The Renaissance Partnership
For Improving Teacher Quality

Annotated Teacher Work Sample

Third grade Science:
Simple Machines
Spring 2002

Annotated, January 2004

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Community and School Factors: With over 500 students attending pre-school through sixth grade, ---------- Elementary is the newest facility in the ------ County School District. The student population is predominately Caucasian, but also includes Asian, Middle Eastern and black ethic groups. The school consists of several high income neighborhoods, one low income housing facility, apartments and one trailer park. Still the socio-economic level is predominately high to high-middle income. The community support for this school is high providing both parent volunteers and monetary donations toward school needs. Currently the school is trying to raise $25,000 to stock their library.\

Provides specific, relevant information for school and community.

Needs instructional implications for community and classroom.

Classroom Factors: My third grade classroom is large, provides space for individual and group work, houses 26 students and contains, VCR, television, whiteboard, student lockers, 4 computers, overhead projector. Parent participation is high. Activities include a balance of independent, whole class learning, and cooperative workgroups. Rules and routines are typical of elementary schools in ---------- County; Be respectful. Give Me Five, etc. Subjects are scheduled in 30-minute to one hour blocks with music, art, PE and computer lab convening outside the classroom. Three third grade teachers collaborate so that curriculums agree.

Student Factors: This class consists of fourteen females and twelve males. There are three black females (one being tested for special education), one black male (who is ADHD with a history of violent behavior), one Native American female, ten white females (one of whom may be held back because she unable to complete assignment) and eleven white males (one recommended for ADHD testing). Ages range from 8 (fourteen students) to 9 (twelve students) years old. All students speak English as their first language. There are twelve exceptional students, five average, three learning

Understanding of student individual differences.

delayed students, one recommended for special education in reading and math, one receiving special speech instruction and one receiving special reading remediation. Student interests involve playground and professional sports, the Olympics, books about animals and kids their age, computer games, the Internet and friends. Third graders are just beginning to practice the nuances of friendship yet still have problems with give and take and keeping friends. Learning modalities in this class include about eighteen kinesthetic learners, four verbal learners and four visual learners. Prior knowledge consists of ability to read, addition and subtraction facts, and basic science ideas. They are working on their multiplication facts and learning to read and write in cursive. Because most students this age are still between concrete and abstract reasoning levels, care will be taken to begin concepts with concrete items they are familiar with and move to the more abstract. Most students will be able to complete reading and homework assignments if time in class is given to allow for questions.

Student individual differences.

Specific ways of student learning

Some knowledge of student prior learning.

Instructional Implications: Students are easily bored with lengthy lectures and need more hands on learning. So lessons will include materials they can manipulate and a balance of lecture and hands on activities. Technology will include work on the web and video clips. The students with delayed learning will be paired with exceptional students. Special attention by questioning and observing students to check understanding of the concepts will be given. I will make sure the Native American student is accepted within her assigned cooperative group. There is special concern because the other students tre her as an outsider and outwardly shun her, which affects her learning outcomes. One o the black students (being tested for special education) will also need to also be monitored because she frequently resists working on classroom activities. She begins most tasks

Provides implications based on student characteristic

Explain how this will be done in assessment plan and design for instruction.

with, "I can't do that!" and will need to be cajoled and encouraged to participate in the activities. Assessments for this unit will include a mix of standard formative and summative testing along with observations of group and individual student learning during cooperative work sessions along with assessments for individual and group participation in the development of the simple machines centers required during this unit. Most of the assessments will require hands on product development.

Most goals are lower level and lack challenge.

Learning Goals

Learning Goal #1: Students will define "force" as a push or pull and demonstrate what force can do to objects.

Justification: This goal accommodates kinesthetic, visual/spatial and linguistic learning at the knowledge, and comprehension learning levels. Because third graders are still in the concrete learning stage of cognitive development, hands on experiments both in and out of class will be a must. This goal is aligned with the **Kentucky Learner Goal #2 - 2.3** "Students identify and analyze systems and the ways their components work together ...", the **Kentucky Core Content and the Warren Co. School District curriculum guide SC-E-1.2.3 -** "The position and motion of objects can be changed by pushing and pulling. The amount of change in position and motion is related to the strength of the push or pull (force)."

Uses developmental theory to justify the goal.

Learning Goal #2: Students will design an experiment showing how gravity and friction work on objects. .

Justification: This goal addresses the kinesthetic and visual/spatial learners at the synthesis level. The study of gravity is a concept that is readily demonstrated and is something with which third graders are already familiar. This study gives students the opportunity to use "scientific ways of thinking" as stated in the **Kentucky Learner Goal #2 - 2.1** and is a continuing study in force according to the **Kentucky Core Content and the Warren Co. School District curriculum guide SC-E-1.2.3** as stated above.

Learning Goal #3: Students will judge that work is done when force makes an object move and apply that knowledge to create a model to demonstrate this concept.

Justification: This goal furnishes kinesthetic, visual/spatial and linguistic learners with the opportunity to discover how work is done by various machines. It provides learning at the application, synthesis and evaluation level through experiments with hands on materials where students are asked to demonstrate work. "Students will design and conduct simple scientific investigations and communicate results of scientific investigations according to **Kentucky Learner Goal #2 -** "...using scientific ways of thinking" and according to the **Kentucky Core Content and the Warren Co. School District curriculum guide SC-E-1.2.3** - "... The amount of change in position and motion is related to the strength of the push or pull (force)."

All goals are aligned with state standards.

Learning Goal #4: Students will name and identify the six types of simple machines and explain how they make work easier.

Justification: This goal addresses the needs of multiple learning styles, kinesthetic, visual/spatial, linguistic, logical and naturalistic. Activities will address the learning levels of knowledge and comprehension with hands on experiments and model construction. Third graders need to understand the different types of machines used to make work easier and determine which of those machines needs to be used. This goal also addresses **Kentucky Learner Goal** #2 - 2.3 "Students identify and analyze systems and the ways their components work together ...", and is a continuing study in force according to the **Kentucky Core Content and the ---- Co. School District curriculum guide SC-E-1.2.3** as stated above.

Assessment Plan

Pre and post-tests for this unit will consists of both performance tasks and pencil paper assessments. These tests have been designed to test specifically for concept understanding. Responses to the pencil and paper portion of the pre-test are either correct or they are not. Performance tasks will be assessed using rubrics. Formative assessments throughout the unit will be in the form of both pencil paper and performance tasks depending on the goal addressed at the time. Assessments will be made at the end of the unit section dealing with force, friction and gravity, and work to determine if any re-teaching is necessary before continuing with the rest of the unit. Another formative assessment by rubric will be given at the end of the unit section on simple machines and will require that students identify the six types of simple machines from various objects on a table and explain how that they make work easier. Observations, in class questions and private conversations with students will be used throughout the unit as formative assessments as well. See attached checklists.

Provides overview of plan but **does not include adaptations**

Needs to reference Appendix A & B.

Learning Goal #1 addresses force and demonstrating force. Students will be asked multiple choice questions about force. Then, one at a time students will come to a center and demonstrate force using a bicycle or wagon. A rubric will be used to score this demonstration. These questions assess student knowledge about force and what force is. A rubric will be used for assessment.

Two ways of assessing one goal gives more reliability

Learning Goal#2will be assessed using multiple choice questions. Then materials will be provided to the student and they will be asked to demonstrate gravity and friction. A rubric will be used to score the multiple choice and performance tasks. These sections

Lower level assessment is not an accurate measure of a performance goal

of the pre-test are designed so that students can demonstrate understanding even if they can not put that understanding into words.

Learning Goal #3 will be assessed using several true/false questions and a scoring rubric regarding work and when work is done. Students will also be asked to fill out a worksheet where they will choose pictures that show work being accomplished. The last box asks for a short explanation about what work is. This short answer will be assessed using a rubric (copy on preceding pages). This assessment gives students pictures of everyday objects that they can use to answer the questions.

Learning Goal #4 will be assessed with a matching exercise covering the six simple machines. Then a worksheet will be provided for students to explain how each of three simple machines of their choice makes work easier. Explanations and matching questions will be assessed with a rubric. This assessment will be used to determine student understanding about machines and what they can do for us.

Be sure to include the assessment criteria and expected level of achievement for each goal. You will not expect students to obtain the expected level of achievement on the pre-assessment but will for the post-assessment. Both scores are needed for analysis of student learning.

Special Education and ADHD students will be given special attention and assistance as required throughout the unit of study and throughout any testing situations to be sure that they fully understand the questions being asked. Additional prompting may also be used where wording or instructions may be too hard for them to comprehend alone.

Learning Goals	**Assessments**	**Format of Assessment**	**Adaptations**
Learning Goal #I: **Students will be able to define force as push and pull and demonstrate what force can do to objects.**	Pre-Assessment:	Students will be asked to define force via multiple choice. Then students will demonstrate force using a bicycle or wagon.	Read questions to students. Check for understanding. Provid additional explanation as required.
	Formative Assessment:	Questions, worksheets and observations during in class activities and center creation.	Use homework as needed to complete assignments. Team up slower learners with exceptional students.
	Post-Assessment:	Students will be asked to define force via multiple choice. Then students will demonstrate force using a bicycle or wagon.	Read questions to students. Check for understanding. Provide additional explanation as required.
Learning Goal #II: Students will be able to design an experiment showing how gravity and friction work on objects.	Pre-Assessment:	Students are assessed using multiple choice questions on gravity and friction. Then they are to demonstrate these concepts.	Read questions to students. Check for understanding. Provide additional explanation as required.
	Formative Assessment:	Questions, worksheets and observations during in class activities and center creation.	Use homework as needed to complete assignments. Team up slower learners with exceptional students.

This is an instructional strategy for the entire class.

Provides some adaptations

Each learning goal is assessed.

Refer to students identified as ADHD and Native American.

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Post assessment should involve designing an experiment.

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	Post-Assessment:	Students are assessed using multiple choice questions on gravity and friction. Then they are to demonstrate these concepts. provided to them.	Read questions to students. Check for understanding. Provide additional explanation as required.
Learning Goal #III: Students will be able to judge that work is done when force makes an object move and apply that knowledge to create a model to demonstrate this concept.	Pre-Assessment:	True/False questions on work and when it is done. Then worksheet to choose pictures that depict work being accomplished.	Read questions to students. Check for understanding. Provide additional explanation as required.
	Formative Assessment:	Questions, worksheets and observations during in class activities and center creation.	Use homework as needed to complete assignments. Team up slower learners with exceptional students.
	Post-Assessment:	True/False questions on work and when it is done. Then worksheet to choose pictures that depict work being accomplished.	Read questions to students. Check for understanding. Provide additional explanation as required.
Learning Goal #IV: Students will be able to name and identify the six types of simple machines and explain how they make-work easier.	Pre-Assessment:	Matching questions on simple machines and worksheet for explanations on how these machines make-work easier.	Read questions to students. Check for understanding. Provide additional explanation as required.
	Formative Assessment:	Questions, worksheets and observations during in class activities and center creation.	Use homework as needed to complete assignments. Team up slower learners with exceptional students.
	Post-Assessment:	Matching questions on simple machines and worksheet for	Read questions to students. Check for understanding. Provide

Post assessment should be an evaluation of the model.

Level of assessments matches level of the goal.

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		explanations on how these machines make work easier.	additional explanation as required.

Design for Instruction

(See appendix C for graphic representations)

Clear identification of location of information.

The following is an analysis of the pre-test results for a third grade science unit on Simple Machines. Scores for the whole class averaged only 32%. Boys averaged slightly higher than girls with an average overall score of 34% versus 30%, respectively.

Learning goal #1 focuses on the scientific term "force" as meaning the push or pull of an object. This goal accommodates kinesthetic, visual/spatial and linguistic learning appropriate for this age group. Interestingly, boys scored somewhat higher on average than girls with average scores of 5 points versus 3 points respectively, out of possible 12 points. Because of this difference, this goal will be re-enforced for especially girls, but also for boys, with activities using an actual bicycle and individual student performance demonstrations of push and pull. The Special Reading and Speech students would benefit from being paired with a learning buddy, while the Special Ed and ADHD children resist working with others. These students would benefit more from extra monitoring during the lesson for all goals and one-on-one remedial instruction after the lesson.

Provides instructional implications.

Average scores for boys and girls were the same on learning goal *#2,* which deals with the concepts of gravity and friction. Multiple choice questions and a performance task was used to determine student prior knowledge of these concepts. Average scores by student characteristic show that the students typically performing "below average" scored the same as "exceptional" students. Mean scores of the "average" students were lowered by the scores of two students; one scored zero on this goal and one scored four points. In reviewing the actual questions, it seems that most students understood the concept of gravity but had trouble with the concept of friction. It will be necessary to go over the

Identifies common error

concept of friction using multiple demonstrations that are connected to the students'prior understanding. I will be using a real bicycle to demonstrate friction along with hands on activities where students pull wood over various surfaces and compare the amount offeree (measured in newtons) needed to pull the wood across surfaces that range from smooth (desktop) to rough (sandpaper).

On learning goal #3, girls scored significantly higher on average than did the boys. Girls averaged 10 points out of a possible 32 contrasted with the boys' average scores of 7 points. This difference could be attributed to that these questions seek to ascertain the student's concept of "work." The term work can mean different things to different people and the boys may be having a problem understanding the "scientific" definition of work, which means to make something move. I will need to be sure that the boys understand this concept by allowing them multiple opportunities to demonstrate and explore activities that are considered "scientific" work and those that are not considered "scientific" work. It is also interesting to note how well the student with undiagnos ADHD did on this section of the test. This student is obviously capable of complet class assignments, if he can be kept on task. In addition, the student receiving Special Reading remediation scored well above even the "exceptional" students. Sometimes this student gets so caught up in making a good grade that she copies the work of others. I went back and discussed this student's answers on these questions and found that she did not give the same responses verbally as she did on the test. Therefore, I can only conclude that she copied her neighbor's responses (they were identical) which skewed the results of the category of the students with "special" needs.

Nice analysis of students' misconception as demonstrated in pre-assessment.

Learning goal #4 consists of matching exercises on the definitions of the six simple machines and a performance task where students are asked to choose simple machines and explain how they make work easier. Pretest results were more in keeping with what one would expect. There was little difference between girls' and boy's scores which were 10 points and 11 points respectively. "Exceptional" students averaged 12 points, "average" students 10 points and "special needs" students scored 8 points, all out of a possible 36 points. The student recommended for special education and the student who receives special reading remediation, scored as well as the exceptional students. However, I actually witnessed these students collaborating with other students on the performance task portion of this question which I feel accounts for their perfect responses. Neither of these students was able to complete the matching portion of this question. During future assessments all students will be placed so that this can not occur. In teaching this goal it will be necessary to conduct several hands on activities regarding each of the simple machines. Currently a full class period is planned to teach of the simple machines. Multiple hands-on activities are planned to re-enforce information presented on each simple machine and daily reviews assessing student learning will be conducted.

Discusses individual students and reasons for performance

Unit **Overview:** This is a complete introductory unit study on Simple Machines for a third grade class who have been exposed to several Simple Machines during various times prior to this year. However, this will be their first in-depth study about each of the six simple machines in one cohesive unit. At the beginning of this unit, parents will be sent a letter introducing this study and encouraged to use included information and instructions to help their child design and create a simple machine. As a beginning for

this unit, students will explore force, work, gravity and friction using hands-on and live demonstrations to help re-enforce and teach each of these concepts. Next, students will be given a summative assessment on each of these concepts before continuing with a study on the six simple machines. Then one of the six simple machines will be explored at each of the following six class periods. After this point students will spend a couple of class periods designing and creating their own simple machines. A center for each machine will be set up to house both in class inventions as well as machines created at home by the students. Activities conducted during class will also be included in these centers. On the last day of the unit, a Machine's Celebration Day will be held with the other third grade classes. Students in each class will divide into two groups group stays behind in their own classroom to man the Machine Centers and demonstrate the various machines in their center to the students coming through the exhibits. The other half of the classes switch classrooms to visit each of the other third grade student's centers. In this way students get the opportunity to re-enforce each of the concepts they are demonstrating by explaining it to the visiting classes and also get the opportunity to practice presentation skills. Once each half of the classes have toured each of the centers, the touring portion of each class become the presenters and the presenters begin their tour of the centers. Serving popcorn and fruit juice will add to the carnival atmosphere where students will continue learning without realizing it as they explore all of the machine centers. The following is an outline of the activities planned for this unit of study.

Day	Learning Goal	Activity
Monday, January 28, 2002	I, II, III, & IV	Pretest
Tuesday, January 29, 2002	I, II, III, & IV	Finish Pretest
Wednesday, January 30, 2002	I & III	Students demonstrate force using bicycle & force changes shape by blowing up balloon. Demonstrate non-scientific work using bicycle & pushing on wall & demonstrate scientific work. Formative assessment = task cards.
Thursday, January 31, 2002	III	Students investigate the effects of gravity on various items. Students brainstorm which force caused the difference. Use balancing clown to discover center of gravity.
Friday, February 1, 2002	I, II, III	Students demonstrate effects of friction, traction, aerodynamic airflow, and Newton experiment. Formative assessment will be completion of results recorded in Science Journals. Create poster depicting one of concepts discussed. A rubic is used for group and individual grade.
Monday, February 4, 2002	I, II, III, & IV	Mid-unit assessment over the first four concepts covered (force, work, gravity, friction). Intro to

Logical organization of lessons.

Activities clearly aligned with learning goals.

		levers demonstration/hands-on: using hammer, screwdriver, bottle opener, see saw, etc. Formative assessment "Levers" worksheet & rubric.
Tuesday, February 5, 2002	IV	Inclined planes: investigate ramps and toy car race. Overhead activity on incline planes, Screw: special inclined plane and "Screw Scavenger Hunt."
Wednesday, February 6, 2002	IV	Wedges: Discussion, demonstration and "Find the Wedges" activity page. Formative assessment writing.
Thursday, February 7, 2002	IV	Pulley's, Wheels, Axles and Gears: groups design and create each of these & demonstrate.
Friday, February 8, 2002	IV	Students divide into groups for each of the concepts and design and create simple machines to represent their center.
Monday, February 11, 2002	IV	Students divide into groups for each of the concepts and design and create simple machines to represent their center.
Tuesday, February 12, 2002	IV	Machines Celebration Day. Formative assessment using rubric for group and individual assessment.
Wednesday,	I, II, III, and IV	Unit summative assessment in the form of test

Significant and appropriate variety of activities.

February 13, 2002		and performance tasks.

Activity One: In cooperative groups, students design and create a poster depicting one of the concepts learned during this unit of study. Each group draws a concept from a basket and reviews what has been learned about that concept. Students use magazine pictures and information from various reference books to complete their project. Presentations of each poster are made to the class. This activity challenges students to actually show what they understand about the concepts addressed in Goal *#1,* #2 and *#3.* In addition, this activity allows students to choose how they will showcase their particular concept, addressing the contextual factors of the various learning modalities in this classroom.

Activity Two: Students will demonstrate various forms of work as one of the first activities of this unit, which addresses goal #3. In these activities students will develop an understanding of the difference in what we traditionally consider "work" to be and what "work" is in scientific terms. The demonstrations will provide the "hands-on" experience students at this level require and will accommodate both kinesthetic and visual/spatial learners as noted in goal #3 and address those needs outlined in the contextual factors. For example, students will learn that even though they are "working" very hard to move a wall, if the wall does not move, their efforts are not considered scientific "work". A bicycle will also be used to demonstrate this concept along with various brainstorming activities to create a list of non-scientific work and scientific work activities.

Activities appeal to the kinesthetic learning modes of the students mentioned earlier.

Formative student learning will be assessed using a set of "task cards" which describe an activity and asks the students what force was used in the activity and if "scientific" work was actually performed.

Activity Three: Activities for learning about inclined planes will included hands-on explorations by students using ramps to move items up to a higher level. Students will use a metal toy truck, tie a string to it and the other end of the string to a spring scale. They will explore lifting the truck to various new levels noting the scale reading. Then they will move the truck to the same height using an inclined plane and note that scale reading. They will observe that less force is required to move the truck to the new he using the inclined plane as opposed to lifting the truck straight up to the new height. Next students will explore moving the truck to the same height and the e that using varying lengths of inclined planes makes on the scale readings. This activity addresses the kinesthetic, visual/spatial and logical reasoning learning modalities identified in the contextual factors for this group of students. In addition, students will understand and be able to explain how that inclined planes help to make work easier as outlined in Goal #4. Technology in this lesson will be addressed through student use of the FOSS kit web site on simple machines ('http:/7www.fossweb.com') and http://www.brainpop.com.

Provide specific accommodations for students identified in the contextual factors.

Technology: Web sites from FOSS and Brain Pop will be used to re-enforce concepts taught in class (http://www.fossweb.com ; http:/7www.brainpop. corn). In addition, videos from the science collection of Mr. Wizard, worksheets from various web sites and the overhead all will be utilized during daily lessons for this unit.

Appropriate use of technology.

Instructional Decision Making

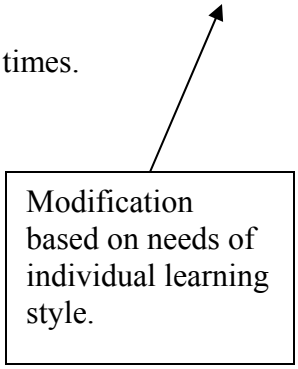
Incident One: On Thursday, January 31st, students were to complete a "balancing clown" activity where they colored and cut out a clown doing a hand stand, glue a penny into each hand of the clown, mount it on tag-board and cut it out again. The clown when finished should balance on a pencil to show center of gravity. However, as students were completing the activity, several clowns fell forward or backward or to the sides and would not balance. After some investigation I realized that in order for the clown to perfectly balance on a pencil, the symmetry of the cut out figure and weight distribution of the pennies had to be exact or he would not balance. Because the fine motor skills required to do this were lacking in many of these third graders, we substituted a length of wire cut from a coat hanger with a ball of clay dough stuck to each side. Then students could determine the center of gravity by moving the wire to the left or the right of the pencil until the center of gravity was found. Because the students had to spend time shifting the weight they could actuallyfeel the center of gravity much more so that if we had used our original activity.

Modification based on student developmental level.

Incident Two: A formative assessment over the concepts for goals #1, #2 and #3 was conducted on Monday, February 4th. Scores showed that many students still did not understand the concept of "scientific work" and missed several of the four questions addressing this concept. Most of the misunderstandings involved the definition of "scientific work" and that you must use a force to make something move to do "scientific work". Because of these unresolved questions, these concepts were reviewed daily for a few minutes before the presentation of new material. Various students were asked to come up and demonstrate work. The rest of the class had to tell what kind of work they

Example of using formative assessment to guide subsequent instruction

performed and the force used to perform the work. Students chosen for the performance and the explanations were selected from the students who had trouble with the concept on the test. In addition, the Task Cards used in the original activity were used as well. Going over this material daily with numerous student devised performances seemed to help everyone master the concept as was shown on the post-test results. The students with "special needs" still required one-on-one help with this concept. At any free minute during the day, these students worked with me individually on this concept. Visual pictures showing "non-scientific work" and "scientific work" seemed to help these students the most. However, the student with ADHD seemed to grasp the concept by acting out the concept multiple times.



Analysis of Student Learning:

Should refer to Appendix C for charts.

Whole Class: The difference between pre and post test scores for this unit is vast. Pretest scores for students over Learning Goal #1 averaged 31% compared to the average post test score of 99%. Over Learning Goal #, which carried an 80% level of achievement criterion, 96% of the students scored 100%. Only one student scored lower at 67%.

Over Learning Goal #2, students scored an average of 29% on the pre test verses an average of 91% on the post test. Over 96% of the students scored over 80% for this goal, which carried an achievement criterion of 80%. Over 70% of the students scored 100% on this goal and 25% of the students scored 80%. Only one student scored lower at 0%.

Provided criteria.

Scores for Learning Goal #3 were just as dramatic. Overall scored averaged 39% on the pretest and 89% on the post test. The achievement criterion for this goal was 80% and 79% of the students received scores of 80% plus. Students scoring 100% on the post test numbered at 46% and 33% of the students scored 88%. Three students scored 75%, or student scored 67% and one student scored 50%.

Includes evidence of impact on number of students who achieved.

Students averaged 28% on the pre test and 83% on the post test over Learning Go #4. These results were less dramatic and seem to indicate a need to spend more time on this part of the unit. Nevertheless, 46% of the students scored 80% or more on the post test for this learning goal, which also carried an 80% achievement criterion. It is interesting, however to note that 33% of the students received scores of 78% which is very near to the 80% criterion required for successful completion of this unit. Thirty-three percent of the students Scored 100% over this learning goal and 13% scored 89%.

Subgroup**:** Goal 3 had the largest disparity in test scores for males versus females on both pre and post tests than any of the other goals. Learning Goal #3 addressed the

concept of scientific work. Scores averaged 26% for males and 48% for females over the pretest for this goal and 86% for males and 91% for females on the post test. It was hypothesized that some of this disparity could be because of the difference in ways males and females consider work and scientific work. During interview and various activities it seemed that the males seemed to consider anything to be considered work; whereas, females were more discriminating. Males had a hard time understanding that they were not working unless an object moved. Their determination of work relied on sweat and effort. Females, however, quickly seemed to accept the fact that for "scientific" work to occur, something must move as a result. Because of this hypothesis, males were closely monitored and given many hands-on opportunities to experiment with "scientific" work so that they could strengthen their understanding of this concept. This extra attention and effort resulted in only a 4 point difference between scores for males and females on the post test versus a 17 point spread on the pretest.

Individual**:** Student W is a below average performing female student. She has problems reading specifically which seems to slow her down substantially during other activities where reading is involved. Her overall unit test scores grew substantially between the pretest at 24% and the post test score at 68%. However, it is interesting to note that goals that relied heavily on reading and comprehension questions she scored significantly lower than on goals that used performances as a way to learn the concepts. Because of this student's problems in reading, she was teamed up with strong readers for the group activities. When this was done, her scores jumped to 100% and 80% respectively for learning goals #1 and #2. However, when activities relied heavily on reading and reading comprehension, scores increased but not as dramatically. For

Explains why learning did not occur.

example on Goal 3, scores rose from 13% to 50% on the pre versus post tests. On Goal #4, scores rose from 33% to 67%. Both of the later goals relied on reading comprehension while goals used more hands-on activities to determine success.

Four students in the class scored 100% on the post test versus the pretest. Three of these students are considered to be exceptional and one average. The average student, student L, had significant increases in learning goal pre and post test scores. For example. Goal 2 scores increased from 40% on the pretest to 100% on the post test. The same thing happened on Goal 4 where scores were 22% on the pretest and 100% on the post test. This student achieved a score of 100% overall. During conversations with this student later, it became apparent that there was an intent interest in the information presented and according to formative assessments for these goals, once the information on the goal was presented, the student quickly absorbed the information. (See examples of both students' work in the appendix).

Reflection and Self-Evaluation

Connects goals with assessment and instruction.

Learning Goal #1 was definitely the most successful goal in terms of student success. Scores on the pretest averaged 28% and increased to 98.6% on the post test. One possible explanation could be that even though this was a very hard concept to master (force), students used a lot of hands-on activities to experience force. After they repeated these activities daily during reviews the concept became real. Once they actually experienced force (especially during performance tasks involving a real bicycle) students did not forget it. Every student in the class scored 100% on this learning goal in the post test with the exception of one student who scored 67%.

Multiple reasons for success.

Another explanation for the possible success of this goal could be partly attributable to the fact that this was the beginning lesson for this unit and excitement was high. Actual manipulatives and experiments involving prediction and hypothesis kept the lesson moving and interesting to the students. If anything, the results of the formative tests and the post test prove that students do learn better with hands-on materials and using discovery learning procedures. Once they actually got to experience force, they seemed to never forget it.

Needs theory to support reasons for/ lack of success

The learning goals where students achieved the least still exceeded my 80% achievement criterion. These scores occurred on learning goal #4. Scores on the pretest averaged 28% versus the post test scores of 83%. One reason students may have achieved less on this goal could be the fact that all these students live in the city limits. Because of this, they are not exposed to simple machines that are tangible for them. Students on their ride home on the bus may pass a backhoe or a bulldozer doing their work but there is little time to actually watch how the machines are operating. Once students arrive home,

they go inside and generally do not come out again until the next morning to catch the bus. They are not exposed to dad's who work in garages fixing the car with simple machines nor mom using simple machines in the kitchen. It was amazing to find how many students did not know what a bottle opener nor can opener were.

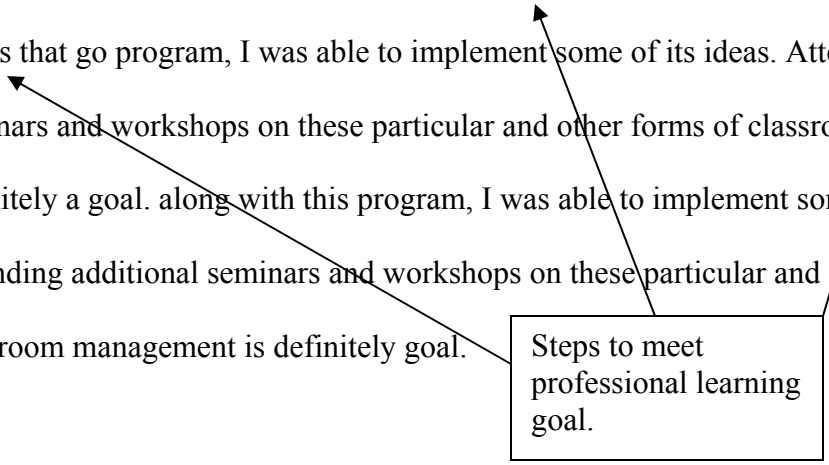
Attempts to explain why learning was not higher.

Another reason could have been because this section was somewhat rushed. Review and re-teaching some concepts resulted in lessons that really should have included another three days to a week to complete. Allowing the students more time to investigate and explore all kinds of simple machines would have resulted in higher scores on the post test.

Ideas for re-design of unit.

Although several web sites were used to help re-enforce the concepts within this unit, I would like to find and use even more. The concepts of inclined planes and levers were re-enforced successfully through movies and questions on "Brain-pop". In addition, because students accessed this site during computer lab, several of the computers shut down because of the heavy traffic on this and other sites we used. Initiating a "grant writing" team at school for additional monies for more computers in the class room might help to resolve some of this problem. With additional computers, students could successfully rotate between them for more hands-on exploration of these concepts. Integrating technology into lessons is the way to go for the future. With students becoming more and more inclined to stay inside and use the computer for learning and fun, they seem to be comfortable and enjoy learning from them better than lectures.

Another professional development goal is to study and implement parts of various discipline plans that have been proven to work in keeping students interested, organized and working. Having already attended a seminar on C.H.A.M.P.S. and purchasing two books that go program, I was able to implement some of its ideas. Attending additional seminars and workshops on these particular and other forms of classroom management is definitely a goal. along with this program, I was able to implement some of its ideas. Attending additional seminars and workshops on these particular and other forms of classroom management is definitely goal.



Appendix A

Needs to label which assessments are pre- post or formative.

Simple Machines -- Grade 3 Science Unit

Name: _____

Goal # **Do not do any of the questions in the boxes until the teacher calls your name.**

Multiple Choice – Circle the letter of the correct answer.

Labels which goal corresponds with each question.

(I) 1. When we talk about work, force is...
   a. a magical power
   b. something in the sky
   c. a push or pull of an object
   d. something you take to work

(I) 2. Force can...
   a. be with you
   b. make something move
   c. make objects change shape
   d. both b and c are true.

(II) 3. Gravity is...
   a. something you eat with your breakfast
   b. what you have when you need to go to the dentist
   c. a pulling force between one object and another
   d. what causes balloons to float

(II) 4. Friction can...
   a. keep you from sliding off the sidewalk when you ride your bike
   b. cause you to slide on ice
   c. be books that are about stories that are not true
   d. cause a tire to spin

(II) 5. We oil machinery because...
   a. we like greasy machines
   b. it is like feeding an animal, machines have to have it
   c. friction slows down moving parts and makes the wear out.
   d. none of the above are true

Note Goal 2 states "students will be able to design an experiment". None of these questions match that higher level goal.

Goal #

Individual assessment provides clear evidence.

Performance Task – When the teacher calls your name, report to her for further instructions. Skip these questions until then.

(I) 1. Showing force on the bicycle.

_____
_____
_____

(II) 2. Beanbag toss. What causes the beanbag to fall?

_____

(II) 3. Rub your palms together very fast until I say stop. How do your palms feel? _____
Now, put some lotion on your palms and rub them together very fast until I say stop. How do your palms feel now? _____
What force is at work here? _____

True or False – circle the correct answer

(III)

T	F	1. There is only one kind of work.
T	F	2. In science work means pushing or pulling something.
T	F	3. To do work, you must use a force to make something move.
T	F	4. When you push hard against a door that does not open, you have performed scientific work.

Goal #

Matching – Draw a line to the correct choice.

(IV)

1. Lever	a specialized incline plane used to raise or lower things and to hold things together
2. Inclined Plane	a simple machine made of a rope or chain wrapped around a wheel
3. Wheel and Axle	two inclined planes joined together
4. Screw	a simple machine made of a stiff arm or arms that pivots or turns
5. Pulley	a simple machine with a slanted surface
6. Wedge	a machine made of a large wheel attached to a post

Needs scoring criteria

Performance Task – When the teacher calls your name, report to her for further instructions.

Name the machine provided and explain how it makes work easier.

1. _____ _____

2. _____ _____

3. _____ _____

Goal III

Note: Reproduce this form for each student to use with page 6.

Name _____

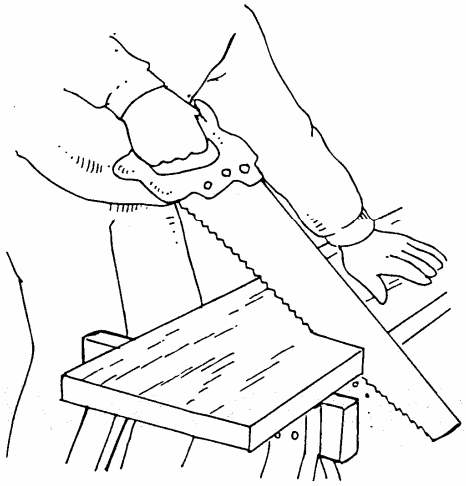
What Is Work?

Is this work?

Yes No

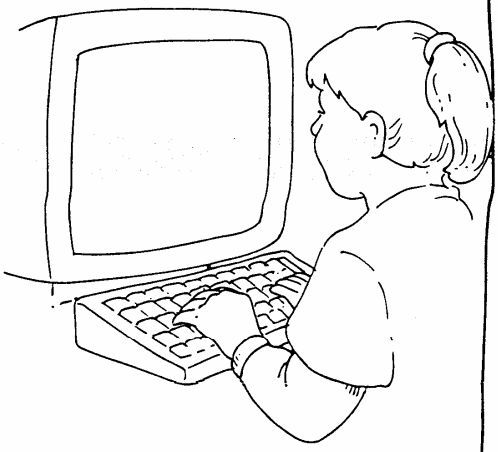
Is this work?

Yes No



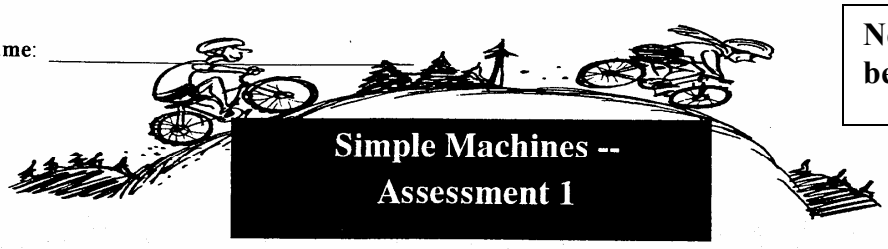
Is this work?

Yes No



I think that work is...

Name: _____



Needs to be labeled.

Simple Machines -- Assessment 1

Use the word list below to complete the following sentences. (5 points each).

Word List		
gravity	one object and another	friction
push or pull	shape or direction	

1. When we talk about work, force is the _____ or _____ of an object.
2. Force can make objects change _____ or _____.
3. A force that pulls objects toward the ground is called _____.
4. _____ is a force that can keep you from sliding off the sidewalk when you ride your bike.
5. Gravity is a pulling force between _____ _____ ____ _____.

Multiple Choice: Circle the correct answer. (5 points each)

1. We oil machinery because...
   a. we like greasy machines
   b. it is like feeding an animal, machines have to have it
   c. friction slows down moving parts and makes the wear out.
   d. none of the above

2. Work is done on an object when...
   a. you try very hard to move it.
   b. a force causes the object to move some distance
   c. you fix it
   d. none of the above

File: firsttest

Name: _____

3. Gravity causes...
   a. Birds to fly.
   b. Bugs to buzz.
   c. A beanbag to fall to earth after a toss in the air.
   d. None of the above.

True / False: Circle the correct answer. (5 points each)

T	F	1. There is only one kind of work.
T	F	2. In science work means pushing or pulling something.
T	F	3. To do work, you must use a force to make something move.
T	F	4. When you push hard against a door that does not open, you have performed scientific work.

Short Answer: Write your best answer the questions. (10 points each).

1. Beanbag toss. What causes the beanbag to fall?

   _____

2. What happens to the palms of your hands when you rub them together very quickly? _____

   What happens to the palms of your hands when rub them together quickly but you put lotion on them before?_____

   What force is at work here? _____

File: firsttest

Appendix B

Nice summary of formative assessments with samples on following pages. Each is labeled to show the corresponding goal.

	Formative AssessmentGoal 1 (Force)			Formative AssessmentGoal 2 (Gravity)	Formative AssessmentGoal 3 (Friction)	Mid Unit Assessments		Formative AssessmentGoal 4 (Simple Machines) rubrics			Culminating Activity			
	Task Cards	Worksheets	Writing	Sci Investigation Worksheet (rubric)	Sci Investigation Worksheet (rubric)	Poster Activity (rubric)	Mid Unit Assessment (Test)	What Is A Lever Worksheet (rubric)	Inclined Planes, Screws, Wedges (Journal) rubric	Pulleys, Wheels, Axles, & Gears (Project) rubric	Machines Celebration Day -- Centers Activities (rubric)			
Code	100 pts.	100 pts.	100 pts.	100 pts.	100 pts.	100 pts.	100 pts.	100 pts.	100 pts.	100 pts.	100 pts.	Sex	Characteristics	SES
A	90	83	65	85	80	100	79	70	66	100	100	F	Spc Ed Testing	low
B	90	75	65	80	75	100	64	70	44	100	100	F	Below Average	low
C	100	83	80	80	75	100	86	90	77	100	100	M	Average	low
D	100	100	90	100	100	100	93	100	89	100	100	M	Exceptional	middle
E	100	83	95	100	100	100	93	100	77	100	100	M	Exceptional	middle
F	100	83	80	100	100	100	93	90	89	100	100	F	Average	middle
G	100	100	65	100	100	100	86	100	66	100	100	M	Average	middle
H	100	100	100	100	90	100	93	100	100	100	100	F	Exceptional	upper
I	100	83	65	80	85	100	86	90	77	100	100	F	Speech	low
J	100	100	100	100	95	100	100	100	100	100	100	F	Exceptional	middle
K	100	92	100	100	100	100	93	100	100	100	100	F	Exceptional	upper
L	100	92	100	100	100	100	100	100	89	100	100	F	Exceptional	middle
M	100	100	95	100	95	100	93	90	89	100	100	M	Exceptional	upper
N	95	75	60	85	75	100	79	70	66	100	100	F	Special Reading	low
O	100	83	85	100	85	100	86	90	89	100	100	M	Average	low
P	100	83	95	100	90	100	93	90	44	100	100	M	Undiagnosed ADHD	middle
Q	100	92	100	100	95	100	93	90	100	100	100	F	Exceptional	middle
R	100	92	100	100	90	100	93	100	89	100	100	F	Average	middle
S	100	100	100	100	95	100	100	90	100	100	100	M	Exceptional	middle
T	90	67	60	80	70	100	79	70	66	100	100	M	Below Average	low
U	100	100	95	100	95	100	93	90	89	100	100	M	Exceptional	middle
V	100	100	95	90	100	100	100	90	89	100	100	F	Exceptional	middle
W	90	75	65	80	75	100	79	70	44	100	100	F	Below Average	low
X	100	92	80	100	95	100	93	90	77	100	100	M	Exceptional	middle

Nice reference to contextual factors.

Goal I:

Use the Task Card Activity as individual assessments over today's material. See rubric.

Name	Task	Force	What Moved?	Was Work Done?
	1	Push	Chair	Yes
	2	Push	Nothing	No
	3	Lifting	Crayon	Yes
	4	Walking	Student	Yes
	5	Kicking	Ball	Yes
	6	None	Nothing	No
	7	Hand pushing	Chalk	Yes
	8	None	Nothing	No
	9	Hand pushing	Pages	Yes
	10	Fingers pushing	Keys	Yes
	11	None	Nothing	No
	12	No force from rider	The car moves	The rider does not work; the car works.
	1	Push	Chair	Yes
	2	Push	Nothing	No
	3	Lifting	Crayon	Yes
	4	Walking	Student	Yes
	5	Kicking	Ball	Yes
	6	None	Nothing	No
	7	Hand pushing	Chalk	Yes
	8	None	Nothing	No
	9	Hand pushing	Pages	Yes
	10	Fingers pushing	Keys	Yes
	11	None	Nothing	No
	12	No force from rider	The car moves	The rider does not work; the car works.

Appendix B

Oops! Below 80 points	Getting There! 80 + points	Work Accomplished! 100 points
<20 points Student could not correctly identify the force	**20 points** Student correctly identified the force with prompting.	**25 points** Student correctly identified the force
<20 points Student could not correctly identify what moved.	**20 points** Student correctly identified what moved with prompting.	**25 points** Student correctly identified what moved.
<20 points Student could not correctly determine that work was or was not done.	**20 points** Student correctly determined that work was or was not done with prompting.	**25 points** Student correctly determined that work was or was not done.
<20 points Student does not demonstrate satisfactory understanding of force and work. Re-teach student/	**20 points** Student demonstrates some understanding of force and work with prompting.	**25 points** Student demonstrates an understanding of force and work.

Appendix B

Goal II:

Refers to assessment.

Complete the "Science Investigation Worksheet" and use as a formative assessment. See rubric for scoring.

Oops! **Below 80 points**	**Getting There!** **80 + points**	**Work Accomplished!** **100 points**
10 points Student did not understood that weight on the scale increased when holding the books without prompting.	**25 points** Student correctly observed with prompting that the reading of weight on the scale increased when holding the books.	**30 points** Student correctly observed that the reading of weight on the scale increased when holding the books.
10 points Student could not identify the force that caused the change in weight without prompting.	**25 points** Student correctly identified the force that caused the change in weight with prompting.	**30 points** Student correctly identified the force that caused the change in weight
0 points Student does not demonstrate a satisfactory understanding of gravity. Re-Teach.	**30 points** Student demonstrates somewhat of an understanding about gravity.	**40 points** Student demonstrates a satisfactory entry-level understanding of gravity.

Appendix B

Goal II:

(Formative assessment)
Complete the "Science Investigation Worksheet" and use as a formative assessment. See rubric for scoring.

Oops! **Below 80 points**	**Getting There!** **80 + points**	**Work Accomplished!** **100 points**
0 points Student did not understand the concept of friction. Re-teach.	**65 points** With some prompting, student correctly observed that smooth surfaces are easier to move objects across .	**70 points** Student correctly observed that smooth surfaces are easier to move objects across.
0 points Student did not answer question #1 correctly on supplementary worksheet.	**5 points** Student answered question #1 correctly on supplementary worksheet.	**5 points** Student answered question #1 on supplementary worksheet.
0 points Student did not answer question #2 correctly on supplementary worksheet.	**5 points** Student answered question #2 correctly on supplementary worksheet.	**5 points** Student answered question #2 on supplementary worksheet.
0 points Student did not answer question #3 correctly on supplementary worksheet.	**5 points** Student answered question #3 correctly on supplementary worksheet.	**5 points** Student answered question #3 on supplementary worksheet.

Appendix B

Goal II: Friction

1. Which of the surfaces was easiest to push the pencil eraser across?
    a. The desktop
    b. The carpet
    c. The sandpaper

2. What caused the other surfaces to be more difficult to push the pencil eraser across them?

_____

_____

3. Which of the surfaces was easiest to push the whiteboard eraser across?
    a. The desktop
    b. The carpet
    c. The sandpaper

d. What caused the other surfaces to be more difficult to push the pencil eraser across them?

_____

_____

Appendix B

5. Which of the surfaces was easiest to push the block of wood across?
    a. The desktop
    b. The carpet
    c. The sandpaper

6. What caused the other surfaces to be more difficult to push the pencil eraser across them?"

_____

_____

Goal I, II, III:

Assessment:
(Formative assessment)
Assess the posters created by the students according to the following rubric.

Oops!	Getting There!	Work Accomplished!
Students do not understand the term they are assigned as evidenced in their selection of pictures and drawings. Re-teach.	Students demonstrate somewhat of an understanding of the term they are assigned in that most pictures chosen define that term.	Students demonstrate an understanding of the term they are assigned by choosing pictures that define that term.

Appendix B

Goal IV:

(Formative assessment)
Complete What Is A Lever worksheet See the following rubric.

Oops! **Below 80 points**	**Getting There!** **80 + points**	**Work Accomplished!** **100 points**
0 points Student can not identify different types of levers. Re-teach.	**60 points** With some prompting, student correctly identified different types of levers.	**70 points** Student correctly identified different types of levers.
0 points Student does not understand how levers work and make our work easier. Re-teach.	**20 points** Student has somewhat of an understand about levers and can explain how they make work easier.	**30 points** Student was able to correctly explain how levers act as simple machines to help make our work easier.

Appendix B

Goal IV:

(Formative assessment)
Have students write a journal entry using their "***This is What I Learned About Simple Machines Today***" page about inclined planes, screws and wedges according to the following rubric.

Oops!	Getting There!	Mission Accomplished! 100 points
11-0 points Student explains the definition of one or fewer simple machines (inclined planes, screws and wedges).	**22 points** Student explains the definition of at least 2 simple machines (inclined planes, screws and wedges).	**34 points** Student explains the definition of inclined planes, screws and wedges.
11-0 points Student gives one example or fewer than 2 simple machines (inclined plane, a screw and a wedge).	**22 points** Student gives one example of at least 2 simple machines (inclined plane, a screw and a wedge).	**33 points** Student gives one example of an inclined plane, a screw and a wedge.
11-0 points Student explains how one or fewer examples make work easier.	**22 points** Student explains how at least 2 examples make work easier.	**33 points** Student explains how each example makes work easier.

Appendix B

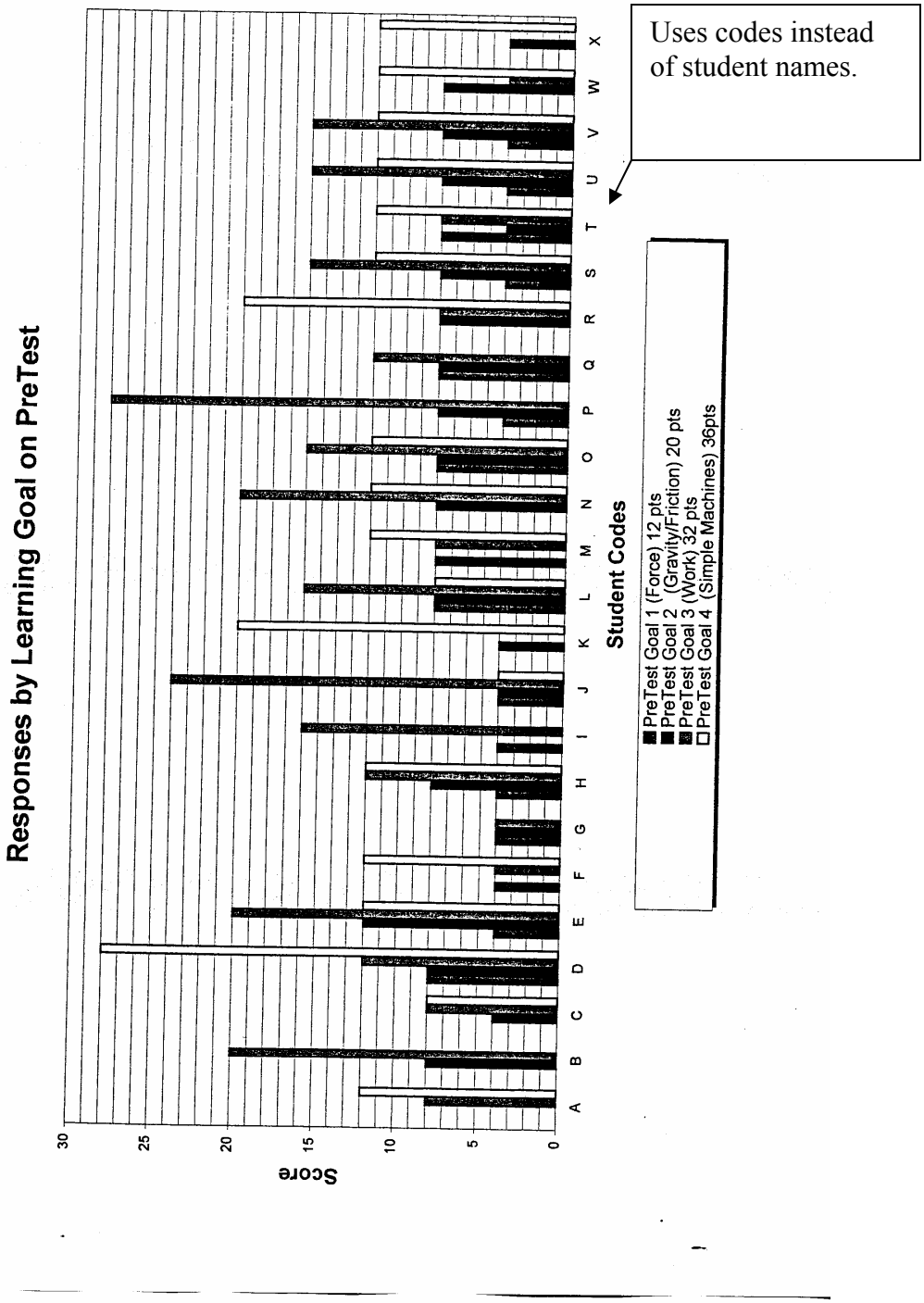
Goal IV:

(formative assessment)
Grade the gears made by each group according to the following rubric.

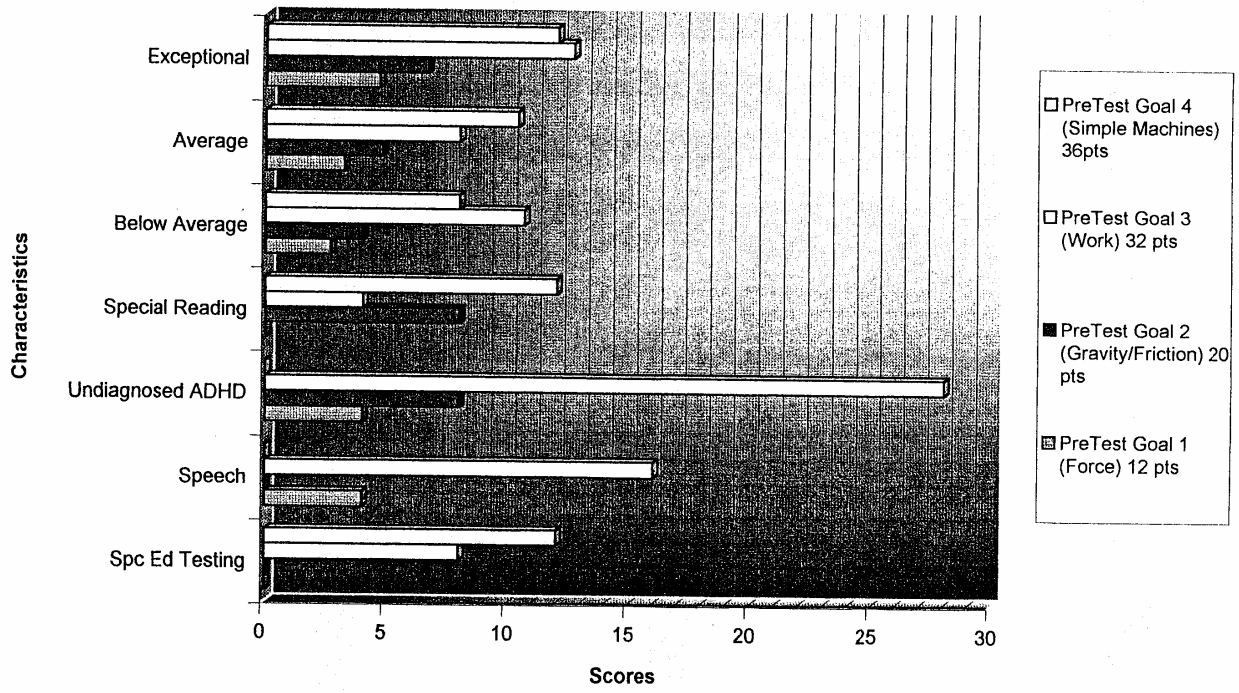
Oops!	**Mission Accomplished!** **100 points**	**Blast-off!!** **Exceeded Mission Expectations!** **125 points**
30 points Group has created less than two gears that work together when turned.	**50 points** Group has created at least two gears that work together when turned.	**75 points** Group has created more than two gears that work together when turned.
30 points Each group member does not have an entry as to his or her contribution to the project.	**50 points** Each group member has an entry as to his or her contribution to the project.	**50 points** Each group member has an entry as to his or her contribution to the project.

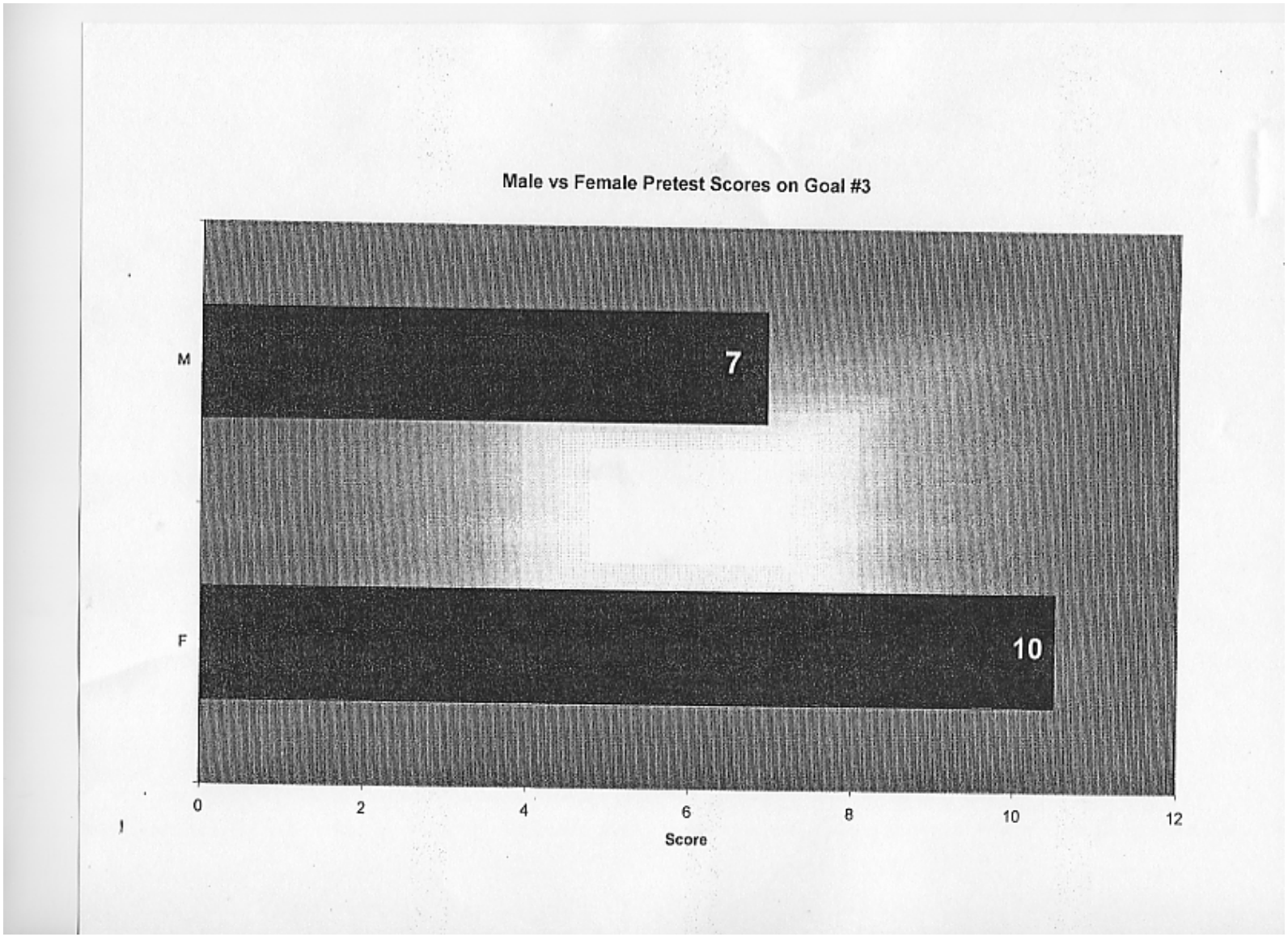
Appendix B

Appendix C


Responses by Learning Goal on PreTest
Score
0
5
10
15
20
25
30
A B C D E F G H I J K L M N O P Q R S T U V W X
Student Codes
PreTest Goal 1 (Force) 12 pts
PreTest Goal 2 (Gravity/Friction) 20 pts
PreTest Goal 3 (Work) 32 pts
PreTest Goal 4 (Simple Machines) 36pts
Uses codes instead of student names.

Correct Responses by Learning Goal by Student Characteristic (PreTest)



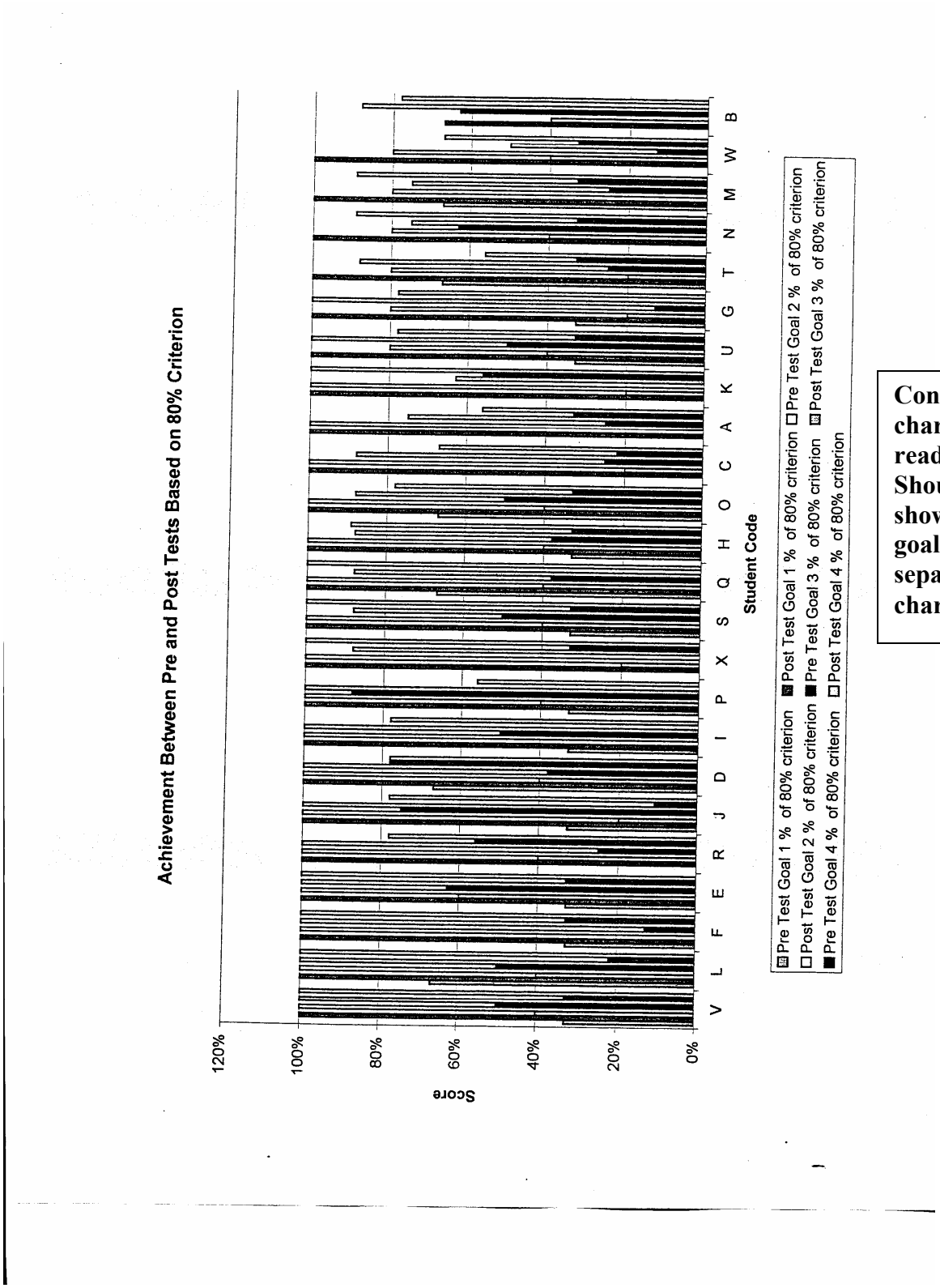

Male vs Female Pretest Scores on Goal #3
M
F
7
10
0
2
4
6
8
10
12
Score

Comparison of Pre and Post Test Scores for All Learning Goals

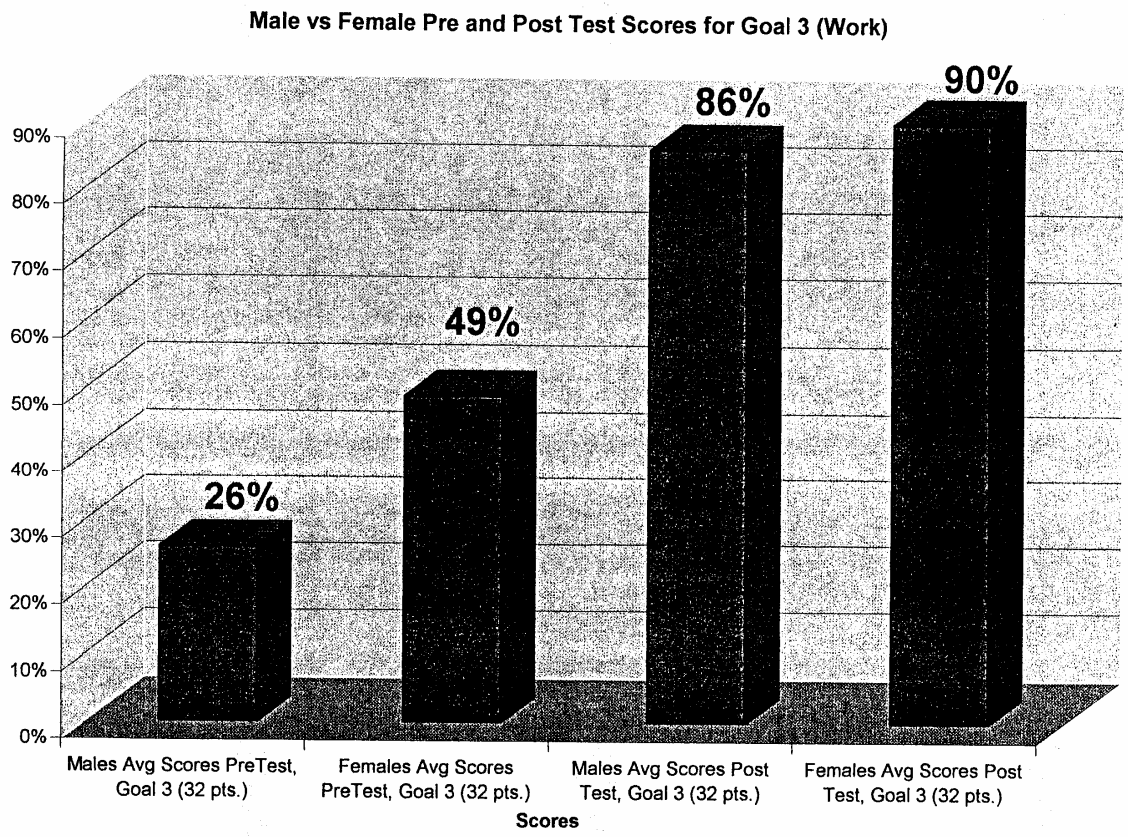
	Pre Test Goal 1	% of 80% criterion	Post Test Goal 1	% of 80% criterion	Pre Test Goal 2	% of 80% criterion	Post Test Goal 2	% of 80% criterion	Pre Test Goal 3	% of 80% criterion	Post Test Goal 3	% of 80% criterion	Pre Test Goal 4	% of 80% criterion	Post Test Goal 4	% of 80% criterion	Score on PreTest	Score on PostTest
	(Force)		(Force)		(Gravity/Friction)		(Gravity/Friction)		(Work)		(Work)		(Simple Machines)		(Simple Machines)		Criterion Base of 80% +	Criterion Base of 80% +
	12 pts		12 pts		20 pts		20 pts		32 pts		32 pts		36pts		36pts		100 pts	100 pts
V	4	33%	12	100%	8	40%	20	100%	16	50%	32	100%	12	33%	36	100%	40%	100%
L	8	67%	12	100%	8	40%	20	100%	16	50%	32	100%	8	22%	36	100%	40%	100%
F	4	33%	12	100%	0	0%	20	100%	4	13%	32	100%	12	33%	36	100%	20%	100%
E	4	33%	12	100%	12	60%	20	100%	20	63%	32	100%	12	33%	36	100%	48%	100%
X	0	0%	12	100%	4	20%	20	100%	0	0%	28	88%	12	33%	36	100%	16%	96%
S	4	33%	12	100%	8	40%	20	100%	16	50%	28	88%	12	33%	36	100%	40%	96%
Q	8	67%	12	100%	8	40%	20	100%	12	38%	28	88%	0	0%	36	100%	28%	96%
R	0	0%	12	100%	8	40%	20	100%	8	25%	32	100%	20	56%	28	78%	36%	92%
J	4	33%	12	100%	4	20%	20	100%	24	75%	32	100%	4	11%	28	78%	36%	92%
H	4	33%	12	100%	8	40%	20	100%	12	38%	28	88%	12	33%	32	89%	36%	92%
D	8	67%	12	100%	8	40%	20	100%	12	38%	32	100%	28	78%	28	78%	56%	92%
U	4	33%	12	100%	8	40%	16	80%	16	50%	32	100%	12	33%	28	78%	40%	88%
O	8	67%	12	100%	8	40%	20	100%	16	50%	28	88%	12	33%	28	78%	44%	88%
K	0	0%	12	100%	4	20%	20	100%	0	0%	20	63%	20	56%	36	100%	24%	88%
I	4	33%	12	100%	0	0%	20	100%	16	50%	28	88%	0	0%	28	78%	20%	88%
G	4	33%	12	100%	4	20%	16	80%	4	13%	32	100%	0	0%	28	78%	12%	88%
P	4	33%	12	100%	8	40%	20	100%	28	88%	32	100%	0	0%	20	56%	40%	84%
N	0	0%	12	100%	8	40%	16	80%	20	63%	24	75%	12	33%	32	89%	40%	84%
M	8	67%	12	100%	0	0%	16	80%	8	25%	24	75%	12	33%	32	89%	28%	84%
C	0	0%	12	100%	4	20%	20	100%	8	25%	28	88%	8	22%	24	67%	20%	84%
T	8	67%	12	100%	4	20%	16	80%	8	25%	28	88%	12	33%	20	56%	32%	76%
A	0	0%	12	100%	0	0%	20	100%	8	25%	24	75%	12	33%	20	56%	20%	76%
W	0	0%	12	100%	8	40%	16	80%	4	13%	16	50%	12	33%	24	67%	24%	68%
B	0	0%	8	67%	8	40%	0	0%	20	63%	28	88%	0	0%	28	78%	28%	64%

Good idea to show possible points.

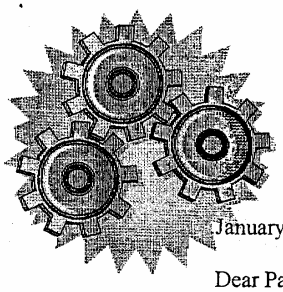
Shows number of students who met criterion.

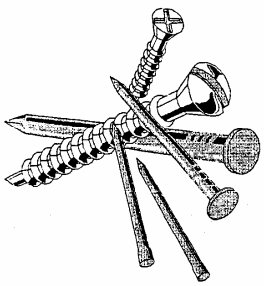


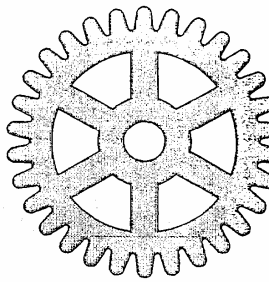
Confusing chart to read. Should show each goal on a separate chart.


Male vs Female Pre and Post Test Scores for Goal 3 (Work)
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
26%
49%
86%
90%
Males Avg Scores PreTest, Goal 3 (32 pts.)
Females Avg Scores PreTest, Goal 3 (32 pts.)
Males Avg Scores Post Test, Goal 3 (32 pts.)
Females Avg Scores Post Test, Goal 3 (32 pts.)
Scores

Appendix D



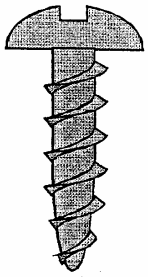


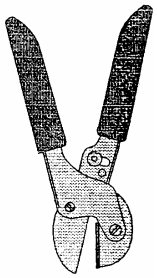


January 18, 2002

Dear Parents,

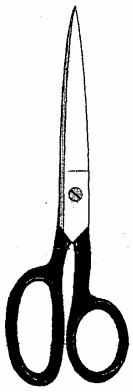
Beginning January 28, we will begin a new science unit on "Simple Machines." As part of our study, we will be asking each student to create a simple machine of his or her choice. This model should be made at home and brought to school for our Machine Celebration Day to be held at the conclusion of this unit, tentatively scheduled for Monday, February 11, 2002. Attached are examples of the machines we will be studying during this unit, which may offer some ideas for models you and your child may want to create on this project.

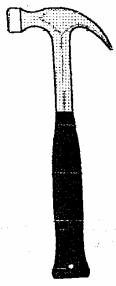




On Machine Celebration Day we will invite other classes in to our classroom to visit our machines centers and discuss with the students the models they created at home. It is not necessary that students create a complicated model, rather it is more important that they understand the model they create and can explain it to others.

In addition, students will work together in cooperative workgroups to create a center based on one simple machine or concept. During their study, students will rotate through the various centers created by their classmates so that they can actually handle or experience the simple machine concept addressed in each center. The list of supplies we need to make available to the students for the creation of their centers is also attached.





I hope you and your child will be able to participate in this exciting unit of study and anything you can offer in way of assistance, supplies or refreshments on our Machine Celebration Day, will be greatly appreciated.

Please call us if you have any questions.

Sincerely,

Ms. [redacted] Ms. [redacted]

Ms. [redacted] Ms. [redacted]