

Sample Student Work for “Analyzing Data for Dr. Angus”

The following samples show work from students who used the same data as on the activity sheet ‘Analyzing Data for Dr. Angus.’ However, in these samples, the students identify the four measurement points differently. Although these students were working with the same measured heights as in ‘Analyzing Data for Dr. Angus,’ they consistently label them as the heights for day 0, day 7, day 14, and day 21, instead of for day 7, day 14, day 21, and day 28, respectively.

The labeling in the samples of work is thus less appropriate and less meaningful than the labeling in the text, since the seedlings were measured at seven-day intervals, and a seedling on day 0 would have no height. It is important to keep the different labeling systems in mind in evaluating these samples of student work and comparing them with other students’ work on the activity.

Group 1

The students in group 1 recognized the need to extend the data set, and they then evaluated their conclusion. Their letter to Dr. Angus and supporting tables follow:

These students extrapolated the data—that is, they extended the shade data by estimating what the next measurement would be. However, they did not communicate how they decided on the numbers that they used for the extension. Once they made the extension, they were able to analyze the averages for the data from day 21 (corresponding to the data for day 28 on the activity page). Thus, they were able to use “all the data,” as the problem required.

Continuing their high-level work, the students then checked their conclusion by finding and comparing the average heights of plants for day 14 (corresponding to day 21 on the activity page). This procedure was a simple yet ingenious way to check their result with numbers that came from actual data. This step illustrates the ability of students to assess their own methods as they solve a problem of this complexity.

The students did not write out a procedure that they could use in a similar situation.

Sample Student Work for "Analyzing Data for Dr. Angus" (continued)

Dear Dr. Angus,

We did some analyzing about where sequoia trees grow best in sun or in the shade. First we rewrote the graphs that showed the height from day 0 - day 21, but only one group had day 21 so we predicted what the heights might be on day 21 in the shade, since that group did not have day 21 recorded. Then we compared day 21 in sunlight and in shade by averaging.

Our Averaging Conclusion

Sunlight - Day 21	Shade - Day 21
2.04	2.41

With what the averaging conclusion says, shade is better.

Since we averaged data that could possibly be right, we wanted to average real data that we knew was right.

Knowing that day 14 sets of data were actually real data, we decided analyze them. We got the same results.

Sunlight - Day 14	Shade - Day 14
1.73	2.06

Our final conclusion:

SHADE

is better for sequoia trees to grow.

Group 1

Sample Student Work for "Analyzing Data for Dr. Angus" (continued)

8.4 - Day 2
192.4

Shade

Trees	Day 0	Day 7	Day 14	Day 21
1	1.5	1.7	1.8	2
2	1.6	2	2.1	2.3
3	1.8	2	2.3	2.7
4	1.6	1.8	1.9	1.9
5	1.6	2	2	2.4
6	1.1	2.3	2.3	2.6
7	1	1.5	2.3	3
8	1.5	1.9	2.1	2.3
9	1.2	1.5	1.9	2.4
10	1.4	1.6	2	2.3

↑ predicted
day 19

2.4 - Day 2
192.4

Sunlight

tree	day 0	day 7	day 14	day 21
1	1.7	1.8	1.9	2
2	1.6	1.7	1.9	2.3
3	1.5	1.6	1.8	2.1
4	1.2	1.3	1.5	1.8
5	0.9	1.6	1.6	1.9
6	0.9	1.6	1.8	1.9
7	1.4	1.5	1.7	2
8	1.2	1.6	1.8	2.2
9	1	1.4	1.5	1.9
10	1.4	1.5	1.8	2.2

Group 1

Sample Student Work for "Analyzing Data for Dr. Angus" (continued)

Group 2

The students in group 2 examined and interpreted trends in the data by using line graphs to represent information. One student's letter to Dr. Angus and line graphs follow:

The student deleted important data; she stopped at day 14 (corresponding to day 21 in the activity) rather than extending the data set. Nevertheless, she was very clear in communicating how she interpreted the trends in her data. In addition, she noticed that the slopes of the line segments in the graphs represent growth as a rate (centimeters per week).

She did not write a procedure that she could use with similar data sets.

Sample Student Work for "Analyzing Data for Dr. Angus" (continued)

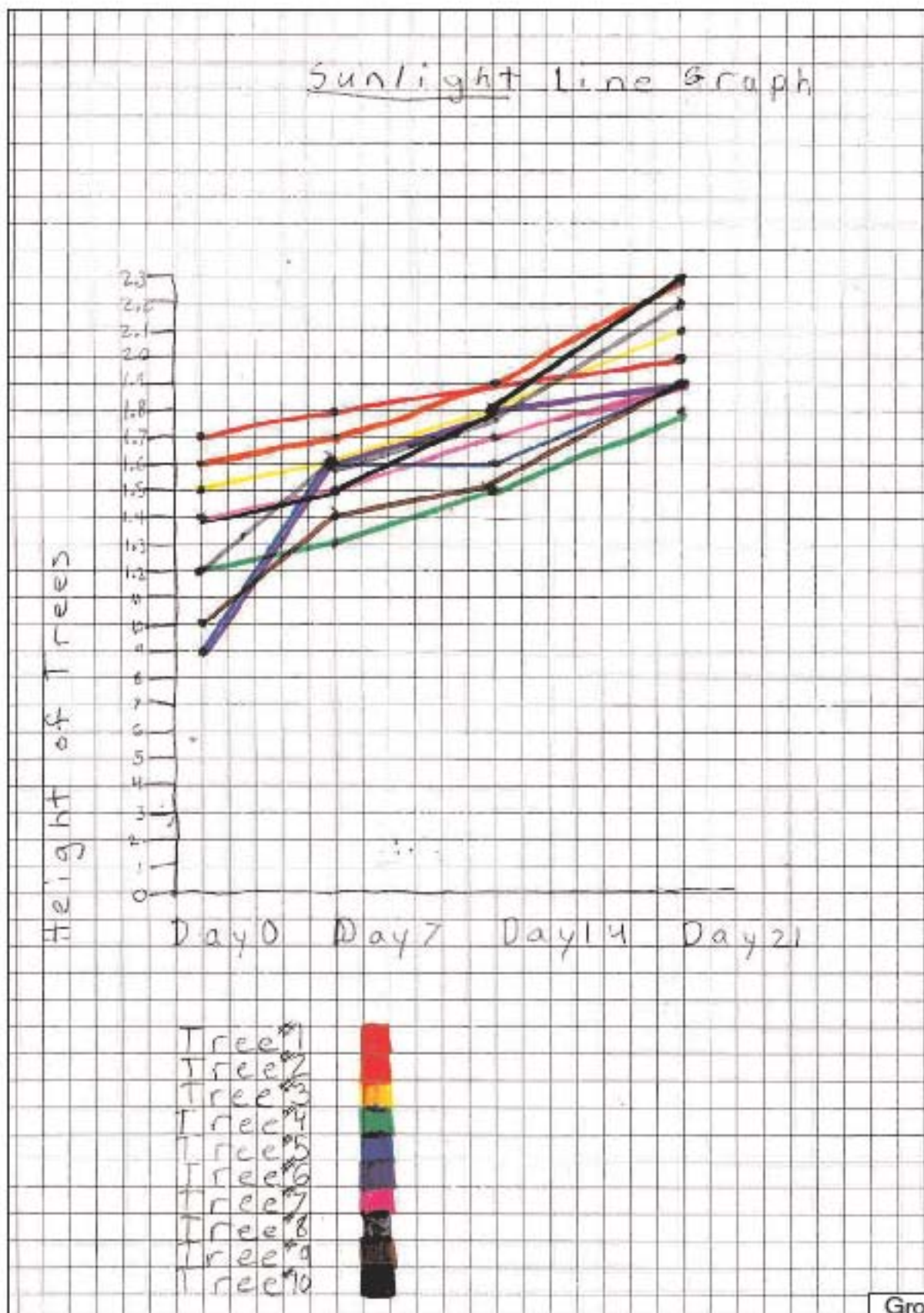
Dear Dr. Angus,

I have made a line graph of days 0-21 in sunlight, and I made a line graph of days 0-14 in shade. I am seeing how much the trees grow over time on my line graphs, and it is very impressive to see some of the differences of the trees in sunlight and shade. I think the trees in the shade grew a lot faster than the trees in the sunlight, for example tree six in shade went from 1.1 to 2.3 and then 2.3 again, and it grew a whole lot between 1.1 and 2.3 that's the most any of the trees have grown. So the tree that grew the most was one in the shade, that's why I think shade is growing the fastest.

Sincerely,

Group 2

Sample Student Work for "Analyzing Data for Dr. Angus" (continued)



Group 2

Sample Student Work for "Analyzing Data for Dr. Angus" (continued)



Sample Student Work for "Analyzing Data for Dr. Angus" (continued)

Group 3

The students in group 3 used mean and range (that is, the differences between data points) to draw conclusions. Their letter and table follow:

The use that these students made of range is particularly interesting because each difference represents change over a unit of time—a remarkable first use of rate by fourth graders! By taking their thinking a step farther, the students could have used rates to extrapolate the missing data. They could have used an average of the rates in one period of time to predict the growth of each seedling over the next period of time.

In their letter to Dr. Angus, the students in group 3 succeeded in communicating how their analysis of the data supports their conclusions. It is worth noting that they applied the term graph to a data table (the students in group 1 did this also). In early encounters with statistics, students usually need reinforcement in using the correct terminology for different representations. Be sure to use the standard terms consistently, and ask your students to tell you the meanings of the terms as different groups make their presentations in your classroom.

Sample Student Work for "Analyzing Data for Dr. Angus" (continued)

Dear Dr. Angus,

Our group has done research on the data you have given us and the results are that in the far red light, squoias grow faster. We have done a big analysis of the data you gave us and found that in the far red light the squoia trees expanded in height and width more rapidly. So we discovered that in the white light the range of growth the numbers were smaller and the differences were smaller between the numbers. According to the data on this graph we made. We think you should use the far red light for squoia in a green house. Graph enclosed.

Sincerely

Group 3

Sample Student Work for "Analyzing Data for Dr. Angus" (continued)

Dunelight		Hacker	
Day 6	Day 7	Day 8	Day 9
1.8	1.5	2.3	1.8
1.7	1.6	2.1	2.1
1.6	1.8	1.8	1.8
1.3	1.6	1.9	2.1
1.6	1.6	2	2.3
1.6	1.1	2.3	2.3
1.5	1.1	1.5	2.1
1.6	1.5	1.9	1.9
1.5	1.2	2.3	1.9
1.4	1.4	1.6	2
1.5			
<u>range</u>	<u>range</u>	<u>range</u>	<u>range</u>
0.8	0.4	0.5	0.8
<u>mean</u>	<u>mean</u>	<u>mean</u>	<u>mean</u>
1.28	1.68	1.94	1.68
	1.56	1.94	1.43

Group 3