Standard 4—Science

Intermediate

Physical Setting

Student Work Sample

Context

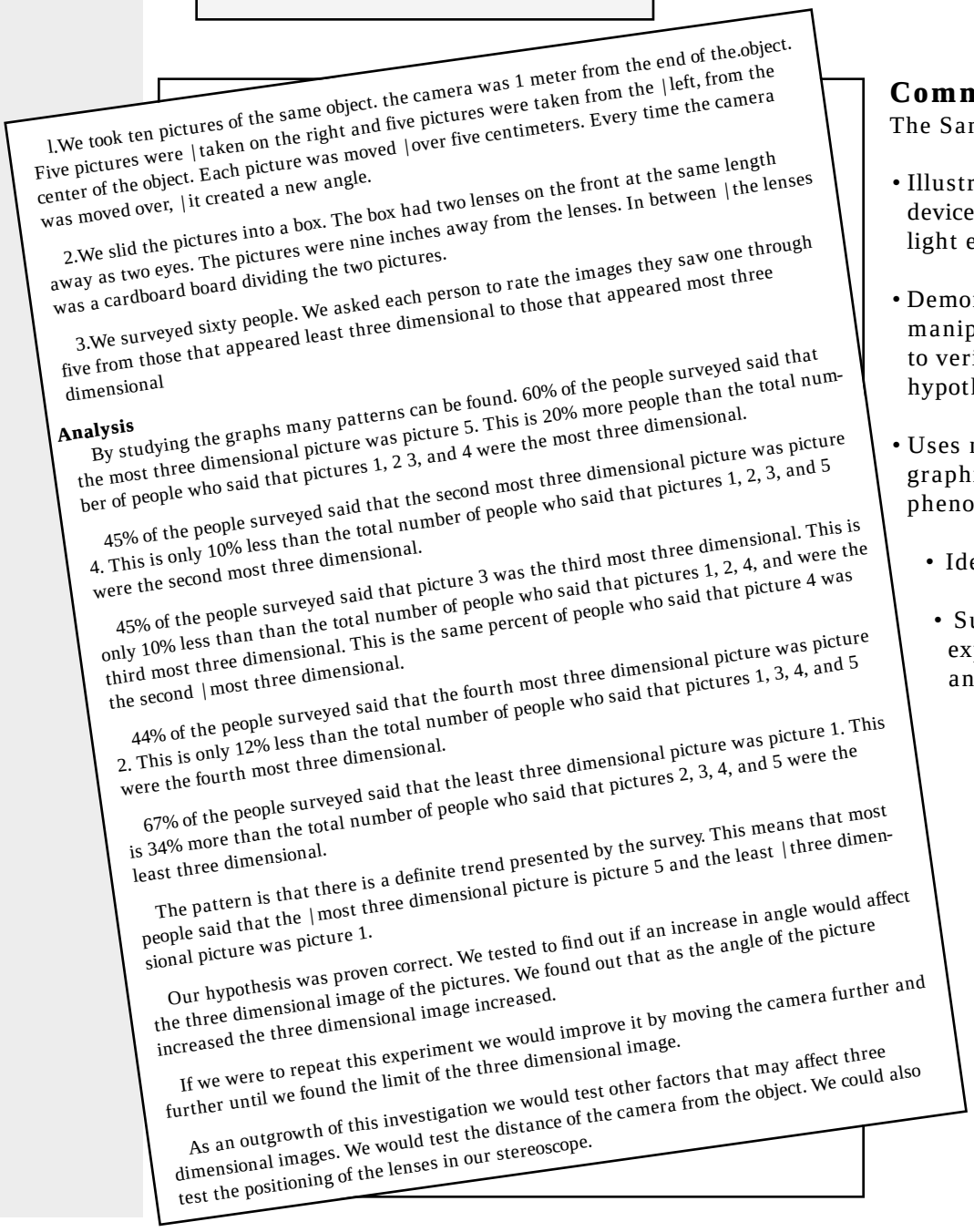
Eighth grade students investigated the phenomena of three-dimensional photography. They researched the stereoscope then attempted to duplicate the method of producing 3-D photos. Subsequently, they surveyed a group to determine which photos appeared the most three-dimensional.

Performance Indicators

Students can:

. . .describe the sources and identify the transformations of energy observed in everyday life.

. . . observe and describe the properties of sound, light, magnetism, and electricity.



l.We took ten pictures of the same object. the camera was 1 meter from the end of the.object. Five pictures were |taken on the right and five pictures were taken from the |left, from the center of the object. Each picture was moved |over five centimeters. Every time the camera was moved over, |it created a new angle.

2.We slid the pictures into a box. The box had two lenses on the front at the same length away as two eyes. The pictures were nine inches away from the lenses. In between |the lenses was a cardboard board dividing the two pictures.

3.We surveyed sixty people. We asked each person to rate the images they saw one through five from those that appeared least three dimensional to those that appeared most three dimensional

Analysis

By studying the graphs many patterns can be found. 60% of the people surveyed said that the most three dimensional picture was picture 5. This is 20% more people than the total number of people who said that pictures 1, 2 3, and 4 were the most three dimensional.

45% of the people surveyed said that the second most three dimensional picture was picture 4. This is only 10% less than the total number of people who said that pictures 1, 2, 3, and 5 were the second most three dimensional.

45% of the people surveyed said that picture 3 was the third most three dimensional. This is only 10% less than than the total number of people who said that pictures 1, 2, 4, and were the third most three dimensional. This is the same percent of people who said that picture 4 was the second |most three dimensional.

44% of the people surveyed said that the fourth most three dimensional picture was picture 2. This is only 12% less than the total number of people who said that pictures 1, 3, 4, and 5 were the fourth most three dimensional.

67% of the people surveyed said that the least three dimensional picture was picture 1. This is 34% more than the total number of people who said that pictures 2, 3, 4, and 5 were the least three dimensional.

The pattern is that there is a definite trend presented by the survey. This means that most people said that the |most three dimensional picture is picture 5 and the least |three dimensional picture was picture 1.

Our hypothesis was proven correct. We tested to find out if an increase in angle would affect the three dimensional image of the pictures. We found out that as the angle of the picture increased the three dimensional image increased.

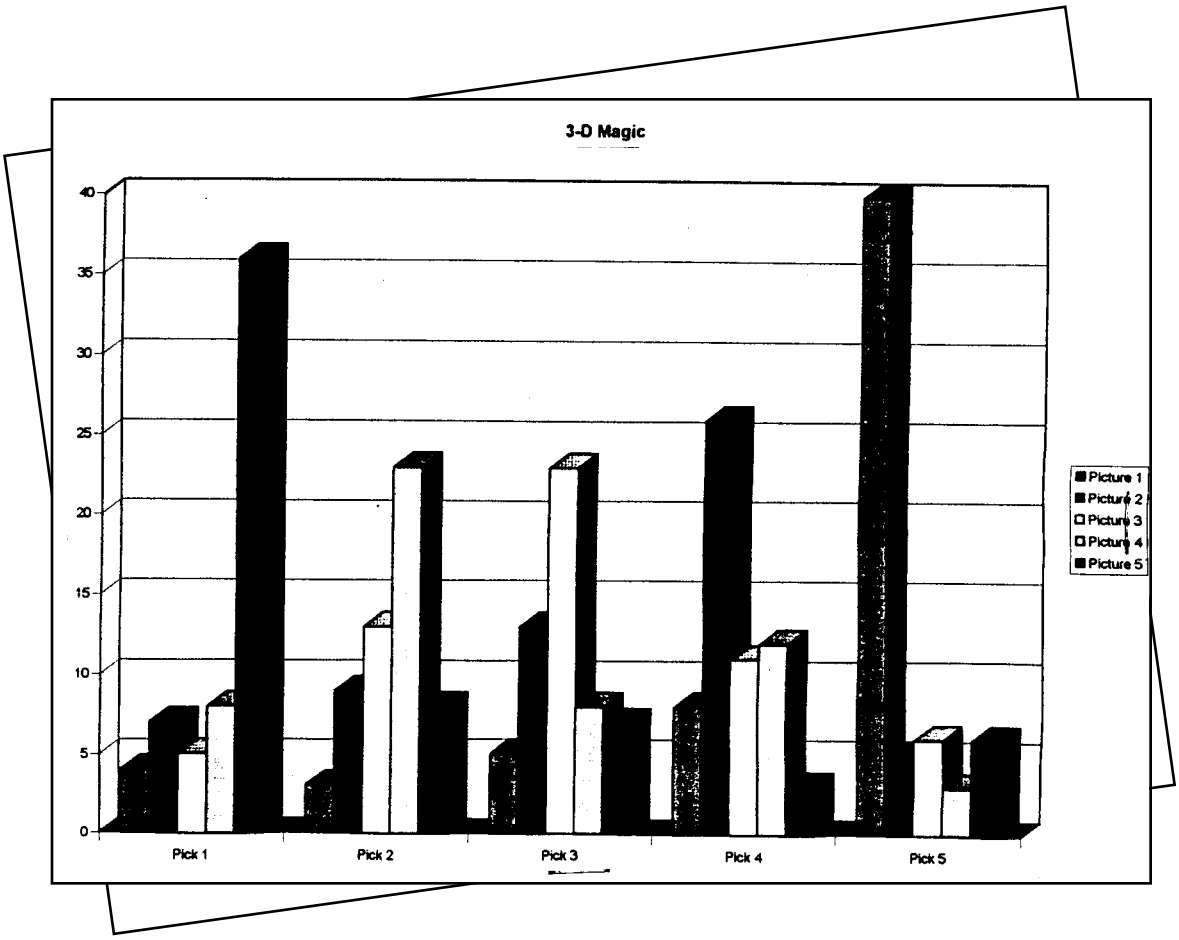
If we were to repeat this experiment we would improve it by moving the camera further and further until we found the limit of the three dimensional image.

As an outgrowth of this investigation we would test other factors that may affect three dimensional images. We would test the distance of the camera from the object. We could also test the positioning of the lenses in our stereoscope.

Commentary

The Sample:

- Illustrates the use of devices which transform light energy.
- Demonstrates the manipulation of variables to verify or refute a hypothesis.
- Uses numbers and graphics to describe phenomena.
  - Identifies patterns.
  - Suggests further experimentation and analysis.


3-D Magic
40
35
30
25
20
15
10
5
0
Pick 1
Pick 2
Pick 3
Pick 4
Pick 5
Picture 1
Picture 2
Picture 3
Picture 4
Picture 5

Standard 4—Science

Commencement

Physical Setting

Student Work Sample

Context

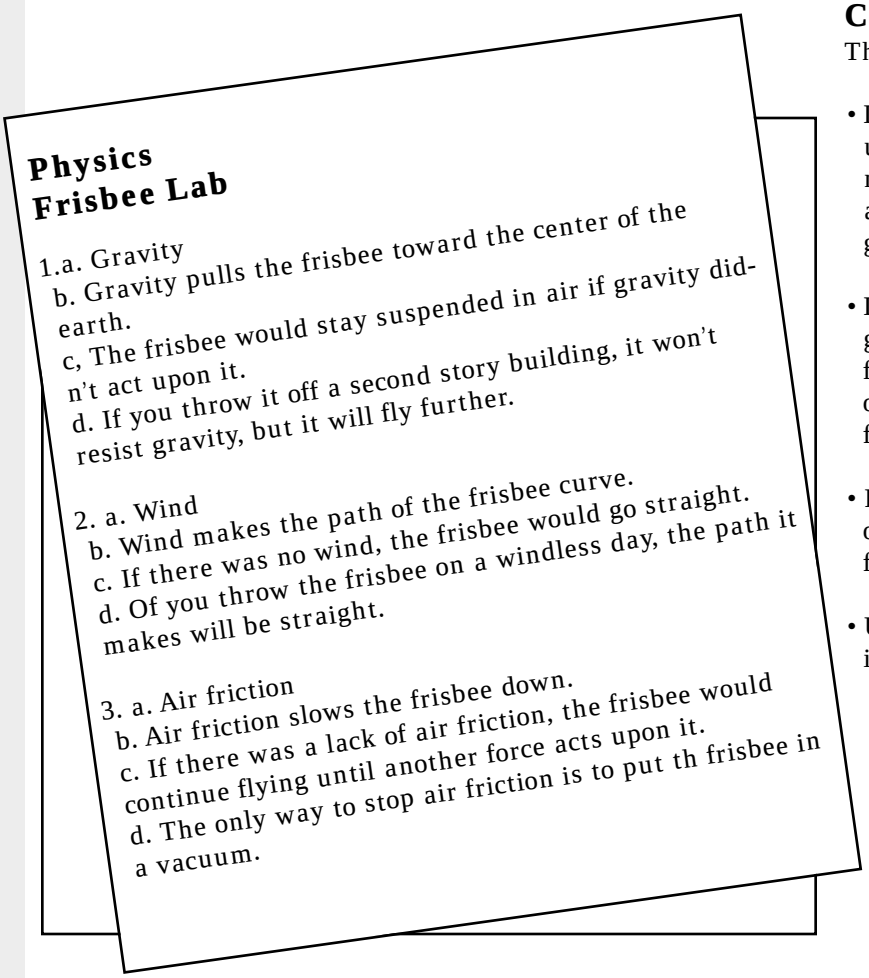
High school students become involved in problem solving in this physics lab. By throwing a frisbee they are able to make and verify predictions about momentum, air friction, gravity and lift as related to distance traveled by the toy.

Performance Indicators

Students can:

. . . observe, describe, and compare the effects of forces, such as gravity . . . on the motion of objects.

. . . explain and predict different patterns of motion of objects.



Physics
Frisbee Lab

1.a. Gravity
b. Gravity pulls the frisbee toward the center of the earth.
c, The frisbee would stay suspended in air if gravity didn't act upon it.
d. If you throw it off a second story building, it won't resist gravity, but it will fly further.

2. a. Wind
b. Wind makes the path of the frisbee curve.
c. If there was no wind, the frisbee would go straight.
d. Of you throw the frisbee on a windless day, the path it makes will be straight.

3. a. Air friction
b. Air friction slows the frisbee down.
c. If there was a lack of air friction, the frisbee would continue flying until another force acts upon it.
d. The only way to stop air friction is to put th frisbee in a vacuum.

Commentary

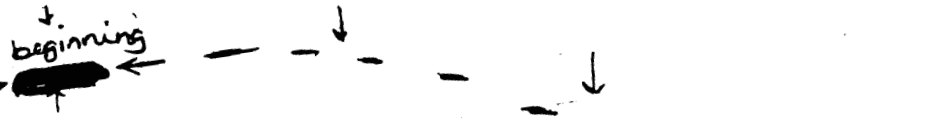
The Sample:

- Demonstrates an understanding that moving objects behave according to certain general principles.
- Describes the effect of gravity, wind, and air friction on the path of an object, in this case, a frisbee.
- Predicts the effect of lack of gravity, wind, and air friction.
- Uses drawings to illustrate phenomena.

Kelly Carnes

Diagrams for lab

1. e.



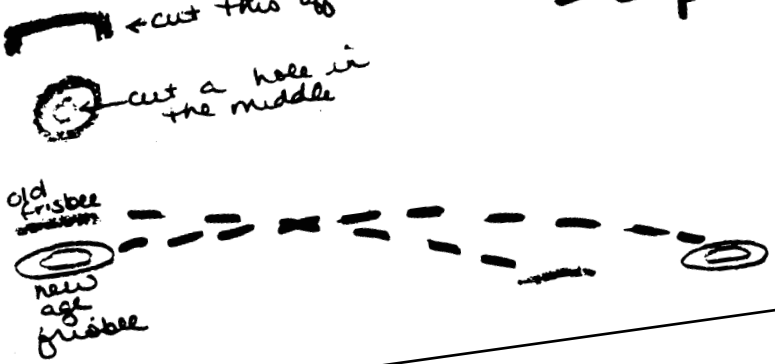
* gravity pulls the frisbee down

2. e

* wind pushes the frisbee to either the left or rig

* If gravity existed also, the frisbee would fall to the ground.

4e.



= path of old
= path of new

Standard 4—Science

Elementary

The Living Environment

Student Work Sample

Context

Fifth-grade students studied the characteristics of spiders and insects, noting their similarities and differences. They constructed imaginary spiders and used a variety of methods to simulate spiders in an effort to better understand what spiders' lives are like. The students learned how to spin their own webs and taught the second graders to do the same. By making a classroom sized web of clothesline and string, the students discovered that they needed to plan their construction and work together with their classmates. Ultimately, the students constructed models of insect prey and "ate" like a spider.

Performance Indicators

Students can:

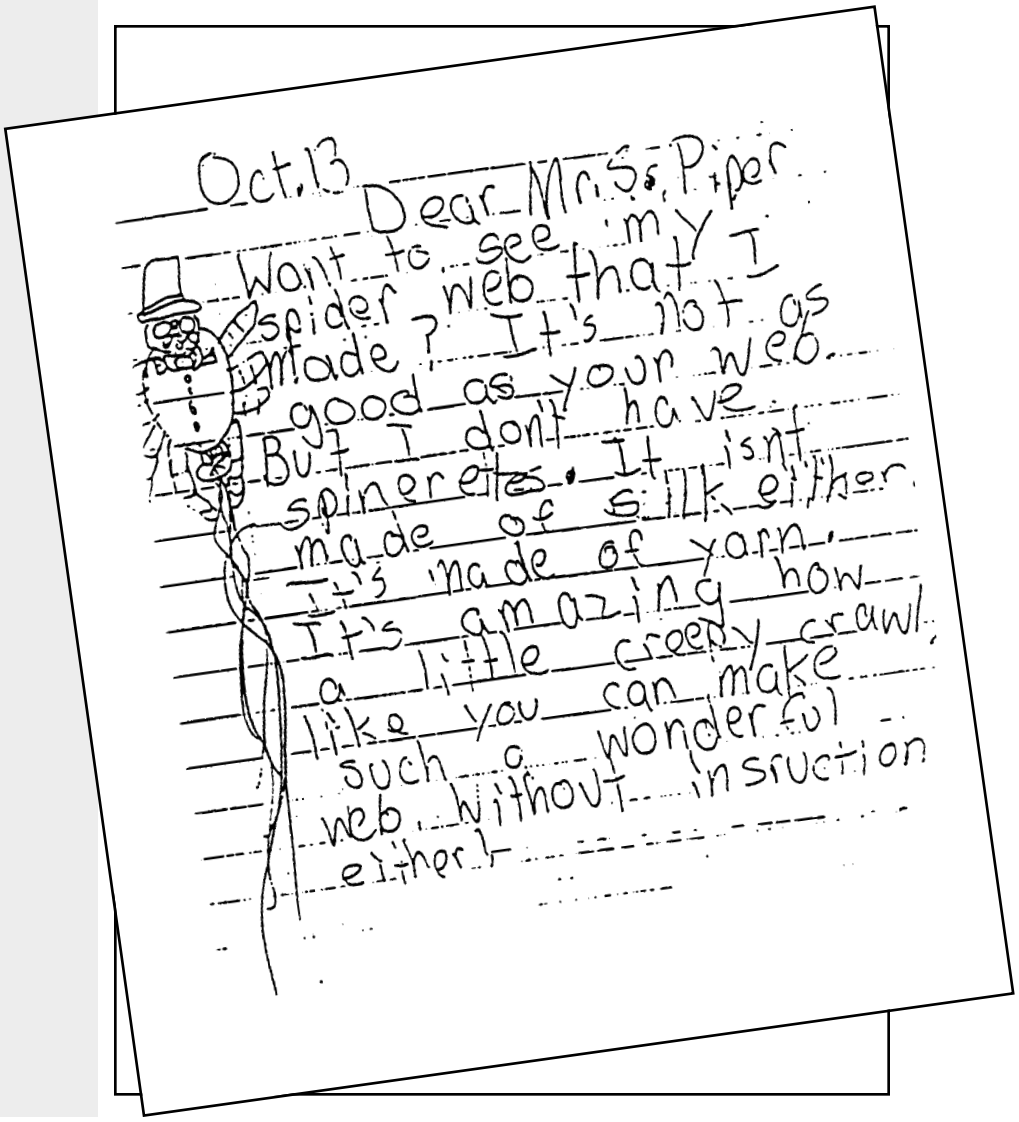
. . . describe basic life functions of common living specimens.

. . . describe some of the survival behaviors of common living specimens.

Commentary

The Sample:

- Demonstrates an understanding of the characteristics unique to spiders.
- Shows a graphic representation of the spider.
- Shows respect and appreciation for the organism.



Standard 4—Science

Intermediate

The Living Environment

Student Work Sample

Context

This middle school science project was conducted to test the hypothesis that, ". . . irradiation will increase the rate of germination and increase the height of the plants . . .".

Performance Indicators

Students can:

. . . recognize that traits of living things are both inherited and acquired . . . .

. . . describe sources of variation in organisms and their structures and relate the variations to survival.

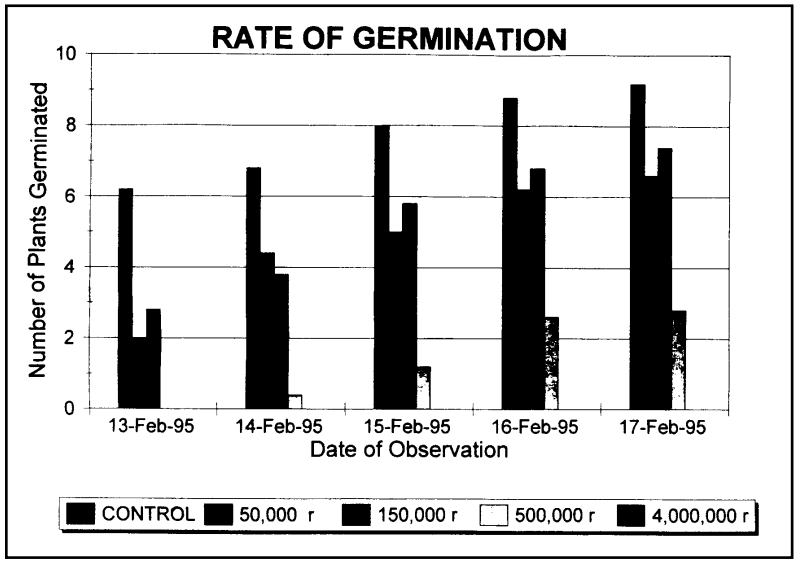
In order to test our hypothesis, we ordered ordinary radish seeds as the control and, as the variable, seeds irradiated with four different measurements: 4,000,000r, 500,000r, 150,000r, 50,000r. We planted five pots of each kind, with ten seeds in each pot. They were watered every other day with ninety milliliters of water and covered with saran wrap. Each day, we recorded the number of seeds germinated, then graphed the results. The heights were measured six days after they were planted.

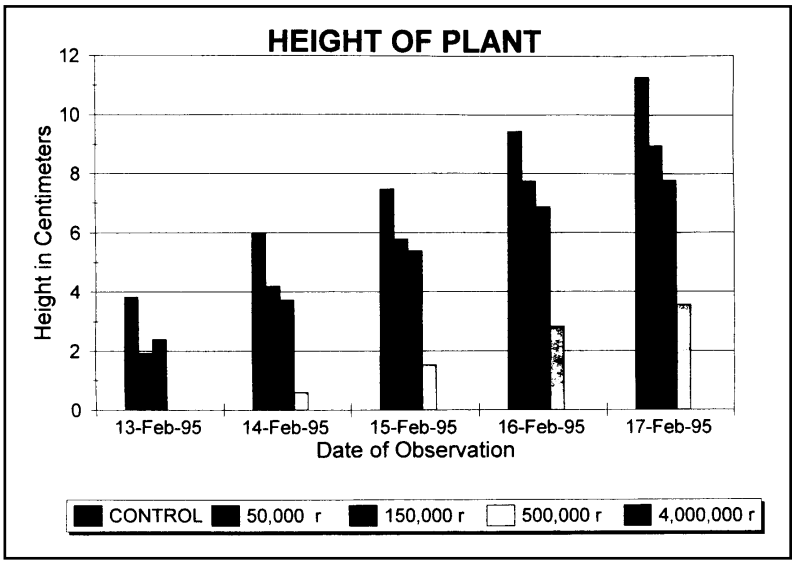
Our hypothesis was proven incorrect. Irradiation worsened the growth of the plants. This experiment disproves the theory that the reason for the incredible growth of the seeds in "Jack and the Beanstalk" was that they were irradiated. Irradiation could not have increased the height of the beanstalk. The hypothesis to test next would be that ordinary radish seeds would germinate quicker than irradiated seeds and the ordinary plants would grow taller and healthier than those irradiated. In order to improve upon this experiment, we would plant the seeds in larger pots so as to give the plants more room to grow. In addition, we could observe the plants over a longer period of time. Future investigations we could do as an outgrowth of this one, are testing the effect of irradiation on different types of seeds and testing irradiation's effect on the fruit of the seeds.

Commentary

The Sample:

- States the hypothesis.
- Describes the preparation of seeds to encourage germination including the irradiated ones.
- Identifies manipulated and held constant variables.
- Describes experimental procedure.
- Represents plant growth and germination using computer generated graphics.
- Concludes that the hypothesis was flawed as evidenced by the charted data.
- Could be improved by presenting an explanation for the results, or plans to seek explanatory information.
- Identifies areas for further research.


RATE OF GERMINATION
Number of Plants Germinated
0
2
4
6
8
10
13-Feb-95
14-Feb-95
15-Feb-95
16-Feb-95
17-Feb-95
Date of Observation
CONTROL
50,000 r
150,000 r
500,000 r
4,000,000 r


HEIGHT OF PLANT
Height in Centimeters
0
2
4
6
8
10
12
13-Feb-95
14-Feb-95
15-Feb-95
16-Feb-95
17-Feb-95
Date of Observation
CONTROL
50,000 r
150,000 r
500,000 r
4,000,000 r