

Quick Start

Presenting a Science Report with Numbers

Numbers, part of iWork '08, is an innovative spreadsheet application that provides easy-to-use tools for calculating, analyzing, organizing, and presenting data. It also integrates well with iLife applications such as iPhoto, as well as with the other iWork applications Keynote and Pages. Numbers includes a variety of customizable Apple-designed templates, such as a grade book, a team organizer, and an event planner.

In this activity, you'll use the Numbers science lab template to present data from a class experiment concerning the effects of light on corn plant growth.

Numbers in the Classroom

There are numerous possibilities for the integration and utilization of Numbers in education. It offers many flexible options for students and teachers who are working with data that can be represented in tables with columns and rows and in charts and graphs. Pictures, video clips, and audio files can be added to Numbers documents for presentation purposes, experiment documentation, explanation of the process and results, and more. Numbers is well suited for many types of student projects and also for creating budgets, class rosters, and grade books. In addition, using Numbers with your students will teach them ways to analyze and organize research data that will better prepare them for college and the workplace.

The example lesson used in this activity is part of a simulated scientific study conducted on the effects of light on corn plant growth. Students would conduct an experiment over a period of 16 weeks. During that time, they would observe and measure the effects of different amounts of light on plant growth rates. They would then enter, analyze, and present their data in Numbers.

Goals

In this activity, you will:

- Modify a Numbers template
- Create a summary sheet with collected data
- Format text in a Numbers file
- Add photographs to a Numbers file

What You Will Need

You will need to download the Numbers_Assets folder that includes an image file (Corn_Growth_Stages.jpg) and a Pages text file (Numbers_Data.pages) that you will use in this activity.

Software needed:

- Numbers
- Pages

Time

This activity will take approximately 45 minutes to complete.

Opening Numbers

- 1 Open Numbers by clicking its icon in the Dock or by double-clicking the Numbers icon in the Applications folder.

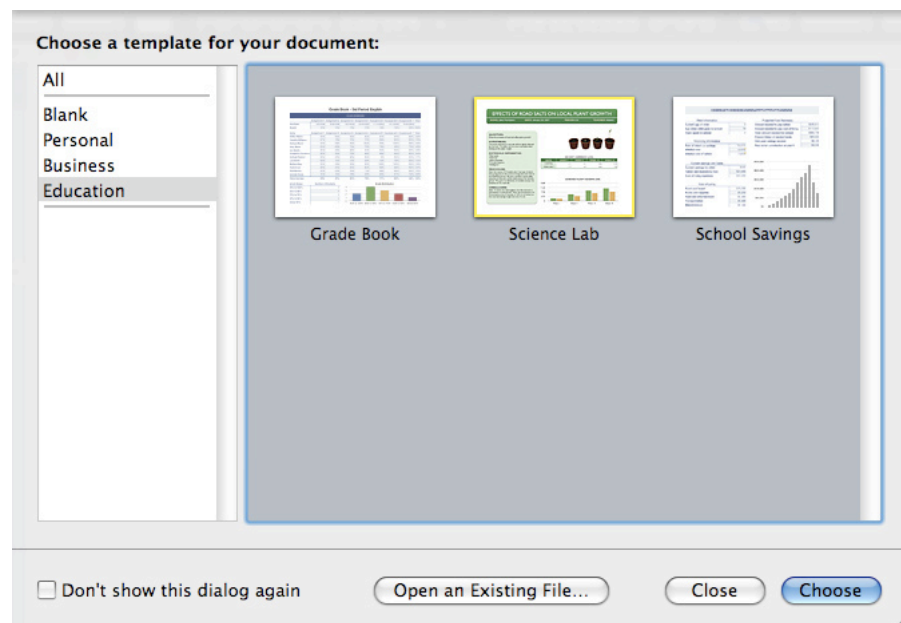


The Template Chooser window appears.

Templates are pre-formatted to help you build spreadsheets more quickly. You can use them just as they are or modify them to suit your specific needs. The Template Chooser window displays the available templates, which are organized into several categories including Personal, Business, and Education.

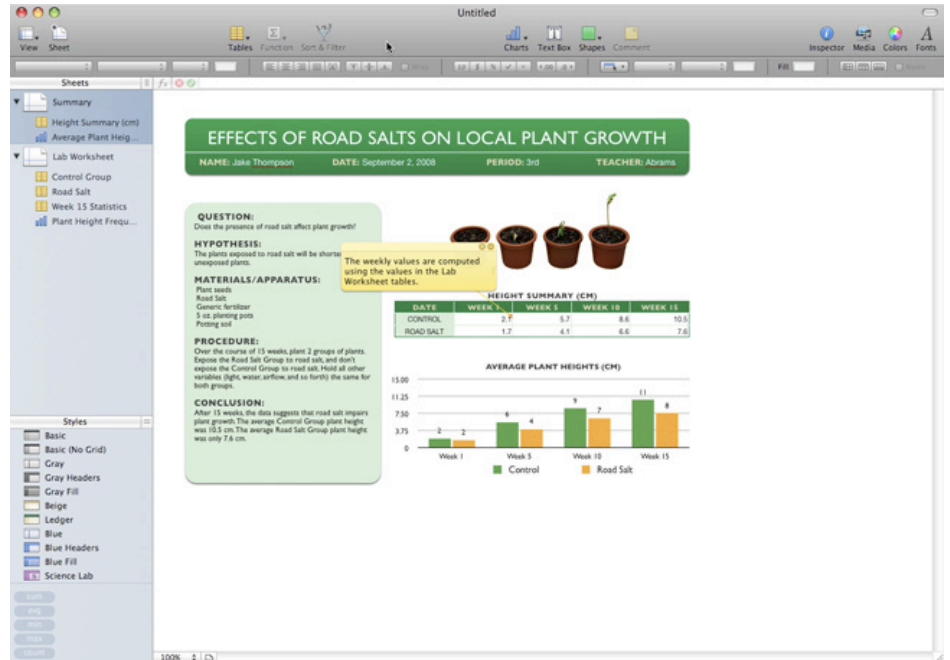
- 2 In the list at the left of the Template Chooser window, click Education.

The Education templates appear in the Template Chooser window.



- Click the Science Lab template, which becomes outlined in yellow, then click Choose.

A pre-formatted Science Lab spreadsheet opens. In the Sheets pane on the left, Summary is selected, indicating that you are about to work on your first sheet. (A Numbers spreadsheet can include several sheets and each sheet can have many tables.)



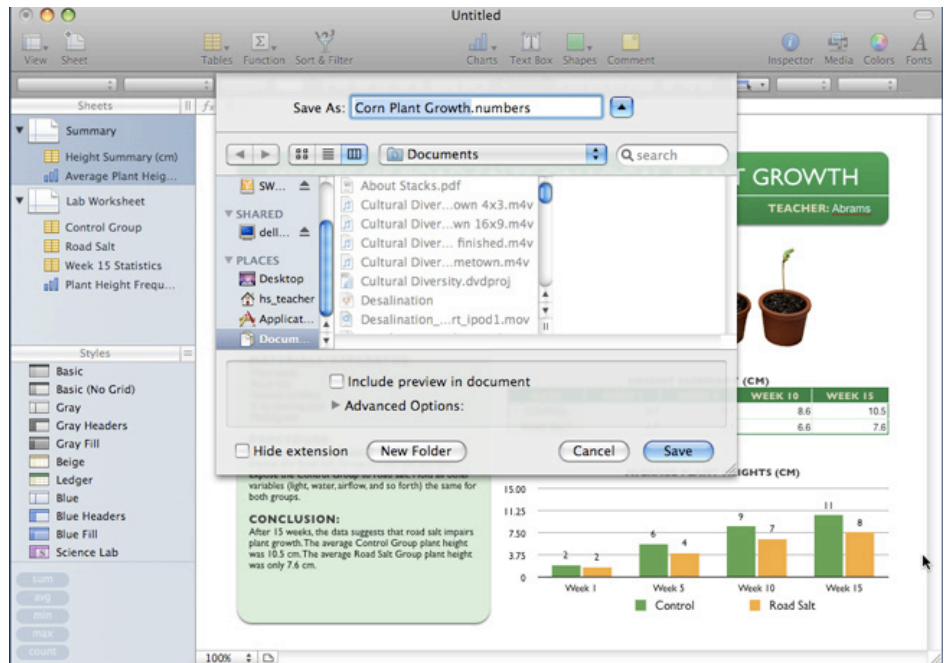
Note: A yellow tooltip in the middle of the window indicates that the weekly values are computed using another sheet in this Numbers spreadsheet. Since you won't be using the other sheet in this activity, you can close this tooltip by clicking its close button.

Saving a Spreadsheet

First you'll name your file so you can more easily locate it later.

- Choose File > Save.
- In the dialog that appears, type *Corn Plant Growth* in the Save As field.
- Make sure that Documents is chosen in the Where pop-up menu. Click the disclosure triangle next to the Save As field and make sure the Hide Extension checkbox is deselected.

- 4 Click Save to save your spreadsheet.



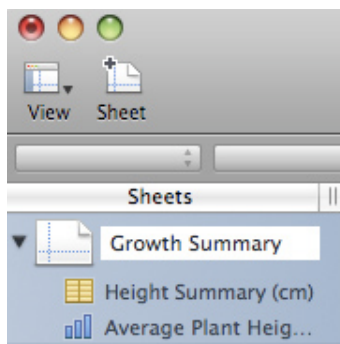
As with any document, it's a good practice to save spreadsheets as soon as they are created and to save them often while you work on them.

Renaming the Summary Sheet

The entire biology class performed an experiment on the effect that various light levels had on the growth cycle of corn plants. A separate Pages document in the Numbers_Assets folder called "Numbers_Data.pages" consists of the raw data to be plotted and the text to be used for the Summary sheet.

The Sheets pane consists of both a Summary sheet and a Lab Worksheet. The Summary sheet contains a chart called Height Summary (CM) and a graph called Average Plant Height. Later you will replace the information in these.

- 1 In the Sheets pane, double-click Summary to make it editable. Type *Growth Summary* and press Return to set the new name.



You are now ready to change the text on the Growth Summary sheet.

Modifying the Title Banner

- 1 In the Finder, open the Numbers_Assets folder and open the Number_Data.pages document.

Note: Keep this document open because you will also use it later in this activity..

- 2 In the green title banner area, triple-click the current title, "EFFECTS OF ROAD SALTS ON LOCAL PLANT GROWTH," to select it, then type *EFFECTS OF LIGHT ON CORN PLANT GROWTH*.
- 3 Refer to the Number_Data.pages to replace the other information in the Number document's green title banner fields: Name, Date, Period, and Teacher. Click outside of the green banner area to deselect the typing function.

The date displayed is automatically filled in with today's date. When the longer pieces of information are typed, the line wrap breaks the line in two. You'll fix this next.

- 4 To accommodate the newly typed text, click inside the green area of the title banner to select it.

The selection handles appear.



- 5 Place the pointer over the center right selection handle and drag it to the right to make enough space for the second line. As you drag the selection handle, blue vertical and horizontal positioning lines appear. Drag the right selection handle until all of the text appears on a single line as seen in the figure below.



The spaces between the name, date, period, and teacher name can be fine-tuned.

- 6 Double-click between the name and date area to select it, as seen in the figure below.



- 7 Press Delete to remove the spaces. Then, without moving the insertion point, press the Space bar eight times.
- 8 Repeat this process so that you have eight spaces between the date and period as well as between the period and teacher.

- 9 The green title banner may be too long, so adjust its size until the spacing is of equal distance on the left and right side of the banner's second line.

The white line that bisects the green banner is now too short. This must also be fixed.

- 10 Click the white line. Selection handles appear on the left and right ends of the line. Drag the rightmost handle to the right until the white line meets the edge of the green banner. Use the blue horizontal guidelines as seen below to line up the elements.



Your banner should now resemble the figure above.

Replacing the Experiment Description Text

Now that the title banner has been modified, you will turn your attention to the text in the green box that describes the experiment. The new text is available in your Numbers_Data.pages document located in the Numbers_Assets folder, which should still be open.

In the Numbers_Data.pages document, locate the text for each of the sections. Your task will be to replace the text for each of those sections labeled question, hypothesis, materials/apparatus, procedure, and conclusion.

- 1 In the Numbers_Data.pages document, copy the text for the header titled "Question" by selecting it and choosing Edit > Copy (or pressing Command-C).

Note: To select specific text inside a Numbers text box, you first click within the text box to make it active. You then click to place the insertion point at the beginning of the text you want to select, and then holding down the mouse button, drag to highlight all of the text you want to select.

- 2 In the Numbers document, triple-click (or click once in front of the text and then drag across) the text to select the whole block to be replaced under the "Question" header. With the text selected, choose Edit > Paste and Match Style (or press Option-Shift-Command-V).

Note: When text is copied and pasted like this, it can bring an extra carriage return with it. This may introduce extra blank lines that you will want to delete.

After you finish copying and pasting the new text for the remaining description headers Hypothesis, Materials/Apparatus, and Procedure, you find that there isn't enough room to paste the text for the Conclusion, as seen in the figure below. You'll fix that now.

QUESTION:
Does the presence of more light affect the corn plant growth cycle?

HYPOTHESIS:
Corn plants exposed to too much light will have a detrimental affect on their growth cycle.

MATERIALS/APPARATUS:
4 separate light tight growing areas
24 corn plant seeds
Potting soil
Potting trays
Generic fertilizer
Automated light system w/ Grow Lights
Automated watering system

PROCEDURE:
Plant 4 groups of corn plant seeds (2 rows of 3 each per container) and place one container per growing area. Over the course of 16 weeks measure the growth rate of the 4 groups at 3 week intervals as they are exposed to different amounts of "daily" light - 6 hrs, 10 hrs, 14 hrs and 18 hrs respectively. The constants such as potting soil, water, and airflow should be the same for all groups.

CONCLUSION:

- 3 At the bottom of the green text description area, drag the handle (+) down until the entire placeholder text is visible.
- 4 Finish copying the Conclusion text as you did in the previous steps, fitting it inside the box.

Replacing Pictures

Another great feature of Numbers is that it allows you to easily add photographs to a spreadsheet. You can add a picture from your iPhoto library using the Numbers Media Browser or from another location on your hard disk. Here you will replace the current potted plant picture with a graphic provided in your Numbers_Assets folder called "Corn_Growth_Stages.jpg." Since you have only one picture to replace, you will do so by dragging it from the Assets folder to the current picture placeholder.

- 1 Double-click the Numbers_Assets folder to open it.
- 2 Drag the Corn_Growth_Stages.jpg image to the template picture placeholder, which is highlighted with a blue box.



- When the placeholder is outlined in blue, release the mouse button.

The new picture is automatically inserted and resized.

- To further resize the picture, click it to display its selection handles. Drag the lower right selection handle up and to the left to make the picture smaller and retain its current proportions.

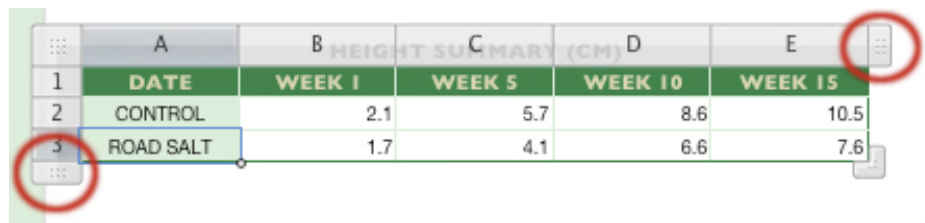
Modifying an Existing Table and Chart

In this Growth Summary sheet, you'll find a table of statistics as well as a chart describing those statistics. You are now ready to modify these items with your collected data. The current titles of the table and the chart are fine for this experiment. However, if you wanted to change the titles, you could do so by repeating the steps you performed in the section "Renaming the Summary Sheet."

The current table is made up of five columns and three rows. You will need to add two columns and rows to support your data.

- Click anywhere inside the table to display the column and row headers, as seen in the figure below.

The handles that are circled at the end of the columns and rows are for adding new elements to the table.



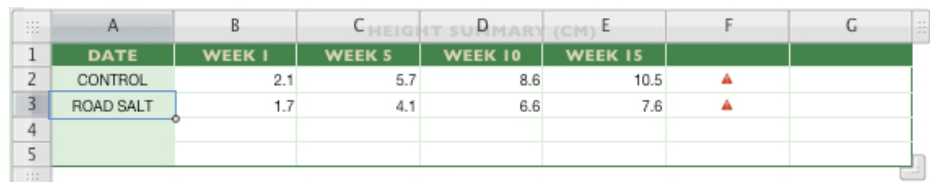
	A	B	C	D	E
1	DATE	WEEK 1	WEEK 5	WEEK 10	WEEK 15
2	CONTROL	2.1	5.7	8.6	10.5
3	ROAD SALT	1.7	4.1	6.6	7.6

Note: If you add a column that is not linked to any associated data, a red triangle warning message appears. You will enter the new data after the columns are created.

- To add two more columns, at the end of column E, click the Column handle twice.
- Below the last row, click the Row handle twice to add two more rows.

Note: You can also add another column by using the Tab key. Click the last column to select it, then press Tab.

You should now have a table that looks like this:



	A	B	C	D	E	F	G
1	DATE	WEEK 1	WEEK 5	WEEK 10	WEEK 15		
2	CONTROL	2.1	5.7	8.6	10.5	▲	
3	ROAD SALT	1.7	4.1	6.6	7.6	▲	
4							
5							

You are ready to change the table data as well as the column and row labels. The data is contained in your Numbers_Assets folder in the Numbers_Data.pages document.

- 4 If it's not still open, double-click the Numbers_Data.pages document to open it.

For each of the cells, you will now transfer the appropriate information from the Pages document table into the summary table in the Numbers spreadsheet.

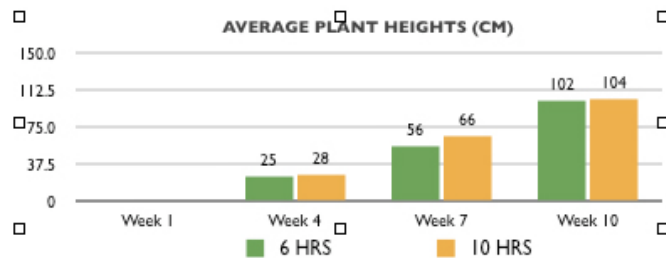
- 5 Click outside of the table to deselect it, then click in a cell to select it and type the corresponding information for that cell. You can use the arrow keys to move from cell to cell to select a cell for data entry.

Note: The colored key below the chart and the chart's numbers automatically update when you begin to type the numbers, but the other two required keys at the bottom of the chart will not be added automatically. When numbers using decimal placeholders are entered into a cell, they are automatically rounded up or down.

- 6 To add two new keys for 14 and 18 hours, click the bar graph chart to select it and display its selection handles.

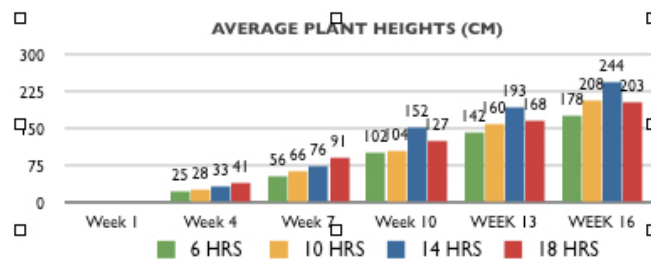
A blue outline appears around the data in the table, which is reflected in the current chart seen in the figure below. The blue outline also encompasses the color coding key (green and orange graph display colors) of the bar graph adjacent to the first column, which is labeled "Date."

HEIGHT SUMMARY (CM)						
DATE	WEEK 1	WEEK 4	WEEK 7	WEEK 10	WEEK 13	WEEK 16
6 HRS	0.0	25.4	55.8	101.6	142.2	177.8
10 HRS	0.0	27.9	66.0	104.1	160.2	208.3
14 HRS	0.0	33.0	76.2	152.4	193.0	243.8
18 HRS	0.0	40.6	91.4	127.0	167.6	203.2



- 7 Drag the lower right handle of the blue outline to encompass the entire table. As you do so, you will see that the other two keys appear on the bar graph.

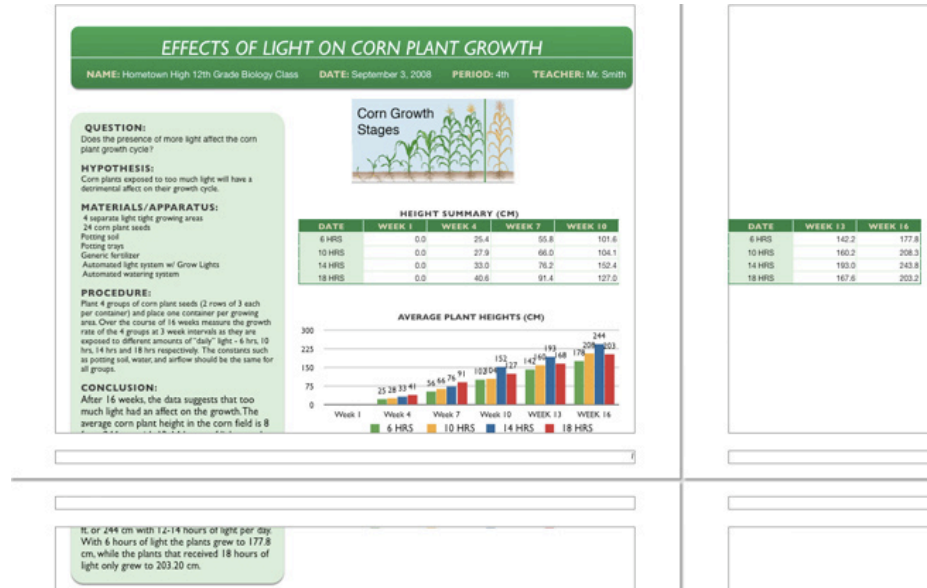
HEIGHT SUMMARY (CM)						
DATE	WEEK 1	WEEK 4	WEEK 7	WEEK 10	WEEK 13	WEEK 16
6 HRS	0.0	25.4	55.8	101.6	142.2	177.8
10 HRS	0.0	27.9	66.0	104.1	160.2	208.3
14 HRS	0.0	33.0	76.2	152.4	193.0	243.8
18 HRS	0.0	40.6	91.4	127.0	167.6	203.2



Previewing Your Document

The Growth Summary sheet is now complete and looks good. However, if you try to print it, some of the elements will be split across two pages. Before you print, you need to preview the print results and adjust the document to fit all of the items onto one page.

- 1 Choose View > Show Print View to see how much of the document needs to be altered.

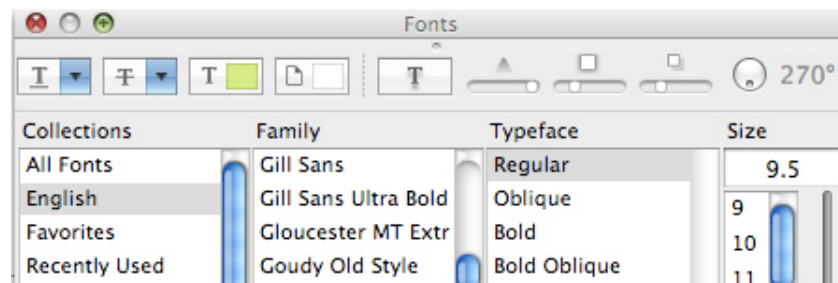


The experiment description box and the table are both too large, which causes them to break across pages. They must be modified before printing. You'll begin with the text in the description.

- 2 In the Numbers toolbar, click the Fonts button to open the Fonts window.



- 3 In the green experiment description box on the left of the sheet, triple-click the text for the "Question" header to select it. Then, in the Fonts window, change the Size to 9.5. Press Return to activate the font size change.



- 4 Repeat these steps for all of the paragraph text, leaving all of the headers at their current sizes.

Now that all of the paragraph text has been resized from 10 to 9.5, the green description box still breaks to a second page. You need to reposition the objects in the spreadsheet to fit them within the print preview box. You'll start with the title banner.

- 5 To reposition the green title banner, click in the middle of the banner to activate its selection handles, then drag the banner to the top of the print preview box and center it.

Note: You'll notice that the white line did not move and it must be repositioned.

- 6 To reposition the white line, drag it up under the title.

Note: The horizontal and vertical blue lines are used to line up objects and appear only when you drag an object.

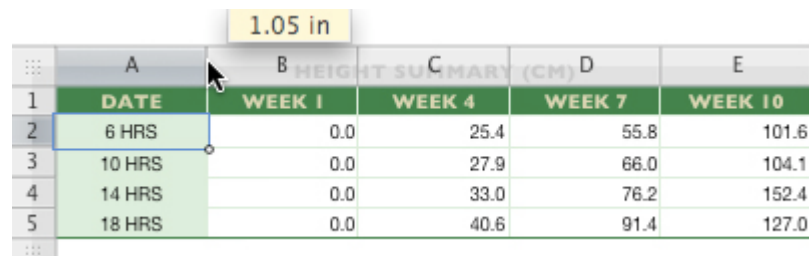
- 7 To reposition the experiment description box, click in the middle of the light green box to activate its selection handles, then drag it to its new position.

You may have to adjust its bottom and its width as you did in the section "Replacing the Experiment Description Text."

Note: If you want to fine-tune the positioning of an object, make sure that it is selected and displays its selection handles. Then press the Up, Down, Left, and Right Arrow keys to nudge it into place.

Next, the table that breaks onto another page must also be fixed. You can do this by adjusting the column widths.

- 8 To adjust the width of a column, click anywhere in the table to display the column and row headers.



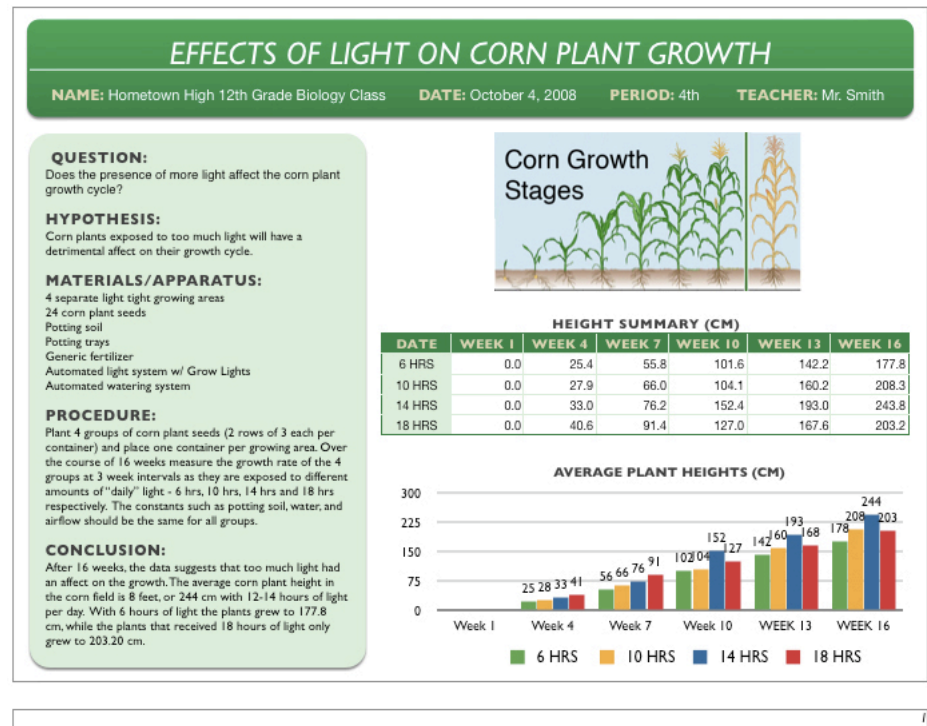
	A	B	C	D	E
	DATE	WEEK 1	WEEK 4	WEEK 7	WEEK 10
1	6 HRS	0.0	25.4	55.8	101.6
2	10 HRS	0.0	27.9	66.0	104.1
3	14 HRS	0.0	33.0	76.2	152.4
4	18 HRS	0.0	40.6	91.4	127.0

- 9 Position the pointer over the resize line between columns A and B, then drag it to the left to reduce the width of column A.

- 10 Repeat these steps for all of the columns until the entire table fits within the print preview area.

Note: You may have to resize the overall table size by using its selection handles to shrink it to fit within the page boundaries.

The sheet should look like this:



You have completed your table and bar graph chart. Using Numbers is a great way to present scientific findings because you can incorporate text, photos, and graphs to tell a clear story.

Next Steps

Now that you've gotten started with Numbers, you're ready to use it with your lessons to enhance teaching and learning. The additional activity ideas that are included here suggest a few more of the ways you can use Numbers with your students. When you want to gain further skills in using the software to implement these and other activities, you can use the resources listed in "Learn More," below.

Learn More

The following are some of the resources you can use to find out more about using Numbers.

Help

When you're working in Numbers, onscreen help is available at any time by choosing Help > Numbers Help.

Video Tutorials

For a collection of tutorials about using Numbers, go to www.apple.com/iwork/tutorials or choose Help > Video Tutorials when Numbers is open.

Apple Media Series

iWork '08 in the Classroom, part of the Apple Media Series, provides how-to videos and step-by-step guides for learning how to use Numbers and the other applications in the iWork suite. iWork '08 in the Classroom, available at an affordable cost to individuals and schools, guides you through what students could produce with each application.

www.apple.com/education/k12/applemediaseries

Additional Activity Ideas

We Are Family—Math, Language Arts, Art

Students can use Numbers to do a variety of activities that relate to home finances. For example, students can develop a family budget for a fictional family that has a specified income and set of expenses. They can also write about the family and create illustrations to combine with their financial information. Instructions for this activity can be found on the Apple Learning Interchange at <http://ali.apple.com>

Ecology and Water—Biology, General Science

Students can conduct water studies of local resources in their community, then analyze and graph the data in Numbers. Using probeware, students could monitor and test water resources for such factors as turbidity, dissolved oxygen, temperature, pH levels, salinity, and so on. The results of their data collection can then be published and shared.

Going Green—Biology

As part of a unit of study about environmental changes, students can use Numbers to track how the temperature on Earth has changed over time. In their spreadsheet, they can create graphs to visually present the data and add text summarizing what they have learned about the topic.

Analyzing the Votes—Social Science, Math

Students can use a Numbers spreadsheet to analyze the results of the last Presidential election or of a state or local election. Students can use the data they enter to create charts and graphs to look at the data in various ways, for example, to compare popular versus electoral votes by state in a Presidential election or how different areas of their state voted on an energy-related initiative. Students can then share their conclusions in a Keynote presentation or a report created in Pages.

Food Math—Science, Math

Students can use Numbers to assist them with food-related projects, such as with developing a new menu item for school lunch. Students can first use a Numbers spreadsheet to enter and adjust the amount of ingredients needed to serve certain numbers of diners and also calculate nutritional values. (They may want to customize the Numbers Dinner Party template for this purpose.) By entering the price for each ingredient, they can then use the tools in Numbers to figure out what price the item would need to be sold for to break even or make a certain amount of profit. They can then use the data to compare the cost of the new dish with current menu items.

Activity Finances—All Subjects

Students and educators can use Numbers to track income and expenses for a variety of school activities, such as the sale of DVDs at a student film festival, the school yearbook or newspaper, or a fundraiser for a sports team or other organization. The spreadsheet can also be used to keep updated contact information and task assignments.
