2010

Effective use of web-based homework in high school physics

Elizabeth Pullig Hitt
Louisiana State University and Agricultural and Mechanical College

EFFECTIVE USE OF WEB-BASED HOMEWORK IN HIGH SCHOOL PHYSICS

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Natural Sciences

in

The Interdepartmental Program in Natural Sciences

By Elizabeth Pullig Hitt
B.S., Louisiana State University, 1979
August 2010

ACKNOWLEDGEMENTS

I would like to express my gratitude to my committee chair, Dr. Steve Watkins, for encouraging me, guiding me, teaching me, and challenging me. To my committee members, Dr. Dana Browne and Dr. Michael Cherry, your leadership and guidance to me personally and to our cohort has been invaluable. To Dr. James Madden and Ms. Sharon Beeson, thank you for all the time and effort you gave not only to make this program happen, for sustaining it and insuring that we had the necessary tools to obtain our Masters of Natural Science degree. To Dr. M. Jayne Fleener, Dean of the College of Education, who not only inspired me to pursue my Masters degree but also informed me of this program, sending me the information to get the process started.

I would also like to thank the members of our Physical Science cohort; each one has taught me and encouraged me, through our years together, to move toward our common goal of our masters' degrees.

I would also like to thank those from Parkview Baptist School, Superintendent, Dr. Melanie Ezell; Dean of Students, Ms. Jill Cowart; and Science Department Chair, Mr. Shawn Liner, for their help and encouragement in making it possible for me to be part of this program.

Thank you to my husband Joe and our children; Rachael, Matt, Lyle, Anna, Mason, and Tucker, who not only encouraged me to pursue my Masters but also took up the slack in making sure family matters were all taken care of. I am truly blessed to have you all in my life.

I would like to dedicate this thesis to my father Dr. R. M. Pullig, who actually obtained his Masters degree here at LSU in 1939 while living in the football stadium dormitory. His quest for knowledge and his gift as a teacher made him an incredible physician and an incomparable role model for me, his youngest daughter. I have often thought of his "large footsteps" leading

the way for me here at LSU; though he always thought I would follow his lead in becoming a physician, I believe that my choice to persevere through this particular program would honor the life he lived.

.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF GRAPHS

ABSTRACT

High school physics tests and web-based homework grades were analyzed to determine if web-based homework improves test grades; if the number of web assignments before a test affects the test grade; and if the length of the web assignment affects the number of students that complete the homework assignment.

The test grades of students who did their homework were compared to test grades of students who did not do their homework; the assumption was that doing web-based homework improved test grades at this school during the four years studied. The homework group scored seven points higher on average than the group that did not do homework. A two-tailed t-Test verified this difference.

Analysis II involved students' test grades arranged into four categories which corresponded to the number of web homework assignments per test: 1:1, 2:1, 3:1, and 4:1. Mean test scores were analyzed. It was found that having three or four homework assignments before a test produced much higher test grades, whereas one or two assignments produced no significant increase. ANOVA confirmed the statistical significance among the four groups.

Analysis III compared the length of the assignment to the number of students who did not do the assignment. Results showed that a greater number of students failed to complete the shorter assignments.

INTRODUCTION

Homework is a commonly used method of reinforcing classroom topics to give the students repetition to master a topic or a process skill. Some homework methods are better than others and some students take it more seriously than others. Occasionally a student will insist that they fully understand the material without homework.

Traditional homework is generally given by instructors at the end of each section or topic within a unit, using end-of-section problems from the textbook, worksheets that come with the textbook or teacher-made worksheets. Most homework provides reinforcement and repetition of a particular skill or introduces a new topic. In high school physics, in particular, homework helps students understand the principles behind the problems and see that there are different ways of applying those principles to problems beyond those covered in class.

Whatever type of homework it is, it must be graded in order to be effective. An article reporting research conducted at Texas Tech University by Cheng, Thacker, Cardenas, and Crouch in 2002, compares ungraded homework with online graded homework:

> The increase in the average force concept inventory normalized gain was statistically significant for all students taught with online homework, indicating that graded homework increases student understanding of physics concepts.(Cheng et al., p.1447)

The effectiveness of automatically graded, web-based homework versus TA (teaching assistant) graded, paper-based homework has been well researched and documented. Summing their research up in an article published in *The Physics Teacher* entitled "Online Homework: Does It Make a Difference?" Bonham, Beichner, and Deardorff wrote:

> Web-based homework is a viable alternative to the traditional paper-based approach. It does not bring significantly greater benefits to students, but neither does it do much worse than standard methods of collecting and grading homework…Web-based homework may also allow for more pedagogically

> sound instruction by freeing up instructor resources for other aspects of the course or by enabling new kinds of assignments that may be more valuable than traditional paper and pencil ones. Technology alone is not going to improve instruction, but web-based homework has a rightful place in the physics instructor's toolbox. (Bonham et al.,p. 269)

In the same article, the authors addressed the length and frequency of assignments.

> The major significant difference found between paired sections was for the calculus (calculus based Physics) section's homework scores-(81%) versus the paper based homework (76%)….The web section may have done better because they had the opportunity to resubmit assignments or alternatively, because they had three short assignments a week as opposed to one long one like their paper-based colleagues. This difference was not seen in the algebra-based physics course, where both sections had one long assignment a week. (op. cit., 294-295)

Professors commonly assign one large web-based homework assignment per unit; this is the most time efficient method for the instructor because once the problems have been selected and the assignment has been scheduled, he does not have to go back to it until he is ready to collect the grades. Alternatively, the practice recommended by WebAssign is to assign fewer problems more frequently. On their website, under *faculty support, best practices and tips,* it states:

- Schedule frequent, but shorter assignments. www.webassign.net

On that same website, John Risley has an article entitled *Motivating Students to Learn Physics Using and Online Homework System.* He states

> This critical grading task can be virtually eliminated by using online homework grading systems. Students will receive immediate feedback, and instructors can offer more frequent, shorter assignments to keep students up to date on the course material.

More work is required of the instructor to make shorter, more frequent assignments because each has to be compiled, scheduled and recorded separately. Whatever the time

constraints are for the instructor, the ultimate goal should be for the students to master the material. If shorter, more frequent web assignments help in that process, this needs to be emphasized in any teacher's pedagogy and lesson plans.

There are many avenues for this type of web-based homework; the one used in this research is WebAssign (www.webassign.net). The research presented here addresses three questions:

1) Does web-based homework raise test grades?
2) Do more frequent web assignments raise test grades?
3) Does the length of the assignment affect the student's tendency to do the assignment?

Included in the WebAssign data bank are textbook questions and problems that correspond to the textbook used in my classes. Most textbooks used on the college and high school levels are included in this data bank. When setting up an assignment, I decide how many problems and which ones to include as well as the amount of submissions and how long the students have to complete the assignment. With this flexibility, I as the teacher am able to adjust both the size of the assignment and how many to schedule before the test.

Another great advantage in using online homework is that the students get immediate feedback on their answer. When the student incorrectly answers a problem, he can go back, rework the problem and resubmit a, hopefully correct, answer. The homework grades tend to be higher than regular paper-based, graded homework because students can get full credit for the corrected answer. Optimally, having a chance to look over the material and find their error will encourage mastery of the material. The student does not work the problem just once and assume it is right, only to find out the next day that he had answered incorrectly. There is extra

motivation built in for the student to persevere with difficult problems until he gets the answer correct because he has the opportunity to receive full credit when and if he gets the answer right. Often when watching a student battle over a problem I will hear a resounding "YES!" in response to the green checkmark informing him that his answer was correct.

In the same study mentioned above (Bonham et al.),

evidence was presented which compared paper-based homework graded by teaching assistants to web-based homework at North Carolina State and the University of North Carolina:

> To help resolve some of these issues, we have conducted a study of computer-graded homework versus human-graded homework in large introductory-physics courses. The study compared the performance of students using an online homework system to those submitting their work on paper in the traditional manner…
>
> In one section students submitted their work to WebAssign for grading (with resubmissions allowed), while students in the other section turned in their homework on paper to a graduate teaching assistant (TA), who spent 15-20 hours a week thoroughly grading the assignment.
>
> Student learning was measured by multiple-choice and written problems on exams and quizzes, along with the Force and Motion Concept Exam (FMCE)9 in the calculus (calculus-based physics) course. Students were also surveyed, and some were interviewed…Looking at the rest of the course, the major significant difference found between paired sections was for the calculus section's homework scores — 81% versus 76%. The web section may have done better because they had the opportunity to resubmit assignments or, alternatively, because they had three short assignments a week as opposed to one long one like their paper-based colleagues. This difference was not seen in the algebra (algebra-based physics) course, where both sections had one long assignment a week. (op. cit., 293-294).

Web-based assessment and testing systems (WATS), in general, refers to the type of assessment that evaluates these systems and their usage. In their article "Education Research Using Web-Based Assessment Systems," Bonham, *et al*. wrote:

> The growth of the Internet, and in particular the World Wide Web, is already influencing the way science is taught and will undoubtedly do so to greater extent in the future. One important facet of this is the development of web-based assessment and testing systems… The adoption of WATS for student work in physics is being driven in part by the promise of reduced grading load and the provision of more immediate feedback to students.

WebAssign reports that 1,500 universities worldwide use their services for 300,000 students in mostly physics, chemistry and math. In addition to WebAssign, there are many other web-based homework sites, indicating that web-based homework is growing rapidly. Many universities have their own web-based homework sites in addition to using WebAssign or other sites on the World Wide Web.

PURPOSE

My goal in this thesis is to determine what has worked best for increasing my students' grades in four years of using web-based homework in high school level physics. These results should not only help me with future classes but also help other instructors of classes in which web-based homework would help in teaching their students.

The purpose of the research presented here is to see if shorter, more frequent web-based homework assignments increase students' mastery of the material as measured in their test scores. Online homework, WebAssign in this case, is not an answer for all homework woes but it is a tool that serves both the student and the teacher.

In my first two years of using WebAssign, 2006-2007and 2007-2008, most units included one web-based homework assignment reinforcing lecture material in preparation for the unit test. Each assignment was lengthy and included a large range of information. In the summer of 2008, while tutoring LSU Physics students in their WebAssign homework, I was able to interview a representative from WebAssign, Mr. Dan Linville. Mr. Linville said that the company recommends that the assignments be shorter and that there should be more than one assignment per unit. This had been a recommendation from some teachers that use WebAssign and it was a method that had worked well for them. After that interview, I decided to split my assignments into shorter, more frequent assignments designed to reinforce the concepts and problems taught in the various sections within the unit. During the 2008-2009 and 2009-2010 school years, I was able to implement this plan and now have data from those school years that reflect assignment-to-test ratios of 1:1, 2:1, 3:1, and 4:1.

My purpose in this research is to analyze test scores to see if any of the following variations of web-based homework has had any effect on students mastery of the material

presented: What is the most effective way of using web-based homework in high school physics? Does the number of assignments during one unit affect the unit test grade? Does the length of the assignment have an effect on the unit test grade? Will shorter assignments help the students learn the material more thoroughly?

PROCEDURE

The data presented in this research were collected over the past four years from high school physics classes at Parkview Baptist High School in Baton Rouge, Louisiana. The classes were composed of juniors and seniors who had future plans to attend college; they were not, however, in honors or Advanced Placement physics. In order to compare one year of students to another, I obtained average composite ACT scores for each group studied. These scores are shown in the table below. Scores for recent 2010 graduates were not yet available.

Table 1. ACT Scores graduating classes used in this study. Similarities in the scores indicate that the classes are similar in aptitude.

Graduation Year	Average Composite ACT Score
2007	24.28
2008	23.61
2009	23.67
2010	Information not yet released

The number of students per class fluctuated somewhat due to the number of physics classes that I taught in that year. Average class size for all years came to 20.25 students. Table 2 shows the number of students taught per year. Appendix B contains the breakdown of the number of students in each section of each year included in the data.

In my study, I used grade books from school years 2006-2007, 2007-2008, 2008-2009, and 2009-2010. I extracted only the WebAssign grades and the unit test grades from complete sets of grades in my grade books. I organized the data on Excel worksheets, by year, pairing up the web homework grades with the test grades on that same topic. All grades were converted to percentages grades, and if there was more than one homework assignment, those were averaged to get one web homework grade for each test grade. These data are located in AppendixA.

In order to determine if homework affects test grades, test grades for the students who did not do their assignment(s) were compiled and compared to test grades for students who had done

Table 2. The number of students per year. Of these students, test grades were included in the data analysis I and II of only those who had done the assignment. Those who had not done the assignment were counted in the analysis III.

Class year	Number of students
2006-2007	79
2007-2008	107
2008-2009	80
2009-2010	58

their homework. Means were determined for each set of students and those means were compared in several ways for Analysis I.

For Analysis II, test grades were categorized according to the number of homework assignments in the same unit. The highest number of web assignments per test was four. The categories, represented by ratios, include 1:1(one web assignment to one test), 2:1 (two web assignments to one test), 3:1 (three web assignments to one test) and 4:1 (four web assignments to one test). After the students' test grades were divided into these categories, the means were calculated and analyzed to see if any statistical difference appeared to be caused by the frequency of the homework. ANOVA software was used in this analysis to compare the four groups for variance among the groups.

Continuing to look at the effect of homework assignment frequency categories 1:1 and 2:1 were combined and compared to a combined group of 3:1 and 4:1. Means were calculated for the two groups and analyzed to determine if there was a statistically significant difference in the groups.

In Analysis III, the length of the web-based assignment was considered in the following way: the number of students who did not do the web homework was compared to the length of the assignment. The decision to test this specific data set was derived from an interview with a student named Ally. I asked her if she preferred the longer or shorter web homework assignments and which ones helped her the most. She said, "Honestly, Mrs. Hitt, the longer ones helped me the most because I made sure to do them. The high point value would affect my grade more than the small ones. Sometimes, I didn't even do the small ones."

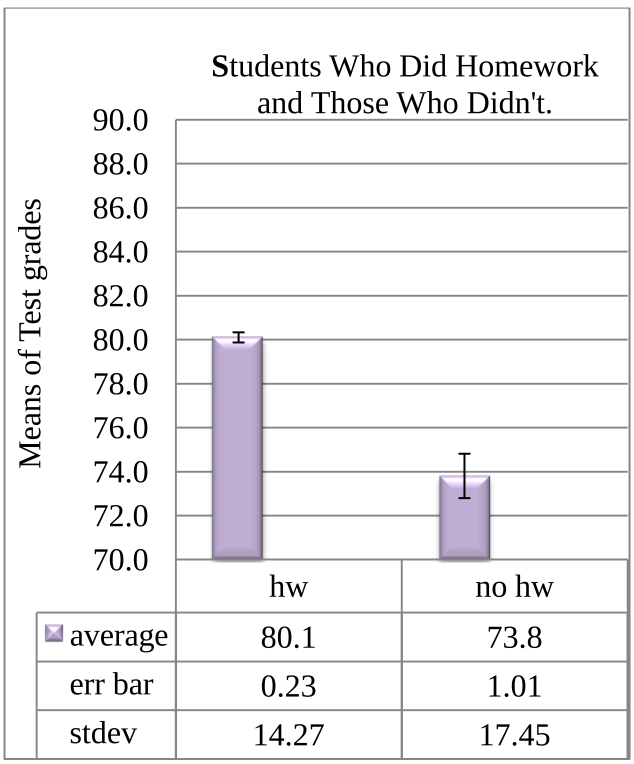
Following my conversation with Ally, I went back to the WebAssign data bank for my classes and transferred those grades to Microsoft Excel to analyze the entire data table, composed of point values of homework assignments and the percent age of students who did not do the assignment. In organizing these data, I compiled a list of assignments by topic and point value. Next, I counted the number of students who did not download or submit that assignment from the WebAssign website. I also included those students that received a zero as a grade. The resulting analysis, Analysis III or Ally's Analysis, is composed of two points.

The first part divided the homework assignments into two groups by homework point value. The lower point value group was composed of assignments worth 7-22 points; the higher point value group was composed of assignments worth 23-58 points. Means were calculated for both groups; they were compared on a bar graph and analyzed to see if a statistically significant difference exists in the percentage of students who did not do the smaller assignments as compared to the larger ones. The second part of this analysis divided the set of data into three groups by increasing point value to see if there was a trend from high to low. The three groups represented the following point values for homework assignments: 7-15 points; 16-27 points; and

29-57 points. Percentages of students who did not do the assignments in the three groups were compiled and their means were calculated and analyzed using ANOVA.

RESULTS

In Analysis I, test scores of students who did their homework were compared to test scores of students who did not do the web homework. Appendix C shows the data extracted from the grade book spreadsheet used to find the means of the students' test grades who did not do their homework. Means of the students' grades who did their homework were then compiled from the remaining data. The total number of grades representing students who did their homework was 3869; these data were compared to the 298 who did not do their homework. Graph 1 and Table 3 show the results of the analysis of these following two calculated test grade means for the two groups: 80.08 ± 0.23 for those who did their web homework and 73.80 ± 1.01 for those who did not do their web homework.



Graph 1. Analysis I comparison of test averages between two homework groups, students who did their homework and those who did not.

Table 3. Analysis I summary and t -Test results

	hw	no hw
Mean	80.08	73.80
Variance	203.71	304.54
Observations	3869	298
Hypothesized Mean Difference -		0
Degrees of freedom	328	
t Stat	6.06	
p-value: two-tail	3.77 $X10^{-9}$	
t Critical two-tail	1.97	

The graph, t-Test and p-value all confirm that there is a statistically significant increase in test grades for students that do web-based homework.

In Analysis II, test grades for students who attempted and/or completed all their web assignments were divided into four categories by the number of web assignments completed before that test. Table 4 shows mean grades and homework information. The full list of 3,869 grades used to calculate the means can be found in Appendix A. Table 4 also shows the number of assignments related to each resulting test grade as well as how the number of web assignments varied each year.

Analysis II-a compares four sets of data representing categories of one web assignment per unit test (1:1), two web assignments per unit test(2:1), three web assignments per unit test (3:1), and four web assignments per unit test (4:1). Table 4 shows the test means sorted by these ratios. It also shows the number of test grades used in those means. The purpose of this analysis was to determine if frequency of homework assignments influences test grades.

Graph 2 summarizes the information in Table 5. There is an apparent increase in grades for homework to test ratios above 2:1. To determine if this is a statistically significant difference, a single factor Analysis of Variance was used to test the significance in the difference in the means of these four groups. The most significant value in the results on Table 6 is the p-value of 0.28 which indicates that there is a 28% chance (95% confidence level) that the difference could be caused by a factor other than homework frequency among these groups.

Table 4. Analysis II, summary of data organized by years. (w-hw = web homework)

Test topic	year	Class size	Test ave	Test stdev	# w-hw	pts / w-hw	ave w-hw	wa stdev
2006-2007								
Math for Phys	06-07	77	78.8	13.3	2	29; 43	90.9	14.6
Motion	06-07	72	76.5	16.8	1	18.0	89.9	27.9
Vectors	06-07	76	87.6	12.5	1	18.0	98.4	12.6
Forces, Friction	06-07	65	86.0	7.9	1	30.0	77.4	32.5
Projectile motio	06-07	75	81.1	14.3	1	18.0	83.0	26.2
momentum	06-07	74	75.4	12.3	1	12.0	78.9	30.0
simple machines	06-07	76	77.9	11.2	1	25.0	82.3	22.4
energy and elec	06-07	66	88.6	8.0	2	14; 34	86.2	23.9
Thermal energy	06-07	69	83.4	15.0	1	14.0	77.3	33.8
Nuclear energy	06-07	72	84.8	11.8	1	58.0	96.6	23.9
Waves	06-07	75	73.9	16.9	1	27.0	77.8	26.9
2007-2008								
Math for Phys	07-08	98	71.6	12.6	2	23; 29	86.2	10.7
Motion	07-08	100	76.3	13.5	1	19.0	90.5	14.8
Gravity	07-08	95	86.8	10.8	1	19.0	94.8	7.1
Vectors I	07-08	97	74.8	13.6	1	25.0	98.1	5.1
Vectors II	07-08	94	84.2	12.8	1	35.0	73.9	19.7
Forces, Friction	07-08	95	77.7	9.8	2	13; 23	85.7	17.1
Projectile motio	07-08	93	81.5	10.8	1	18.0	84.1	24.4
Momentum	07-08	102	84.6	9.7	1	29.0	82.4	22.3
Work andPower,	07-08	104	85.3	10.5	1	43.0	84.0	20.6
Energy and Elec	07-08	94	74.6	13.6	2	14; 52	87.2	15.5
Thermal energy	07-08	99	67.6	15.8	1	14.0	81.5	22.6
Waves-sound	07-08	89	84.0	10.8	1	27.0	82.2	20.1
Light and Color	07-08	97	88.2	10.9	1	19.0	84.6	19.8
Nuclear energy	07-08	100	77.5	12.8	1	58.0	95.7	13.0
2008-2009								
Math for Phys	08-09	77	72.8	13.5	1	93	87.1	7.4
Motion	08-09	76	78.6	11.2	2	18	90.3	12.4
Gravity	08-09	75	84.9	12.7	1	19	91.3	16.7
Vectors I	08-09	70	72.8	17.0	1	25	90.2	22.2
Vectors II	08-09	76	84.8	11.0	1	18	83.9	14.0
Forces, Friction	08-09	69	76.7	13.2	3	14; 23; 26	89.5	20.5
Projectile motio	08-09	60	80.3	14.2	2	10 ; 11	89.7	13.2

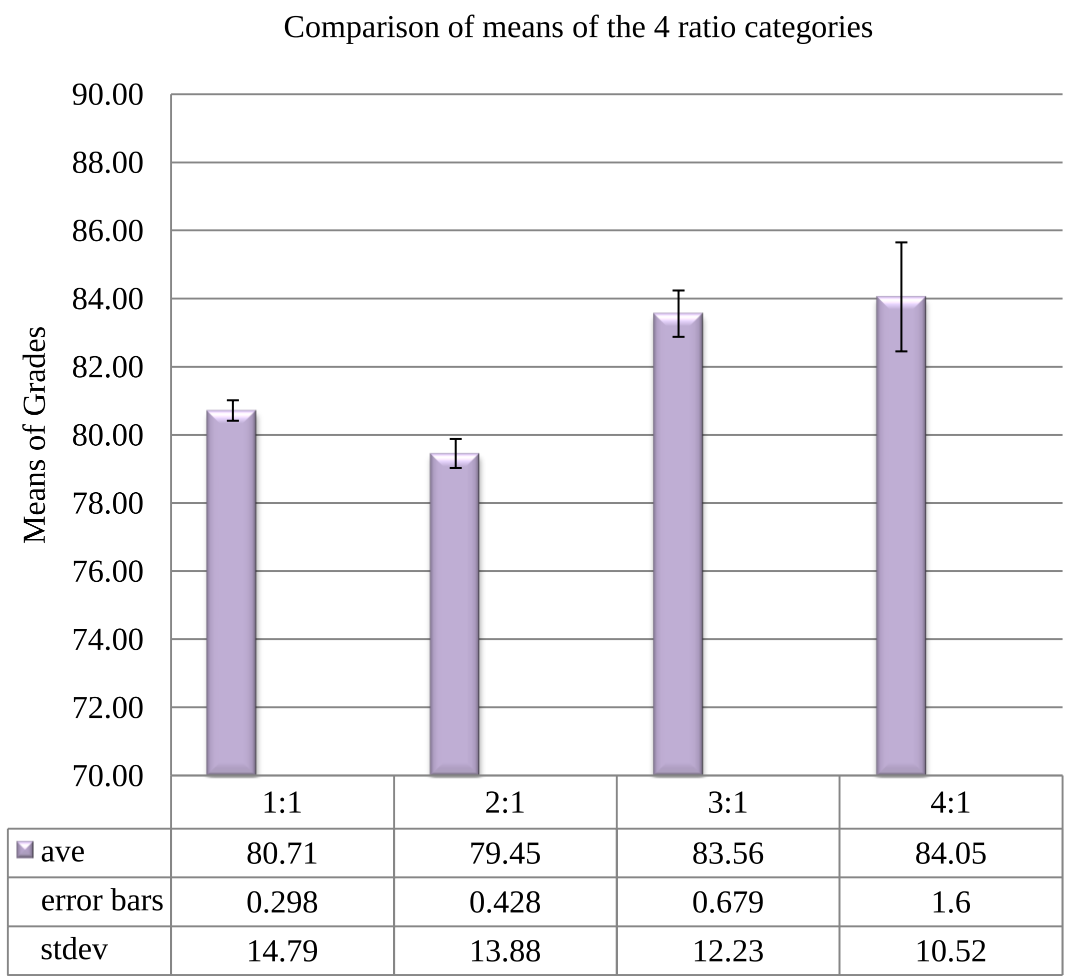
(Table cont'd)

Pendulum	08-09	75	87.7	9.4	1	18	88.7	18.2
Momentum	08-09	68	86.6	10.2	2	19; 23	85.3	19.6
Simple machines	08-09	71	82.4	11.4	2	17; 25	91.5	11.9
Energy and Electricity	08-09	71	81.7	12.2	3	14;47; 51	95.3	5.2
Thermal energy	08-09	68	76.1	17.9	1	14	82.6	25.4
Thermal expansion	08-09	72	79.5	18.5	2	30; 8	88.8	13.2
Nuclear energy	08-09	78	77.8	13.4	1	58	97.3	7.0
Waves	08-09	68	81.9	11.5	3	13;27 ; 31	87.8	15.9
2009-2010								
Math for Phys	09-10	54	77.4	11.4	2	29; 43	94.6	77.4
Motion	09-10	53	82.0	8.3	2	18; 18	91.8	8.9
gravity	09-10	48	90.3	15.7	2	19; 7	90.3	15.7
Vectors I	09-10	45	82.4	13.4	2	19; 11	86.3	14.7
Vectors II	09-10	53	83.5	12.7	1	17	81.5	21.8
Forces, Friction	09-10	45	83.2	10.5	3	12; 11; 33	90.8	11.6
Projectile motion	09-10	40	93.3	10.1	3	10; 15; 16	89.1	7.1
Momentum	09-10	48	91.9	7.0	3	10; 20; 8	89.2	14.0
Work, Power, Simple machines	09-10	43	84.0	10.5	4	29;16;15;7	92.5	11.6
Energy	09-10	51	84.9	11.2	2	14; 14	97.5	4.3
Electricity	09-10	52	91.5	8.3	1	27	98.3	5.1
Thermal energy	09-10	12	90.3	7.1	2	11; 18	94.0	9.1
Nuclear energy	09-10	54	76.1	16.4	2	23; 57	97.6	5.6
Waves	09-10	52	78.6	14.3	2	13; 25	87.6	14.0

The greatest difference, however, is noticed in the bar graph between the ratios of 2:1 and 3:1. In the next analysis, Analysis II-b, the combined group of lower frequency assignments to test ratios (1:1 and 2:1) were compared to a combined group of higher frequency ratios (3:1 and 4:1). Graph 3 and Table 7 show the difference to be significant with a p-value near zero using a two-tailed t-Test. Results indicate that more than 2 web assignments increase a student's score on the test grade.

Table 5. Analysis II-a data summary.

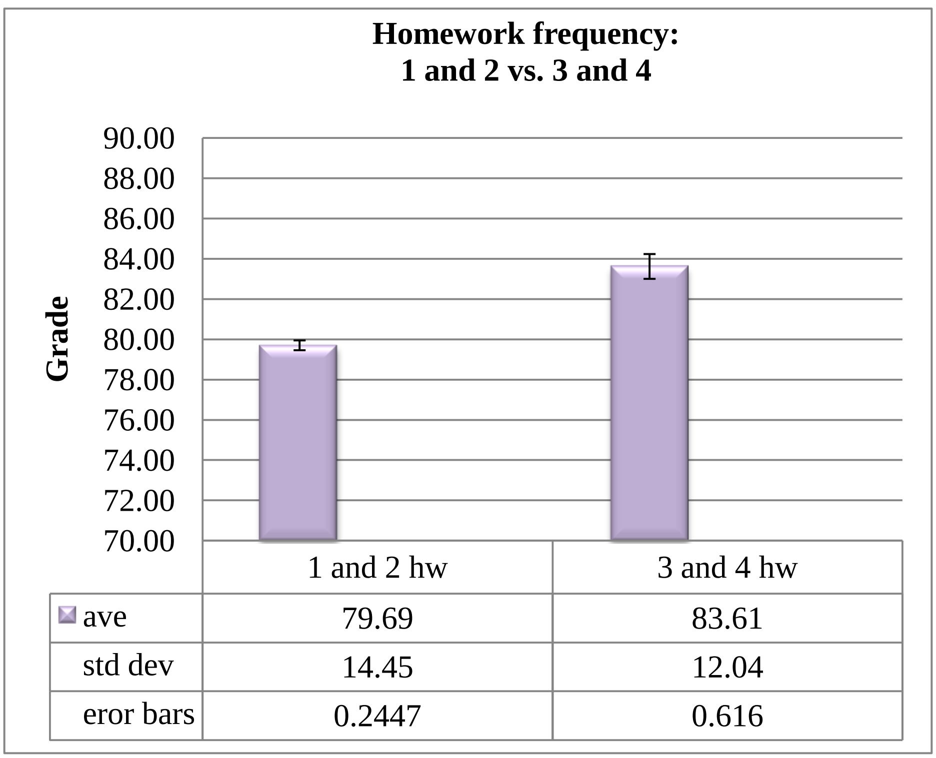
Ratios	1:1	2:1	3:1	4:1
Count	2423	1064	339	43
Mean	79.80	79.45	83.56	84.05



Graph 2. Analysis II-a: Means of grades, shown in categories of web homework frequency per test.

Table 6 . Analysis II-a, ANOVA results.

SUMMARY				α=.05		
Groups	Count	Sum	Average	Variance		
1: 1	2423	19,3359.5	79.80	215.81		
2: 1	1064	84,536.38	79.45	192.56		
3: 1	339	28,325.71	83.56	149.50		
4: 1	43	3614	84.05	110.71		
ANOVA						
Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squared	F	P-value	F crit
Between Groups	5382.12	3	1794.04	8.86	7.52×10^{-6}	2.61
Within Groups	78,2568.9	3865	202.48			
Total	78,7951	3868				



Graph 3. Analysis II-b: Bars represent means of test grades of students who did the number of web homework assignments labeled below the bars.

Table 7. Analysis II-b data and t-Test results. Summary of data of two sets of averages sorted by frequency of homework per test.

t-Test: Two-Sample Assuming Unequal Variances		
Homework frequency number	1 and 2	3 and 4
Mean	79.69	83.61
Variance	208.69	144.85
Observations	3487	382
Hypothesized Mean Difference 0.00		
df (degrees of freedom)	509	
t Stat	5.91	
p-value, two-tail	0.00	
t Critical two-tail	1.96	

Analysis III, Ally's analysis, compared the length of web homework to number of students who did not complete the assignment. In this analysis, the student's tendency to skip the assignments with a lower point value and complete the assignments with higher point value is explored. The data used for this study are found on Table 8. The percentage of students assigned the homework was compared to the percentage who did not do the assignment.

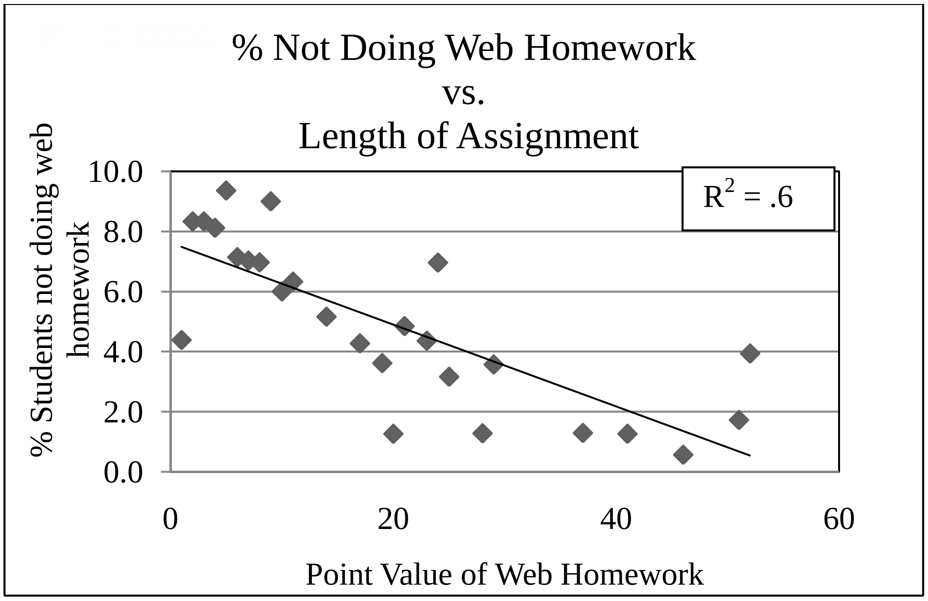
These data were analyzed in two ways. Graph 3 shows a relationship indicating that the greater the point value of the assignment, the smaller fraction of students who did not do it.

Pearson's coefficient, R^2, is a statistic that will give some information about the goodness of fit of a model. In regression, the R^2 coefficient of determination is a statistical measure of how well the regression line approximates the real data points. An R^2 of 1.0 indicates that the

Table 8. Analysis III data on homework length. These data reflect the length of homework assignments to the percent of students who did not do the assignment.

H/w totals	# did not do hw	# assigned hw	% that did not do hw
7	5	114	4.4
8	18	216	8.3
9	1	12	8.3
10	22	271	8.1
11	19	203	9.4
12	4	56	7.1
13	22	313	7.0
14	49	703	7.0
15	9	114	7.9
16	6	137	4.4
17	5	79	6.3
18	34	876	3.9
19	19	385	4.9
20	8	155	5.2
23	10	234	4.3
25	17	470	3.6
26	1	79	1.3
27	16	330	4.8
29	28	642	4.4
30	11	158	7.0
31	5	158	3.2
34	1	78	1.3
35	2	56	3.6
43	3	232	1.3
47	1	79	1.3
52	1	176	0.6
57	1	58	1.7
58	10	254	3.9

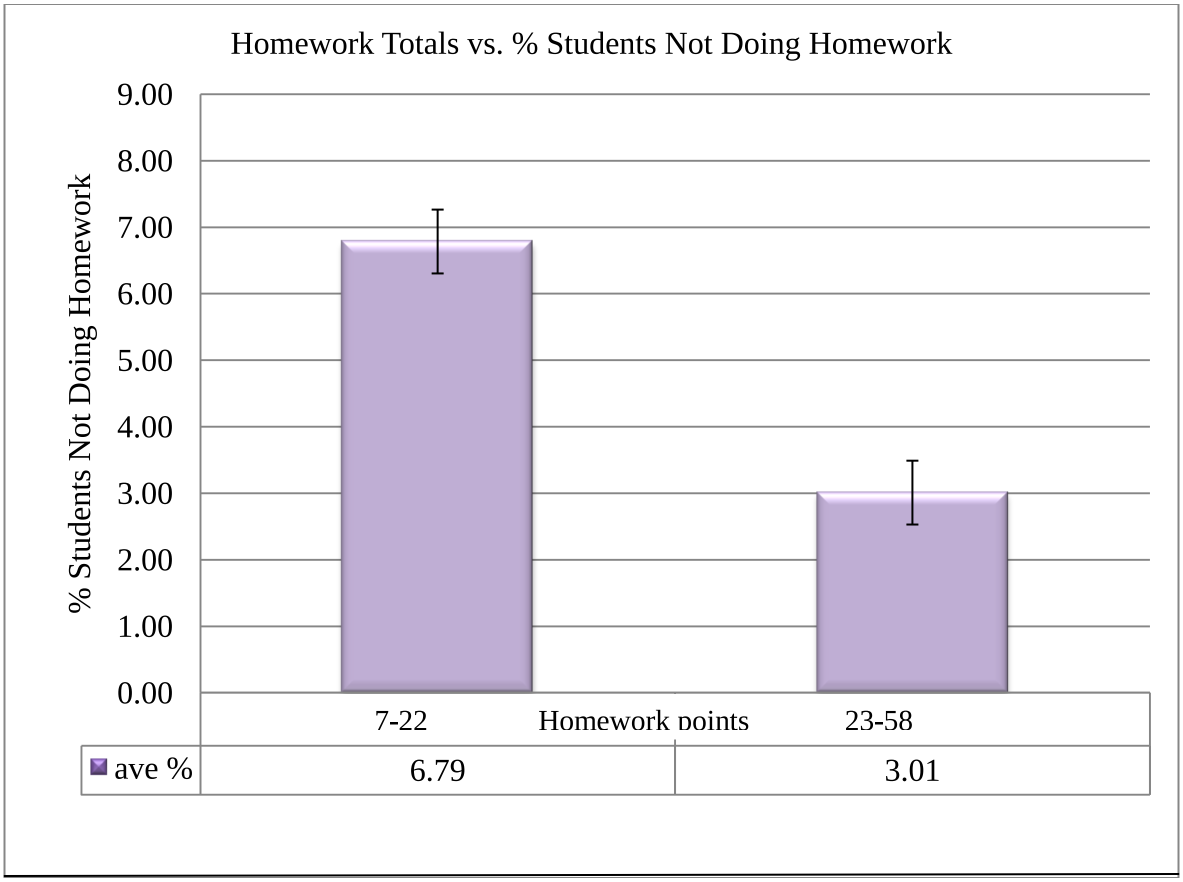
regression line perfectly fits the data, 100% of the data points on the best line fit. In Graph 3 the R^2 value of 0.6 indicates that 60% of the data points are on the best line fit. This is a decent statistic which validates the apparent relationship among the data.



Graph 4. Analysis III-a shows the scatter plot of percent of students not doing their homework of certain lengths. The best fit line indicates a relationship between the length of homework and the percentage of students who did not do the assignment.

In order to further validate this trend, I divided the data first into two groups to determine if the variation in the means is significant. The two groups were based on the homework point values: 7-22 points and 23-58 points. Graph 5 shows the results of this analysis; the t-test results and summary for the data are in Table 9.

Analysis III-c involved separating the test data into three groups; group one includes homework of point value 7-15 points, group two homework point value varied from 16-27 points, and group three included the high point value homework of 29-57 points. In comparing the graph of the means the decrease in the percentage of students who did not do the homework decreased as the point value of the homework increased, see Graph 6.



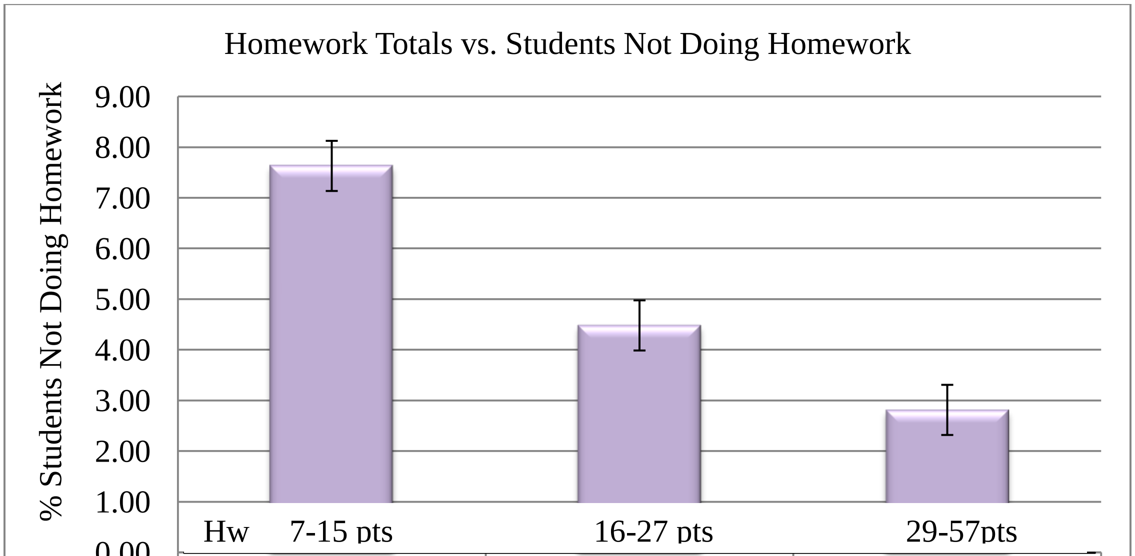
Graph 5. Analysis III-b bar graph showing means of percent of students not doing homework of point values divided into two groups, 2-22 point value and 23-58 point value.

Table 9. Analysis III-b summary of data and t-Test results. Statistical results for testing means of two sets of percentages of students not doing web homework are presented.

t-Test: Two-Sample Assuming Unequal Variances		
Point value of homework	7-22 points	23-58 points
Mean of % students not doing hw	6.79	3.01
Variance	3.02	3.36
Observations	14	14
Hypothesized Mean Difference	0	
df	26	
t Stat	5.59	
p-value, two-tail	7.05×10^{-6}	
t Critical two-tail	2.06	

ANOVA was used to study these sets of data to investigate whether or not the difference between the means was statistically significant. Table 10 displays a summary of the data and the results of the ANOVA. The p-value of 6.7×10^{-6} with $\alpha = 0.05$ suggests this difference is real: homework size caused the difference in the percent of students doing the work.

I created an online survey using *Survey Monkey* to obtain insight into the thought processes of my high school physics students. The entire survey and results may be viewed in Appendix C. The survey was given to the students at the end of the 2010 school year after grades had been completed. One question investigated the students' attitudes toward large assignments. 81% of those responding chose the answer, "I took it seriously because of point value." One student even commented in the free response area, "The webassigns that counted for a high amount of points helped because I did them. The ones that were only seven and eight points hurt my grade because I completely disregarded them."



	1	2	3
ave%	7.63	4.48	2.81

Graph 6. Analysis III-c bar graph showing three means of the percentage of students not doing the assignments. The three sets of data represent homework points divided into the lower third of point value, the central third and the upper third.

Table 10. Analysis III-c ANOVA and summary of data. Compares the three means of the percentage of students not doing web homework. The point values for the three sets of tests are in parenthesis by the column numbers.

Anova: Single Factor						
SUMMARY						
Groups, Homework value	*Count*	*Sum*	*Average*	*Variance*		
Column 1 (7-15 pts)	9	68.67	7.63	2.21		
Column 2 (16-27 pts)	9	40.33	4.48	2.25		
Column 3 (29-57 pts)	10	28.13	2.82	3.87		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	112.22	2	56.11	19.90	$6.75X10^{-6}$	3.39
Within Groups	70.49	25	2.82			
Total	182.72	27				

CONCLUSIONS AND APPLICATIONS

The results of this study have shown that web-based homework helps high school physics students achieve mastery of course material as indicated by their higher test grades. By completing the web assignments, the student is able to practice the subject matter outside of the classroom and receive immediate feedback concerning the correctness of his work; this aspect of web-based homework has been shown to be an important factor in the students' retention of the course material. The teacher may , therefore, be confident of the following; web-based homework is valuable for reinforcing material taught in class, and a student who is able to adjust to the nature of web-based homework will be much more likely to be successful if when it is used on the college level. When my students were asked on the survey (Appendix C) how confident they would feel if they were to encounter Webassign again on the college level, their responses included the following: 52 % said that they would be secure in knowing that they had used this before, 22 % said that they would be excited to see it again, and two students said that they would actually drop the course if they saw that it used WebAssign.

Further results have shown that three or four web homework assignments completed per unit will increase test grades better than one or two. Though most chapters in physics text books are already divided into sections of information, application, and problems, some units are naturally more easily divided into multiple assignments than others. In addition to the positive effects seen on test grades when a greater number of homework assignments are made and completed during the testing period, this research shows that online homework is highly beneficial.

The length of the web assignment has an effect on a student's motivation to complete the homework. It was found that the lower point value assignments (i.e. the shorter assignments)

were skipped at a greater rate than the higher point value (longer) assignments. This tendency contradicts the finding that frequency is also an important factor. Assigning three large web assignments is too much for a single subject (in this case, physics) in a high school curriculum. Since point value was shown to be a factor in the motivation behind the students' completion of the homework, a possible solution could be to attach larger point value to smaller assignments by increasing the amount each question is worth (i.e. answers count for more than one point).

There are many topics that could be researched in the area of web-based homework. It would be interesting to see research comparing web-based homework sites. There are many sites available, and I believe one could reasonably expect that there would be strengths and weaknesses in each. Another topic for future research is testing the use of web-based homework in other subject areas where it is appropriate on the high school and college levels. Would web-homework raise test scores in those subjects as well?

Web-based homework in the High School curriculum is an area of ongoing research. I hope to learn more about optimal ways to use this tool in making the web-based homework more effective, working to help instructors prepare students for whatever educational or professional roads are ahead of them.

REFERENCES

Bonham, Scott W, Robert J Beichner, and Duane L Deardorff. "Online Homework: Does it make a difference:." *The Physics Teacher* 39.5 (2001): 293-296. *The Physics Teacher*. Web. May 2001. <http://scitation.aip.org/getabs/servlet/GetabsServlet?prog=normal&id=PHTEAH000039000005000293000001&idtype=cvips&gifs=yes>.

Bonham, Scott W, et al. "Education Research Using Web-based Assessment Systems." *Journal of Research on Computing in Education* 33.1 (2000): 28-44. Print.

Cheng, Kelvin K, et al. "Using an online homework system enhances students' learning of physics concepts in an introductory physics course." *American Journal of Physics* 72.11 (2004): 1447-1453. Print.

Committee on the Foundations of Assessment, et al. "The Nature of Assessment and Reasoning from Evidence." *Knowing What Students Know: The Science and Design of Educational Assessment*. Washington, D.C: National Academy Press, 2001. 37-56. Print.

Dancy, Melissa H., and Robert J Beichner. "But Are They Learning? Getting Started in Classroom Evaluation." *Cell Biology Education* 1 (Fall 2002): 87-94. Print.

Demirci, N. "Web-Based vs. Paper-Based Homework to Evaluate Students' Performance in Introductory Physics Courses and Students' Perceptions: Two Years Experience." *International Journal on E-Learning* 9.1 (2010): 27-49. Print.

Doorn, David, Susan Janssen, and Maureen O'Brien. "Student Attitudes and Approaches to Online Homework." *International Journal for the Scholarshop of Teaching and Learning* 4.1 (2010): n. pag. Print.

Engelbrecht, Johann, and Ansie Harding. "Combining Online and Paper Assessment In a Web-Based Course In Undergraduate Mathematics." *Journal of Computers in Mathematics and Science Teaching* 23.3 (2004): 217-231. Print.

"Faculty Support, Best Practices and Tips." *WebAssign*. North Carolina State University, Spring 2010. Web. 16 June 2010. <http://webassign.net/user_support/faculty/best_practices_and_tips.html>.

Hoskins, S L, and J.C. V. Hooff. "Motivation and ability: which students use online learning and what influence does it have on their achievement?" *British Journal of Educational Technology* 36.2 (2005): 177-192. Print.

Jackson, Graziella. "Dot Teen: Portrait of a Facebook Generation." *Navigationarts*. N.p., 1 Apr. 2008. Web. 1 Apr. 2008. <http://blog.navigationarts.com/dot-teen-portrait-of-a-facebook-generation/>.

Linville, Dan. Personal interview. June 2008.

Parr, Ben. "Teens Just Don't Blog or Tweet [STATS]." *Mashable*. Ed. Pete Cashmore, Adam Ostrow, and Sharon Feder. a t & t, Mar. 2010. Web. 21 June 2010. <http://mashable.com/2010/02/03/teens-dont-tweet-or-blog/>.

Survey Monkey. Survey Monkey, Summer 2010. Web. 24 June 2010. <http://www.surveymonkey.com/>.

WebAssign. North Carolina State University, Spring 2010. Web. 24 June 2010. <http://webassign.net/>.

"Who Uses WebAssign?" *WebAssign*. N.p., Spring 2010. Web. 16 June 2010. <http://www.webassign.net/success_stories/usage_information.html>.

APPENDIX A: WEB HOMEWORK AND TEST GRADES

2006-2007 (tests grades are in shaded cells, web-based homework are in the cells preceding the test)

Intro to WebAssign	Ch 2 A Mathematical Toolkit				Math for Physics TEST		Motion		Motion, vel. Acc TEST			Perpendicular Vectors		TEST
29	43	%I	%II	2 wa ave	100		18	%	90	%		18	%	100
29	17	100.0	39.5	69.8	78.0		18	100.0	65.0	72.2		18	100.0	66.0
29	42	100.0	97.7	98.8	92.0		18	100.0	79.0	87.8		18	100.0	96.0
28	41	96.6	95.3	96.0	86.0		18	100.0	87.0	96.7		18	100.0	96.0
29	42	100.0	97.7	98.8	98.0		18	100.0	70.0	77.8		18	100.0	95.0
29	43	100.0	100.0	100.0	79.0		17	94.4	68.0	75.6		18	100.0	82.0
27	42	93.1	97.7	95.4	80.0		18	100.0	65.0	72.2		17	94.4	97.0
29	41	100.0	95.3	97.7	85.0		15	83.3	79.0	87.8		18	100.0	100.0
29	37	100.0	86.0	93.0	62.0		17	94.4	60.0	66.7		18	100.0	90.0
29	43	100.0	100.0	100.0	95.0		18	100.0	85.0	94.4		18	100.0	92.0
27	43	93.1	100.0	96.6	63.0		18	100.0	64.0	71.1		18	100.0	99.0
29	42	100.0	97.7	98.8	93.0		14	77.8	65.0	72.2		18	100.0	90.0
6	41	20.7	95.3	58.0	94.0		16	88.9	68.0	75.6		18	100.0	98.0
29	39	100.0	90.7	95.3	71.0		17	94.4	70.0	77.8		18	100.0	84.0
2	36	6.9	83.7	45.3	66.0		7	38.9	68.0	75.6		14	77.8	44.0
28	42	96.6	97.7	97.1	52.0		18	100.0	63.0	70.0		18	100.0	93.0
29	43	100.0	100.0	100.0	80.0		18	100.0	71.0	78.9		18	100.0	93.0
29	41	100.0	95.3	97.7	71.0		18	100.0	61.0	67.8		18	100.0	87.0
29	38	100.0	88.4	94.2	90.0		18	100.0	80.0	88.9		18	100.0	97.0
0	43	0.0	100.0	50.0	83.0		18	100.0	76.0	84.4		18	100.0	93.0
29	31	100.0	72.1	86.0	57.0		6	33.3	52.0	57.8		18	100.0	88.0
29	42	100.0	97.7	98.8	87.0		17	94.4	87.0	96.7		16	88.9	99.0
29	42	100.0	97.7	98.8	79.0		18	100.0	69.0	76.7		18	100.0	66.0
29	43	100.0	100.0	100.0	86.0		18	100.0	83.0	92.2		18	100.0	83.0
25	37	86.2	86.0	86.1	87.0		17.0	94.4	79.0	87.8		18.0	100.0	95.0
29	23	100.0	53.5	76.7	80.0		9.0	50.0	62.0	68.9		18.0	100.0	64.0
28	40	96.6	93.0	94.8	81.0		14.0	77.8	66.0	73.3		18.0	100.0	93.0
29	42	100.0	97.7	98.8	75.0		12.0	66.7	77.0	85.6		18.0	100.0	88.0
29	40	100.0	93.0	96.5	85.0		18.0	100.0	69.0	76.7		18.0	100.0	96.0
29	32	100.0	74.4	87.2	55.0		18.0	100.0	66.0	73.3		18.0	100.0	61.0
29	40	100.0	93.0	96.5	80.0		15.0	83.3	67.0	74.4		18.0	100.0	92.0
29	42	100.0	97.7	98.8	85.0		18.0	100.0	93.0	103.3		18.0	100.0	91.0
28	37	96.6	86.0	91.3	102.0		17.0	94.4	74.0	82.2		18.0	100.0	95.0

29	43	100.0	100.0	100.0	87.0		15.0	83.3	69.0	76.7		18.0	100.0	95.0
7	40	24.1	93.0	58.6	74.0		0	0.0	66	73.3		18	100.0	97
29	34	100.0	79.1	89.5	92.0		17	94.4	73	81.1		18	100.0	91
29	42	100.0	97.7	98.8	71.0		16	88.9	61	67.8		18	100.0	88
29	42	100.0	97.7	98.8	79.0		17	94.4	82	91.1		18	100.0	96
15	15	51.7	34.9	43.3	80.0		1	5.6		0.0		18	100.0	82
29	38	100.0	88.4	94.2	84.0		15	83.3	74	82.2		18	100.0	91
29	41	100.0	95.3	97.7	81.0		18	100.0	81	90.0		18	100.0	95
4	35	13.8	81.4	47.6	87.0		17	94.4	80	88.9		18	100.0	90
25	26	86.2	60.5	73.3	80.0		18	100.0	62	68.9		18	100.0	68
28	43	96.6	100.0	98.3	72.0		0	0.0	63	70.0		18	100.0	94
29	35	100.0	81.4	90.7	91.0		11	61.1		0.0		18	100.0	96
29	43	100.0	100.0	100.0	85.0		18	100.0	82	91.1		18	100.0	100
26	38	89.7	88.4	89.0	91.0		9	50.0	55	61.1		18	100.0	94
27	34	93.1	79.1	86.1	84.0		8	44.4	76	84.4		18	100.0	
29	43	100.0	100.0	100.0	74.0		18	100.0	57	63.3		17	94.4	89
29	41	100.0	95.3	97.7	50.0		0	0.0	58	64.4		0	0.0	72
29	41	100.0	95.3	97.7	89.0		18	100.0	54	60.0		18	100.0	95
17	42	58.6	97.7	78.1	73.0		17	94.4	44	48.9		18	100.0	78
29	42	100.0	97.7	98.8	88.0		18	100.0	65	72.2		18	100.0	97
29	43	100.0	100.0	100.0	97.0		18	100.0	67	74.4		18	100.0	96
28	40	96.6	93.0	94.8	89.0		18	100.0	67	74.4		17	94.4	95
29	42	100.0	97.7	98.8	100.0		15	83.3	68	75.6		18	100.0	97
29	42	100.0	97.7	98.8	72.0		17	94.4	63	70.0		18	100.0	54
29	43	100.0	100.0	100.0	94.0		18	100.0	65	72.2		18	100.0	96
25	42	86.2	97.7	91.9	98.0		14	77.8	77	85.6		18	100.0	95
18	41	62.1	95.3	78.7	93.0		17	94.4	64	71.1		18	100.0	98
25	42	86.2	97.7	91.9	50.0		18	100.0	52	57.8		18	100.0	97
29	39	100.0	90.7	95.3	80.0		11	61.1	74	82.2		14	77.8	92
29	41	100.0	95.3	97.7	83.0		3	16.7	72	80.0		18	100.0	87
29	36	100.0	83.7	91.9	74.0		0	0.0	51	56.7		17	94.4	73
29	43	100.0	100.0	100.0	82.0		18	100.0	62	68.9		18	100.0	92
28	41	96.6	95.3	96.0	72.0		17	94.4	59	65.6		18	100.0	72
29	43	100.0	100.0	100.0	80.0		17	94.4	69	76.7		18	100.0	99
29	40	100.0	93.0	96.5	36.0		18	100.0	40	44.4		18	100.0	70
28	35	96.6	81.4	89.0	69.0		18.0	100.0	69.0	76.7		18.0	100.0	72.0
29	41	100.0	95.3	97.7	63.0		18	100.0	64	71.1		18	100.0	89
29	43	100.0	100.0	100.0	76.0		18	100.0	48	53.3		18	100.0	97
29	41	100.0	95.3	97.7	87.0		18	100.0	82	91.1		17	94.4	89
8	42	27.6	97.7	62.6	63.0		18	100.0	78	86.7		18	100.0	86
29	38	100.0	88.4	94.2	61.0		17	94.4	68	75.6		18	100.0	74

8	32	27.6	74.4	51.0	43.0		15	83.3	47	52.2		11	61.1	47
29	39	100.0	90.7	95.3	83.0		17	94.4	66	73.3		18	100.0	92
29	42	100.0	97.7	98.8	70.0		17	94.4	68	75.6		18	100.0	77
29	42	100.0	97.7	98.8	82.0		18	100.0	75	83.3		18	100.0	88
29	43	100.0	100.0	100.0	83.0		18	100.0	89	98.9		18	100.0	97
				90.4	78.8			83.9		74.0			97.2	87.4
				14.6	13.3			27.9		16.8			12.6	12.5

web assign		TEST	Web hw		TEST			web		momentum	TEST	
Newton's Laws of Motion				**Projectile Motion**								
30	%	100		18	%	100				12	%	
0.0	0.0	86.0		13	72.2	75.0				11	91.7	61.0
21.0	70.0	96.0		17	94.4	100.0				11	91.7	88.0
23.0	76.7	84.0		17	94.4	80.0				12	100.0	88.0
29.0	96.7	84.0		17	94.4	97.0				12	100.0	76.0
28.0	93.3	79.0		16	88.9	80.0				12	100.0	88.0
27.0	90.0	80.0		13	72.2	80.0				9	75.0	69.0
27.0	90.0	98.0		14	77.8	100.0				12	100.0	96.0
14.0	46.7	77.0		6	33.3	75.0				10	83.3	66.0
29.0	96.7	96.0		18	100.0	90.0				12	100.0	86.0
30.0	100.0	86.0		18	100.0	48.0				9	75.0	64.0
20.0	66.7	98.0		18	100.0	84.0				10	83.3	90.0
29.0	96.7	96.0		18	100.0	98.0				12	100.0	100.0
30.0	100.0	88.0		18	100.0	96.0				12	100.0	89.0
17.0	56.7	85.0		13	72.2	64.0				9	75.0	88.0

26.0	86.7	77.0		18	100.0	90.0		11	91.7	54.0			
11.0	36.7	89.0		12	66.7	77.0		10	83.3	71.0			
25.0	83.3	89.0		11	61.1	84.0		12	100.0	81.0			
29.0	96.7	82.0		18	100.0	96.0		12	100.0	81.0			
20.0	66.7	81.0		18	100.0	82.0		12	100.0	79.0			
15.0	50.0	81.0		10	55.6	90.0		9	75.0	81.0			
29.0	96.7	88.0		18	100.0	98.0		12	100.0	85.0			
29.0	96.7	86.0		18	100.0	76.0		11	91.7	80.0			
28.0	93.3	82.0		6	33.3	76.0		11	91.7	56.0			
20.0	66.7	89.0		10.0	55.6	90.0		12.	100.0	72.0			
0.0	0.0	88.0		10.0	55.6	70.0		12.	100.0	73.0			
21.0	70.0	98.0		17.0	94.4	75.0		11.	91.7	60.0			
24.0	80.0	86.0		10.0	55.6	80.0		12.	100.0	56.0			
10.0	33.3	91.0		17.0	94.4	76.0		11.	91.7	67.0			
16.0	53.3			16.0	88.9	93.0		12.	100.0	83.0			
27.0	90.0	85.0		16.0	88.9	92.0		12.	100.0	84.0			
28.0	93.3	90.0		18.0	100.0	96.0		12.	100.0	78.0			
0.0	0.0	92.0		18.0	100.0	96.0		12.	100.0	70.0			
21.0	70.0	99.0		18.0	100.0	82.0		12.	100.0	91.0			
23	76.7	83		0	0.0	52		1	8.3	75			
16	53.3	75		17	94.4	74		4	33.3	76			
24	80.0	81		14	77.8	75		11	91.7	75			
23	76.7	80		18	100.0	100		11	91.7	68			
18	60.0	78		6	33.3	83		5	41.7	60			
0	0.0	91		13	72.2	98		0	0.0	86			

0	0.0	88		3	16.7	25		5	41.7	48			
14	46.7	87		16	88.9	88		9	75.0	89			
0	0.0	80		17	94.4	75		9	75.0	55			
27	90.0	88		18	100.0	50		12	100.0	72			
20	66.7	99		16	88.9	88		12	100.0	72			
30	100.0	97		17	94.4	98		5	41.7	91			
27	90.0	86		17	94.4	92		11	91.7	86			
0	0.0	77		15	83.3	50		1	8.3	52			
27	90.0	87		17	94.4	76		9	75.0	75			
0	0.0	86		4	22.2	58		4	33.3	50			
23	76.7	87		17	94.4	86		10	83.3	70			
0	0.0	81		17	94.4	83		3	25.0	66			
15	50.0	94		18	100.0	87		10	83.3	88			
25	83.3	87		18	100.0	93		12	100.0	90			
0	0.0	94		18	100.0	84		9	75.0	84			
17	56.7	87		18	100.0	95		12	100.0	88			
0	0.0	80		7	38.9	76		2	16.7	58			
30	100.0	99		18	100.0	92		12	100.0	89			
18	60.0	79		18	100.0	79		0	0.0	86			
29	96.7	80		17	94.4	95		4	33.3	78			
24	80.0	74		18	100.0	72		10	83.3				
26	86.7	91		17	94.4	77		11	91.7	78			
14	46.7	79		8	44.4	75		3	25.0	73			
20	66.7	72		0	0.0	66		8	66.7	68			
30	100.0	99		18	100.0	94		12	100.0	89			

20	66.7	66		6	33.3	78		9	75.0	66	
23	76.7	84		12	66.7	81		10	83.3	74	
25	83.3	71		13	72.2	59.0		1	8.3	55.0	
24.0	80.0	75		18.0	100.0	59		10.	83.3	56	
15	50.0	65									
0	0.0	87		6	33.3	80		10	10.0	85	
23	76.7	100		15	83.3	76		12	100.0	73	
26	86.7	93		18	100.0	64		11	91.7	93	
19	63.3	84		18	100.0	65		9	75.0	71	
24	80.0	86		14	77.8	77		5	41.7	74	
17	56.7	90		18	100.0	93		11	91.7	88	
29	96.7	83		17	94.4	76		9	75.0	74	
30	100.0	85		17	94.4	85		12	100.0	82	
28	93.3	98		18	100.0	89		12	100.0	73	
	65.2	86.0			80.8	80.6			76.9	75.7	
	32.5	7.9			26.2	14.3			30.0	12.3	

web assign		TEST		web assign					
Simple Machines				**Energy**	**Electricity**				
25	%	100		14	34	I	I and II	100	
20.0	80.0	56.0		0	19	0.0	27.9	92.0	
21.0	84.0	92.0		13	33	92.9	95.0	99.0	
25.0	100.0	85.0		13	33	92.9	95.0	98.0	
25.0	100.0	81.0		14	34	100.0	100.0	90.0	
21.0	84.0	75.0		14	33	100.0	98.5	74.0	
23.0	92.0	82.0		7	32	50.0	72.1	87.0	
25.0	100.0	85.0		14	33	100.0	98.5	96.0	
21.0	84.0	57.0		13	29	92.9	89.1	85.0	
25.0	100.0	76.0		14	33	100.0	98.5	96.0	
24.0	96.0	71.0		14	33	100.0	98.5	72.0	
23.0	92.0	96.0		13	28	92.9	87.6	97.0	
22.0	88.0	78.0		14	32	100.0	97.1	96.0	
25.0	100.0	85.0		14	34	100.0	100.0	89.0	
10.0	40.0	79.0		11	32	78.6	86.3	89.0	
18.0	72.0	80.0		0	32	0.0	47.1	87.0	
24.0	96.0	77.0		14	31	100.0	95.6	87.0	
24.0	96.0	63.0		7	29	50.0	67.6	84.0	
23.0	92.0	80.0		14	33	100.0	98.5	89.0	

25.0	100.0	68.0		14	32	100.0	97.1	76.0	
7.0	28.0	60.0		12	29	85.7	85.5	86.0	
25.0	100.0	92.0		14	32	100.0	97.1	99.0	
24.0	96.0	58.0		13	33	92.9	95.0	93.0	
22.0	88.0	81.0		0	26	0.0	38.2	79.0	
22.0	88.0	87.0		11.0	27.0	78.6	79.0	93.0	
6.0	24.0	72.0		0.0	22.0	0.0	32.4	84.0	
18.0	72.0	90.0		13.0	28.0	92.9	87.6	96.0	
8.0	32.0	78.0		12.0	30.0	85.7	87.0	96.0	
20.0	80.0	94.0		10.0	29.0	71.4	78.4	91.0	
18.0	72.0	71.0		12.0	26.0	85.7	81.1	91.0	
23.0	92.0	71.0		14.0	33.0	100.0	98.5	88.0	
21.0	84.0	85.0		14.0	34.0	100.0	100.0	100.0	
25.0	100.0	91.0		14.0	34.0	100.0	100.0	95.0	
24.0	96.0	79.0		13.0	33.0	92.9	95.0	94.0	
18	72.0	90		10	25	71.4	72.5	89	
17	68.0	70		8	27	57.1	68.3	89	
23	92.0	70		9	32	64.3	79.2	87	
24	96.0	92		13	30	92.9	90.5	91	
14	56.0	76		12	33	85.7	91.4	97	
20	80.0	87		14	30	100.0	94.1	90	
12	48.0	75		10	15	71.4	57.8	74	
14	56.0	83		0	18	0.0	26.5	92	
20	80.0	77		13	18	92.9	72.9	82	
24	96.0	70		13	29	92.9	89.1	81	

21	84.0	90		14	29	100.0	92.6	87	
24	96.0	95		11	30	78.6	83.4	92	
19	76.0	82		9	13	64.3	51.3	85	
24	96.0	86		0	30	0.0	44.1	80	
24	96.0	86		14	30	100.0	94.1	87	
0	0.0	53		0	11	0.0	16.2	84	
19	76.0	70		13	31	92.9	92.0	90	
21	84.0	81		4	23	28.6	48.1	74	
25	100.0	70		13	21	92.9	77.3	91	
25	100.0	78		13	32	92.9	93.5	95	
24	96.0	94		14	33	100.0	98.5	90	
25	100.0	87		14	33	100.0	98.5	87	
14	56.0	64		7	24	50.0	60.3	66	
25	100.0	93		14	34	100.0	100.0	99	
17	68.0	88		12	34	85.7	92.9	97	
25	100.0	80		0	34	0.0	50.0	94	
14	56.0	57		7	30	50.0	69.1	97	
24	96.0	87		14	34	100.0	100.0	95	
8	32.0	69		0	0	0.0	0.0	79	
16	64.0	66		0	8	0.0	11.8	74	
25	100.0	89		13	32	92.9	93.5	99	
24	96.0	66		14	26	100.0	88.2	84	
16	64.0	76		14	31	100.0	95.6	92	
10	40.0	59		6	28	42.9	62.6	66	
24.0	96.0	76		8.0	33.0	57.1	77.1	86	

11	44.0	90.0		13	26	92.9	84.7	79.0	
25	100.0	83		12	30	85.7	87.0	96	
21	84.0	83		7	34	50.0	75.0	92	
25	100.0	74		5	34	35.7	67.9	78	
18	72.0	46		8	21	57.1	59.5	78	
25	100.0	86		0	27	0.0	39.7	90	
24	96.0	63		12	33	85.7	91.4	75	
24	96.0	75		13	29	92.9	89.1	92	
25	100.0	70		13	30	92.9	90.5	95	
	81.2	77.6					78.2	88.1	
	22.4	11.2					23.9	8.0	

web assign		Test		web assign		Test		web		Test
Thermal Energy				**Nuclear Energy**				**Waves: Sound**		
14	%	100		58		100		27	%	100
11.0	78.6	56.0		0.0	100.0	78.0		25.0	92.6	61.0
13.0	92.9	100.0		58.0	100.0	92.0		27.0	100.0	87.0
13.0	92.9	93.0		58.0	100.0	92.0		22.0	81.5	90.0
14.0	100.0	81.0		58.0	100.0	90.0		27.0	100.0	71.0
14.0	100.0	69.0		58.0	100.0	72.0		27.0	100.0	61.0

12.0	85.7	78.0		58.0	100.0	80.0		17.0	63.0	63.0
12.0	85.7	97.0		58.0	100.0	96.0		26.0	96.3	57.0
11.0	78.6	81.0		58.0	100.0	83.0		23.0	85.2	64.0
14.0	100.0	77.0		58.0	100.0	97.0		27.0	100.0	82.0
4.0	28.6	74.0		58.0	98.3	62.0		26.0	96.3	65.0
13.0	92.9	93.0		57.0	100.0			20.0	74.1	83.0
14.0	100.0	98.0		58.0	100.0	92.0		23.0	85.2	78.0
14.0	100.0	88.0		58.0	0.0	87.0		25.0	92.6	87.0
4.0	28.6	77.0		0.0	94.8	92.0		22.0	81.5	0.0
14.0	100.0	81.0		55.0	100.0	63.0		27.0	100.0	53.0
13.0	92.9	88.0		58.0	98.3	93.0		26.0	96.3	79.0
13.0	92.9	77.0		57.0	100.0	80.0		13.0	48.1	51.0
14.0	100.0	94.0		58.0	100.0	90.0		27.0	100.0	74.0
13.0	92.9	86.0		58.0	93.1	89.0		26.0	96.3	69.0
6.0	42.9	70.0		54.0	100.0	80.0		12.0	44.4	60.0
14.0	100.0	93.0		58.0	100.0	91.0		25.0	92.6	81.0
9.0	64.3	71.0		58.0	100.0	85.0		27.0	100.0	79.0
4.0	28.6	86.0		58.0	100.0	89.0		17.0	63.0	78.0
13.0	92.9	85.0		58.0	0.0	98.0		19.0	70.4	85.0
0.0	0.0	61.0		0.0	98.3	63.0		9.0	33.3	50.0
13.0	92.9	95.0		57.0	98.3	98.0		13.0	48.1	90.0
4.0	28.6	91.0		57.0	98.3	97.0		25.0	92.6	79.0
12.0	85.7	99.0		57.0	100.0	94.0		26.0	96.3	84.0
6.0	42.9	78.0		58.0	100.0	92.0		27.0	100.0	83.0
14.0	100.0	89.0		58.0	62.1	92.0		27.0	100.0	87.0

14.0	100.0	96.0		36.0	100.0	92.0		25.0	92.6	93.0
14.0	100.0	96.0		58.0	100.0	91.0		20.0	74.1	95.0
13.0	92.9	90.0		58.0	62.1	94.0		25.0	92.6	87.0
9	64.3	91		36	100.0	69		0	0.0	82
5	35.7	78		58	100.0	81		14	51.9	74
13	92.9	88		58	96.6	52		23	85.2	75
12	85.7	94		56	91.4	85		20	74.1	75
7	50.0	76		53	100.0	72		0	0.0	50
14	100.0	92		58	100.0	94		19	70.4	80
8	57.1	95		58	37.9	79		6	22.2	74
0	0.0	98		22	100.0	100		14	51.9	74
0	0.0	56		58	100.0	76		24	88.9	88
14	100.0	73		58	100.0	83		23	85.2	67
14	100.0	94		58	94.8	85		16	59.3	87
7	50.0	87		55	100.0	86		19	70.4	77
4	28.6	81		58	100.0	81		11	40.7	86
0	0.0	65		58	100.0	96		14	51.9	73
13	92.9	85		58	0.0	91		27	100.0	84
0	0.0	38		ND	100.0	82		13	48.1	61
0	0.0	90		58	100.0	78		20	74.1	83
11	78.6	83		58	100.0	60		5	18.5	71
6	42.9	87		58	100.0	91		25	92.6	81
12	85.7	93		58	100.0	95		27	100.0	97
12	85.7	78		58	100.0	90		27	100.0	92
14	100.0	78		58	98.3	88		25	92.6	87

5	35.7	79		57	100.0	75		10	37.0	73
14	100.0	99		58	100.0	95		26	96.3	98
13	92.9	74		58	100.0	89		24	88.9	83
11	78.6	93		58	100.0	87		27	100.0	73
4	28.6	59		58	100.0	61		22	81.5	61
12	85.7	88		58	91.4	100		26	96.3	73
4	28.6	89		53	60.3	69		2	7.4	69
12	85.7	71		35	100.0	72		17	63.0	65
11	78.6	94		58	100.0	97		23	85.2	93
7	50.0	79		58	100.0	81		26	96.3	65
11	78.6	63		58	100.0	97		24	88.9	61
4	28.6	16		58	98.3	73		20	74.1	70
0.0	0.0	76		57.0		94		19.0	70.4	76
					100.0				0.0	
7	50.0	55.0		58	98.3	82.0		18	66.7	53.0
14	100.0	96		57	98.3	89		25	92.6	78
13	92.9	89		57	100.0	89		24	88.9	82
10	71.4	61		58	84.5	87		21	77.8	67
0	0.0	55		49	98.3	41		16	59.3	0
13	92.9	95		57	100.0	78		20	74.1	87
14	100.0	88		58	100.0	87		27	100.0	96
13	92.9	89		58	100.0	80		24	88.9	75
14	100.0	95		58		100		10	37.0	72
	69.3	81.7			91.6	84.5			74.8	73.9

	33.8	15.0			23.9	11.8			26.9	16.9

2007-2008

	Math for Physics	Intro to Webas sign				Math for Physics		Motion wa		Motion : test
totals	27	29	%I	%II	2 ave wa	100		19	%	100
student s	26	29	96.3	100.0	98.1	86		20	100	99
	24	29	88.9	100.0	94.4	55		20	100	80
	25	29	92.6	100.0	96.3	72		20	100	71
	17	28	63.0	96.6	79.8	63		19	95	75
	27	29	100.0	100.0	100.0	88		18	90	80
	21	29	77.8	100.0	88.9	51		20	100	83
	21	29	77.8	100.0	88.9	54		16	80	66
	23	29	85.2	100.0	92.6	81		13	65	90
	0	23	0.0	79.3	39.7	48		12	60	69
	0	28	0.0	96.6	48.3	44		17	85	71
	25	29	92.6	100.0	96.3	83		20	100	89
	27	29	100.0	100.0	100.0	93		20	100	64
	20	29	74.1	100.0	87.0	76		19	95	80
	26	29	96.3	100.0	98.1	65		16	80	73
	24	29	88.9	100.0	94.4	69		18	90	79
	6	28	22.2	96.6	59.4	59		18	90	61
	25	29	92.6	100.0	96.3	55		19	95	84
	24	29	88.9	100.0	94.4	82		19	95	80
	24	25	88.9	86.2	87.5	48		18	90	74
2nd	20	29	74.1	100.0	87.0	92		19	95	100
	17	29	63.0	100.0	81.5	70		14	70	53
	19	29	70.4	100.0	85.2	62		19	95	50
	20	29	74.1	100.0	87.0	66		19	95	91

		6	0	22.2	0.0	11.1	62		19	95	55
		18	29	66.7	100.0	83.3	80		19	95	50
		7	27	25.9	93.1	59.5	71		19	95	61
		18	29	66.7	100.0	83.3	69		19	95	72
		19	29	70.4	100.0	85.2	85		19	95	85
		19	29	70.4	100.0	85.2	72		19	95	91
		20	29	74.1	100.0	87.0	89		19	95	80
		19	29	70.4	100.0	85.2	80		19	95	67
		19	29	70.4	100.0	85.2	92		19	95	82
		19	29	70.4	100.0	85.2	87		19	95	90
		20	29	74.1	100.0	87.0	68		19	95	101
		18	29	66.7	100.0	83.3	95		17	85	96
		18	47	66.7	162.1	114.4	86		19	95	70
		20	29	74.1	100.0	87.0	80		19	95	89
		20	29	74.1	100.0	87.0	79		19	95	73
		20	29	74.1	100.0	87.0	83		19	95	81
		20	29	74.1	100.0	87.0	57		19	95	71
		12	29	44.4	100.0	72.2	80		19	95	86
		20	29	74.1	100.0	87.0	75		19	95	67
		20	29	74.1	100.0	87.0	78		2	10	87
		20	29	74.1	100.0	87.0	63		19	95	67
	3rd	17	29	63.0	100.0	81.5	51		19	95	57
		19	29	70.4	100.0	85.2	62		19	95	82
		19	29	70.4	100.0	85.2	66		19	95	46
		15	29	55.6	100.0	77.8	81		18	90	84
		15	29	55.6	100.0	77.8	67		19	95	80
		19	29	70.4	100.0	85.2	76		19	95	86
		19	27	70.4	93.1	81.7	57		19	95	56
		14	29	51.9	100.0	75.9	61		17	85	71
		20	29	74.1	100.0	87.0	49		19	95	63
		19	29	70.4	100.0	85.2	67		19	95	88
		19	29	70.4	100.0	85.2	75		19	95	70
		7	29	25.9	100.0	63.0	70			0	76
		19	29	70.4	100.0	85.2	87		19	95	81
		9	29	33.3	100.0	66.7	71		10	50	66
		14	29	51.9	100.0	75.9	51		19	95	73
		19	25	70.4	86.2	78.3	65		19	95	57
		20	29	74.1	100.0	87.0	60		19	95	78
		16	29	59.3	100.0	79.6	46		19	95	55
		20	13	74.1	44.8	59.5	56		19	95	93
		18	29	66.7	100.0	83.3	46		19	95	50

	20	29	74.1	100.0	87.0	87		19	95	86
	2	29	7.4	100.0	53.7	55		19	95	54
	0	29	0.0	100.0	50.0	84		19	95	95
4th	19	29	70.4	100.0	85.2	81		19	95	86
	17	29	63.0	100.0	81.5	75		19	95	85
	20	27	74.1	93.1	83.6	68		6	30	61
	19	28	70.4	96.6	83.5	81		19	95	73
	19	29	70.4	100.0	85.2	83		19	95	104
	9	29	33.3	100.0	66.7	78		19	95	70
	13	29	48.1	100.0	74.1	54		14	70	51
	20	29	74.1	100.0	87.0	83		19	95	76
	20	29	74.1	100.0	87.0	49		19	95	59
	0	29	0.0	100.0	50.0	72		13	65	77
	19	29	70.4	100.0	85.2	81		19	95	81
	19	29	70.4	100.0	85.2	76		6	30	80
	20	29	74.1	100.0	87.0	64		19	95	80
	20	29	74.1	100.0	87.0	58		19	95	74
	17	29	63.0	100.0	81.5	79		19	95	95
	19	29	70.4	100.0	85.2	74		19	95	87
6th	24	29	88.9	100.0	94.4	71		20	100	75
	27	29	100.0	100.0	100.0	70		20	100	84
	26	29	96.3	100.0	98.1	87		19	95	94
	27	29	100.0	100.0	100.0	85		20	100	92
	27	29	100.0	100.0	100.0	46		20	100	64
	25	29	92.6	100.0	96.3	78		20	100	78
	25	29	92.6	100.0	96.3	71		19	95	72
	25	29	92.6	100.0	96.3	79		19	95	90
	26	29	96.3	100.0	98.1	61		18	90	64
	24	28	88.9	96.6	92.7	77		19	95	83
	25	29	92.6	100.0	96.3	81		14	70	68
	25	29	92.6	100.0	96.3	80		20	100	93
	23	29	85.2	100.0	92.6	69		19	95	72
	27	29	100.0	100.0	100.0	84		19	95	85
	25	29	92.6	100.0	96.3	76		19	95	86
	26	29	96.3	100.0	98.1	58		20	100	50
	25	29	92.6	100.0	96.3	76		19	95	82
	23	29	85.2	100.0	92.6	88		19	95	100
					84.3	71.0			89.6	76.2

Newton's Laws of Motion, Forces and Friction								Motion in 2 Dimensions		Motion in Two Dimensions
13	23	%I	%II	2 wa ave	100			18	%	100
13	21	100.0	91.3	95.7	90			18	100.0	97
12	21	92.3	91.3	91.8	80			18	100.0	72
12	22	92.3	95.7	94.0	78			18	100.0	77
11	27	84.6	117.4	101.0	82			11	61.1	81
12	22	92.3	95.7	94.0	89			18	100.0	92
13	16	100.0	69.6	84.8	81			18	100.0	90
4	21	30.8	91.3	61.0	87			17	94.4	82
13	21	100.0	91.3	95.7	93			18	100.0	93
13	21	100.0	91.3	95.7	77			17	94.4	87
4	18	30.8	78.3	54.5	74			6	33.3	70
13	22	100.0	95.7	97.8	85			18	100.0	74
13	22	100.0	95.7	97.8	90			18	100.0	94
12	22	92.3	95.7	94.0	77			17	94.4	78
12	21	92.3	91.3	91.8	73			17	94.4	91
9	18	69.2	78.3	73.7	89			15	83.3	91
13	10	100.0	43.5	71.7	82			18	100.0	67
13	30	100.0	130.4	115.2	80			18	100.0	90
1	0	7.7	0.0	3.8	80			18	100.0	41
13	20	100.0	87.0	93.5	78			15	83.3	88
10	23	76.9	100.0	88.5	76			17	94.4	85
4	17	30.8	73.9	52.3	76			7	38.9	80
13	22	100.0	95.7	97.8	90			18	100.0	80
13	22	100.0	95.7	97.8	82			18	100.0	91
13	23	100.0	100.0	100.0				2	11.1	72
13	22	100.0	95.7	97.8	85			18	100.0	91
13	13	100.0	56.5	78.3	61			0	0.0	70
13	17	100.0	73.9	87.0	72			18	100.0	74
6	13	46.2	56.5	51.3	67			15	83.3	84
11	20	84.6	87.0	85.8	70			18	100.0	75
9	16	69.2	69.6	69.4	72			13	72.2	80
4	16	30.8	69.6	50.2	86			0	0.0	75
13	22	100.0	95.7	97.8	65			18	100.0	77
13	20	100.0	87.0	93.5	78			18	100.0	94
13	22	100.0	95.7	97.8	70			18	100.0	92
13	22	100.0	95.7	97.8	84			18	100.0	91
13	22	100.0	95.7	97.8	73			18	100.0	79
13	22	100.0	95.7	97.8	91			17	94.4	97
17	15	130.8	65.2	98.0	69			17	94.4	68
13	22	100.0	95.7	97.8	85			18	100.0	88
13	21	100.0	91.3	95.7	81			17	94.4	85
12	22	92.3	95.7	94.0	92			18	100.0	89

Conservation of Momentum		Momentum			Work, Power, Simple Machines		Work, power, simple machines: test
29	%	100			43	%	100
28	96.6	91			42	97.7	102
27	93.1	76			40	93.0	85
29	100.0	75			43	100.0	85
20	69.0	75			33	76.7	76
29	100.0	96			43	100.0	84
29	100.0	81			43	100.0	81
25	86.2	88			41	95.3	90
28	96.6	95			42	97.7	93
0	0.0	88			36	83.7	88
21	72.4	77			27	62.8	70
29	100.0	88			43	100.0	88
29	100.0	97			43	100.0	102
26	89.7	92			43	100.0	98
19	65.5	86			43	100.0	94
28	96.6	92			32	74.4	81
28	96.6	76			43	100.0	82
26	89.7	95			42	97.7	93
29	100.0	82			43	100.0	47
29	100.0	93			43	100.0	87
24	82.8	81			42	97.7	87
11	37.9	78			23	53.5	62
29	100.0	98			43	100.0	82
29	100.0	93			42	97.7	87
28	96.6	70			18	41.9	54
29	100.0	96			43	100.0	104
7	24.1	73			30	69.8	78
22	75.9	76			42	97.7	65
20	69.0	82			26	60.5	90
29	100.0	84			12	27.9	71
29	100.0	87			43	100.0	72
2	6.9	83			19	44.2	76
17	58.6	84			43	100.0	90
27	93.1	94			40	93.0	86
27	93.1	85			41	95.3	95
29	100.0	73			37	86.0	94
25	86.2	84			42	97.7	88

	29	100.0	90			43	100.0	99	
	26	89.7	72			34	79.1	86	
	29	100.0	98			43	100.0	97	
	23	79.3	71			26	60.5	65	
	29	100.0	90			43	100.0	97	
	13	44.8	70			21	48.8	76	
	29	100.0	90			43	100.0	97	
	29	100.0	87			35	81.4	84	
	29	100.0	93			43	100.0	82	
	25	86.2	66			25	58.1	86	
	25	86.2	73			36	83.7	78	
	22	75.9	74			32	74.4	94	
	14	48.3	85			31	72.1	87	
	28	96.6	86			42	97.7	91	
	29	100.0	97			43	100.0	95	
	7	24.1	84			15	34.9	67	
	21	72.4	70			35	81.4	68	
	15	51.7	58			43	100.0	88	
	26	89.7	94			21	48.8	95	
	29	100.0	91			36	83.7	80	
	0	0.0	76			36	83.7	76	
	26	89.7	93			42	97.7	93	
	18	62.1	84			12	27.9	88	
	16	55.2	72			43	100.0	77	
	24	82.8	91			34	79.1	86	
	29	100.0	74			21	48.8	86	
	28	96.6	92			43	100.0	92	
	11	37.9	83			28	65.1	94	
	27	93.1	68			21	48.8	86	
	29	100.0	91			43	100.0	89	
	26	89.7	70			42	97.7	58	
	22	75.9	95			43	100.0	100	
	27	93.1	80			40	93.0	80	
	27	93.1	78			39	90.7	84	
	22	75.9	85			43	100.0	83	
	8	27.6	78			29	67.4	88	
	20	69.0	70			37	86.0	87	
	29	100.0	99			42	97.7	97	
	14	48.3	92			21	48.8	91	
	19	65.5	90			24	55.8	85	
	27	93.1	91			43	100.0	90	

27	93.1	85			35	81.4	78
1	3.4	86			29	67.4	95
21	72.4	93			23	53.5	83
25	86.2	90			38	88.4	93
11	37.9	83			21	48.8	78
27	93.1	90			43	100.0	75
21	72.4	99			42	97.7	92
25	86.2	95			43	100.0	96
28	96.6	81			43	100.0	82
27	93.1	89			43	100.0	89
27	93.1	94			43	100.0	94
28	96.6	88			42	97.7	90
0	0.0	71			16	37.2	64
29	100.0	66			43	100.0	82
25	86.2	75			42	97.7	81
24	82.8	95			25	58.1	91
23	79.3	66			43	100.0	83
28	96.6	91			30	69.8	92
24	82.8	93			32	74.4	88
29	100.0	93			43	100.0	83
23	79.3	73			40	93.0	78
27	93.1	96			39	90.7	97
26	89.7	92			43	100.0	94
29	100.0	62			43	100.0	86
26	89.7	97			42	97.7	96
14	48.3	97			20	46.5	99
29	100.0	81			42	97.7	86
	80.0	84.4				84.0	85.3

kinetic and potential energy	Current Electricity				Energy and Electricity		Thermal energy:		Thermal energy test
14	52	%I	%II	2 wa ave	100		14	%	100
14	50	100.0	96.2	98.1	99		14	100.0	84
10	47	71.4	90.4	80.9	65		12	85.7	61
14	51	100.0	98.1	99.0	66		14	100.0	60
11	26	78.6	50.0	64.3	64		6	42.9	69
14	49	100.0	94.2	97.1	91		14	100.0	91
6	51	42.9	98.1	70.5	69		14	100.0	55

11	43	78.6	82.7	80.6	67			14	100.0	54
14	43	100.0	82.7	91.3	93			14	100.0	86
0	41	0.0	78.8	39.4	63			6	42.9	72
10	10	71.4	19.2	45.3	49			5	35.7	58
14	51	100.0	98.1	99.0	82			14	100.0	45
14	51	100.0	98.1	99.0	89			14	100.0	96
13	49	92.9	94.2	93.5	92			14	100.0	84
14	48	100.0	92.3	96.2	68			14	100.0	68
10	47	71.4	90.4	80.9	77			10	71.4	80
12	51	85.7	98.1	91.9	74			14	100.0	56
13	49	92.9	94.2	93.5	83			14	100.0	80
14	51	100.0	98.1	99.0	30			14	100.0	34
14	44	100.0	84.6	92.3	79			12	85.7	81
12	50	85.7	96.2	90.9	79			7	50.0	74
11	24	78.6	46.2	62.4	63			11	78.6	51
14	50	100.0	96.2	98.1	95			14	100.0	83
14		100.0	0.0	50.0	84			14	100.0	71
9	51	64.3	98.1	81.2	74			12	85.7	46
12	41	85.7	78.8	82.3	93			12	85.7	95
11	47	78.6	90.4	84.5	65			4	28.6	35
14	47	100.0	90.4	95.2	66			9	64.3	57
8	34	57.1	65.4	61.3	78			11	78.6	63
11	51	78.6	98.1	88.3	77			14	100.0	32
13	51	92.9	98.1	95.5	75			12	85.7	79
14	10	100.0	19.2	59.6	89			0	0.0	63
14	48	100.0	92.3	96.2	65			14	100.0	57
14	52	100.0	100.	100.	69			14	100.0	87
14	47	100.0	90.4	95.2	70			11	78.6	76
14	33	100.0	63.5	81.7	90			13	92.9	69
14	51	100.0	98.1	99.0	58			4	28.6	72
14	50	100.0	96.2	98.1	98			13	92.9	84
13	43	92.9	82.7	87.8	81			14	100.0	66
13	51	92.9	98.1	95.5	86			13	92.9	88
10	37	71.4	71.2	71.3	55			5	35.7	49
13	52	92.9	100.	96.4	93			14	100.0	81
14	49	100.0	94.2	97.1				0	0.0	47
14	52	100.0	100.	100.	73			14	100.0	97
14	50	100.0	96.2	98.1	68			14	100.0	53
14	53	100.0	101.	101.	80			12	85.7	65
14	22	100.0	42.3	71.2	60			11	78.6	60
12	37	85.7	71.2	78.4	53			11	78.6	44

	12	45	85.7	86.5	86.1	70			12	85.7	71	
	13	32	92.9	61.5	77.2	81			11	78.6	67	
	13	46	92.9	88.5	90.7	81			14	100.0	88	
	13	50	92.9	96.2	94.5	90			14	100.0	72	
	14	45	100.0	86.5	93.3	61			12	85.7	47	
	12	49	85.7	94.2	90.0	70			14	100.0	40	
	10	51	71.4	98.1	84.8	56			12	85.7	55	
	14	26	100.0	50.0	75.0	80			5	35.7	72	
	10	52	71.4	100.	85.7	81			11	78.6	55	
	11	21	78.6	40.4	59.5	82			13	92.9	51	
	14	46	100.0	88.5	94.2	88			14	100.0	76	
	11	0	78.6	0.0	39.3	55			8	57.1	44	
	12	46	85.7	88.5	87.1	59			4	28.6	45	
	11	35	78.6	67.3	72.9	54			7	50.0	61	
	0	35	0.0	67.3	33.7	58			10	71.4	63	
	14	40	100.0	76.9	88.5	94			11	78.6	75	
	11	49	78.6	94.2	86.4	56			14	100.0	55	
	11	47	78.6	90.4	84.5	75			14	100.0	47	
	14	49	100.0	94.2	97.1	83			14	100.0	74	
	13	35	92.9	67.3	80.1				5	35.7	30	
	14	51	100.0	98.1	99.0	80			3	21.4	85	
	4	0	28.6	0.0	14.3	83			4	28.6	81	
	13	47	92.9	90.4	91.6	88			13	92.9	69	
	13	50	92.9	96.2	94.5	63			10	71.4	81	
	8	3	57.1	5.8	31.5	61			8	57.1	59	
	14	11	100.0	21.2	60.6	83			10	71.4	68	
	13	50	92.9	96.2	94.5	85			13	92.9	82	
	14	52	100.0	100.	100.	91			14	100.0	81	
	0	52	0.0	100.	50.0	91			7	50.0	54	
	14	50	100.0	96.2	98.1	91			14	100.0	70	
	14	45	100.0	86.5	93.3	65			5	35.7	61	
	7	8	50.0	15.4	32.7	59			0	0.0	69	
	14	40	100.0	76.9	88.5	75			0	0.0	57	
	13	35	92.9	67.3	80.1				12	85.7	83	
	14	51	100.0	98.1	99.0	85			14	100.0	85	
	14	46	100.0	88.5	94.2	90			12	85.7	66	
	13	49	92.9	94.2	93.5	85			11	78.6	76	
	14	50	100.0	96.2	98.1	92			13	92.9	92	
	13	51	92.9	98.1	95.5	59			12	85.7	56	
	14	51	100.0	98.1	99.0	58			14	100.0	60	
	14	50	100.0	96.2	98.1	92			14	100.0	84	

14	48	100.0	92.3	96.2	71			14	100.0	81
13	49	92.9	94.2	93.5	70			14	100.0	75
14	51	100.0	98.1	99.0	54			14	100.0	67
13	50	92.9	96.2	94.5	73			13	92.9	59
14	46	100.0	88.5	94.2	90			11	78.6	81
13	51	92.9	98.1	95.5	68			13	92.9	72
13	50	92.9	96.2	94.5	79			8	57.1	82
3	16	21.4	30.8	26.1	53			10	71.4	90
14	51	100.0	98.1	99.0	94			14	100.0	45
12	47	85.7	90.4	88.0	64			8	57.1	47
14	44	100.0	84.6	92.3	79			14	100.0	84
12	48	85.7	92.3	89.0				10	71.4	62
14	51	100.0	98.1	99.0	57			12	85.7	54
14	50	100.0	96.2	98.1	76			14	100.0	81
12	37	85.7	71.2	78.4	55			0	0.0	84
14	47	100.0	90.4	95.2	77			9	64.3	84
				84.3	74.47				77.6	67.432692

Sound		Waves Sound		light and color:		light and color:			Nuclear Energy:		Nuclear energy:	
27	%	100		19	%	100			58	%	94	%
26	96.3	95		18	94.7	94			57	98.3	94	100
20	74.1	81		16	84.2	74			55	94.8	49	52.1
0	0.0	81		19	100.0	93			58	100.	67	71.3
23	85.2	87		13	68.4	90			55	94.8	60	63.8
27	100.	98		19	100.0	89			58	100.	83	88.3
0	0.0	75		19	100.0	98			58	100.	64	68.1
15	55.6	82		18	94.7	86			58	100.	72	76.6
25	92.6	94		17	89.5	90			58	100.	86	91.5
10	37.0	75		10	52.6	77			25	43.1	75	79.8
25	92.6	88		15	78.9	81			58	100.	70	74.5
26	96.3	93		19	100.0	101			57	98.3	93	98.9
0	0.0	93		18	94.7	95			58	100.0	74	78.7
25	92.6	79		19	100.0	100			58	100.0	75	79.8
23	85.2	86		19	100.0	73			57	98.3	78	83.0
17	63.0	92		18	94.7	81			56	96.6	65	69.1
27	100.	78		19	100.0	78			58	100.	51	54.3
25	92.6	85		19	100.0	100			58	100.	71	75.5
0	0.0	67		8	42.1	45			54	93.1	68	72.3

	26	96.3	91		16	84.2	78			58	100.0	89	94.7	
	25	92.6	86		13	68.4	85			58	100.0	65	69.1	
	15	55.6	87		15	78.9	82			57	98.3	67	71.3	
	27	100.	89		19	100.0	93			56	96.6	93	98.9	
	24	88.9	86		16	84.2	91			58	100.0	70	74.5	
	14	51.9	59		12	63.2	72			58	100.0		0.0	
	23	85.2	93		17	89.5	90			58	100.0	75	79.8	
	11	40.7	72		0	0.0	44			58	100.0	72	76.6	
	25	92.6	82		17	89.5	71			58	100.0	66	70.2	
	14	51.9	89		16	84.2	89			57	98.3	84	89.4	
	0	0.0	71		19	100.0	84			58	100.0	50	53.2	
	27	100.	94		18	94.7	93			58	100.0	80	85.1	
	5	18.5	76		0	0.0	99			57	98.3	86	91.5	
	27	100.	73		18	94.7	65			58	100.0	52	55.3	
	27	100.	92		19	100.0	81			58	100.0	67	71.3	
	27	100.	88		19	100.0	83			58	100.0	60	63.8	
	25	92.6	83		18	94.7	97			58	100.0	81	86.2	
	24	88.9	76		18	94.7	94			58	100.0	67	71.3	
	24	88.9	97		17	89.5	97			58	100.0	84	89.4	
	25	92.6	68		18	94.7	79			55	94.8	62	66.0	
	25	92.6	95		19	100.0	89			58	100.0	78	83.0	
	12	44.4	72		9	47.4	80			53	91.4	59	62.8	
	27	100.	99		19	100.0	94			58	100.0	89	94.7	
	8	29.6	71		7	36.8	76			56	96.6	76	80.9	
	22	81.5	93		15	78.9	91			58	100.0	76	80.9	
	27	100.	88		18	94.7	91			58	100.0	71	75.5	
	0	0.0	86		0	0.0	83			11	19.0	42	44.7	
	25	92.6	75		18	94.7	102			58	100.0	73	77.7	
	26	96.3	29		15	78.9	79			58	100.0	66	70.2	
	20	74.1	92		8	42.1	90			58	100.0	74	78.7	
	17	63.0	96		11	57.9	86			52	89.7	81	86.2	
	25	92.6	87		19	100.0	99			54	93.1	77	81.9	
	25	92.6	90		18	94.7	99			58	100.0	80	85.1	
	15	55.6	77		15	78.9	96			13	22.4	49	52.1	
	25	92.6	81		13	68.4	79			37	63.8	64	68.1	
	27	100.	73		18	94.7	83			58	100.0	67	71.3	
	17	63.0	95		15	78.9	95			57	98.3	86	91.5	
	25	92.6	91		18	94.7	93			58	100.0	69	73.4	
	6	22.2	76		17	89.5	89			46	79.3	64	68.1	
	18	66.7	85		18	94.7	94			58	100.0	82	87.2	
	20	74.1	87		12	63.2	77			58	100.0	50	53.2	

	24	88.9	88		19	100.0	93			56	96.6	75	79.8	
	25	92.6	73		18	94.7	105			57	98.3	80	85.1	
	0	0.0	75		18	94.7	74			58	100.0	62	66.0	
	26	96.3	96		11	57.9	101			58	100.0	93	98.9	
	0	0.0	76		17	89.5	88			56	96.6	54	57.4	
	0	0.0	58		18	94.7	79			58	100.0	59	62.8	
	23	85.2	86		17	89.5	88			58	100.0	70	74.5	
	15	55.6	61		0	0.0	45			49	84.5	58	61.7	
	0	0.0	93		16	84.2	89			58	100.0	96	102.	
	25	92.6	72		2	10.5	76			0	0.0	50	53.2	
	23	85.2	90		15	78.9	95			56	96.6	76	80.9	
	26	96.3	89		18	94.7	82			55	94.8	75	79.8	
	14	51.9	79		5	26.3	82			58	100.0	58	61.7	
	24	88.9	91		16	84.2	92			56	96.6	55	58.5	
	27	100.	96		19	100.0	100			58	100.0	93	98.9	
	27	100.	94		19	100.0	94			58	100.0	75	79.8	
	27	100.	93		16	84.2	74			58	100.0	87	92.6	
	25	92.6	77		19	100.0	91			58	100.0	76	80.9	
	21	77.8	84		17	89.5	74			58	100.0	69	73.4	
	0	0.0	77		0	0.0	75			54	93.1	80	85.1	
	16	59.3	95		0	0.0	98			55	94.8	79	84.0	
	22	81.5	81		18	94.7	78			58	100.0		0.0	
	27	100.	90		19	100.0	103			58	100.0	80	85.1	
	24	88.9	74		17	89.5	96			52	89.7	85	90.4	
	25	92.6	95		18	94.7	98			58	100.0	80	85.1	
	26	96.3	97		18	94.7	96			58	100.0	82	87.2	
	15	55.6	84		12	63.2	83			56	96.6	48	51.1	
	25	92.6	74		19	100.0	99			58	100.0	88	93.6	
	25	92.6	89		18	94.7	103			58	100.0	87	92.6	
	27	100.	92		16	84.2	100			55	94.8	78	83.0	
	0	0.0	80		0	0.0	88			0	0.0	35	37.2	
	27	100.	70		19	100.0	87			58	100.0	82	87.2	
	26	96.3	76		14	73.7	98			55	94.8	69	73.4	
	22	81.5	92		13	68.4	99			58	100.0	83	88.3	
	27	100.	75		19	100.0	100			58	100.0	65	69.1	
	23	85.2	86		18	94.7	99			58	100.0	83	88.3	
	15	55.6	93		18	94.7	89			57	98.3	70	74.5	
	0	0.0	79		18	94.7	104			58	100.0	78	83.0	
	24	88.9	68		18	94.7	92			56	96.6	60	63.8	
	24	88.9	92		17	89.5	97			57	98.3	80	85.1	
	0	0.0	69		13	68.4	68			58	100.0	89	94.7	

25	92.6	78		18	94.7	55			57	98.3	56	59.6
25	92.6	77		19	100.0	97			58	100.0	87	92.6
0	0.0	86		3	15.8	88			58	100.0	73	77.7
13	48.1	79		7	36.8	98			57	98.3	75	79.8
	70.4	83.1			78.9	87.37				94.0		75.4

2008-2009

		total Math for Physics:		Introduction to Physics and Math review		Motion		Motion: Velocity and Acceleration
totals		93	%	100		18	%	100
	6th	79	84.9	81		17	94.4	84
		84	90.3	50		18	100.0	51
		75	80.6	85		18	100.0	88
		81	87.1	70		18	100.0	74
		78	83.9	82		18	100.0	76
		82	88.2	81		16	88.9	83
		70	75.3	53		18	100.0	52
		72	77.4	61		17	94.4	65
		85	91.4	71		16	88.9	85
		86	92.5	51		17	94.4	80
		80	86.0	33		14	77.8	62
		83	89.2	62		18	100.0	68
		82	88.2	86		18	100.0	89
		81	87.1	62		18	100.0	78
		84	90.3	93		18	100.0	89
		81	87.1	88		18	100.0	89
		83	89.2	83		17	94.4	83
		85	91.4	55		18	100.0	82
		84	90.3	57		18	100.0	83
		81	87.1	75		18	100.0	81
		86	92.5	77		18	100.0	76
	3rd hr	86	92.5	80		14	77.8	87
		69	74.2	33		7	38.9	58
		83	89.2	66		18	100.0	86
		87	93.5	81		9	50.0	81
		82	88.2	72		13	72.2	74
		81	87.1	80		17	94.4	87

		86	92.5	85		13	72.2	81
		85	91.4	84		17	94.4	79
		84	90.3	81		18	100.0	88
		83	89.2	77		14	77.8	74
		65	69.9	58		14	77.8	INC
		82	88.2	71		15	83.3	84
		80	86.0	50		14	77.8	65
		87	93.5	82		17	94.4	81
		87	93.5	85		16	88.9	91
		66	71.0	63		12	66.7	64
		88	94.6	86		17	94.4	93
		84	90.3	86		17	94.4	89
		80	86.0	60		17	94.4	47
		82	88.2	86		18	100.0	79
		89	95.7	85		17	94.4	88
		84	90.3	61		16	88.9	61
	7th hr	72	77.4	80		18	100.0	80
		81	87.1	84		11	61.1	77
		66	71.0	65		12	66.7	81
		85	91.4	69		17	94.4	90
		50	53.8	61		14	77.8	75
		93	100.0			16	88.9	
		87	93.5	77		16	88.9	77
		85	91.4	83		17	94.4	93
		87	93.5	77		17	94.4	82
		85	91.4	69		18	100.0	79
		85	91.4	72		16	88.9	89
		84	90.3	73		18	100.0	74
		86	92.5	73		18	100.0	85
		66	71.0	74		18	100.0	73
		82	88.2	63		15	83.3	63
		87	93.5	81		18	100.0	92
		67	72.0	80		18	100.0	84
	1st hr	87	93.5	85		16	88.9	63
		74	79.6	54		13	72.2	80
		78	83.9	57		18	100.0	67
		87	93.5	97		18	100.0	90
		83	89.2	70		16	88.9	78
		78	83.9	79		17	94.4	84
		85	91.4	81		18	100.0	85
		86	92.5	53		15	83.3	55

		85	91.4	88		18	100.0	93
		83	89.2	74		15	83.3	74
		84	90.3	79		16	88.9	78
		88	94.6	91		14	77.8	89
		74	79.6	51		18	100.0	53
		83	89.2	84		17	94.4	87
		81	87.1	88		16	88.9	94
		79	84.9	80		16	88.9	79
		88	94.6	85		14	77.8	95
		80	86.0	58		17	94.4	82
ave			87.3	72.8			90.1	78.6
std								

gravity :		gravity :			vectors I:		Perpendicula r vectors		Non perpendicular vectors		vector , all types:
19	%	70			25	%	100		18	%	100
17	89.5	65			3	12	71		13	72.2	79
19	100.0	60			25	100	67		15	83.3	69
13	68.4	53			0	0	91		15	83.3	98
19	100.0	55			23	92	68		18	100.0	83
19	100.0	65			25	100	78		18	100.0	88
16	84.2	61			21	84	97		14	77.8	71
18	94.7	62			25	100	64		13	72.2	84
12	63.2	51			0	0	64		18	100.0	86
17	89.5	69			25	100	88		17	94.4	92
19	100.0	65			25	100	74		18	100.0	89
18	94.7	67			21	84	46		15	83.3	70
19	100.0	50			24	96	79		13	72.2	81
19	100.0	61			24	96	97		18	100.0	97
18	94.7	53			25	100	76		13	72.2	86
19	100.0	68			25	100	87		16	88.9	100
19	100.0	66			24	96	100		17	94.4	96
19	100.0	64			25	100	87		15	83.3	100
19	100.0	59			0	0	83		18	100.0	90
19	100.0	62			25	100	80		12	66.7	81
18	94.7	62			25	100	65		15	83.3	84
19	100.0	62			25	100	50		18	100.0	77
19	100.0	62			25	100	73		15	83.3	73
2	10.5	45			0	0	76		10	55.6	69
19	100.0	31			6	24	40		13	72.2	55
19	100.0	63			24	96	81		6	33.3	65

	19	100.0	42			25	100	72		15	83.3	76	
	14	73.7	66			25	100	80		17	94.4	83	
	13	68.4	55			25	100	72		13	72.2	85	
	19	100.0	64			25	100	95		17	94.4	93	
	18	94.7	46			25	100	82		18	100.0	82	
	19	100.0	57			25	100	83		14	77.8	89	
	16	84.2	39			24	96	50		0	0.0	74	
	16	84.2	63			25	100	50		13	72.2	84	
	0	0.0	36			9	36	47		13	72.2	50	
	19	100.0	65			22	88	94		18	100.0	94	
	18	94.7	64			25	100	87		14	77.8	99	
	3	15.8	47			25	100	30		14	77.8	78	
	19	100.0	67			25	100	85		17	94.4	94	
	16	84.2	61			23	92	96		16	88.9	96	
	19	100.0	39			6	24	51		13	72.2	63	
	14	73.7	50			25	100	75		14	77.8	86	
	19	100.0	65			25	100	93		17	94.4	92	
	18	94.7	58			25	100	40		18	100.0	83	
	19	100.0	66			25	100	70		12	66.7	87	
	14	73.7	66				0	78		14	77.8	86	
	17	89.5	64			25	100	80		15	83.3	91	
	19	100.0	59			25	100	76		15	83.3	91	
	19	100.0	55			25	100	38		14	77.8	80	
	19	100.0	60			25	100	58		17	94.4	87	
	19	100.0	58			25	100	50		10	55.6	75	
	19	100.0	65			25	100	77		18	100.0	84	
	19	100.0	66			25	100	80		18	100.0	84	
	19	100.0	54			25	100	64		18	100.0	83	
	19	100.0	69			25	100	79		18	100.0	95	
	19	100.0	65			25	100	76		17	94.4	86	
	19	100.0	62			25	100	80		16	88.9	82	
	0	0.0	61			0	0	59		14	77.8	66	
	18	94.7	25			25	100	84		18	100.0	97	
	19	100.0	69			25	100	89		13	72.2	97	
	13	68.4	63			25	100				0.0		
	18	94.7	66			22	88	85		15	83.3	98	
	15	78.9	63			15	60	56		10	55.6	69	
	19	100.0	55			3	12	58		13	72.2	77	
	19	100.0	69			25	100	94		18	100.0	99	
	18	94.7	68			25	100	67		18	100.0	91	
	19	100.0	61			8	32	41		12	66.7	65	

16	84.2	62			25	100	93		13	72.2	95
13	68.4	52			19	76	78		13	72.2	81
19	100.0	57			25	100	81		14	77.8	97
18	94.7	62			25	100	75		12	66.7	88
17	89.5	66			25	100	60		18	100.0	69
19	100.0	66			21	84	81		15	83.3	97
19	100.0	51			0	0	67		15	83.3	89
19	100.0	68			25	100	91		18	100.0	97
19	100.0	69			24	96	83		17	94.4	95
19	100.0	65			23	92	60		13	72.2	88
0	0.0	63			23	92	92		18	100.0	95
12	63.2	64			14	56	50		15	83.3	90
	87.8	59.2				82.1	72.9			81.8	84.6

Newton's laws	All cases of friction	Friction problems					Forces and Friction:
14	23	26	% I	% II	% III	3 ave wa	100
4	14	19	28.6	60.9	73.1	54.2	86
10	19	26	71.4	82.6	100.0	84.7	59
13	22	26	92.9	95.7	100.0	96.2	82
14	23	26	100.0	100.0	100.0	100.0	85
13	22	24	92.9	95.7	92.3	93.6	86
13	20	21	92.9	87.0	80.8	86.9	85
10	22	25	71.4	95.7	96.2	87.7	47
13	19	25	92.9	82.6	96.2	90.5	76
12	19	25	85.7	82.6	96.2	88.2	78
0	22	25	0.0	95.7	96.2	63.9	73
13	14	22	92.9	60.9	84.6	79.4	69
14	18	25	100.0	78.3	96.2	91.5	75
14	22	26	100.0	95.7	100.0	98.6	99
12	23	25	85.7	100.0	96.2	94.0	60
14	21	26	100.0	91.3	100.0	97.1	73
13	22	26	92.9	95.7	100.0	96.2	89

7	19	25	50.0	82.6	96.2	76.3	81
14	22	25	100.0	95.7	96.2	97.3	82
13	19	26	92.9	82.6	100.0	91.8	79
9	17	26	64.3	73.9	100.0	79.4	82
13	22	26	92.9	95.7	100.0	96.2	69
14	22	26	100.0	95.7	100.0	98.6	63
13	22	25	92.9	95.7	96.2	94.9	71
7	16	25	50.0	69.6	96.2	71.9	65
0	17	23	0.0	73.9	88.5	54.1	91
14	23	26	100.0	100.0	100.0	100.0	62
14	23	25	100.0	100.0	96.2	98.7	82
9	23	25	64.3	100.0	96.2	86.8	83
13	22	26	92.9	95.7	100.0	96.2	82
13	22	25	92.9	95.7	96.2	94.9	95
9	18	24	64.3	78.3	92.3	78.3	67
8	22	25	57.1	95.7	96.2	83.0	88
8	21	25	57.1	91.3	96.2	81.5	81
13	19	24	92.9	82.6	92.3	89.3	52
14	20	22	100.0	87.0	84.6	90.5	70
13	22	26	92.9	95.7	100.0	96.2	86
14	14	14	100.0	60.9	53.8	71.6	46
14	23	26	100.0	100.0	100.0	100.0	65
13	21	24	92.9	91.3	92.3	92.2	82
14	22	24	100.0	95.7	92.3	96.0	
12	14	25	85.7	60.9	96.2	80.9	65
11	22	22	78.6	95.7	84.6	86.3	80
13	22	26	92.9	95.7	100.0	96.2	44
0	16	26	0.0	69.6	100.0	56.5	94
11	17	26	78.6	73.9	100.0	84.2	62
12	21	25	85.7	91.3	96.2	91.1	91
10	19	26	71.4	82.6	100.0	84.7	83
2	0	22	14.3	0.0	84.6	33.0	54
14	22	26	100.0	95.7	100.0	98.6	90
14	21	24	100.0	91.3	92.3	94.5	83
13	22	26	92.9	95.7	100.0	96.2	89
14	22	26	100.0	95.7	100.0	98.6	84
14	22	26	100.0	95.7	100.0	98.6	68
14	19	26	100.0	82.6	100.0	94.2	94
0	21	24	0.0	91.3	92.3	61.2	47
14	22	25	100.0	95.7	96.2	97.3	87
14	12	24	100.0	52.2	92.3	81.5	38

14	22	26	100.0	95.7	100.0	98.6	81
13	22	26	92.9	95.7	100.0	96.2	94
13	20	26	92.9	87.0	100.0	93.3	94
8	16	11	57.1	69.6	42.3	56.3	72
14	22	23	100.0	95.7	88.5	94.7	69
14	23	26	100.0	100.0	100.0	100.0	94
14	21	25	100.0	91.3	96.2	95.8	84
9	17	13	64.3	73.9	50.0	62.7	75
14	22	25	100.0	95.7	96.2	97.3	83
9	21	16	64.3	91.3	61.5	72.4	78
12	22	25	85.7	95.7	96.2	92.5	78
13	21	26	92.9	91.3	100.0	94.7	80
7	22	26	50.0	95.7	100.0	81.9	65
14	0	22	100.0	0.0	84.6	61.5	91
13	22	25	92.9	95.7	96.2	94.9	61
13	22	25	92.9	95.7	96.2	94.9	81
13	23	26	92.9	100.0	100.0	97.6	93
14	23	25	100.0	100.0	96.2	98.7	87
9	7	0	64.3	30.4	0.0	31.6	84
5	22	13	35.7	95.7	50.0	60.5	83
						86.1	76.6578 9

Projectile motion case I	case I and II				Motion in 2 dimensions			Circular motion:		pendulum and centripetal	
10	11	% I	% II	2 wa ave	60	%		18	%	55	%
9	11	90	100.0	95.0	55	91.7		18	100.0	55	100.0
8	11	80	100.0	90.0	57	95.0		18	100.0	44	80.0
4	11	40	100.0	70.0	36	60.0		18	100.0	55	100.0
10	11	100	100.0	100.0	53	88.3		18	100.0	47	85.5
10	11	100	100.0	100.0	60	100.0		18	100.0	47	85.5
9	8	90	72.7	81.4	33	55.0		15	83.3	55	100.0
10	11	100	100.0	100.0	53	88.3		17	94.4	51	92.7
10	11	100	100.0	100.0	40	66.7		18	100.0	43	78.2
9	11	90	100.0	95.0	60	100.0		16	88.9	43	78.2
7	11	70	100.0	85.0	58	96.7		9	50.0	46	83.6
8	11	80	100.0	90.0	40	66.7		14	77.8	47	85.5
10	10	100	90.9	95.5	48	80.0		17	94.4	40	72.7
10	11	100	100.0	100.0	57	95.0		18	100.0	55	100.0

	8	11	80	100.0	90.0	53	88.3		18	100.0	46	83.6	
	0	11	0	100.0	50.0	60	100.0		18	100.0	55	100.0	
	10	11	100	100.0	100.0	61	101.7		18	100.0	55	100.0	
	9	0	90	0.0	45.0	49	81.7		18	100.0	45	81.8	
	9	11	90	100.0	95.0	54	90.0		17	94.4	49	89.1	
	0	11	0	100.0	50.0		0.0		18	100.0	47	85.5	
	9	11	90	100.0	95.0	56	93.3		18	100.0	44	80.0	
	8	11	80	100.0	90.0	44	73.3		14	77.8	41	74.5	
	9	10	90	90.9	90.5	46	76.7					0.0	
	7	3	70	27.3	48.6	36	60.0		6	33.3	43	78.2	
	0	11	0	100.0	50.0	43	71.7		18	100.0	49	89.1	
	0	11	0	100.0	50.0	43	71.7		0	0.0	45	81.8	
	10	11	100	100.0	100.0	45	75.0		18	100.0	51	92.7	
	6	11	60	100.0	80.0	54	90.0		18	100.0	47	85.5	
	10	11	100	100.0	100.0	58	96.7		18	100.0	55	100.0	
	9	11	90	100.0	95.0	41	68.3		17	94.4	47	85.5	
	9	11	90	100.0	95.0	52	86.7		18	100.0	55	100.0	
	5	0	50	0.0	25.0	48	80.0		12	66.7	49	89.1	
	9	11	90	100.0	95.0	34	56.7		18	100.0	43	78.2	
	8	10	80	90.9	85.5	47	78.3		12	66.7	55	100.0	
	9	9	90	81.8	85.9	32	53.3		18	100.0	44	80.0	
	9	11	90	100.0	95.0	42	70.0		18	100.0	49	89.1	
	8	0	80	0.0	40.0	59	98.3		18	100.0	53	96.4	
	8	2	80	18.2	49.1	36	60.0		6	33.3	37	67.3	
	9	11	90	100.0	95.0	53	88.3		18	100.0	49	89.1	
	7	11	70	100.0	85.0	49	81.7		16	88.9	53	96.4	
	0	11	0	100.0	50.0	31	51.7		18	100.0	41	74.5	
	5	11	50	100.0	75.0	41	68.3		18	100.0	43	78.2	
	9	9	90	81.8	85.9	57	95.0		18	100.0	49	89.1	
	9	11	90	100.0	95.0	34	56.7		18	100.0	49	89.1	
	1	11	10	100.0	55.0	43	71.7		18	100.0	53	96.4	
	8	11	80	100.0	90.0	46	76.7		10	55.6	43	78.2	
	0	2	0	18.2	9.1	47	78.3		16	88.9	49	89.1	
	10	0	100	0.0	50.0	44	73.3		18	100.0	43	78.2	
	1	0	10	0.0	5.0	33	55.0		8	44.4	46	83.6	
	10	11	100	100.0	100.0	49	81.7		18	100.0	43	78.2	
	9	11	90	100.0	95.0	46	76.7		9	50.0	53	96.4	
	9	11	90	100.0	95.0	59	98.3		13	72.2	53	96.4	
	10	11	100	100.0	100.0	53	88.3		18	100.0	55	100.0	
	10	11	100	100.0	100.0	44	73.3		18	100.0	49	89.1	
	10	11	100	100.0	100.0	60	100.0		18	100.0	41	74.5	

9	11	90	100.0	95.0	43	71.7		12	66.7	45	81.8
10	11	100	100.0	100.0	51	85.0		18	100.0	55	100.0
10	11	100	100.0	100.0	38	63.3		18	100.0	45	81.8
10	11	100	100.0	100.0	61	101.7		15	83.3	43	78.2
10	0	100	0.0	50.0	59	98.3		18	100.0	53	96.4
		0	0.0	0.0		0.0		18	100.0	55	100.0
7	11	70	100.0	85.0	58	96.7		14	77.8	47	85.5
8	11	80	100.0	90.0	49	81.7		16	88.9	49	89.1
3	9	30	81.8	55.9	29	48.3		13	72.2	33	60.0
8	11	80	100.0	90.0				18	100.0	49	89.1
9	11	90	100.0	95.0	46	76.7		17	94.4	47	85.5
9	10	90	90.9	90.5	50	83.3		13	72.2	49	89.1
9	11	90	100.0	95.0	43	71.7		18	100.0	47	85.5
8	11	80	100.0	90.0	39	65.0		17	94.4	53	96.4
8	0	80	0.0	40.0	43	71.7		5	27.8	53	96.4
8	11	80	100.0	90.0	52	86.7		17	94.4	47	85.5
10	11	100	100.0	100.0	51	85.0		16	88.9	48	87.3
9	0	90	0.0	45.0	34	56.7		16	88.9	55	100.0
10	11	100	100.0	100.0		0.0		14	77.8	40	72.7
8	11	80	100.0	90.0	58	96.7		18	100.0	53	96.4
9	11	90	100.0	95.0	51	85.0		18	100.0	55	100.0
9	11	90	100.0	95.0	41	68.3		18	100.0	41	74.5
1	10	10	90.9	50.5	57	95.0		13	72.2	55	100.0
8	0	80	0.0	40.0							
				79.1		76.4			87.6		86.4

impulse and momentum :	Review of momentum:				Momentum		work and power:	simple machines review for test				Simple Machines
29	23	% I	%II	2 wa ave	100		17	25	%I	%II	2 wa ave	100.0
14	13	48.3	56.5	52.4	94		12	21	70.6	84.0	77.3	73.0
29	23	100.0	100.0	100.0	89		14	20	82.4	80.0	81.2	66.0
29	23	100.0	100.0	100.0	96		16	25	94.1	100.0	97.1	92.0
28	22	96.6	95.7	96.1	93		17	25	100.0	100.0	100.0	75.0
29	21	100.0	91.3	95.7	92		17	25	100.0	100.0	100.0	88.0
27	0	93.1	0.0	46.6	90		15	21	88.2	84.0	86.1	95.0
20	6	69.0	26.1	47.5	83		17	0	100.0	0.0	50.0	67.0
28	23	96.6	100.0	98.3	87		17	23	100.0	92.0	96.0	64.0

9	15	31.0	65.2	48.1	94		15	25	88.2	100.0	94.1	95.0
12	19	41.4	82.6	62.0	84		0	10	0.0	40.0	20.0	73.0
14	21	48.3	91.3	69.8	66		15	17	88.2	68.0	78.1	71.0
21	23	72.4	100.0	86.2	86		17	21	100.0	84.0	92.0	70.0
28	23	96.6	100.0	98.3	97		17	23	100.0	92.0	96.0	91.0
17	18	58.6	78.3	68.4	85		13	18	76.5	72.0	74.2	66.0
29	22	100.0	95.7	97.8	97		17	25	100.0	100.0	100.0	95.0
29	19	100.0	82.6	91.3	96		16	25	94.1	100.0	97.1	93.0
26	23	89.7	100.0	94.8	92		16	0	94.1	0.0	47.1	89.0
26	18	89.7	78.3	84.0	94		15	20	88.2	80.0	84.1	92.0
27	18	93.1	78.3	85.7	78		14	24	82.4	96.0	89.2	84.0
25	22	86.2	95.7	90.9	86		14	21	82.4	84.0	83.2	88.0
29	23	100.0	100.0	100.0	84		17	25	100.0	100.0	100.0	67.0
		0.0	0.0	0.0					0.0	0.0	0.0	
0	10	0.0	43.5	21.7	83		11	19	64.7	76.0	70.4	67.0
29	23	100.0	100.0	100.0	81		17	25	100.0	100.0	100.0	83.0
0	3	0.0	13.0	6.5	82		0	25	0.0	100.0	50.0	85.0
28	22	96.6	95.7	96.1	86		17	25	100.0	100.0	100.0	79.0
29	23	100.0	100.0	100.0	85		17	25	100.0	100.0	100.0	82.0
29	23	100.0	100.0	100.0	89		17	25	100.0	100.0	100.0	90.0
28	23	96.6	100.0	98.3	91		17	25	100.0	100.0	100.0	80.0
28	22	96.6	95.7	96.1	80		16	25	94.1	100.0	97.1	87.0
23	11	79.3	47.8	63.6	89		8	4	47.1	16.0	31.5	80.0
28	22	96.6	95.7	96.1	76		17	24	100.0	96.0	98.0	97.0
10	15	34.5	65.2	49.9	90		16	24	94.1	96.0	95.1	78.0
23	17	79.3	73.9	76.6	58		15	21	88.2	84.0	86.1	60.0
24	18	82.8	78.3	80.5	84		15	21	88.2	84.0	86.1	83.0
11	0	37.9	0.0	19.0	95		12	0	70.6	0.0	35.3	76.0
5	3	17.2	13.0	15.1	42		16	25	94.1	100.0	97.1	67.0
27	23	93.1	100.0	96.6	89		17	24	100.0	96.0	98.0	93.0
29	22	100.0	95.7	97.8	91		17	25	100.0	100.0	100.0	92.0
28	23	96.6	100.0	98.3	60		17	25	100.0	100.0	100.0	56.0
27	23	93.1	100.0	96.6	85		16	25	94.1	100.0	97.1	73.0
29	23	100.0	100.0	100.0	92		0	25	0.0	100.0	50.0	84.0
29	23	100.0	100.0	100.0	74		17	21	100.0	84.0	92.0	66.0
26	23	89.7	100.0	94.8	87		14	25	82.4	100.0	91.2	90.0
24	11	82.8	47.8	65.3	90		15	14	88.2	56.0	72.1	81.0
25	0	86.2	0.0	43.1	83		16	23	94.1	92.0	93.1	86.0
20	21	69.0	91.3	80.1	88		16	21	94.1	84.0	89.1	66.0
4	0	13.8	0.0	6.9	85		17	21	100.0	84.0	92.0	82.0
21	22	72.4	95.7	84.0	82		17	24	100.0	96.0	98.0	74.0

22	0	75.9	0.0	37.9	94		17	24	100.0	96.0	98.0	77.0
29	23	100.	100	100	97		17	24	100	100	100	100.0
29	23	100.0	100.0	100.0	93		17	25	100.0	100.0	100.0	91.0
10	22	34.5	95.7	65.1	89		17	25	100.0	100.0	100.0	89.0
29	23	100.0	100.0	100.0	94		17	23	100.0	92.0	96.0	93.0
13	23	44.8	100.0	72.4	86		17	25	100.0	100.0	100.0	83.0
29	23	100.0	100.0	100.0	93		17	25	100.0	100.0	100.0	92.0
29	23	100.0	100.0	100.0	91		14	25	82.4	100.0	91.2	95.0
18	18	62.1	78.3	70.2	69		14	23	82.4	92.0	87.2	79.0
29	23	100.0	100.0	100.0	94		17	25	100.0	100.0	100.0	91.0
24	23	82.8	100.0	91.4	98		17	25	100.0	100.0	100.0	93.0
29	21	100.0	91.3	95.7	100		14	21	82.4	84.0	83.2	87.0
7	4	24.1	17.4	20.8	91		0	4	0.0	16.0	8.0	60.0
20	16	69.0	69.6	69.3	80		7	23	41.2	92.0	66.6	54.0
29	23	100.0	100.0	100.0	98		17	25	100.0	100.0	100.	94.0
25	22	86.2	95.7	90.9	88		16	24	94.1	96.0	95.1	84.0
26	12	89.7	52.2	70.9	72		16	22	94.1	88.0	91.1	83.0
25	22	86.2	95.7	90.9	90		14	24	82.4	96.0	89.2	94.0
29	23	100.0	100.0	100.0	81		17	22	100.0	88.0	94.0	91.0
26	14	89.7	60.9	75.3	94		16	23	94.1	92.0	93.1	96.0
28	20	96.6	87.0	91.8	94		17	22	100.0	88.0	94.0	82.0
0	5	0.0	21.7	10.9	67		15	25	88.2	100.0	94.1	65.0
29	0	100.0	0.0	50.0	95		16	25	94.1	100.0	97.1	86.0
29	23	100.0	100.0	100.0	76		17	25	100.0	100.0	100.	59.0
28	23	96.6	100.0	98.3	95		16	25	94.1	100.0	97.1	98.0
29	22	100.0	95.7	97.8	94		16	24	94.1	96.0	95.1	90.0
29	23	100.0	100.0	100.0	89		16	24	94.1	96.0	95.1	81.0
29	22	100.0	95.7	97.8	96		15	20	88.2	80.0	84.1	95.0
10	14	34.5	60.9	47.7	88		16	24	94.1	96.0	95.1	87.0
				77.5	86.						86.0	81.8

PE and KE	Electricity I	Electricity					Energy and Electricity		Thermal energy I	
14	47	51	%I	%II	%III	3 wa ave	100		14	%
14	47	38	100.0	100.0	74.5	91.5	89.0		5	35.7
13	47	48	92.9	100.0	94.1	95.7	69.0		0	0.0
14	47	51	100.0	100.0	100.0	100.0	91.0		14	100.0
14	47	50	100.0	100.0	98.0	99.3	85.0		14	100.0
14	47	50	100.0	100.0	98.0	99.3	79.0		14	100.0

13	45	39	92.9	95.7	76.5	88.4	79.0		10	71.4
9	47	43	64.3	100.0	84.3	82.9	68.0		9	64.3
11	47	45	78.6	100.0	88.2	88.9	76.0		5	35.7
14	47	49	100.0	100.0	96.1	98.7	87.0		13	92.9
12	47	48	85.7	100.0	94.1	93.3	69.0		0	0.0
10	47	40	71.4	100.0	78.4	83.3	47.0		7	50.0
14	47	50	100.0	100.0	98.0	99.3	78.0		14	100.0
13	47	50	92.9	100.0	98.0	97.0	87.0		14	100.0
0	47	39	0.0	100.0	76.5	58.8	64.0		13	92.9
14	47	50	100.0	100.0	98.0	99.3	97.0		14	100.0
14	47	49	100.0	100.0	96.1	98.7	92.0		14	100.0
0	47	37	0.0	100.0	72.5	57.5	65.0		0	0.0
14	47	41	100.0	100.0	80.4	93.5	78.0		12	85.7
14	47	45	100.0	100.0	88.2	96.1	89.0		13	92.9
11	47	51	78.6	100.0	100.0	92.9	95.0		6	42.9
14	47	46	100.0	100.0	90.2	96.7	78.0		14	100.0
14	36	41	100.0	76.6	80.4	85.7			4	28.6
14	0	48	100.0	0.0	94.1	64.7	66.0		14	100.0
14	47	51	100.0	100.0	100.0	100.0	69.0		14	100.0
0	47	44	0.0	100.0	86.3	62.1	74.0		14	100.0
14	47	49	100.0	100.0	96.1	98.7	88.0		14	100.0
13	47	50	92.9	100.0	98.0	97.0	98.0		13	92.9
14	47	51	100.0	100.0	100.0	100.0	82.0		14	100.0
13	47	51	92.9	100.0	100.0	97.6	93.0		14	100.0
13	47	51	92.9	100.0	100.0	97.6	77.0		14	100.0
12	42	35	85.7	89.4	68.6	81.2	86.0		5	35.7
13	46	46	92.9	97.9	90.2	93.6	77.0		8	57.1
14	47	42	100.0	100.0	82.4	94.1	84.0		4	28.6
13	47	50	92.9	100.0	98.0	97.0	50.0		13	92.9
14	47	43	100.0	100.0	84.3	94.8	92.0		13	92.9
12	47	49	85.7	100.0	96.1	93.9	96.0		14	100.0
13	47	48	92.9	100.0	94.1	95.7	63.0		4	28.6
14	47	51	100.0	100.0	100.0	100.0	84.0		14	100.0
14	43	48	100.0	91.5	94.1	95.2	81.0		12	85.7
14	47	51	100.0	100.0	100.0	100.0	60.0		14	100.0
11	47	48	78.6	100.0	94.1	90.9	74.0		6	42.9
14	47	50	100.0	100.0	98.0	99.3	70.0		0	0.0
11	47	50	78.6	100.0	98.0	92.2	59.0		14	100.0
14	47	51	100.0	100.0	100.0	100.0	75.0		8	57.1
11	47	34	78.6	100.0	66.7	81.7	76.0		0	0.0
14	47	45	100.0	100.0	88.2	96.1	82.0		11	78.6

14	47	44	100.0	100.0	86.3	95.4	70.0		12	85.7
11	47	32	78.6	100.0	62.7	80.4	75.0		0	
14	47	50	100.0	100.0	98.0	99.3	63.0		12	85.7
12	47	49	85.7	100.0	96.1	93.9	86.0		3	21.4
13	47	48	92.9	100.0	94.1	95.7	94.0		14	100.0
14	47	48	100.0	100.0	94.1	98.0	92.0		14	100.0
14	47	48	100.0	100.0	94.1	98.0	77.0		14	100.0
14	47	50	100.0	100.0	98.0	99.3	89.0		14	100.0
14	47	51	100.0	100.0	100.0	100.0	64.0		14	100.0
13	47	50	92.9	100.0	98.0	97.0	82.0		14	100.0
14	47	49	100.0	100.0	96.1	98.7	92.0		6	42.9
14	47	48	100.0	100.0	94.1	98.0	57.0		4	28.6
14	47	50	100.0	100.0	98.0	99.3	97.0		13	92.9
13	47	51	92.9	100.0	100.0	97.6	95.0		12	85.7
14	47	50	100.0	100.0	98.0	99.3	100.0		14	100.0
13	16	0	92.9	34.0	0.0	42.3	75.0		13	92.9
0	47	47	0.0	100.0	92.2	64.1	62.0		0	0.0
14	47	51	100.0	100.0	100.0	100.0	96.0		14	100.0
14	47	44	100.0	100.0	86.3	95.4	79.0		14	100.0
11	47	28	78.6	100.0	54.9	77.8	76.0		0	0.0
14	47	51	100.0	100.0	100.0	100.0	89.0		14	100.0
14	47	50	100.0	100.0	98.0	99.3	78.0		14	100.0
14	47	36	100.0	100.0	70.6	90.2	94.0		11	78.6
13	47	43	92.9	100.0	84.3	92.4	87.0		5	35.7
14	47	48	100.0	100.0	94.1	98.0	91.0		14	100.0
13	44	49	92.9	93.6	96.1	94.2	96.0		0	0.0
13	42	51	92.9	89.4	100.0	94.1	76.0		0	0.0
13	47	51	92.9	100.0	100.0	97.6	100.0		13	92.9
14	47	49	100.0	100.0	96.1	98.7	79.0		14	100.0
13	47	50	92.9	100.0	98.0	97.0	84.0		14	100.0
14	47	47	100.0	100.0	92.2	97.4	96.0		14	100.0
10	47	49	71.4	100.0	96.1	89.2	96.0		12	85.7
						92.3	80.6			72.9

Therm energy II	Thermal expansion				expansion and exchange			nuclear energy:			nuclear energy
30	8	%I	%II	2 wa ave	52	%		58	%		100
29	3	96.7	37.5	67.1	41	78.8		56	96.6		85
27	8	90.0	100.0	95.0	36	69.2		58	100.0		61
30	8	100.0	100.0	100.0	51	98.1		58	100.0		82
30	8	100.0	100.0	100.0	51	98.1		57	98.3		89

30	8	100.0	100.0	100.0	39	75.0		58	100.0		94
21	5	70.0	62.5	66.3	45	86.5		58	100.0		92
24	5	80.0	62.5	71.3	24	46.2		53	91.4		56
30	7	100.0	87.5	93.8	39	75.0		57	98.3		61
30	7	100.0	87.5	93.8	44	84.6		56	96.6		86
24	6	80.0	75.0	77.5	44	84.6		58	100.0		71
21	4	70.0	50.0	60.0	18	34.6		42	72.4		71
30	8	100.0	100.0	100.0	41	78.8		57	98.3		90
30	7	100.0	87.5	93.8	50	96.2		56	96.6		87
24	5	80.0	62.5	71.3	24	46.2		54	93.1		66
30	8	100.0	100.0	100.0	49	94.2		58	100.0		89
30	8	100.0	100.0	100.0	46	88.5		58	100.0		80
12	0	40.0	0.0	20.0	41	78.8		58	100.0		63
26	8	86.7	100.0	93.3	45	86.5		58	100.0		95
27	6	90.0	75.0	82.5	50	96.2		58	100.0		97
29	8	96.7	100.0	98.3	30	57.7		57	98.3		86
30	8	100.0	100.0	100.0	32	61.5		57	98.3		79
18	8	60.0	100.0	80.0	45	86.5		58	100.0		68
30	8	100.0	100.0	100.0	43	82.7		58	100.0		73
30	8	100.0	100.0	100.0	40	76.9		56	96.6		72
30	8	100.0	100.0	100.0	10	19.2		57	98.3		69
30	8	100.0	100.0	100.0	40	76.9		58	100.0		68
29	8	96.7	100.0	98.3	48	92.3		58	100.0		90
30	7	100.0	87.5	93.8	39	75.0		58	100.0		92
30	7	100.0	87.5	93.8	47	90.4		57	98.3		88
30	8	100.0	100.0	100.0	68	130.8		57	98.3		83
27	7	90.0	87.5	88.8	48	92.3		43	74.1		67
17	0	56.7	0.0	28.3	23	44.2		54	93.1		75
17	6	56.7	75.0	65.8	40	76.9		51	87.9		71
30	40	100.0	500.0	300.0	20	38.5		58	100.0		51
26	8	86.7	100.0	93.3	42	80.8		56	96.6		68
30	8	100.0	100.0	100.0	45	86.5		58	100.0		85
25	6	83.3	75.0	79.2	21	40.4		58	100.0		67
30	8	100.0	100.0	100.0	48	92.3		58	100.0		88
30	7	100.0	87.5	93.8	51	98.1		57	98.3		82
30	6	100.0	75.0	87.5	27	51.9		58	100.0		60
23	6	76.7	75.0	75.8	43	82.7		58	100.0		76
30	0	100.0	0.0	50.0	40	76.9		58	100.0		68
28	7	93.3	87.5	90.4	31	59.6		58	100.0		72
30	7	100.0	87.5	94	46	88.5		58	100.0		69
16	1	53.3	12.5	33	45	86.5		30	51.7		98

29	6	96.7	75.0	86	49	94.2	57	98.3	83
28	8	93.3	100.0	97	47	90.4	58	100.0	94
30	8	100.0	100.0	100	29	55.8	57	98.3	73
29	8	96.7	100.0	98	40	76.9	58	100.0	59
30	5	100.0	62.5	81	49	94.2	51	87.9	81
30	6	100.0	75.0	88	52	100.0	58	100.0	94
30	7	100.0	87.5	94	44	84.6	58	100.0	89
30	6	100.0	75.0	88	42	80.8	58	100.0	85
30	8	100.0	100.0	100	50	96.2	58	100.0	91
30	6	100.0	75.0	88	45	86.5	55	94.8	74
30	8	100.0	100.0	100	40	76.9	58	100.0	96
13	7	43.3	87.5	65	41	78.8	58	100.0	74
27	8	90.0	100.0	95	40	76.9	56	96.6	81
30	8	100.0	100.0	100	47	90.4	57	98.3	96
26	7	86.7	87.5	87	49	94.2	58	100.0	77
27	7	90.0	87.5	88.8	48	92.3	58	100.0	80
27	7	90.0	87.5	88.8	29	55.8	58	100.0	57
18	0	60.0	0.0	30.0	19	36.5	57	98.3	49
30	8	100.0	100.0	100.0	52	100.0	57	98.3	94
25	7	83.3	87.5	85.4	41	78.8	58	100.0	74
30	8	100.0	100.0	100.0	43	82.7	58	100.0	84
29	7	96.7	87.5	92.1	44	84.6	58	100.0	80
30	8	100.0	100.0	100.0	33	63.5	56	96.6	61
23	2	76.7	25.0	50.8	45	86.5	57	98.3	83
19	7	63.3	87.5	75.4	42	80.8	57	98.3	65
28	7	93.3	87.5	90.4	26	50.0	58	100.0	60
28	7	93.3	87.5	90.4	52	100.0	58	100.0	88
30	0	100.0	0.0	50.0		0.0	56	96.6	30
30	7	100.0	87.5	93.8	48	92.3	58	100.0	81
27	7	90.0	87.5	88.8	47	90.4	58	100.0	90
30	6	100.0	75.0	87.5	42	80.8	56	96.6	89
30	0	100.0	0.0	50.0	69	132.7	58	100.0	98
25	8	83.3	100.0	91.7	35	67.3	58	100.0	75
				87.8		78.1		97.3	77.8

I Waves:	II light:	III sound:					Waves:
13	27	31	%I	%II	%III	3 wa ave	100
9	15	30	69.2	55.6	96.8	73.9	85.0
9	26	31	69.2	96.3	100.0	88.5	60.0
12	27	31	92.3	100.0	100.0	97.4	85.0
12	27	31	92.3	100.0	100.0	97.4	76.0

10	27	31	76.9	100.0	100.0	92.3	84.0	
8	20	28	61.5	74.1	90.3	75.3	86.0	
6	9	13	46.2	33.3	41.9	40.5	79.0	
5	16	30	38.5	59.3	96.8	64.8	60.0	
11	26	31	84.6	96.3	100.0	93.6	90.0	
0	27	0	0.0	100.0	0.0	33.3	69.0	
6	19	13	46.2	70.4	41.9	52.8	82.0	
3	27	31	23.1	100.0	100.0	74.4	76.0	
10	26	31	76.9	96.3	100.0	91.1	94.0	
13	27	31	100.0	100.0	100.0	100.0	56.0	
13	27	31	100.0	100.0	100.0	100.0	85.0	
11	27	31	84.6	100.0	100.0	94.9	89.0	
10	12	26	76.9	44.4	83.9	68.4	91.0	
12	26	29	92.3	96.3	93.5	94.1	95.0	
11	24	2	84.6	88.9	6.5	60.0	77.0	
13	25	30	100.0	92.6	96.8	96.5	76.0	
13	27	31	100.0	100.0	100.0	100.0	68.0	
5	22	27	38.5	81.5	87.1	69.0		
12	22	29	92.3	81.5	93.5	89.1	71.0	
0	27	31	0.0	100.0	100.0	66.7	74.0	
13	27	31	100.0	100.0	100.0	100.0	83.0	
13	27	31	100.0	100.0	100.0	100.0	94.0	
3	29	31	23.1	107.4	100.0	76.8	86.0	
10	29	31	76.9	107.4	100.0	94.8	87.0	
13	27	31	100.0	100.0	100.0	100.0	93.0	
13	26	30	100.0	96.3	96.8	97.7	83.0	
8	19	15	61.5	70.4	48.4	60.1	88.0	
8	10	23	61.5	37.0	74.2	57.6	84.0	
11		27	84.6	0.0	87.1	57.2	82.0	
5	23	31	38.5	85.2	100.0	74.5	68.0	
12	27	31	92.3	100.0	100.0	97.4	91.0	
13	29	31	100.0	107.4	100.0	102.5	91.0	
8	23	31	61.5	85.2	100.0	82.2	62.0	
11	27	30	84.6	100.0	96.8	93.8	88.0	
12	25	30	92.3	92.6	96.8	93.9	93.0	
0	16	31	0.0	59.3	100.0	53.1	55.0	
12	17	24	92.3	63.0	77.4	77.6	59.0	
12	28	31	92.3	103.7	100.0	98.7	79.0	
10	37	31	76.9	137.0	100.0	104.7	84.0	
4	27	31	30.8	100.0	100.0	76.9	53.0	
0	21	3	0.0	77.8	9.7	29.2	75.0	

11	19	29	84.6	70.4	93.5	82.8	84.0	
13	27	31	100.0	100.0	100.0	100.0	81.0	
13	21	31	100.0	77.8	100.0	92.6	57.0	
12	25	31	92.3	92.6	100.0	95.0	83.0	
2	9	0	15.4	33.3	0.0	16.2	79.0	
0	26	31	0.0	96.3	100.0	65.4	66.0	
11	24	31	84.6	88.9	100.0	91.2	89.0	
12	27	31	92.3	100.0	100.0	97.4	84.0	
11	25	31	84.6	92.6	100.0	92.4	85.0	
0	27	10	0.0	100.0	32.3	44.1	69.0	
11	27	31	84.6	100.0	100.0	94.9	78.0	
11	21	31	84.6	77.8	100.0	87.5	65.0	
13	22	30	100.0	81.5	96.8	92.8	51.0	
12	26	31	92.3	96.3	100.0	96.2	86.0	
12	17	28	92.3	63.0	90.3	81.9	94.0	
13	24	31	100.0	88.9	100.0	96.3	94.0	
4	26	31	30.8	96.3	100.0	75.7	81.0	
2	22	31	15.4	81.5	100.0	65.6	78.0	
33	25	31	253.8	92.6	100.0	148.8	95.0	
12	26	31	92.3	96.3	100.0	96.2	83.0	
13	27	31	100.0	100.0	100.0	100.0	84.0	
12	23	31	92.3	85.2	100.0	92.5	94.0	
10	25	31	76.9	92.6	100.0	89.8	89.0	
11	27	31	84.6	100.0	100.0	94.9	86.0	
5	27	14	38.5	100.0	45.2	61.2	85.0	
13	26	30	100.0	96.3	96.8	97.7	83.0	
12	21	31	92.3	77.8	100.0	90.0	97.0	
0	17	0	0.0	63.0	0.0	21.0	72.0	
11	22	31	84.6	81.5	100.0	88.7	100.0	
12	27	29	92.3	100.0	93.5	95.3	93.0	
12	26	29	92.3	96.3	93.5	94.1	89.0	
0	23	3	0.0	85.2	9.7	31.6	96.0	
13	20	14	100.0	74.1	45.2	73.1	86.0	
						81.9	80.8	

2009-2010

	intro to web	Mathtool kit:				Math for Phys:		Vel and acc:					Motion: Velocity and Acceleration
	29	43	%I	%II	2 wa ave	100		18	18	%I	%II	2 wa ave	100
	29	43	100.0	100.0	100.	76		14	15	77.8	83.3	80.6	89
	29	40	100.0	93.0	96.5	82		14	14	77.8	77.8	77.8	76
	29	43	100.0	100.0	100.	87		18	18	100.0	100.0	100.	87
	29	42	100.0	97.7	98.8	59		16	17	88.9	94.4	91.7	88
	29	37	100.0	86.0	93.0	80		17	17	94.4	94.4	94.4	94
	29	42	100.0	97.7	98.8	76		18	14	100.0	77.8	88.9	72
	29	35	100.0	81.4	90.7	85		16	18	88.9	100.0	94.4	75
	29	41	100.0	95.3	97.7	55		18	18	100.0	100.0	100.	51
	0	41	0.0	95.3	47.7	67		13	16	72.2	88.9	80.6	88
	29	42	100.0	97.7	98.8	78		18	17	100.0	94.4	97.2	82
	29	0	100.0	0.0	50.0	70		10	15	55.6	83.3	69.4	76
	29	43	100.0	100.0	100.0	88		15	17	83.3	94.4	88.9	75
	29	42	100.0	97.7	98.8	70		18	17	100.0	94.4	97.2	72
	26	40	89.7	93.0	91.3	81		16	17	88.9	94.4	91.7	75
	29	41	100.0	95.3	97.7	53		14	0	77.8	0.0	38.9	74
	29	42	100.0	97.7	98.8	79		18	15	100.0	83.3	91.7	87
	29	42	100.0	97.7	98.8	93		18	17	100.0	94.4	97.2	88
	29	42	100.0	97.7	98.8	87		16	16	88.9	88.9	88.9	88
	29	40	100.0	93.0	96.5	77		17	17	94.4	94.4	94.4	79
	29	41	100.0	95.3	97.7	90		17	17	94.4	94.4	94.4	89
	18	7	62.1	16.3	39.2	74		17	15	94.4	83.3	88.9	82
	29	39	100.0	90.7	95.3	84		18	18	100.0	100.0	100.0	92
	29	42	100.0	97.7	98.8	69		16	18	88.9	100.0	94.4	84
	29	42	100.0	97.7	98.8	77		18	18	100.0	100.0	100.0	83
	29	42	100.0	97.7	98.8	99		17	18	94.4	100.0	97.2	97
	29	42	100.0	97.7	98.8	76		18	18	100.0	100.0	100.0	90
	29	38	100.0	88.4	94.2	64		18	18	100.0	100.0	100.0	85
	28	42	96.6	97.7	97.1	92		17	15	94.4	83.3	88.9	78
	29	27	100.0	62.8	81.4	66		18	15	100.0	83.3	91.7	75
	29	41	100.0	95.3	97.7	60		17	18	94.4	100.0	97.2	89
	29	40	100.0	93.0	96.5	81		18	18	100.0	100.0	100.0	96
	27	43	93.1	100.0	96.6	83		9	0	50.0	0.0	25.0	79

	29	39	100.0	90.7	95.3	74		18	18	100.0	100.0	100.0	84	
	29	36	100.0	83.7	91.9	51		18	18	100.0	100.0	100.0	70	
	29	40	100.0	93.0	96.5	78		18	18	100.0	100.0	100.0	78	
	29	38	100.0	88.4	94.2	62		18	16	100.0	88.9	94.4	92	
	29	43	100.0	100.0	100.0	70		18	18	100.0	100.0	100.0	75	
	28	41	96.6	95.3	96.0	80		12	14	66.7	77.8	72.2	75	
	29	42	100.0	97.7	98.8	96		17	18	94.4	100.0	97.2	85	
	28	42	96.6	97.7	97.1	88		17	18	94.4	100.0	97.2	86	
	29	43	100.0	100.0	100.0	85		18	18	100.0	100.0	100.0	84	
	27	43	93.1	100.0	96.6	70		15	17	83.3	94.4	88.9	89	
	29	41	100.0	95.3	97.7	86		16	18	88.9	100.0	94.4	85	
	29	42	100.0	97.7	98.8	77		18	17	100.0	94.4	97.2	77	
	29	43	100.0	100.0	100.0	95		18	16	100.0	88.9	94.4	93	
	29	40	100.0	93.0	96.5	70		11	18	61.1	100.0	80.6	77	
	29	40	100.0	93.0	96.5	79		16	18	88.9	100.0	94.4	82	
	29	20	100.0	46.5	73.3	63		9	18	50.0	100.0	75.0	77	
	29	23	100.0	53.5	76.7	76		8	17	44.4	94.4	69.4	76	
	29	23	100.0	53.5	76.7	78		0	17	0.0	94.4	47.2	79	
	29	39	100.0	90.7	95.3	84		15	17	83.3	94.4	88.9	86	
	29	43	100.0	100.0	100.0	77		18	18	100.0	100.0	100.0	70	
	29	43	100.0	100.0	100.0	85		13	18	72.2	100.0	86.1	77	
	29	43	100.0	100.0	100.0	90		16	18	88.9	100.0	94.4	92	
	29	40	100.0	93.0	96.5	55		16	18	88.9	100.0	94.4	76	
	28	32	96.6	74.4	85.5	87		6	18	33.3	100.0	66.7	80	
					92.9	77.0						88.8	81.8	

Gravity I:	Law of Gravitation:				Gravity:
19	7	%I	%II	2 wa ave	100
18	1	94.7	14.3	54.5	86
13	4	68.4	57.1	62.8	70
19	7	100.0	100.0	100.0	88
19	7	100.0	100.0	100.0	88
18	7	94.7	100.0	97.4	90
17	2	89.5	28.6	59.0	77
19	0	100.0	0.0	50.0	98
13	0	68.4	0.0	34.2	62
18	7	94.7	100.0	97.4	84
19	7	100.0	100.0	100.0	92
2	0	10.5	0.0	5.3	90
16	3	84.2	42.9	63.5	84
19	7	100.0	100.0	100.0	88
17	4	89.5	57.1	73.3	81
0	0	0.0	0.0	0.0	59
19	7	100.0	100.0	100.0	87
19	7	100.0	100.0	100.0	96

19	7	100.0	100.0	100.0	94
12	7	63.2	100.0	81.6	82
19	7	100.0	100.0	100.0	95
19	7	100.0	100.0	100.0	68
19	7	100.0	100.0	100.0	84
18	7	94.7	100.0	97.4	93
19	7	100.0	100.0	100.0	85
19	7	100.0	100.0	100.0	95
19	7	100.0	100.0	100.0	88
15	6	78.9	85.7	82.3	77
17	7	89.5	100.0	94.7	82
2	6	10.5	85.7	48.1	72
19	7	100.0	100.0	100.0	83
19	6	100.0	85.7	92.9	85
19	7	100.0	100.0	100.0	76
17	5	89.5	71.4	80.5	56
19	7	100.0	100.0	100.0	73
19	7	100.0	100.0	100.0	80
19	7	100.0	100.0	100.0	70
19	6	100.0	85.7	92.9	82
14	7	73.7	100.0	86.8	76
19	7	100.0	100.0	100.0	94
19	7	100.0	100.0	100.0	86
19	7	100.0	100.0	100.0	82
19	4	100.0	57.1	78.6	90
19	7	100.0	100.0	100.0	92
19	7	100.0	100.0	100.0	78
18	7	94.7	100.0	97.4	98
19	0	100.0	0.0	50.0	80
0	7	0.0	100.0	50.0	88
15	0	78.9	0.0	39.5	70
19	6	100.0	85.7	92.9	81
18	0	94.7	0.0	47.4	63
13	6	68.4	85.7	77.1	88
19	6	100.0	85.7	92.9	69
19	7	100.0	100.0	100.0	94
19	7	100.0	100.0	100.0	92
12	1	63.2	14.3	38.7	88
16	7	84.2	100.0	92.1	88
				82.3	82.8

Vectors I: Intro to vectors	Vectors II:				Vectors I: Perpendicular vectors	non-perpendicular Vectors: components/trig	All vectors:				
19	11	%I	%II	2 wa ave	100		17	%	100		
19	9	100.0	81.8	90.9	90		12	70.6	91		
18	9	94.7	81.8	88.3	95		14	82.4	92		
17	11	89.5	100.0	94.7	87		17	100.0	86		
16	9	84.2	81.8	83.0	79		12	70.6	80		

19	9	100.0	81.8	90.9	88		17	100.0	96		
18	8	94.7	72.7	83.7	69		11	64.7	86		
17	11	89.5	100.0	94.7	89		15	88.2	93		
19	9	100.0	81.8	90.9	35		14	82.4	67		
17	10	89.5	90.9	90.2	93		8	47.1	90		
18	11	94.7	100.0	97.4	89		17	100.0	100		
11	0	57.9	0.0	28.9	76		9	52.9	73		
14	10	73.7	90.9	82.3	90		9	52.9	86		
0	11	0.0	100.0	50.0	64		13	76.5	73		
11	3	57.9	27.3	42.6	69		6	35.3	63		
0	0	0.0	0.0	0.0	66		0	0.0	80		
18	9	94.7	81.8	88.3	86		17	100.0	89		
18	9	94.7	81.8	88.3	97		17	100.0	96		
19	11	100.0	100.0	100.0	92		17	100.0	94		
13	8	68.4	72.7	70.6	76		16	94.1	83		
18	11	94.7	100.0	97.4	96		17	100.0	96		
16	9	84.2	81.8	83.0	81		16	94.1	89		
0	2	0.0	18.2	9.1	80		16	94.1	93		
19	9	100.0	81.8	90.9	91		14	82.4	81		
19	11	100.0	100.0	100.0	94		17	100.0	93		
0	11	0.0	100.0	50.0	96		16	94.1	98		
0	11	0.0	100.0	50.0	68		17	100.0	89		
16	10	84.2	90.9	87.6	55		14	82.4	66		
17	8	89.5	72.7	81.1	83		16	94.1	92		
9	1	47.4	9.1	28.2	58		2	11.8	68		
18	8	94.7	72.7	83.7	93		16	94.1	88		
17	11	89.5	100.0	94.7	76		17	100.0	90		
18	8	94.7	72.7	83.7	86		16	94.1	84		
17	11	89.5	100.0	94.7	83		13	76.5	66		
19	11	100.0	100.0	100.0	79		17	100.0	89		
0	10	0.0	90.9	45.5	87		5	29.4	88		
0	9	0.0	81.8	40.9	86		17	100.0	76		
19	11	100.0	100.0	100.0	46		11	64.7	76		
14	6	73.7	54.5	64.1	73		14	82.4	81		
17	11	89.5	100.0	94.7	94		13	76.5	91		
18	10	94.7	90.9	92.8	92		17	100.0	95		
19	11	100.0	100.0	100.0	93		17	100.0	85		
19	6	100.0	54.5	77.3	84		11	64.7	90		
17	10	89.5	90.9	90.2	81		17	100.0	91		
15	11	78.9	100.0	89.5	87		17	100.0	80		
18	11	94.7	100.0	97.4	96		16	94.1	86		
0	9	0.0	81.8	40.9	64		0	0.0	50		
18	11	94.7	100.0	97.4	92		15	88.2	87		
19	11	100.0	100.0	100.0	76		17	100.0	76		
18	9	94.7	81.8	88.3	86		8	47.1	53		
0	0	0.0	0.0	0.0	73		0	0.0	47		
17	5	89.5	45.5	67.5	84		10	58.8	85		
18	6	94.7	54.5	74.6	75		7	41.2	67		
12	7	63.2	63.6	63.4	89		12	70.6	87		
19	11	100.0	100.0	100.0	92		17	100.0	98		
19	8	100.0	72.7	86.4	70		13	76.5	30		

15	0	78.9	0.0	39.5	63		15	88.2	84	
				75.7	80.9			77.1	82.2	

Newton's laws of motion:	Friction (in class):	All cases of friction: All Cases of Friction			forces, friction and newton's laws:		
12	11	33	%I	%II	%III	3 wa ave	100
11	11	34	91.7	100.0	100.0	97.2	75
11	9	31	91.7	81.8	91.2	88.2	78
12	11	33	100.0	100.0	97.1	99.0	89
12	10	31	100.0	90.9	91.2	94.0	78
12	11	33	100.0	100.0	97.1	99.0	99
12	9	26	100.0	81.8	76.5	86.1	80
12	11	32	100.0	100.0	94.1	98.0	85
12	11	27	100.0	100.0	79.4	93.1	85
0	0	31	0.0	0.0	91.2	30.4	76
			0.0	0.0	0.0	0.0	
8	10	1	66.7	90.9	2.9	53.5	
9	10	12	75.0	90.9	35.3	67.1	58
0	0	0	0.0	0.0	0.0	0.0	63
10	9	24	83.3	81.8	70.6	78.6	71
0	0	0	0.0	0.0	0.0	0.0	70
12	11	33	100.0	100.0	97.1	99.0	81
11	10	33	91.7	90.9	97.1	93.2	97
12	11	33	100.0	100.0	97.1	99.0	94
10	11	3	83.3	100.0	8.8	64.1	68
11	9	33	91.7	81.8	97.1	90.2	99
12	9	17	100.0	81.8	50.0	77.3	79
12	10	34	100.0	90.9	100.0	97.0	84
9	11	27	75.0	100.0	79.4	84.8	74
12	11	33	100.0	100.0	97.1	99.0	92
12	11	34	100.0	100.0	100.0	100.0	92
12	11	34	100.0	100.0	100.0	100.0	86
12	10	30	100.0	90.9	88.2	93.0	80
11	11	31	91.7	100.0	91.2	94.3	85
0	3	0	0.0	27.3	0.0	9.1	78
12	12	33	100.0	109.1	97.1	102.0	77
12	11	33	100.0	100.0	97.1	99.0	89
11	9	28	91.7	81.8	82.4	85.3	87
12	11	32	100.0	100.0	94.1	98.0	75
11	11	35	91.7	100.0	102.9	98.2	71
12	7	23	100.0	63.6	67.6	77.1	79
0	11	27	0.0	100.0	79.4	59.8	92
12	10	29	100.0	90.9	85.3	92.1	80

9	4	21	75.0	36.4	61.8	57.7	74	
12	9	33	100.0	81.8	97.1	93.0	84	
12	11	33	100.0	100.0	97.1	99.0	93	
12	11	33	100.0	100.0	97.1	99.0	93	
12	11	34	100.0	100.0	100.0	100.0	88	
12	10	33	100.0	90.9	97.1	96.0	95	
11	11	33	91.7	100.0	97.1	96.2	91	
11	11	31	91.7	100.0	91.2	94.3	96	
7	0	27	58.3	0.0	79.4	45.9	78	
12	9	31	100.0	81.8	91.2	91.0	91	
12	11	34	100.0	100.0	100.0	100.0	54	
11	0	22	91.7	0.0	64.7	52.1	63	
0	7	25	0.0	63.6	73.5	45.7	76	
0	9	29	0.0	81.8	85.3	55.7	94	
11	6	30	91.7	54.5	88.2	78.1	79	
10	11	33	83.3	100.0	97.1	93.5	89	
12	11	33	100.0	100.0	97.1	99.0	95	
12	11	32	100.0	100.0	94.1	98.0	63	
10	10	30	83.3	90.9	88.2	87.5	92	
						80.0	82.1	

Projectile Motion I:	Proj motion I and II:	circular motion a					Circular and Pendulum	
10	15	16	%I	%II	%III	ave	70	%
8	12	0	80	80.0	0.0	53.3	62	88.6
8	6	12	80	40.0	66.7	62.2	60	85.7
10	15	16	100	100.0	88.9	96.3	64	91.4
10	15	15	100	100.0	83.3	94.4	70	100.0
10	15	17	100	100.0	94.4	98.1	70	100.0
9	15	16	90	100.0	88.9	93.0	64	91.4
9	15	17	90	100.0	94.4	94.8	64	91.4
0	15	12	0	100.0	66.7	55.6	46	65.7

7	12	15	70	80.0	83.3	77.8	68	97.1
		18	0	0.0	100.0	33.3		0.0
6	11	0	60	73.3	0.0	44.4	58	82.9
0	0	14	0	0.0	77.8	25.9	70	100.0
8	15	16	80	100.0	88.9	89.6	94	134.3
8	14	13	80	93.3	72.2	81.9	56	80.0
10	15	15	100	100.0	83.3	94.4	68	97.1
10	15	15	100	100.0	83.3	94.4	70	100.0
10	15	17	100	100.0	94.4	98.1	68	97.1
10	15	16	100	100.0	88.9	96.3	70	100.0
9	8	0	90	53.3	0.0	47.8	58	82.9
10	4	16	100	26.7	88.9	71.9	66	94.3
9	12	12	90	80.0	66.7	78.9	70	100.0
9	13	16	90	86.7	88.9	88.5	64	91.4
9	14	10	90	93.3	55.6	79.6	58	82.9
10	15	16	100	100.0	88.9	96.3	66	94.3
10	15	12	100	100.0	66.7	88.9	47	67.1
10	15	16	100	100.0	88.9	96.3	64	91.4
10	15	15	100	100.0	83.3	94.4	64	91.4
10	15	14	100	100.0	77.8	92.6	60	85.7
9	13	15	90	86.7	83.3	86.7	66	94.3
10	15	9	100	100.0	50.0	83.3	57	81.4
10	15	17	100	100.0	94.4	98.1	64	91.4
7	14	16	70	93.3	88.9	84.1	70	100.0
7	15	17	70	100.0	94.4	88.1	60	85.7
10	14	15	100	93.3	83.3	92.2	59	84.3
10	15	17	100	100.0	94.4	98.1	52	74.3
10	15	1	100	100.0	5.6	68.5	64	91.4
7	15	16	70	100.0	88.9	86.3	70	100.0
8	0	16	80	0.0	88.9	56.3	70	100.0
9	15	16	90	100.0	88.9	93.0	64	91.4
10	15	6	100	100.0	33.3	77.8	66	94.3
10	15	16	100	100.0	88.9	96.3	66	94.3
8	15	17	80	100.0	94.4	91.5	70	100.0
10	15	16	100	100.0	88.9	96.3	70	100.0
10	14	16	100	93.3	88.9	94.1	70	100.0
10	13	17	100	86.7	94.4	93.7	66	94.3
0	15	17	0	100.0	94.4	64.8	64	91.4
9	1	0	90	6.7	0.0	32.2	70	100.0
10	15	0	100	100.0	0.0	66.7	62	88.6
1	1	0	10	6.7	0.0	5.6	68	97.1
0	0	16	0	0.0	88.9	29.6	53	75.7
9	0	0	90	0.0	0.0	30.0	54	77.1
9	15	0	90	100.0	0.0	63.3	49	70.0
7	0	14	70	0.0	77.8	49.3	62	88.6

10	14	16	100	93.3	88.9	94.1	62	88.6
9	15	12	90	100.0	66.7	85.6	70	100.0
8	13	17	80	86.7	94.4	87.0	68	97.1
		17			94.4	94.4	51	72.9
		14			77.8	77.8	70	100.0
						77.3		89.8

momentum I:	conservation of momentum	momentum at angles:					Momentum:
10	20	8	%I	%II	%III	3 wa ave	100
9	11	8	90.0	55.0	100.0	81.7	92
9	15	8	90.0	75.0	100.0	88.3	91
10	19	8	100.0	95.0	100.0	98.3	96
5	9	8	50.0	45.0	100.0	65.0	95
10	19	8	100.0	95.0	100.0	98.3	97
4	10	8	40.0	50.0	100.0	63.3	63
10	19	7	100.0	95.0	87.5	94.2	93
0	0	0	0.0	0.0	0.0	0.0	72
5	10	8	50.0	50.0	100.0	66.7	89
			0.0	0.0	0.0	0.0	
5	6	7	50.0	30.0	87.5	55.8	84
3	19	7	30.0	95.0	87.5	70.8	94
5	0	0	50.0	0.0	0.0	16.7	99
9	14	7	90.0	70.0	87.5	82.5	84
10	0	1	100.0	0.0	12.5	37.5	96

10	19	8	100.0	95.0	100.0	98.3	88
10	19	8	100.0	95.0	100.0	98.3	100
10	19	8	100.0	95.0	100.0	98.3	91
0	19	8	0.0	95.0	100.0	65.0	90
10	19	8	100.0	95.0	100.0	98.3	97
7	13	1	70.0	65.0	12.5	49.2	91
10	19	8	100.0	95.0	100.0	98.3	91
8	19	8	80.0	95.0	100.0	91.7	89
10	19	8	100.0	95.0	100.0	98.3	98
2	19	7	20.0	95.0	87.5	67.5	77
10	18	8	100.0	90.0	100.0	96.7	100
10	19	8	100.0	95.0	100.0	98.3	97
8	18	8	80.0	90.0	100.0	90.0	92
10	19	8	100.0	95.0	100.0	98.3	92
0	3	0	0.0	15.0	0.0	5.0	74
10	19	8	100.0	95.0	100.0	98.3	91
10	19	8	100.0	95.0	100.0	98.3	90
10	19	8	100.0	95.0	100.0	98.3	95
10	19	7	100.0	95.0	87.5	94.2	83
10	19	8	100.0	95.0	100.0	98.3	92
10	19	7	100.0	95.0	87.5	94.2	93
10	19	8	100.0	95.0	100.0	98.3	100
10	19	8	100.0	95.0	100.0	98.3	93

5	19	5	50.0	95.0	62.5	69.2	78	
10	19	7	100.0	95.0	87.5	94.2	89	
10	19	8	100.0	95.0	100.0	98.3	99	
10	19	8	100.0	95.0	100.0	98.3	95	
10	19	8	100.0	95.0	100.0	98.3	97	
10	19	8	100.0	95.0	100.0	98.3	95	
10	19	8	100.0	95.0	100.0	98.3	100	
10	19	8	100.0	95.0	100.0	98.3	90	
0	17	0	0.0	85.0	0.0	28.3	94	
0	0	0	0.0	0.0	0.0	0.0	86	
1	19	6	10.0	95.0	75.0	60.0	98	
10	19	8	100.0	95.0	100.0	98.3	96	
7	0	3	70.0	0.0	37.5	35.8	80	
0	18	0	0.0	90.0	0.0	30.0		
5	19	7	50.0	95.0	87.5	77.5	99	
10	15	8	100.0	75.0	100.0	91.7	90	
10	17	0	100.0	85.0	0.0	61.7	83	
10	19	8	100.0	95.0	100.0	98.3	98	
10	18	8	100.0	90.0	100.0	96.7	84	
9	17	8	90.0	85.0	100.0	91.7	95	
						77.1	91.0	

Waves:	Light, Color, Mirrors and Lens				waves:	
13	25	%I	%II	2 wa ave	121	%
10	21	76.9	84	80.5	98	81.0
10	23	76.9	92	84.5	86	71.1
11	25	84.6	100	92.3	111	91.7
13	24	100.0	96	98.0	89	73.6
13	24	100.0	96	98.0	112	92.6
12	24	92.3	96	94.2	76	62.8
0	20	0.0	80	40.0	104	86.0
13	21	100.0	84	92.0	65	53.7
5	0	38.5	0	19.2	101	83.5
		0.0	0	0.0		0.0
0	20	0.0	80	40.0	73	60.3
12	20	92.3	80	86.2	88	72.7
13	22	100.0	88	94.0	66	54.5
2	23	15.4	92	53.7	76	62.8
11	13	84.6	52	68.3	87	71.9
13	25	100.0	100	100.0	81	66.9
12	25	92.3	100	96.2	120	99.2
12	25	92.3	100	96.2	110	90.9
10	9	76.9	36	56.5	77	63.6
12	22	92.3	88	90.2	93	76.9
13	25	100.0	100	100.0	96	79.3
12	25	92.3	100	96.2	78	64.5
10	21	76.9	84	80.5	100	82.6
13	25	100.0	100	100.0	115	95.0
12	14	92.3	56	74.2	69	57.0
13	25	100.0	100	100.0	121	100.0
13	24	100.0	96	98.0	90	74.4
9	24	69.2	96	82.6	84	69.4
9	24	69.2	96	82.6	111	91.7
2	0	15.4	0	7.7	49	40.5
10	22	76.9	88	82.5	102	84.3
13	25	100.0	100	100.0	95	78.5
9	15	69.2	60	64.6	78	64.5
12	24	92.3	96	94.2	95	78.5
12	21	92.3	84	88.2	81	66.9
10	20	76.9	80	78.5	86	71.1
13	25	100.0	100	100.0	121	100.0
12	25	92.3	100	96.2	77	63.6
12	22	92.3	88	90.2	90	74.4

10	23	76.9	92	84.5	90	74.4
11	22	84.6	88	86.3	105	86.8
12	25	92.3	100	96.2	117	96.7
13	25	100.0	100	100.0	113	93.4
12	25	92.3	100	96.2	112	92.6
11	24	84.6	96	90.3	118	97.5
13	25	100.0	100	100.0	105	86.8
12	24	92.3	96	94.2	121	100.0
12	24	92.3	96	94.2	99	81.8
11	25	84.6	100	92.3	115	95.0
13	25	100.0	100	100.0	52	43.0
6	25	46.2	100	73.1	61	50.4
7	4	53.8	16	34.9	82	67.8
6	20	46.2	80	63.1	104	86.0
12	25	92.3	100	96.2	98	81.0
10	23	76.9	92	84.5	103	85.1
13	25	100.0	100	100.0	115	95.0
13	24	100.0	96	98.0	68	56.2
11	17	84.6	68	76.3	107	88.4
				82.0		76.0

Work, Power, Simple Machines Ch 10		work and power:	Work Ch 10:						Work, Powre, Simple Machines Test
29	16	15	7	%I	%II	%III	%IV	4 ave wa	100
17	14	0	7	58.6	87.5	0.0	100.0	61.5	88.0
28	15	15	5	96.6	93.8	100.0	71.4	90.4	72.0
29	16	15	7	100.0	100.0	100.0	100.0	100.0	90.0
9	13	15	7	31.0	81.3	100.0	100.0	78.1	93.0
28	16	15	7	96.6	100.0	100.0	100.0	99.1	100.0
19	10	13	7	65.5	62.5	86.7	100.0	78.7	63.0
28	16	15	7	96.6	100.0	100.0	100.0	99.1	100.0
15	6	15	7	51.7	37.5	100.0	100.0	72.3	50.0
26	14	15	7	89.7	87.5	100.0	100.0	94.3	91.0
29	16	15	7	100.0	100.0	100.0	100.0	100.0	91.0
10	11	14	6	34.5	68.8	93.3	85.7	70.6	80.0
18	15	15	6	62.1	93.8	100.0	85.7	85.4	78.0
0	0	0	6	0.0	0.0	0.0	85.7	21.4	50.0
24	13	13	5	82.8	81.3	86.7	71.4	80.5	72.0
25	14	0	0	86.2	87.5	0.0	0.0	43.4	94.0
29	16	15	7	100.0	100.0	100.0	100.0	100.0	90.0
28	19	15	7	96.6	118.8	100.0	100.0	103.8	87.0
29	16	15	7	100.0	100.0	100.0	100.0	100.0	72.0

0	0	15	2	0.0	0.0	100.0	28.6	32.1	45.0
28	16	15	7	96.6	100.0	100.0	100.0	99.1	96.0
29	14	15	7	100.0	87.5	100.0	100.0	96.9	81.0
29	15	15	7	100.0	93.8	100.0	100.0	98.4	89.0
21	14	15	5	72.4	87.5	100.0	71.4	82.8	82.0
29	16	15	7	100.0	100.0	100.0	100.0	100.0	90.0
0	15	15	6	0.0	93.8	100.0	85.7	69.9	50.0
29	16	15	7	100.0	100.0	100.0	100.0	100.0	98.0
29	16	15	7	100.0	100.0	100.0	100.0	100.0	90.0
28	16	15	7	96.6	100.0	100.0	100.0	99.1	91.0
28	15	15	7	96.6	93.8	100.0	100.0	97.6	77.0
0	0	0	6	0.0	0.0	0.0	85.7	21.4	51.0
29	13	14	6	100.0	81.3	93.3	85.7	90.1	91.0
29	16	15	7	100.0	100.0	100.0	100.0	100.0	79.0
18	13	9	7	62.1	81.3	60.0	100.0	75.8	74.0
29	16	15	7	100.0	100.0	100.0	100.0	100.0	82.0
28	15	15	7	96.6	93.8	100.0	100.0	97.6	81.0
28	15	15	6	96.6	93.8	100.0	85.7	94.0	85.0
29	16	15	7	100.0	100.0	100.0	100.0	100.0	100.0
28	15	15	7	96.6	93.8	100.0	100.0	97.6	94.0
18	13	15	7	62.1	81.3	100.0	100.0	85.8	76.0
14	5	4	5	48.3	31.3	26.7	71.4	44.4	75.0
28	16	15	6	96.6	100.0	100.0	85.7	95.6	83.0
29	16	15	7	100.0	100.0	100.0	100.0	100.0	84.0
29	16	15	7	100.0	100.0	100.0	100.0	100.0	82.0
29	16	15	7	100.0	100.0	100.0	100.0	100.0	89.0
29	15	15	7	100.0	93.8	100.0	100.0	98.4	96.0
29	16	15	7	100.0	100.0	100.0	100.0	100.0	82.0
0	0	14	0	0.0	0.0	93.3	0.0	23.3	95.0
0	10	15	7	0.0	62.5	100.0	100.0	65.6	77.0
4	13	0	7	13.8	81.3	0.0	100.0	48.8	93.0
5	14	15	0	17.2	87.5	100.0	0.0	51.2	57.0
0	0	6	4	0.0	0.0	40.0	57.1	24.3	65.0
0	12	15	4	0.0	75.0	100.0	57.1	58.0	89.0
29	16	14	0	100.0	100.0	93.3	0.0	73.3	98.0
0	0	12	7	0.0	0.0	80.0	100.0	45.0	73.0
17	12	0	6	58.6	75.0	0.0	85.7	54.8	96.0
29	16	15	7	100.0	100.0	100.0	100.0	100.0	91.0
8	15	15	7	27.6	93.8	100.0	100.0	80.3	66.0
27	15	13	7	93.1	93.8	86.7	100.0	93.4	81.0
								80.6	81.6

energy:	Ener gy I:				energy: quiz			Electricity II:		Energy and Ele:
14	14	%I	%II	2 wa ave	54	%		27	%	100
14	14	100.0	100.0	100.0	54	100.0		26	96.3	90
14	14	100.0	100.0	100.0	44	81.5		27	100.0	98
14	14	100.0	100.0	100.0	46	85.2		24	88.9	90
14	14	100.0	100.0	100.0	48	88.9		26	96.3	86
14	14	100.0	100.0	100.0	50	92.6		27	100.0	98
13	14	92.9	100.0	96.4	36	66.7		27	100.0	85
14	13	100.0	92.9	96.4	52	96.3		27	100.0	95
13	14	92.9	100.0	96.4	37	68.5		19	70.4	84
12	14	85.7	100.0	92.9	49	90.7		0	0.0	92
14	12	100.0	85.7	92.9	52	96.3		27	100.0	96
14	14	100.0	100.0	100.0	40	74.1		27	100.0	88
13	14	92.9	100.0	96.4	38	70.4		27	100.0	82
0	0	0.0	0.0	0.0	0	0.0		0	0.0	0
14	14	100.0	100.0	100.0	39	72.2		26	96.3	84
0	14	0.0	100.0	50.0	42	77.8		0	0.0	82
14	14	100.0	100.0	100.0	48	88.9		27	100.0	100
14	14	100.0	100.0	100.0	48	88.9		27	100.0	98
14	14	100.0	100.0	100.0	50	92.6		27	100.0	100
14	14	100.0	100.0	100.0	41	75.9		27	100.0	97
13	14	92.9	100.0	96.4	51	94.4		27	100.0	94
13	14	92.9	100.0	96.4	44	81.5		27	100.0	90
14	14	100.0	100.0	100.0	47	87.0		27	100.0	98
14	13	100.0	92.9	96.4	52	96.3		25	92.6	98
14	14	100.0	100.0	100.0	53	98.1		27	100.0	97
12	0	85.7	0.0	42.9	34	63.0		26	96.3	94
14	14	100.0	100.0	100.0	53	98.1		27	100.0	100
14	14	100.0	100.0	100.0	38	70.4		27	100.0	92
14	14	100.0	100.0	100.0	45	83.3		27	100.0	86
14	14	100.0	100.0	100.0	47	87.0		27	100.0	95
14	0	100.0	0.0	50.0	45	83.3		27	100.0	99
14	13	100.0	92.9	96.4	40	74.1		27	100.0	90
14	14	100.0	100.0	100.0	45	83.3		27	100.0	90
12	14	85.7	100.0	92.9	53	98.1		27	100.0	99
14	14	100.0	100.0	100.0	43	79.6		27	100.0	90
14	14	100.0	100.0	100.0	32	59.3		27	100.0	80
14	13	100.0	92.9	96.4	46	85.2		27	100.0	84
14	14	100.0	100.0	100.0	54	100.0		27	100.0	100
14	14	100.0	100.0	100.0	50	92.6		27	100.0	93
14	14	100.0	100.0	100.0	41	75.9		27	100.0	86
13	14	92.9	100.0	96.4	44	81.5		27	100.0	89

14	13	100.0	92.9	96.4	52	96.3		27	100.0	90
14	14	100.0	100.0	100.0	50	92.6		27	100.0	99
14	14	100.0	100.0	100.0	47	87.0		27	100.0	100
14	14	100.0	100.0	100.0	43	79.6		27	100.0	98
14	14	100.0	100.0	100.0	49	90.7		27	100.0	91
14	14	100.0	100.0	100.0	47	87.0		27	100.0	93
14	0	100.0	0.0	50.0	54	100.0		0	0.0	100
12	13	85.7	92.9	89.3	48	88.9		0	0.0	85
14	13	100.0	92.9	96.4	51	94.4		27	100.0	71
0	14	0.0	100.0	50.0	38	70.4		27	100.0	85
0	14	0.0	100.0	50.0	27	50.0		26	96.3	76
9	12	64.3	85.7	75.0	46	85.2		26	96.3	57
13	12	92.9	85.7	89.3	50	92.6		27	100.0	100
13	14	92.9	100.0	96.4	44	81.5		27	100.0	92
13	13	92.9	92.9	92.9	44	81.5		0	0.0	98
14	14	100.0	100.0	100.0	51	94.4		27	100.0	100
13	14	92.9	100.0	96.4	24	44.4		27	100.0	98
13	14	92.9	100.0	96.4	43	79.6		22	81.5	92
				90.8		82.3			88.1	89.9

Nuclear energy I:	II				Nuclear energy:
23	57	%I	%II	2 wa ave	100
23	57	100.0	100.0	100.0	71
23	57	100.0	100.0	100.0	62
23	57	100.0	100.0	100.0	84
23	51	100.0	89.5	94.7	65
23	56	100.0	98.2	99.1	98
22	56	95.7	98.2	96.9	42
23	57	100.0	100.0	100.0	91
22	57	95.7	100.0	97.8	20
22	56	95.7	98.2	96.9	48
23	57	100.0	100.0	100.0	83
22	56	95.7	98.2	96.9	92
23	55	100.0	96.5	98.2	68
23	57	100.0	100.0	100.0	73
23	54	100.0	94.7	97.4	57
0	0	0.0	0.0	0.0	75
23	56	100.0	98.2	99.1	84
23	57	100.0	100.0	100.0	95
23	57	100.0	100.0	100.0	94
22	57	95.7	100.0	97.8	52
23	55	100.0	96.5	98.2	82
23	56	100.0	98.2	99.1	70
23	57	100.0	100.0	100.0	78

22	57	95.7	100.0	97.8	67
23	57	100.0	100.0	100.0	89
23	57	100.0	100.0	100.0	33
23	57	100.0	100.0	100.0	96
22	57	95.7	100.0	97.8	74
23	56	100.0	98.2	99.1	88
23	56	100.0	98.2	99.1	92
20	52	87.0	91.2	89.1	75
23	54	100.0	94.7	97.4	72
23	57	100.0	100.0	100.0	80
23	56	100.0	98.2	99.1	82
22	55	95.7	96.5	96.1	73
23	57	100.0	100.0	100.0	69
23	57	100.0	100.0	100.0	69
23	57	100.0	100.0	100.0	100
23	57	100.0	100.0	100.0	86
23	53	100.0	93.0	96.5	69
23	56	100.0	98.2	99.1	65
23	56	100.0	98.2	99.1	84
23	56	100.0	98.2	99.1	91
23	57	100.0	100.0	100.0	90
23	57	100.0	100.0	100.0	90
23	52	100.0	91.2	95.6	91
23	57	100.0	100.0	100.0	72
23	57	100.0	100.0	100.0	77
22	55	95.7	96.5	96.1	90
0	57	0.0	100.0	50.0	87
0		0.0	0.0	0.0	45
23	53	100.0	93.0	96.5	65
0	51	0.0	89.5	44.7	91
22	15	95.7	26.3	61.0	87
20	57	87.0	100.0	93.5	84
22	57	95.7	100.0	97.8	87
23	55	100.0	96.5	98.2	86
23	55	100.0	96.5	98.2	56
20	53	87.0	93.0	90.0	71
				92.5	76.0

APPENDIX B: SOURCE OF SAMPLE SIZE

number of students per section	**yr**	**total /yr**
22	06- 07	
24	06 -07	79
23	06 -07	
10	06 -07	
19	07 -08	
16	07- 08	
25	07- 08	107
26	07- 08	
21	07- 08	
18	08- 09	
22	08- 09	80
22	08 -09	
18	08 -09	
20	09-10	
21	09 -10	58
17	09-10	

APPENDIX C: ANALYSIS I TEST GRADES

Grades of those not doing homework									**no hw**
web homework scores, averages and test gradess									Test gr
0.0	43.0	0.0	100.0	50.0	83.0				83.0
0.0	0.0	66.0	73.3						73.3
1.0	5.6		0.0						0.0
0.0	0.0	63.0	70.0						70.0
0.0	0.0	58.0	64.4						64.4
0.0	0.0	72.0							72.0
0.0	0.0	51.0	56.7						56.7
0.0	0.0	86.0							86.0
0.0	19.0	0.0	55.9	27.9	92.0				92.0
0.0	32.0	0.0	94.1	47.1	87.0				87.0
0.0	0.0	88.0							88.0
0.0	0.0	92.0							92.0
0.0	0.0	52.0							52.0
0.0	26.0	0.0	76.5	38.2	79.0				79.0
0.0	22.0	0.0	64.7	32.4	84.0				84.0
0.0	0.0	91.0							91.0
0.0	0.0	88.0							88.0
0.0	0.0	80.0							80.0
0.0	0.0	77.0							77.0
0.0	0.0	86.0							86.0
0.0	0.0	81.0							81.0
0.0	0.0	94.0							94.0
0.0	0.0	80.0							80.0
0.0	0.0	86.0							86.0
0.0	0.0	86.0							86.0
0.0	0.0	53.0							53.0
0.0	18.0	0.0	52.9	26.5	92.0				92.0
0.0	30.0	0.0	88.2	44.1	80.0				80.0
0.0	11.0	0.0	32.4	16.2	84.0				84.0
0.0	34.0	0.0	100.0	50.0	94.0				94.0
0.0	0.0	87.0							87.0
0.0	0.0	66.0							66.0
0.0	0.0	0.0	0.0	0.0	79.0				79.0
0.0	8.0	0.0	23.5	11.8	74.0				74.0
0.0	27.0	0.0	79.4	39.7	90.0				90.0

0.0	0.0	61.0							61.0
0.0	0.0	92.0							92.0
0.0	0.0	63.0							63.0
0.0	0.0	82.0							82.0
0.0	0.0	50.0							50.0
ND	0.0	82.0							82.0
0.0	0.0	98.0							98.0
0.0	0.0	56.0							56.0
0.0	0.0	65.0							65.0
0.0	0.0	38.0							38.0
0.0	0.0	90.0							90.0
0.0	0.0	76.0							76.0
0.0	0.0	55.0							55.0
0.0	0.0	78.0							78.0
1.0	8.3	55.0							55.0
0.0	23.0	0.0	79.3	39.7	48.0				48.0
0.0	28.0	0.0	96.6	48.3	44.0				44.0
6.0	0.0	22.2	0.0	11.1	62.0				62.0
0.0	0.0	63.0							63.0
0.0	0.0	31.0							31.0
0.0	0.0	50.0							50.0
0.0	0.0	67.0							67.0
0.0	0.0	76.0							76.0
0.0	0.0	88.0							88.0
0.0	0.0	97.0							97.0
0.0	0.0	74.0							74.0
0.0	0.0	52.0	86.7						86.7
0.0	0.0	62.0							62.0
0.0	0.0	60.0							60.0
0.0	29.0	0.0	100.0	50.0	84.0				84.0
0.0	29.0	0.0	100.0	50.0	72.0				72.0
2.0	29.0	7.4	100.0	53.7	55.0				55.0
0.0	0.0	36.0	60.0						60.0
	0.0	67.0							67.0
0.0	0.0	56.0							56.0
0.0	0.0	77.0							77.0
2.0	10.0	87.0							87.0
1.0	0.0	7.7	0.0	3.8	80.0				80.0
0.0	0.0	70.0							70.0
0.0	0.0	75.0							75.0

2.0	6.9	83.0							83.0
0.0	0.0	88.0							88.0
0.0	41.0	0.0	78.8	39.4	63.0				63.0
14.0		100.0	0.0	50.0	84.0				84.0
11.0	0.0	78.6	0.0	39.3	55.0				55.0
0.0	0.0	76.0							76.0
0.0	0.0	56.0							56.0
0.0	0.0	73.0							73.0
17.0	0.0	73.9	37.0	57.0					57.0
0.0	76.9	0.0	38.5	83.0					83.0
0.0	35.0	0.0	67.3	33.7	58.0				58.0
4.0	0.0	28.6	0.0	14.3	83.0				83.0
0.0	52.0	0.0	100.0	50.0	91.0				91.0
0.0	0.0	71.0							71.0
1.0	3.4	86.0							86.0
0.0	0.0	57.0							57.0
0.0	0.0	77.0							77.0
0.0	0.0	70.0							70.0
0.0	0.0	70.0							70.0
0.0	0.0	86.0							86.0
0.0	23.1	75.0							75.0
1.0	5.6	86.0							86.0
0.0	0.0	74.0							74.0
0.0	14.0	0.0	60.9	30.4	68.0				68.0
0.0	0.0	63.0							63.0
0.0	0.0	81.0							81.0
0.0	0.0	75.0							75.0
0.0	0.0	93.0							93.0
0.0	0.0	67.0							67.0
0.0	0.0	71.0							71.0
0.0	0.0	44.0							44.0
0.0	0.0	99.0							99.0
0.0	0.0	50.0	53.2						53.2
0.0	0.0	45.0							45.0
0.0	0.0	83.0							83.0
0.0	0.0	86.0							86.0
0.0	0.0	75.0							75.0
0.0	0.0	76.0							76.0
0.0	0.0	58.0							58.0
0.0	0.0	93.0							93.0

0.0	0.0	47.0							47.0
0.0	0.0	69.0							69.0
0.0	0.0	57.0							57.0
0.0	0.0	77.0							77.0
0.0	0.0	80.0							80.0
0.0	0.0	79.0							79.0
0.0	0.0	69.0							69.0
0.0	0.0	84.0							84.0
0.0	0.0	86.0							86.0
0.0	0.0	75.0							75.0
0.0	0.0	98.0							98.0
0.0	0.0	35.0	37.2						37.2
0.0	0.0	88.0							88.0
0.0	0.0	91.0							91.0
0.0	0.0	64.0							64.0
0.0	0.0	83.0							83.0
0.0	0.0	76.0							76.0
2.0	10.5	45.0							45.0
0.0	0.0	36.0							36.0
0.0	0.0	78.0							78.0
0.0	0.0	61.0							61.0
0.0	0.0	63.0							63.0
0.0	0.0	59.0							59.0
0.0	0.0	67.0							67.0
0.0	22.0	25.0	0.0	95.7	96.2	63.9	73.0		73.0
0.0	11.0	0.0	100.0	50.0	60.0	100.0			100.0
9.0	0.0	90.0	0.0	45.0	49.0	81.7			81.7
0.0	11.0	0.0	100.0	50.0		0.0			0.0
0.0	11.0	0.0	100.0	50.0	43.0	71.7			71.7
0.0	11.0	0.0	100.0	50.0	43.0	71.7			71.7
0.0	17.0	23.0	0.0	73.9	88.5	54.1	91.0		91.0
0.0	0.0	74.0							74.0
0.0	16.0	26.0	0.0	69.6	100.0	56.5	94.0		94.0
2.0	0.0	22.0	14.3	0.0	84.6	33.0	54.0		54.0
5.0	0.0	50.0	0.0	25.0	48.0	80.0			80.0
8.0	0.0	80.0	0.0	40.0	59.0	98.3			98.3
0.0	11.0	0.0	100.0	50.0	31.0	51.7			51.7
0.0	2.0	0.0	18.2	9.1	47.0	78.3			78.3
10.0	0.0	100.0	0.0	50.0	44.0	73.3			73.3
1.0	0.0	10.0	0.0	5.0	33.0	55.0			55.0

10.0	0.0	100.0	0.0	50.0	59.0	98.3			98.3
		0.0	0.0	0.0		0.0			
8.0	0.0	80.0	0.0	40.0	43.0	71.7			71.7
9.0	0.0	90.0	0.0	45.0	34.0	56.7			56.7
8.0	0.0	80.0	0.0	40.0	59.0	98.3			98.3
9.0	7.0	0.0	64.3	30.4	0.0	31.6	84.0		84.0
14.0	0.0	22.0	100.0	0.0	84.6	61.5	91.0		91.0
0.0	21.0	24.0	0.0	91.3	92.3	61.2	47.0		47.0
0.0	0.0	45.0	81.8						81.8
0.0	10.0	0.0	43.5	21.7	83.0				83.0
0.0	3.0	0.0	13.0	6.5	82.0				82.0
11.0	0.0	37.9	0.0	19.0	95.0				95.0
16.0	0.0	94.1	0.0	47.1	89.0				89.0
0.0	25.0	0.0	100.0	50.0	85.0				85.0
12.0	0.0	70.6	0.0	35.3	76.0				76.0
0.0	25.0	0.0	100.0	50.0	84.0				84.0
25.0	0.0	86.2	0.0	43.1	83.0				83.0
4.0	0.0	13.8	0.0	6.9	85.0				85.0
0.0	5.0	0.0	21.7	10.9	67.0				67.0
29.0	0.0	100.0	0.0	50.0	95.0				95.0
0.0	4.0	0.0	16.0	8.0	60.0				60.0
0.0	47.0	39.0	0.0	100.0	76.5	58.8	64.0		64.0
0.0	47.0	37.0	0.0	100.0	72.5	57.5	65.0		65.0
14.0	0.0	48.0	100.0	0.0	94.1	64.7	66.0		66.0
0.0	47.0	44.0	0.0	100.0	86.3	62.1	74.0		74.0
0.0	47.0	47.0	0.0	100.0	92.2	64.1	62.0		62.0
0.0	0.0	45.0	69.2						69.2
0.0	0.0	63.0	96.9						96.9
0.0	0.0	62.0	95.4						95.4
0.0	0.0	54.0	83.1						83.1
0.0	0.0	41.0	63.1						63.1
0.0	0.0	44.0	67.7						67.7
0.0	0.0	40.0	61.5						61.5
0.0	0.0	68.0	68.0						68.0
12.0	0.0	40.0	0.0	20.0	41.0	78.8			78.8
17.0	0.0	56.7	0.0	28.3	23.0	44.2			44.2
30.0	0.0	100.0	0.0	50.0	40.0	76.9			76.9
18.0	0.0	60.0	0.0	30.0	19.0	36.5			36.5
30.0	0.0	100.0	0.0	50.0		0.0			0.0
30.0	0.0	100.0	0.0	50.0	69.0	69.0			69.0

13.0	16.0	0.0	92.9	34.0	0.0	42.3	75.0		75.0
0.0	27.0	0.0	0.0	100.0	0.0	33.3	69.0		69.0
0.0	27.0	31.0	0.0	100.0	100.0	66.7	74.0		74.0
11.0		27.0	84.6	0.0	87.1	57.2	82.0		82.0
0.0	16.0	31.0	0.0	59.3	100.0	53.1	55.0		55.0
0.0	21.0	3.0	0.0	77.8	9.7	29.2	75.0		75.0
2.0	9.0	0.0	15.4	33.3	0.0	16.2	79.0		79.0
0.0	26.0	31.0	0.0	96.3	100.0	65.4	66.0		66.0
0.0	27.0	10.0	0.0	100.0	32.3	44.1	69.0		69.0
0.0	17.0	0.0	0.0	63.0	0.0	21.0	72.0		72.0
0.0	23.0	3.0	0.0	85.2	9.7	31.6	96.0		96.0
17.0	0.0	100.0	0.0	50.0	67.0				67.0
0.0	10.0	0.0	40.0	20.0	73.0				73.0
22.0	0.0	75.9	0.0	37.9	94.0				94.0
27.0	0.0	93.1	0.0	46.6	90.0				90.0
0.0	41.0	0.0	95.3	47.7	67.0				67.0
29.0	0.0	100.0	0.0	50.0	70.0				70.0
9.0	0.0	50.0	0.0	25.0	79.0				79.0
14.0	0.0	77.8	0.0	38.9	74.0				74.0
13.0	0.0	68.4	0.0	34.2	62.0				62.0
2.0	0.0	10.5	0.0	5.3	90.0				90.0
0.0	0.0	0.0	0.0	0.0	59.0				59.0
0.0	11.0	0.0	100.0	50.0	64.0				64.0
0.0	0.0	0.0	0.0	0.0	66.0				66.0
11.0	0.0	57.9	0.0	28.9	76.0				76.0
0.0	2.0	0.0	18.2	9.1	80.0				80.0
0.0	11.0	0.0	100.0	50.0	96.0				96.0
0.0	11.0	0.0	100.0	50.0	68.0				68.0
0.0	10.0	0.0	90.9	45.5	87.0				87.0
0.0	9.0	0.0	81.8	40.9	86.0				86.0
0.0	9.0	0.0	81.8	40.9	64.0				64.0
0.0	0.0	0.0	0.0	0.0	73.0				73.0
15.0	0.0	78.9	0.0	39.5	63.0				63.0
0.0	0.0	80.0							80.0
0.0	0.0	50.0							50.0
0.0	0.0	47.0							47.0
0.0	7.0	25.0	0.0	63.6	73.5	45.7	76.0		76.0
0.0	9.0	29.0	0.0	81.8	85.3	55.7	94.0		94.0
11.0	0.0	22.0	91.7	0.0	64.7	52.1	63.0		63.0
7.0	0.0	27.0	58.3	0.0	79.4	45.9	78.0		78.0

0.0	11.0	27.0	0.0	100.0	79.4	59.8	92.0		92.0
0.0	3.0	0.0	0.0	27.3	0.0	9.1	78.0		78.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	70.0		70.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.0		63.0
0.0	0.0	31.0	0.0	0.0	91.2	30.4	76.0		76.0
8.0	12.0	0.0	80.0	80.0	0.0	53.3	62.0	88.6	88.6
0.0	15.0	12.0	0.0	100.0	66.7	55.6	46.0	65.7	65.7
		18.0	0.0	0.0	100.0	33.3		0.0	0.0
6.0	11.0	0.0	60.0	73.3	0.0	44.4	58.0	82.9	82.9
0.0	0.0	14.0	0.0	0.0	77.8	25.9	70.0	100.0	100.0
9.0	8.0	0.0	90.0	53.3	0.0	47.8	58.0	82.9	82.9
8.0	0.0	16.0	80.0	0.0	88.9	56.3	70.0	100.0	100.0
0.0	15.0	17.0	0.0	100.0	94.4	64.8	64.0	91.4	91.4
9.0	1.0	0.0	90.0	6.7	0.0	32.2	70.0	100.0	100.0
10.0	15.0	0.0	100.0	100.0	0.0	66.7	62.0	88.6	88.6
1.0	1.0	0.0	10.0	6.7	0.0	5.6	68.0	97.1	97.1
0.0	0.0	16.0	0.0	0.0	88.9	29.6	53.0	75.7	75.7
9.0	0.0	0.0	90.0	0.0	0.0	30.0	54.0	77.1	77.1
9.0	15.0	0.0	90.0	100.0	0.0	63.3	49.0	70.0	70.0
7.0	0.0	14.0	70.0	0.0	77.8	49.3	62.0	88.6	88.6
0.0	0.0	0.0	0.0	0.0	0.0	0.0	72.0		72.0
10.0	0.0	1.0	100.0	0.0	12.5	37.5	96.0		96.0
0.0	19.0	8.0	0.0	95.0	100.0	65.0	90.0		90.0
0.0	3.0	0.0	0.0	15.0	0.0	5.0	74.0		74.0
0.0	17.0	0.0	0.0	85.0	0.0	28.3	94.0		94.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	86.0		86.0
1.0	19.0	6.0	10.0	95.0	75.0	60.0	98.0		98.0
7.0	0.0	3.0	70.0	0.0	37.5	35.8	80.0		80.0
0.0	18.0	0.0	0.0	90.0	0.0	30.0			30.0
10.0	17.0	0.0	100.0	85.0	0.0	61.7	83.0		83.0
2.0	0.0	15.4	0.0	7.7	49.0	40.5			40.5
0.0	20.0	0.0	80.0	40.0	73.0	60.3			60.3
5.0	0.0	38.5	0.0	19.2	101.0	83.5			83.5
0.0	20.0	0.0	80.0	40.0	104.0	86.0			86.0
17.0	14.0	0.0	7.0	58.6	87.5	0.0	100.0	61.5	88.0
0.0	0.0	0.0	6.0	0.0	0.0	0.0	85.7	21.4	50.0
25.0	14.0	0.0	0.0	86.2	87.5	0.0	0.0	43.4	94.0
0.0	0.0	15.0	2.0	0.0	0.0	100.0	28.6	32.1	45.0
0.0	15.0	15.0	6.0	0.0	93.8	100.0	85.7	69.9	50.0
0.0	0.0	0.0	6.0	0.0	0.0	0.0	85.7	21.4	51.0

0.0	0.0	14.0	0.0	0.0	0.0	93.3	0.0	23.3	95.0
0.0	10.0	15.0	7.0	0.0	62.5	100.0	100.0	65.6	77.0
4.0	13.0	0.0	7.0	13.8	81.3	0.0	100.0	48.8	93.0
5.0	14.0	15.0	0.0	17.2	87.5	100.0	0.0	51.2	57.0
0.0	0.0	6.0	4.0	0.0	0.0	40.0	57.1	24.3	65.0
0.0	12.0	15.0	4.0	0.0	75.0	100.0	57.1	58.0	89.0
29.0	16.0	14.0	0.0	100.0	100.0	93.3	0.0	73.3	98.0
0.0	0.0	12.0	7.0	0.0	0.0	80.0	100.0	45.0	73.0
17.0	12.0	0.0	6.0	58.6	75.0	0.0	85.7	54.8	96.0
0.0	14.0	0.0	100.0	50.0	38.0	70.4			70.4
0.0	14.0	0.0	100.0	50.0	27.0	50.0			50.0
14.0	0.0	100.0	0.0	50.0	54.0	100.0			100.0
14.0	0.0	100.0	0.0	50.0	45.0	83.3			83.3
12.0	0.0	85.7	0.0	42.9	34.0	63.0			63.0
0.0	14.0	0.0	100.0	50.0	42.0	77.8			77.8
0.0	0.0	92.0							92.0
0.0	0.0	82.0							82.0
0.0	0.0	100.0							100.0
0.0	0.0	85.0							85.0
0.0	0.0	98.0							98.0
0.0	51.0	0.0	89.5	44.7	91.0				91.0
0.0	57.0	0.0	100.0	50.0	87.0				87.0
0.0		0.0	0.0	0.0	45.0				45.0
0.0	0.0	0.0	0.0	0.0	75.0				75.0
								ave	73.8
								std dev	17.5
								std err	1.0

APPENDIX D: SURVEY SAMPLE AND RESULTS

Blank Survey sent to Students from Survey Monkey Online Survey: `(results follow)
WebAssign

1. Did you find the use of WebAssign helpful in Physics this year?

- Extremely helpful
- Somewhat helpful
- Could have learned material with or without it
- Was a waste of time
- Hated it!

Other (please specify)

2. My attitude toward assignments over 40 points was:

- Took it seriously because of point value
- Was not as helpful because of wide range of subject matter.
- Took too much time.
- Too much trouble to complete.
- Tended not to complete assignment

Other (please specify)

3. What was your attitude about short WebAssigns (under 15 pts)even if they occurred more frequently?

- Easy to skip because of low point value
- Helpful because of small amount of material covered
- Easy to complete
- Easy to forget, low importance

Other (please specify)

4. How did the WebAssigns affect your Physics grades?

- ☐ Helped because of point values
- ☐ Helped because it helped me learn the material
- ☐ Had no affect on grade
- ☐ Hurt because of points lost by not completing them
- ☐ Hurt because it did not help me learn the material and it took up study time.

Other (please specify)

5. Over the whole year, how much help did you give or receive (to or from peers) in completing your assignments?

- ○ I received help on most of it
- ○ I received some help after I tried it on my own first
- ○ I received no help on it
- ○ I gave no help on it
- ○ I helped friends with their assignments as I taught them how to work the problems.
- ○ I did the problems for them most of the time.

Other (please specify)

6. Did you get help from an online tutorial or answer source?

- ○ No
- ○ Yes, a few times
- ○ Yes, many times

Other (please specify)

7. Evaluate these areas of your webassign experience

	Really like	Somewhat like	Indifferent	Somewhat dislike	Really dislike
Knowing if the answer was right or wrong immediately after you finished the problem.	Really like	Somewhat like	Indifferent	Somewhat dislike	Really dislike
Having to turn in your paper work after assignment was completed.	Really like	Somewhat like	Indifferent	Somewhat dislike	Really dislike
Working problems that "stretched" your knowledge of the subject matter.	Really like	Somewhat like	Indifferent	Somewhat dislike	Really dislike
Being able to work it at home or at school.	Really like	Somewhat like	Indifferent	Somewhat dislike	Really dislike
Having WebAssign problems on the unit test.	Really like	Somewhat like	Indifferent	Somewhat dislike	Really dislike

Other (please specify)

8. How much trouble did you have with your:

	No trouble at all	Some trouble	Lots of trouble
Computer running WebAssign?	No trouble at all	Some trouble	Lots of trouble
Logging in on WebAssign?	No trouble at all	Some trouble	Lots of trouble
Submitting answers on WebAssign?	No trouble at all	Some trouble	Lots of trouble
Learning how to use WebAssign?	No trouble at all	Some trouble	Lots of trouble
The Website itself?	No trouble at all	Some trouble	Lots of trouble

9. On the average, how much time (approximately) did you spend on difficult questions?

- Under a minute
- 5 minutes
- 10 minutes
- 20 minutes
- 30 minutes
- More than 30 minutes

Other (please specify)

10. If you see WebAssign or a similar program at the college level, what will your attitude be?

- Excited, I know how to use this!
- Confidently secure in knowing that you have used this before.
- No reaction, its just part of the class.
- Oh no, not this again!
- If this class uses WebAssign, I'm dropping it!

Other (please specify)

Results of Survey:

	Total Started Survey:	**27**
	Total Completed Survey:	**27 (100%)**

1. Did you find the use of WebAssign helpful in Physics this year?

		Response Percent	**Response Count**
Extremely helpful	33.3%		9
Somewhat helpful	40.7%		11
Could have learned material with or without it	18.5%		5
Was a waste of time	0.0%		0
Hated it!	7.4%		2

Other (please specify)

1. The webassigns that counted for a high amount of points helped, because I did them. The ones that were only 7 and 8 points hurt my grade, because I completely disregard them.

2. My attitude toward assignments over 40 points was:

		Response Percent	**Response Count**
Took it seriously because of point value	81.5%	22	
Was not as helpful because of wide range of subject matter	18.5%	5	
Took too much time.	14.8%	4	
Too much trouble to complete.	7.4%	2	
Tended not to complete assignment	7.4%	2	

Other (please specify)1

It was annoying to do, but definitely helpful if the following test was going to be a big pointer.

1.

3. What was your attitude about short WebAssigns (under 15 pts)even if they occurred more frequently?

	Response Percent	Response Count
Easy to skip because of low point value	22.2%	6
Helpful because of small amount of material covered	44.4%	12
Easy to complete	51.9%	14
Easy to forget, low importance	25.9%	7

Other (please specify)

1.Easy to complete, but were still helpful!

4. How did the WebAssigns affect your Physics grades?

	Response Percent	Response Count
Helped because of point values	59.3%	16
Helped because it helped me learn the material	55.6%	15
Had no affect on grade	7.4%	2
Hurt because of points lost by not completing them	22.2%	6
Hurt because it did not help me learn the material and it took up study time.	7.4%	2

Other (please specify)2

1. unfortunately i'm the type of person who is going to keep trying till i get it right so it somewhat hurts me on the tests because I use the same outlook on the test like oh lets see if i got it wrong

2. It helped by giving extra points but probably helped me even more by getting to know the material more. If it wasn't for the webassign, I know I would have gotten more wrong on the tests.

5. Over the whole year, how much help did you give or receive (to or from peers) in completing your assignments?

Answer Options	Response Percent	Response Count
I received help on most of it	7.4%	2
I received some help after I tried it on my own first	37.0%	10
I received no help on it	14.8%	4
I gave no help on it	0.0%	0
I helped friends with their assignments as I taught them how to work the problems.	37.0%	10
I did the problems for them most of the time.	3.7%	1
Other (please specify)		2

but if i had trouble on problems, i would get people to show me and not get them to do it
At first I was just completing the problems for them, but then it got to where I could see the problems reoccuring on the tests so instead I would show them how to work it and it helped them a lot more.

6. Did you get help from an online tutorial or answer source?

Answer Options	**Response Percent**	**Response Count**
No	77.8%	21
Yes, a few times	18.5%	5
Yes, many times	3.7%	1
Other (please specify)		0

7. Evaluate these areas of your webassign experience

	Really like	Somewhat like	Indifferent	Somewhat dislike	Really dislike	Response Count
Knowing if the answer was right or wrong immediately after you finished the problem.	81.5% (22)	3.7% (1)	3.7% (1)	3.7% (1)	7.4% (2)	27
Having to turn in your paper work after assignment was completed.	11.1% (3)	22.2% (6)	25.9% (7)	14.8% (4)	25.9% (7)	27
Working problems that "stretched" your knowledge of the subject matter.	18.5% (5)	29.6% (8)	33.3% (9)	7.4% (2)	11.1% (3)	27
Being able to work it at home or at school.	74.1% (20)	14.8% (4)	3.7% (1)	0.0% (0)	7.4% (2)	27
Having WebAssign problems on the unit test.	55.6% (15)	22.2% (6)	11.1% (3)	0.0% (0)	11.1% (3)	27

8. How much trouble did you have with your:

	No trouble at all	Some trouble	Lots of trouble	Response Count
Computer running WebAssign?	63.0% (17)	29.6% (8)	7.4% (2)	27
Logging in on WebAssign?	74.1% (20)	18.5% (5)	7.4% (2)	27
Submitting answers on WebAssign?	63.0% (17)	29.6% (8)	7.4% (2)	27
Learning how to use WebAssign?	77.8% (21)	14.8% (4)	7.4% (2)	27
The Website itself?	74.1% (20)	18.5% (5)	7.4% (2)	27

9. On the average, how much time (approximately) did you spend on difficult questions?

	Response Percent	Response Count
Under a minute	19.2%	5
5 minutes	23.1%	6
10 minutes	38.5%	10
20 minutes	11.5%	3
30 minutes	3.8%	1
More than 30 minutes	3.8%	1

1. it depends on the problem
2. I never really had problems with the questions I attempted.
3. Nothing was difficult.

10. If you see WebAssign or a similar program at the college level, what will your attitude be?

	Response Percent	Response Count
Excited, I know how to use this!	22.2%	6
Confidently secure in knowing that you have used this before.	51.9%	14
No reaction, it's just part of the class.	11.1%	3
Oh no, not this again!	7.4%	2
If this class uses WebAssign, I'm dropping it!	7.4%	2
Other (please specify)0		

VITA

Elizabeth Ann Pullig was born in April 1956 to Richard Murphy "Jack" and Rachael Pullig in Clinton, Louisiana. She attended Clinton Elementary School through the seventh grade and finished high school at Silliman Institute. She attended Louisiana State University from August 1974 until earning a Bachelor of Science degree in secondary education in 1979, majoring in biology with a minor in physics.

After graduation, Beth worked for three years at Mississippi State University as part of the ministry of Campus Crusade for Christ, International. In 1982, she married Joe Hitt and began her teaching career at Northlake Christian School in Covington, Louisiana; while there she taught life science, physical science and biology. Beth spent the next years in Covington, teaching, sometimes part time, as the family of two quickly started to expand; Rachael was born in 1985, and Lyle followed in 1986. In 1987 the family of four moved to Clinton, Louisiana. Beth's teaching career continued in life science at Clinton Middle School until Mason was born in 1988. Before Tucker was born in 1992, she taught in Baton Rouge, Louisiana, at Scotlandville Magnet High School in areas of physics and biology. To make life a little simpler, Beth took a teaching position at Silliman Institute in Clinton teaching biology and physical science.

In January of 2003, the family moved to Baton Rouge, Louisiana, and Beth started her present teaching career at Parkview Baptist High School. Her main teaching concentrations are biology II and physics, but she has also taught biology I, physical science and Bible as needed.

Beth entered graduate school at Louisiana State University in 2008 as part of the Master of Natural Sciences cohort; she plans to obtain her degree in August 2010.