Wednesday, November 27/13
Physics 112/111

AARAO - Wednesday, Nov. 27

Walk About -> Grade 11 8:45-9:10
Grade 12 9:15-9:40

Grade 12 Only -> Session 1 -> 9:45-10:05
Session 2 -> 10:10-10:30
Session 3 -> 10:35-10:55

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1. Quiz: Work and Types of Energy -> Date - Tentatively Mon. - Dec. 2/13.
2. Check -> Textbook: Page 250, PP # 27, 29
3. Hooke's Law
4. Investigation 6A - Force and Spring Extension (Page 255)
   Read for HW

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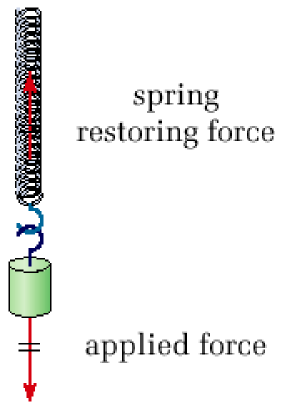
5. Elastic Potential Energy
6. Textbook: Page 261, PP #38-40

Hooke's Law

(Page 256)

When a force causes a spring to stretch or compress, the spring exerts a force in a direction that will return it to its original length. The force that the spring exerts is called the restoring force and it is equal in magnitude to the applied force that stretches or compresses the spring and acts in a direction opposite to the applied force.

Physics
McGraw-Hill
Page 255



Newton's 3rd Law

= mg

> Hooke's Law: The applied force or restored force is directly proportional to the extension or compression of a spring.

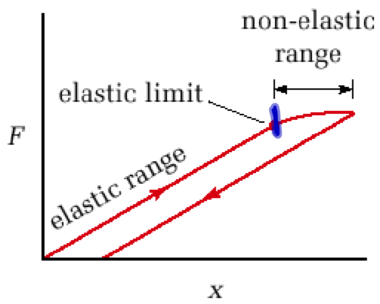
Hooke's Law

$$F_A = kx$$

F_A -> applied force (N)
k -> spring/force constant (N/m)
x -> elongation or compression (m)

PHYSICS FILE

A *perfectly elastic* material will return precisely to its original form after being deformed, such as stretching a spring. No real material is perfectly elastic. Each material has an elastic limit, and when stretched to that limit, will not return to its original shape. The graph below shows that when something reaches its elastic limit, the restoring force does not increase as rapidly as it did in its elastic range.



elastic limit.

Before	After
$F_A = kx$	~~$F_A = kx$~~

Lab Format

Title: Investigation 6A - Force and Spring Extension

Names:

Due Date:

Problem:

Equipment: retort stand, C-clamp, weight hanger and assorted masses, right-angled clamp, metal rod, coiled spring, meter stick

Procedure: Refer to page 255 in the physics textbook.

Observations:

Table 1

Mass on Hanger m (kg)	Applied Force* F (N)	Height of Hanger Above Desk h (m)	Extension of Spring** x (m)
0	0	h_o	0
		h	

* $F = mg$
** $x = h_o - h$

Analyze and Conclude:

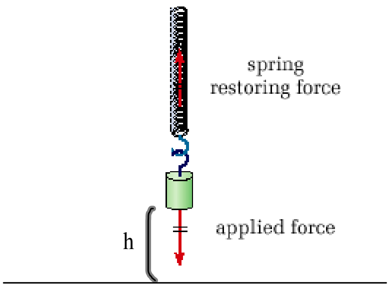
Answer #1-4, Page 255

Investigation 6-A
Force and Spring Extension
(Page 255)

INVESTIGATION 6-A
Force and Spring Extension

TARGET SKILLS
- Performing and recording
- Analyzing and interpreting
- Communicating results

Problem
What relationship exists between the force applied to a spring and its extension?



Equipment
- retort stand and C-clamp
- weight hanger and accompanying set of masses
- coil spring
- ring clamp
- metre stick

CAUTION Wear protective eye goggles during this investigation.

Procedure
1. Clamp the retort stand firmly to the desk.
2. Attach the ring clamp close to the top of the retort stand.
3. Hang the spring by one end from the ring clamp.
4. Prepare a data table with the headings: Mass on hanger, m(kg); Applied force, F(N); Height of hanger above desk, h(m); and Extension of spring, x(m).
5. Attach the weight holder and measure its distance above the desktop. Record this value in the first row of the table. This value will be your equilibrium value, h_0, at which you will assign the value of zero to the extension of the spring, x. Put these values in the first line of your table.

   h_o = 0.2070 m
6. To create an applied force, add a mass to the weight holder. Wait for the spring to come to rest and measure the height of the weight holder above the desk. Record these values in the table. h = 0.2000 m
7. Complete the second row in the table by calculating the value of the applied force (weight of the mass) and the extension of the spring ($x = h_0 - h$).
8. Continue by adding more masses until you have at least five sets of data. Make sure that you do not overextend the spring. 6

Analyze and Conclude
1. Draw a graph of the applied force versus the extension of the spring. **Note:** Normally, you would put the independent variable (in this case, the applied force) on the x-axis and the dependent variable (in this case, the extension of the spring) on the y-axis. However, the mathematics will be simplified in this case by reversing the position of the variables.
2. Draw a smooth curve through the data points. line of best fit
3. Describe the curve and write the equation for the curve. Skill Set 4 - Page 946
4. State the relationship between the applied force and the extension.

→ inversely // directly.

Attachments

Student ID re-takes 2013.doc