

Booklet # 53



Name: (5 minutes before the end of the class, I'll collect booklet # 53).

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Do now	<p>1a. What is force? What are the forces around us?</p> <p>1b. What is gravity? Who discovered it?</p> <p>1b. A force of 1000 N stretches a spring with a Spring constant of 10000 N/m? Find the displacement.</p> <p>1d. Okay, now tell me what is the relationship between the displacement of Spring and the mass of the object hanging on the spring? Can you write an equation modeling this relationship?</p>

Step # 1

1	Make a hypothesis		
	<p>"AMS Physics students have recently discovered a Planet which they named X (for lack of creativity). They want to make a trip to this new Planet X. So they need to find its acceleration of gravity. In order to do so, Mr. Bari, their physics teacher, asks them to make a hypothesis and test the hypothesis by following 14 steps. "</p> <p>H_0 = Null hypothesis</p> <table border="1"> <tr> <td>H_0</td> <td></td> </tr> </table>	H_0	
H_0			

Step # 2

2	Take and organize data that will help you verify the relationship between the displacement of Spring & the mass of the object hanging on the spring.									
	<table border="1" style="width: 100%;"> <tr> <th style="width: 50%;">Mass (Gram)</th> <th style="width: 50%;">D (CM)</th> </tr> <tr> <td>50 gram</td> <td></td> </tr> <tr> <td>100 gram</td> <td></td> </tr> <tr> <td>250 gram</td> <td></td> </tr> </table>		Mass (Gram)	D (CM)	50 gram		100 gram		250 gram	
Mass (Gram)	D (CM)									
50 gram										
100 gram										
250 gram										

Step # 4:

3	Clearly describe the relationship that you notice.

Step # 5:

4	Write an equation modeling this relationship and define your variable (Make sure your equation works for all of your data).

Step # 6:

5	Determine the masses of the green, gold, and red cylinders...																
	<table border="1" style="width: 100%;"> <tr> <td colspan="2"></td> <td style="background-color: #e0e0e0;">Mass of Planet X</td> </tr> <tr> <th style="width: 30%;">Mass</th> <th style="width: 30%;">D (cm)</th> <th style="width: 40%;">Mass (Gram)</th> </tr> <tr> <td>Green</td> <td></td> <td style="background-color: #e0e0e0;"></td> </tr> <tr> <td>Gold</td> <td></td> <td style="background-color: #e0e0e0;"></td> </tr> <tr> <td>Red</td> <td></td> <td style="background-color: #e0e0e0;"></td> </tr> </table>				Mass of Planet X	Mass	D (cm)	Mass (Gram)	Green			Gold			Red		
		Mass of Planet X															
Mass	D (cm)	Mass (Gram)															
Green																	
Gold																	
Red																	

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Step # 7 :

6	Now let's use only Spring # 3 with the stiffness on hard (Use the slider to do so)	
	Investigate the relationship between the displacement of a spring and the mass of the object hanging on the spring. Is it same or different?	
	Mass	D (cm)
	50 gram	
	100 grams	
	250 grams	

Step # 8:

7	Organize the data you take and express this relationship in an equation, defining your variables including units and identifying which is dependent and which is independent. Make sure your equation works for all of your data! How is this equation different than the previous equation?

Step # 9:

8	First calculate the Earth's acceleration of gravity and then let's go to the Moon and Jupiter! Take and organize data that will help you analyze the relationship between the displacement of Spring 1 or 2 and the acceleration of gravity of the planet the spring is on (We will do Earth, Moon and Jupiter).	
	Hang 50 grams onto Spring # 1:	
	Planet	Gravity (m/s ²)
	Earth	
	Moon	
	Jupiter	

Hang 100 grams onto Spring # 1:		
Planet	Gravity (m/s ²)	D(m)
Earth		
Moon		
Jupiter		
Hang 250 grams onto Spring # 1:		
Planet	Gravity (m/s ²)	D(m)
Earth		
Moon		
Jupiter		

Step 10

9	Show qualitative understanding: Clearly describe the relationship that you notice. Identifying which is dependent and which is independent variable.

Step 11

10	Show quantitative understanding: Write an equation modeling this relationship by hanging 100 gram mass onto spring 1.						
	<table border="1"> <tr> <th>Planet</th> <th>D (M)</th> <th>Gravity (m/s²)</th> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>	Planet	D (M)	Gravity (m/s ²)			
Planet	D (M)	Gravity (m/s ²)					

Step 12

11	Determine the acceleration of gravity on planet X, showing the data you have taken and the calculations you have done.

Step # 13

12	Accept or reject the hypothesis?		
	<table border="1"><tr><td>H_0</td><td></td></tr></table> <p>I accept / reject the hypothesis because _____</p>	H_0	
H_0			

Step # 14 (Homework)

13	Is it possible to make a trip to Planet X based on its Acceleration of Gravity? Explain your answer using the data.