Acme Scale's
Mathematical Analysis of
Marist Corp. and Immaculata Corp. Springs

The Problem: The cost of the springs we presently use in our mass scales have doubled. We have identified two companies that sell a comparable spring at a substantially lower price. The Marist Spring Corporation spring is approximately 22 cm in length, and the spring from the Immaculata Spring Corporation is 4 cm in length. We have decided to evaluate the quality of these springs based on the criteria below. We will pick the spring that best meets the criteria below.

The following objectives must be met before deciding which spring to purchase.

Purpose:

To:

a) determine the mathematical relationship between force and stretch for both springs.

b) calculate the spring constant of each spring using the slope of an F vs. x plot

c) identify the spring that comes closest to exhibiting the properties of an ideal spring ***(NOTE x = stretch)***

Notes from teacher discussion:

_____

_____

_____

_____

Each person in your group should:

1. Plot F vs. x (stretch) for **each** spring

a) Include a title for each plot, i.e. Marist Spring Data or Immaculata Spring Data
b) Add the best fit line for both plots

_____ # _____ Regents Physics

Section _____

Spring Constants Lab

Introduction (Use your notes and summarize, in a paragraph, what you know about an Ideal Spring. Define the term and describe the F vs x plots this type of spring produces. Do this in a paragraph. Define the term spring constant. **(6 pts)**

_____

_____

_____

_____

Purpose:

a) determine the mathematical relationship between force and stretch for both springs.
b) calculate the spring constant of each spring using the slope of an F vs. x plot

c) identify the spring that comes closest to exhibiting the properties of an ideal spring ***(NOTE x = stretch)***
d) Use your spring to find the value of an unknown mass

Materials

- Immaculata Spring, Marist Spring
- Spring Mount
- Variety of Masses

Procedure (5 pts)

1._____

2._____

3._____

4._____

Data (5 pts)

Marist Spring

Unstretched Length _____**__1.0 kg maximum**

_____ (kg)	_____ (N)	Stretch (cm)
0	0	0

Immaculata Spring

(190 gm MAX)

_____ (kg)	_____ (N)	_____ (cm)
0	0	0

Name _____ # _____ _____ # _____

_____ # _____ _____ # _____

Spring Scales Analysis

Full Sentence (3 pt) Correct Answer **(4 pts)**

1. What was the mass in kg of the metal cube you were given? Show how you obtained your answer.

2. Which of the two springs you tested was most ideal? Marist or Immaculata? **Explain**

3. What is the mathematical relationship between force and stretch for the spring that was most ideal? **(5 pt)**

4. What is the value of the spring constant for the most ideal spring? (include units)

Equation Substitution with Units Answer with units

5. What stretch would be produced if the Immaculata spring had a 2 N weight on it?

Equation Substitution with Units Answer with units

6. What stretch would be produced if the Immaculata spring had a 250-gram mass on it? (Be sure to convert)

Equation Substitution with Units Answer with units

7. If you stretched both springs you tested in this lab by 4.0 cm, which spring would have the greater potential energy? **(3 pts)** Write the PE formula for spring and use it to explain your answer. **(6 pts)**

8. Which spring was stiffer, Marist or Immaculata? Use your data to support your answer. Be specific.

Plot F vs x with F on the y axis. Put your plots after this page **(28 pts)**