetic and Potential Energy vs. Time