



# User's Guide



manual number 012-10616D

**Limited Warranty**

For a description of the product warranty, see the PASCO catalog.

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# Introduction

## About the SPARK Science Learning System

The SPARK Science Learning System is an all-in-one mobile device that seamlessly integrates the power of probeware with inquiry-based content and assessment. With its large, full-color display, finger-touch navigation and data collection and analysis capabilities, SPARK redefines the concept of easy-to-use — so the focus remains on the learning of science.

The SPARK Science Learning System (SPARK) is designed to become the center of your school's discovery-based science learning environment, providing both teacher and student the embedded support for exploring scientific concepts.

The SPARK Science Learning System includes 61 free pre-installed SPARKlabs™ — standards-based guided inquiry labs in a unique electronic notebook format. These SPARKlabs integrate background content, data collection and analysis, even assessment — all within the same environment. Everything you need is right there in context.

## Getting started

There are three basic ways to start an investigation on the SPARK Science Learning system. They are:

- *Open* an embedded SPARKlab and follow the on-screen instructions;
- *Show* a SPARKlab with one measurement in a graph, table, digits display, and meter; and
- *Build* a custom SPARKlab with your choice of data, displays, text, and pictures.

To start learning the SPARK Science Learning System, simply turn it on, plug in a sensor, and start using it. If you need help doing a task, you'll find step-by-step instructions in this guide.

## Technical and Teacher Support

For help with the SPARK Science Learning System and other PASCO products, you can contact PASCO's Technical and Teacher Support staff by phone, email, or on the Web.

Phone: 1-800-772-8700 (in the U.S.)  
+1 916 786 3800 (worldwide)

Email: [support@pasco.com](mailto:support@pasco.com)

Web: [www.pasco.com/support](http://www.pasco.com/support)

# Starting an experiment

## Turning on the SPARK Science Learning System

1. If the battery is not charged, connect the included AC adapter to a wall outlet and to the AC adapter port on the bottom of the SPARK.
2. Press and hold the power button.

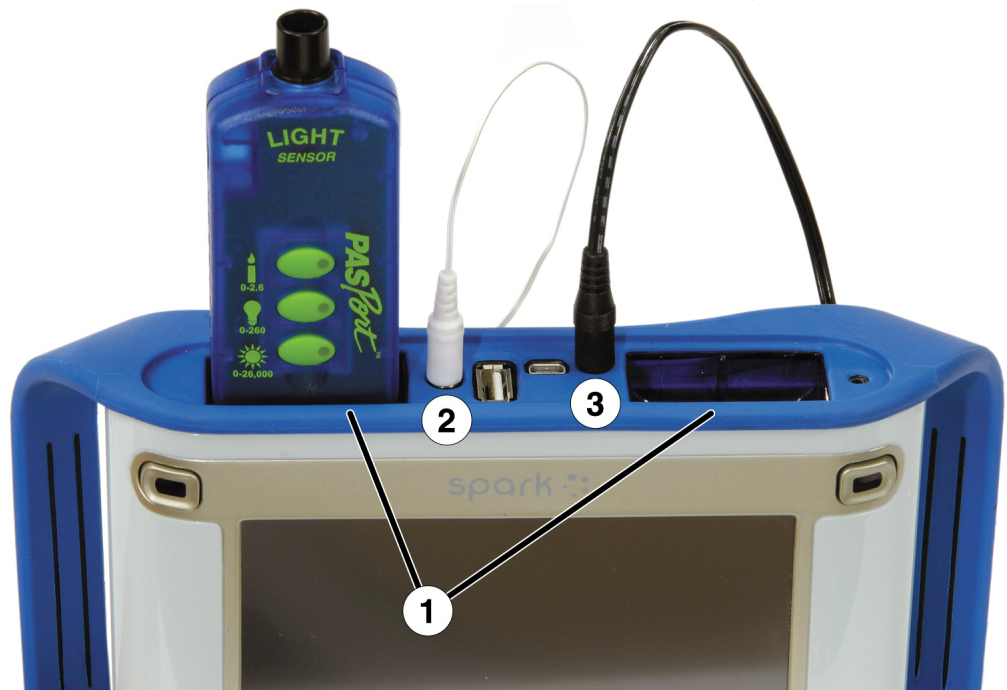
The SPARK turns on, boots up, and displays the Home screen.

1. AC adapter port. 2. Power button.



## Connecting sensors

1. PASPORT ports. 2. Temperature port. 3. Voltage port.



You can use up to two PASPORT sensors plus a temperature probe and a voltage probe. The SPARK automatically identifies any sensor connected to it.

Complete one or more of the following tasks to connect sensors to the SPARK.

### Connecting PASPORT sensors

1. Plug a PASPORT sensor into one of the PASPORT ports on the top of the SPARK.
2. Optionally, plug a second PASPORT sensor into the other PASPORT port.

### Connecting a temperature probe

- Plug the included fast-response temperature probe (or other type of temperature probe) into the temperature port on the top of the SPARK.

---

## Connecting a voltage probe

- 
- Plug the included voltage probe into the voltage port on the top of the SPARK.
- 

## Monitoring live data

Live data from all connected sensors are displayed whenever the Home screen is open.

The Home screen is the first screen that appears when the SPARK has been turned on and booted up.

If the Home screen is not visible, touch the **Home** button to return to the Home screen.



## Moving on from the Home screen

With the Home screen displayed, you are ready to move into a SPARKlab. A SPARKlab is a multi-page environment where your science investigation takes place.

Complete one of the following tasks to open an embedded SPARKlab, show a measurement in a SPARKlab, or build a custom SPARKlab.

## Opening a SPARKlab

The SPARK Science Learning System includes over 60 embedded SPARKlabs. Complete these steps to open a SPARKlab:

- 
1. Connect the sensors required for the SPARKlab that you wish to do.
  2. If there are unneeded sensors connected, disconnect them.
  3. In the Home screen, touch **Open**.  
A list of folders appears.
  4. Touch the folder corresponding your subject area.
  5. If necessary, touch a subfolder.
  6. Touch the SPARKlab that you would like to open.

7. Touch **OK**.
- 

The SPARKlab opens.

Follow the on-screen instructions to continue your science investigation. Touch the **Page Navigator** to turn pages.



## Showing a SPARKlab

A show-path SPARKlab is the fastest way to record data and display it in a graph, table, digits display, and meter. Complete these steps to show a SPARKlab:

1. Connect a sensor.
2. In the Home screen, touch the measurement that you would like to show.  
The selected measurement is highlighted.
3. Touch **Show**.

*A measurement must be selected for **Show** to be available.*

---

A four-page SPARKlab opens.

Touch the **Start** button to record data.



Touch the **Page Navigator** to see your data in the different displays.

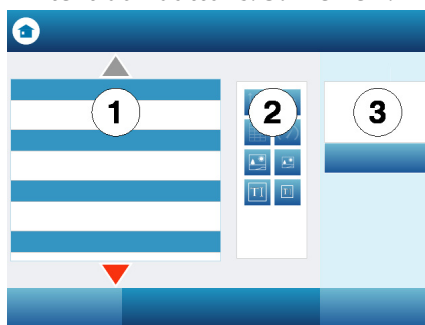


## Building a SPARKlab

When you build a custom SPARKlab, you design each page with your choice of measurements and displays. You can also add text and pictures. Complete these steps to start building a SPARKlab:

1. Connect a sensor (or sensors).
2. In the Home screen, touch **Build**.  
The Page-build screen opens.

**Page-build screen:** 1. Measurements. 2. Data display, image box, and text box buttons. 3. Preview.



3. Touch the measurement (or measurements) that you would like to show in the first data display.  
Selected measurements are highlighted. Touch a measurement again to clear a selection.
4. Touch one of the data display buttons for a graph, table, digits display, or meter.

**Data display buttons:** graph, digits display, table, and meter.



If you select just one measurement, all data displays are available. If you select two measurements, only the graph and table are available. If you select three or more measurements, only the table is available.

The measurements and display that you have selected appear in the preview section of the page-build screen.

5. Optionally, do any of the following:
  - Repeat the steps above to select more measurements and add another data display.
  - Touch one of the image box buttons to add a large or small image box. (After the page has been added to the SPARKlab, you can touch the image box to select an image to display in the box.)



- Touch one of the text box buttons to add a large or small text box. (After the page has been added to the SPARKlab, you can touch the text box to enter text.)



- Touch the **Undo** button to remove an element from the preview.



6. When you are satisfied with the preview and ready to build your page, touch **OK**.
- 

Your new SPARKlab opens showing the page that you have just built.

Touch the **Start** button to record data.



Touch the **New Page** button to build another page and add it to your SPARKlab.





# Setting up an experiment

## Customizing data collection

You can start recording data using the default settings, or complete one or more of the following tasks to change the sampling rate or sampling mode.

### Setting the sample rate

With the SPARK in periodic sampling mode (the default mode), complete these steps to set how many data points are recorded each second or how much time elapses between data points:

1. Touch the **Sampling Options** button.



The Sampling Options screen opens.

2. Touch the **Sample Rate Unit:** box and select **Hz, seconds, minutes, or hours**.
3. Touch the **Sample Rate:** box and select a value.
4. Touch **OK**.

### Putting the SPARK into periodic sampling mode

In periodic sampling mode (the default mode, sometimes known as “continuous” mode), the SPARK records data points at regular intervals. If the SPARK is in manual sampling mode, complete these steps to put it into periodic sampling mode:

1. Touch the **Sampling Options** button.



The Sampling Options screen opens.

2. Touch **Periodic**.
3. Touch **OK**.

## Putting the SPARK into manual sampling mode

In manual sampling mode, a single value from each measurement is recorded each time you manually trigger the SPARK. Complete these steps to put the SPARK into manual sampling mode:

- 
1. Touch the **Sampling Options** button.



The Sampling Options screen opens.

2. Touch **Manual**.
  3. Touch **OK**.
- 

## Setting an automatic stop condition

When a stop condition is set, the SPARK automatically stops recording data after a set time interval. Complete these steps to set a stop condition:

- 
1. Touch the **Sampling Options** button.



The Sampling Options screen opens.

2. Under **Automatic Stop Condition**, touch the **Condition:** box and select **Stop after duration**.
  3. Touch the **Value:** box and enter a time value.
  4. Touch the **Units:** box and select units of time.
  5. Touch **OK**.
- 

## Customizing how numbers are displayed

### Setting the number of decimal places displayed

- 
1. Touch the **Experiment Tools** button.




The Experiment Tools screen opens.


2. Touch **DATA PROPERTIES**.  
The Data Properties screen opens.

3. Touch the **Measurement:** box and select a measurement or other variable.
  4. Touch **Number Format**.  
The number format options appear.
  5. Touch the **Number Style:** box and select **Fixed Precision**.
  6. Use the **Digits:** arrows to select the number of digits to be displayed after the decimal point.
  7. Touch **OK**.
- 

## Setting the number of significant figures displayed

1. Touch the **Experiment Tools** button.  
  
The Experiment Tools screen opens.
  2. Touch **DATA PROPERTIES**.  
The Data Properties screen opens.
  3. Touch the **Measurement:** box and select a measurement or other variable.
  4. Touch **Number Format**.  
The number format options appear.
  5. Touch the **Number Style:** box and select **Significant Figures**.
  6. Use the **Digits:** arrows to select the number of significant figures to be displayed.
  7. Touch **OK**.
- 

## Displaying numbers in scientific notation

1. Touch the **Experiment Tools** button.  
  
The Experiment Tools screen opens.
2. Touch **DATA PROPERTIES**.  
The Data Properties screen opens.
3. Touch the **Measurement:** box and select a measurement or other variable.

4. Touch **Number Format**.  
The number format options appear.
  5. Touch the **Number Style:** box and select **Scientific Notation**.
  6. Use the **Digits:** arrows to select the number of digits to be displayed.
  7. Touch **OK**.
- 

## Changing the units of a measurement

Do one or both of the following tasks to select different units for a measurement.

### Changing the units of a measurement in an existing display

Complete these steps to change the units of a measurement displayed in an existing graph, digits display, table, or meter:

1. Touch the **Tools** button of a graph, digits display, table, or meter to open the tools palette.



2. Touch the **Properties** button to open the Properties screen.



3. Touch the **Units:** box and select a unit of measure.
  4. Touch **OK**.
- 

The display shows the measurement with the selected units.

### Changing the default units of a measurement

Complete these steps to change the units that will be used by default when you select a measurement in the future:

1. Touch the **Experiment Tools** button to open the Experiment Tools screen.



2. Touch **DATA PROPERTIES** to open the Data Properties screen.
3. Touch the **Measurement:** box and select a measurement.
4. Touch the **Units:** box and select units of measure.

5. Touch **Set As Default** to select it.  
When **Set As Default** is selected, it is highlighted.
  6. Touch **OK**.
- 

The next time you select that measurement for display, it will appear with the units that you selected.

## Calibrating sensors

Sensor calibration is an optional step that can help to make measurements more accurate.

Complete the following tasks to select a measurement and calibration type and perform a calibration.

### Selecting a measurement to calibrate and a calibration type

---

1. Touch the **Experiment Tools** button.



The Experiment Tools screen opens.

2. Touch **CALIBRATE SENSOR**.  
The Calibrate Sensor: Select Measurement screen opens.
  3. Touch the **Sensor:** box and select the sensor to be calibrated.
  4. Touch the **Measurement:** box and select the measurement to be calibrated.
  5. Touch the **Calibration Type:** box and select a calibration type.  
See the instructions provided with your sensor for information about what type of calibration is appropriate for your sensor.
  6. Touch **NEXT**.
- 

The Calibrate Sensor: Enter Values screen opens.

Now that you have selected a measurement, you can perform a calibration as described in the next task.

## Performing a calibration

After you have selected a measurement to be calibrated and a calibration type (see previous task), you are ready to perform a calibration.

Depending on the calibration type that you have selected, perform a 2-point calibration, a 1-point offset-only calibration, or a 1-point slope-only calibration.

### Performing a 2-point calibration

In the Calibrate Sensor: Enter Values screen, complete these steps:

- 
1. Apply a known quantity to the sensor.  
For example, place a pH probe in a pH 4 buffer solution.
  2. Under **Calibration Point 1** touch the **Standard Value:** box and enter the known value.  
For example, enter the known pH of the buffer solution.
  3. Under **Calibration Point 1** touch **Read From Sensor**.  
The value measured by the sensor is transferred to the **Sensor Value:** box.
  4. Apply a different known quantity to the sensor.  
For example, place the pH probe in a pH 7 buffer solution.
  5. Under **Calibration Point 2** touch the **Standard Value:** box and enter the known value.  
For example, enter the known pH of the buffer solution.
  6. Under **Calibration Point 2** touch **Read From Sensor**.  
The value measured by the sensor is transferred to the **Sensor Value:** box.
  7. Touch **OK**.
- 

Calibration is complete.

### Performing a 1-point offset-only calibration

In the Calibrate Sensor: Enter Values screen, complete these steps:

- 
1. Apply a known quantity to the sensor.  
For example, place a temperature probe in ice water known to be 0 °C.
  2. Under **Calibration Point 1** touch the **Standard Value:** box and enter the known value.  
For example, enter the known temperature of the water.
  3. Under **Calibration Point 1** touch **Read From Sensor**.  
The value measured by the sensor is transferred to the **Sensor Value:** box.

- 
4. Touch **OK**.
- 

Calibration is complete.

### Performing a 1-point slope-only calibration

In the Calibrate Sensor: Enter Values screen, complete these steps:

- 
1. Apply a known quantity to the sensor.  
For example, place a dissolved oxygen probe in a bottle known to contain 9.1 mg/L of dissolved oxygen.
  2. Under **Calibration Point 2** touch the **Standard Value:** box and enter the known value.  
For example, enter the known dissolved oxygen concentration.
  3. Under **Calibration Point 2** touch **Read From Sensor**.  
The value measured by the sensor is transferred to the **Sensor Value:** box.
  4. Touch **OK**.
- 

Calibration is complete.

## Using sensor adapters

### Connecting a sensor through a Digital Adapter or Photogate Port

The Digital Adapter (PASCO part PS-2159) allows digital switch-type sensors such as photogates and Smart Pulleys to be used with the SPARK. It also allows the use of a *ScienceWorkshop* Motion Sensor (CI-6742A) or Rotary Motion Sensor (CI-6538).

The Photogate Port (PS-2123) is a type of adapter that supports switch-type sensors, but not the Rotary Motion Sensor or Motion Sensor.

Complete these steps to connect and configure a sensor with a Digital Adapter or Photogate Port:

- 
1. Connect the adapter to one of the PASPORT ports on the top of the SPARK.

2. Connect a digital sensor to the adapter.  
You can connect a switch-type sensor to either port of the adapter.  
If you are connecting a Motion Sensor or Rotary Motion Sensor, connect the yellow plug to Port 1 and the black plug to Port 2.  
A list of digital sensors and sensor configurations appears.
  3. Optionally, connect a second switch-type sensor to the other port of the adapter.
  4. In the list, touch one of the sensors or configurations to select it and touch **OK**.  
You may need to touch the arrows to scroll the list.
  5. If the SPARK prompts you to enter one or more measurements specific to your equipment, enter the value or values and touch **OK**.  
The measurements that you enter will be used to compute data such as the velocity of an object passing through a photogate.
- 

## Connecting a sensor through an Analog Adapter

The Analog Adapter (PASCO part PS-2158) allows analog *ScienceWorkshop* sensors to be used with the SPARK.

Complete these steps to connect and configure a sensor with an Analog Adapter:

- 
1. Connect the Analog Adapter to one of the PASPORT ports on the top of the SPARK.
  2. Connect an analog sensor to the adapter.  
A list of sensors appears.
  3. Touch one of the sensors to select it and touch **OK**.  
You may need to touch the arrows to scroll the list.
  4. Optionally, touch the **Gain:** box and select a gain setting.
  5. Touch **OK** again.
-



# Data recording

The following tasks describe how to record a data run with the SPARK in periodic sampling mode and manual sampling mode. Over the course of a science investigation, you can record multiple data runs and sets.

## Recording a run of periodically sampled data

With the SPARK in periodic sampling mode (the default mode, sometimes known as “continuous” mode), complete these steps to record a data run:

1. Touch the **Start** button.



You can press one of the record buttons instead of touching the on-screen **Start** button.



The SPARK creates a new data run and starts recording data points into it.

2. To stop recording data, touch the **Stop** button.



You can press one of the record buttons instead of touching the on-screen **Stop** button.

The SPARK stops recording data.

Repeat these steps to record another data run.

## Recording a set of manually sampled data

To record manually sampled data, first put the SPARK into manual sampling mode. See “Putting the SPARK into manual sampling mode” on page 10.

In manual sampling mode, a single value from each measurement is recorded each time you manually trigger the SPARK. A series of values is recorded in a data set. Complete these steps to start a data set, trigger points to be recorded, and close the data set:

1. Optionally, turn to a page in your SPARKlab where you will be able to see your data in a table.

You can record data with any type of display visible (or no display at all), but it is typical to record manually sampled data while looking at a table.

2. Touch the **Start** button.



You can press one of the record buttons instead of touching the on-screen **Start** button.

The SPARK creates a new data set. The record buttons start flashing to indicate that the SPARK is ready to be triggered. Live data appear in the data displays.

3. When you are ready to record a data point, touch the **Keep** button.



You can press one of the record buttons instead of touching the on-screen **Keep** button.



The SPARK records a single value from each measurement.

4. Repeat the previous step as many times as necessary to record all of the data that you want in the data set.

- 
5. When the entire set has been recorded, touch the **Stop** button.



The data set closes.

---

Repeat these steps to record another data set.

## Deleting data runs

- 
1. Touch the **Experiment Tools** button.



The Experiment Tools screen opens.

2. Touch **MANAGE RUNS**.

The Manage Runs screen opens.

3. Do one of the following:

- Touch **Delete Last Run**.
- Touch **Delete All Runs**.
- Touch **Delete Run...** and select the run that you want to delete.

4. Touch **Done**.

5. Touch **OK**.
-



# Data display

## Displaying data in a graph

### Creating a new graph

To create a new graph, do one of the following:

- If the Home screen is visible, create a new SPARKlab:
  - a. Touch a measurement.
  - b. Touch **Show**.

A graph appears on page 1 of the SPARKlab.

- If a SPARKlab is open, add a new page:
  - a. Touch the **New Page** button.



The Page-build screen opens.

- b. Touch a measurement (or two measurements).
- c. Touch the **Graph** button.



- d. Touch **OK**.

A new page containing a graph is added to the SPARKlab.

### Showing and hiding the graph tool palette

- To show the tool palette, touch the blue **Graph Tools** button near the lower left corner of the graph.



- To hide the tool palette, touch the orange **Graph Tools** button.



## Adjusting the scale of a graph

Do one or more of the following tasks (in any order) to change the range and domain of a graph.

### Scaling a graph to fit all data

- 
1. Touch the **Graph Tools** button to open the tool palette.



2. Touch the **Scale-to-fit** button.



---

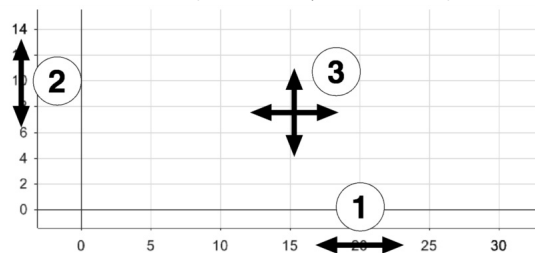
The graph adjusts to fit all data (or all highlighted data).

### Scaling by direct manipulation

Complete one or more of these steps in any order:

- 
- Touch one of the numbers labeling the x-scale of the graph and drag it left or right.  
The graph expands or contracts horizontally.
  - Touch one of the numbers labeling the y-scale of the graph and drag it up or down.  
The graph expands or contracts vertically.
  - Touch the middle of the graph and drag it in any direction.  
The graph moves.
- 

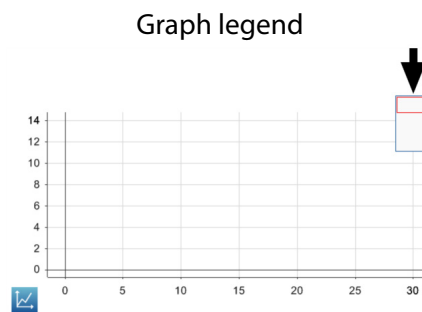
**1.** Expanding and contracting horizontally. **2.** Expanding and contracting vertically. **3.** Moving.



## Selecting data to show in an existing graph

### Showing and hiding data runs in a graph

1. Touch the graph legend.  
The legend enlarges to show available data runs.
2. Select or clear the check box next to each data run that you want to show or hide.
3. Optionally, touch outside the legend to reduce the size of the legend.



### Changing the variable on the x- or y-axis

1. Touch the **Graph Tools** button to open the tool palette.



2. Touch the **Properties** button to open the Properties screen.



3. For each axis, touch the **Measurement:** box and select a measurement or other variable.

## Selecting data for operation in a graph

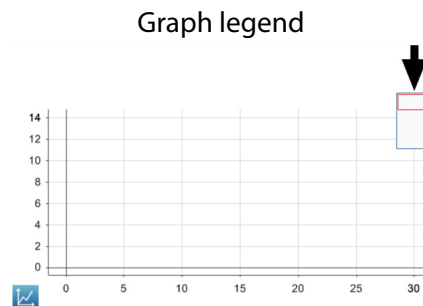
### Selecting a data run for operation in a graph

In the graph legend, a red outline surrounds the run that is selected for operation. Complete these steps to change which run is selected:

1. Touch the graph legend.  
The legend enlarges.

2. In the legend, touch the symbol (but not the check box) of the run that you want to select.

The red outline moves to the selected run.



When you turn on statistics, graph tools, or curve fits, they are applied to the selected run.

### Selecting part of a data run for operation in a graph

If part of a data run is selected for operation, the selected data points are highlighted. Scale-to-fit, statistics, graph tools, and curve fits are applied only to the selected data points. Complete these steps to select part of a data run:

1. If there is more than one data run on the graph, first select the run from which you will select data points:
  - a. Touch the graph legend.  
The legend enlarges.
  - b. In the legend, touch the symbol of the run that you want to select.  
The red outline moves to the selected run.
2. Touch the **Graph Tools** button to open the tool palette.



3. Touch the **Select** button.

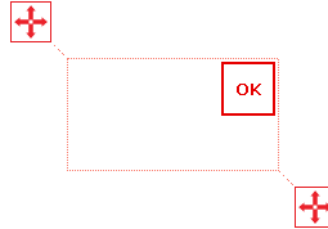


The button turns orange.



4. Touch somewhere on the graph; then, within one second, touch somewhere else on the graph.

The two locations that you touch define the corners of a selection box. A selection box appears. Data points inside the box are highlighted.



5. Optionally, adjust the size and position of the selection box by dragging the handles at the corners of the box.



6. When the desired data points are highlighted, touch **OK**. The selection box disappears, but the points remain selected.

To clear the selection, touch the **Select** button again.

## Annotating data in a graph

### Adding an annotation

1. If there is more than one data run on the graph, first select the run that the annotation will be attached to:
  - a. Touch the graph legend.  
The legend enlarges.
  - b. In the legend, touch the symbol of the run that you want to select.  
The red outline moves to the selected run.
2. Touch the **Graph Tools** button to open the tool palette.



3. Touch the **Select** button.



The button turns orange.

4. Touch a point on the graph.
5. Touch **OK**.

6. Touch the **Annotation** button.



The on-screen keyboard appears.

7. Enter a note and touch **OK**.  
An annotation appears on the graph.
  8. Touch the **Select** button.  
The button turns blue.
- 

### Editing or deleting an annotation

---

1. If necessary, touch the **Graph Tools** button to open the tool palette.



2. Touch the annotation that you want to edit or delete.  
The annotation is highlighted.
3. Touch the **Annotation** button.



The on-screen keyboard appears.

4. Edit or delete the annotation and touch **OK**.
- 

## Displaying data in a table

### Creating a new table

To create a new table, do one of the following:

---

- If the Home screen is visible, create a new SPARKlab:
  - a. Touch a measurement.
  - b. Touch **Show**.  
A SPARKlab appears.
  - c. Touch the **Page Navigator** to turn to the table on page 3 of the SPARKlab.



- If a SPARKlab is open, add a new page:
  - a. Touch the **New Page** button.



The Page-build screen opens.

- b. Touch a measurement (or up to six measurements).
- c. Touch the **Table** button.



- d. Touch **OK**.

A new page containing a table is added to the SPARKlab.

## Showing and hiding the table tool palette

- To show the tool palette, touch the blue **Table Tools** button near the upper left corner of the table.



- To hide the tool palette, touch the orange **Table Tools** button.



## Scrolling a table

- Touch the middle of the table and drag it up or down.

7	1.20	19.930
8	1.40	23.422
9	1.60	24.952
10	1.80	28.708
11	2.00	31.012
12	2.20	33.289
13	2.40	33.964

## Selecting data to show in an existing table

### Selecting a run for display in an existing column

- 
1. Touch the run number at the top of the column.  
A list of available runs appears.
  2. Touch the run that you want to see.
- 

### Changing the variable displayed in an existing column

- 
1. Touch the **Table Tools** button to open the tool palette.



2. Touch the **Properties** button to open the Properties screen.



3. Touch the **Column:** box and select the column that you want to change.  
Columns are number 1, 2, 3, etc. from left to right.
  4. Touch the **Measurement:** box and select the measurement or other variable that you want to see.
  5. Touch **OK**.
- 

### Adding a column

A table can contain up to six columns. Complete these steps to add a column to a table:

- 
1. Touch the **Table Tools** button to open the tool palette.



2. Optionally, select a position in the table where the new column will be inserted:
  - a. Touch the **Select** button.



The button turns orange.

- b. Touch the column to the right of where you want the new column to appear.

If you do not select a position, the new column will be added to the right side of the table.

3. Touch the **Add Column** button.



---

A new, empty column is added to the table.

Touch the **Properties** button to select a measurement or other variable to display in the new column.



## Removing a column

- 
1. Touch the **Table Tools** button to open the tool palette.



2. Touch the **Select** button.



The button turns orange.

3. Touch the column that you want to remove.
4. Touch the **Remove Column** button.



## Selecting cells for operation in a table

If a group of table cells is selected for operation, the selected cells are outlined. If statistics are displayed, they apply only to the data in the selected cells. Complete these steps to select cells:

1. Touch the **Table Tools** button to open the tool palette.



2. Touch the **Select** button.



The button turns orange.

3. On the table, drag down a column, across a row, or diagonally across rows and columns to select a group of cells.

The selected group of cells is outlined.

1. Selecting cells in a single column.
2. Selecting cells in a single row.
3. Selecting cells in multiple columns and rows.

5			
6	1.0000	18.509	
7	1.200000	19.990	1
8		4.82	1
9		24.362	1
10	1.000000	28.708	18.660
11	2.000000	31.012	11.404

To clear the selection, touch the **Select** button again.

## Displaying data in a digits display

### Creating a new digits display

To create a new digits display, do one of the following:

- If the Home screen is visible, create a new SPARKlab:
  - a. Touch a measurement.
  - b. Touch **Show**.  
A SPARKlab appears.
  - c. Touch the **Page Navigator** to turn to the digits display on page 2 of the SPARKlab.



- If a SPARKlab is open, add a new page:
  - a. Touch the **New Page** button.



The Page-build screen opens.

- b. Touch a measurement.
- c. Touch the **Digits Display** button.



- d. Touch **OK**.

A new page containing a digits display is added to the SPARKlab.

## Showing and hiding the digits display tool palette

- To show the tool palette, touch the blue **Digits Display Tools** button near the lower left corner of the digits display.



- To hide the tool palette, touch the orange **Digits Display Tools** button.



## Changing the variable in a digits display

1. Touch the **Digits Display Tools** button to open the tool palette.



2. Touch the **Properties** button to open the Properties screen.



3. Touch the **Measurement:** box and select the measurement or other variable that you want to see.
4. Touch **OK**.

## Displaying data in a meter

### Creating a new meter

To create a new meter, do one of the following:

- If the Home screen is visible, create a new SPARKlab:
  - a. Touch a measurement.
  - b. Touch **Show**.  
A SPARKlab appears.
  - c. Touch the **Page Navigator** to turn to the meter on page 4 of the SPARKlab.



- If a SPARKlab is open, add a new page:
  - a. Touch the **New Page** button.



The Page-build screen opens.

- b. Touch a measurement.
- c. Touch the **Meter** button.



- d. Touch **OK**.

A new page containing a meter is added to the SPARKlab.

---

### Showing and hiding the meter tool palette

- To show the tool palette, touch the blue **Meter Tools** button near the lower left corner of the meter.



- To hide the tool palette, touch the orange **Meter Tools** button.





---

## Adjusting the scale of a meter

### Scaling a meter to fit all data

- 
1. Touch the **Meter Tools** button to open the tool palette.



2. Touch the **Scale-to-fit** button.



---

The scale of the meter adjusts to fit the currently displayed data run.

### Setting the scale of a meter

- 
1. Touch the **Meter Tools** button to open the tool palette.



2. Touch the **Properties** button to open the Properties screen.



3. For the **Always Scale to Fit:** option select **off**.
  4. Touch the **Minimum:** box and enter the low value of the desired range.
  5. Touch the **Maximum:** box and enter the high value of the desired range.
  6. Touch **OK**.
- 

## Changing the variable displayed in a meter

- 
1. Touch the **Meter Tools** button to open the tool palette.



2. Touch the **Properties** button to open the Properties screen.



3. Touch the **Measurement:** box and select the measurement or other variable that you want to see.
  4. Touch **OK**.
-

## Customizing the appearance of a meter

- 
1. Touch the **Meter Tools** button to open the tool palette.



2. Touch the **Properties** button to open the Properties screen.



3. Touch the **Sweep Range:** box and select **Small Sweep**, **Semicircle**, or **Large Sweep**.
  4. Touch **OK**.
-

# Data analysis



In any display, you can view the statistics of data runs, including minimum value, maximum value, mean value, standard deviation, and count (or number of points). In a graph, the area statistic is also available.

A graph also allows you to apply curve fits; draw predictions; and find coordinates, distances, and slopes on data plots.

## Analyzing data in a graph

### Viewing statistics in a graph

Complete these steps to see the minimum, maximum, mean, standard deviation, count, and area-under-the-curve of a data run:

1. If more than one data run is displayed, first select a run:
  - a. Touch the graph legend.  
The legend enlarges.
  - b. In the legend, touch the symbol of the run that you want to select.  
The red outline moves to the selected run.
2. Touch the **Graph Tools** button to open the tool palette.  

3. Touch the **Statistics** button to open the Statistics screen.  

4. Touch one or more of the statistics.  
Selected statistics are highlighted.
5. Touch **OK**.  
Statistics appear on the graph.
6. Optionally, select part of the data set for statistics to be applied to.  
See "Selecting part of a data run for operation in a graph" on page 24.

To remove the statistics, touch the **Statistics** button again.

## Applying a curve fit

Complete these steps to apply a linear, quadratic, power, inverse, inverse square, or sine fit to a data run:

- 
1. If more than one data run is displayed, first select a run:
    - a. Touch the graph legend.  
The legend enlarges.
    - b. In the legend, touch the symbol of the run that you want to select.  
The red outline moves to the selected run.
  2. Touch the **Graph Tools** button to open the tool palette.



3. Touch the **Curve Fit** button to open the Curve Fit screen.



4. Touch one curve fit to select it.
  5. Touch **OK**.  
The curve and parameters of the curve appear on the graph.
  6. Optionally, select part of the data set for the curve fit to be applied to.  
See “Selecting part of a data run for operation in a graph” on page 24.
- 

## Removing a curve fit

- 
1. Touch the **Graph Tools** button to open the tool palette.



2. Touch the **Curve Fit** button.



## Drawing a prediction

Complete these steps to manually sketch on a graph:

- 
1. Touch the **Graph Tools** button to open the tool palette.



2. Touch the **Prediction** button.



3. Do one of the following:
  - Trace a continuous curve on the graph.
  - Touch several locations on the graph to draw a series of connected points.
4. Touch **OK**.

---

To delete the prediction, touch the **Prediction** button again.

## Finding the x- and y-values of a point

Complete these steps to select a point on a graph and display its coordinates:

- 
1. If more than one data run is displayed, first select a run:
    - a. Touch the graph legend.  
The legend enlarges.
    - b. In the legend, touch the symbol of the run that you want to select.  
The red outline moves to the selected run.
  2. Touch the **Graph Tools** button to open the tool palette.

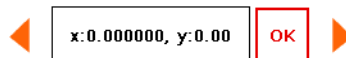


3. Touch the **Select** button.



The button turns orange.

4. Touch a point on the graph.  
The x- and y-values of the selected point are displayed.
5. Optionally, touch the arrows of the point selector to change which point is selected.



---

Touch the **Select** button again to clear the selection.

## Finding the x- and y-difference between two points

Complete these steps to select a range of points and display the change-in-x and change-in-y between the first and last points in the selected range:

1. If more than one data run is displayed, first select a run:
  - a. Touch the graph legend.  
The legend enlarges.
  - b. In the legend, touch the symbol of the run that you want to select.  
The red outline moves to the selected run.
2. Touch the **Graph Tools** button to open the tool palette.



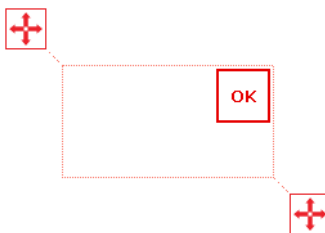
3. Touch the **Select** button.



The button turns orange.

4. Touch somewhere on the graph; then, within one second, touch somewhere else on the graph.

The two locations that you touch define the corners of a selection box. A selection box appears. Data points inside the box are highlighted.



5. Optionally, adjust the size and position of the selection box by dragging the handles at the corners of the box.



6. When the desired data points are highlighted, touch **OK**.  
The selection box disappears, but the points remain selected.
7. Touch the **Coordinates** button.



An annotation with the following information appears on the graph:

- The x- and y-values of the first point in the selected range ( $x1$  and  $y1$ ),

- The x- and y-values of the last point in the selected range ( $x_2$  and  $y_2$ ), and
- The x- and y-differences between those two points ( $dx$  and  $dy$ ).

To clear the annotation, touch the **Coordinates** button again. To clear the selection, touch the **Select** button again.

## Finding the slope at a point on a data plot

Complete these steps to display the slope at a selected point:

1. If more than one data run is displayed, first select a run:
  - a. Touch the graph legend.  
The legend enlarges.
  - b. In the legend, touch the symbol of the run that you want to select.  
The red outline moves to the selected run.
2. Touch the **Graph Tools** button to open the tool palette.



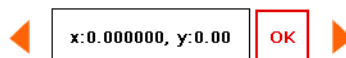
3. Touch the **Slope Tool** button.



The Slope Tool appears on the graph displaying the slope at one point.

The Slope Tool appears in the middle of the data run or, if part of the data run has been selected, in the middle of the selected part. See “Selecting part of a data run for operation in a graph” on page 24.

4. Touch the arrows of the point selector to move the slope tool to nearby points.



To hide the Slope Tool, touch the **Slope Tool** button again.

## Viewing statistics in a table

Complete these steps to see the minimum, maximum, mean, standard deviation, and count of data runs:

1. Touch the **Table Tools** button to open the tool palette.



2. Touch the **Statistics** button to open the Statistics screen.



3. Touch one or more of the statistics.  
Selected statistics are highlighted
  4. Touch **OK**.  
Statistics appear at the bottom of each column.
  5. Optionally, select a group of cells for statistics to be applied to.  
See "Selecting cells for operation in a table" on page 30.
- 

Touch the **Statistics** button again to remove the statistics.

## Viewing statistics in a digits display

Complete these steps to see the minimum, maximum, mean, standard deviation, or count of a data run:

- 
1. Touch the **Digits Display Tools** button to open the tool palette.



2. Touch the **Statistics** button to open the Statistics screen.



3. Touch one of the statistics to select it.
  4. Touch **OK**.
- 

The selected statistic appears in the digits display (instead of the most recently collected value that normally appears).

Touch the **Statistics** button again to return the digits display to normal.



## Viewing statistics in a meter

Complete these steps to see the minimum, maximum, mean, standard deviation, or count of a data run:

- 
1. Touch the **Meter Tools** button to open the tool palette.



2. Touch the **Statistics** button to open the Statistics screen.



3. Touch one of the statistics to select it.
  4. Touch **OK**.
- 

The meter indicates the selected statistic (instead of the most recently collected value that it normally indicates).

Touch the **Statistics** button again to return the meter to normal.



# Calculations and manually entered data

## Working with calculations

### Opening the calculator screen

1. Touch the **Experiment Tools** button.



The Experiment Tools screen opens.

2. Touch **CALCULATED DATA**.

The calculator screen opens.

### Creating a calculation

Complete one or more of the following steps in any order to enter an expression in the calculator screen:

- To start a new expression, touch **Insert**.
- To insert a measurement into the expression, touch **Measurements**.
- To cycle through the various functions available for use in the expression, touch the button under **Functions**.
- If the expression contains a trigonometric function, select **RAD** or **DEG** to indicate how angles are measured.
- To enter words or letters into the expression, touch the **Letters** button.



- To enter Greek letters into the expression, touch the **Greek Letters** button.



Touch **CAPS** or **SHIFT** to switch between lowercase and uppercase Greek letters.

- To enter subscript and superscript numbers, use the number keys on the Greek keyboard. Touch **SHIFT** to switch between subscript and superscript.
- Touch the **Numbers** button to return to the main calculator keyboard.



- When you have finished entering the expression, touch **RETURN**. The SPARK may prompt you to enter definitions for variables and constants used in the expression.
- To exit the calculator screen, touch **Done**.

## Displaying a calculation

Once you have created a calculation, it is available to be shown in any data display. Complete these steps to select the calculation for display.

1. Touch the **Tools** button of a graph, digits display, table, or meter to open the tools palette.



2. Touch the **Properties** button to open the Properties screen.



3. Touch the **Measurement:** box and select the calculation.
4. Touch **OK**.

## Entering data manually

These steps outline the process of manual data entry.

See the following tasks for detailed instructions.

1. Open the measurements list in the Page-build screen or the Table Properties screen.

2. Create a empty data set for number or text data entry.
  3. Prepare a table for data entry.
  4. Enter data in the table.
  5. Optionally, display the entered data in other displays.
  6. Optionally, edit any manually entered number or text.
- 

## Opening the measurements list

Do one of the following to open the measurements list:

- If the Home screen is open, touch **Build**.  
The Page-build screen containing the measurements list opens.
- If a SPARKlab is open and you want to enter data into a *new* table, touch the **New Page** button.



The Page-build screen containing the measurements list opens.

- If you want to enter data into an *existing* table, complete these sub-steps:
  - a. Touch the **Table Tools** button to open the tool palette.



- b. Touch the **Add Column** button to add a new empty column.



- c. Touch the **Properties** button to open the Properties screen.



- d. Touch the **Measurement:** box to open the measurement list.  
The measurement list opens.

---

Now that the measurement list is open, you can create an empty data set as described in the next task.

## Creating a data set for manual entry

Complete one of the following tasks.

### Creating a data set for manually entered numbers

- 
1. In the measurement list under **Experiment Clock**, touch **Create Data Set**.  
The Define the Data Set screen opens.
  2. Touch the **Measurement Name:** box and enter a name for the new data set.
  3. Optionally, touch the box and enter the name of the units.
  4. Touch **OK**.
- 

### Creating a data set for manually entered text

- 
1. In the measurement list under **User-entered Text Data**, touch **Create Data Set**.  
The Define the Data Set screen opens.
  2. Touch the **Measurement Name:** box and enter a name for the new data set.
  3. Touch **OK**.
- 

## Preparing a table for manual data entry

After you have completed the previous task, either the Page-build screen or the Table Properties screen appears. Depending on which screen you see, do one of the following:

- 
- If the Table Properties screen is open, touch **OK**.  
The table appears displaying the empty data set ready for data entry.

- If the Page-build screen is open, build a page containing the empty data set displayed in a table:
  - a. In the measurement list, touch the data set that you just created to select it.
  - b. Touch the **Table** button.



- c. Touch **OK**.

A new table appears displaying the empty data set ready for data entry.

## Entering data into a manual data set

After creating a data set as described in the previous tasks, complete these steps to enter data:

1. If the table tool palette is not already open, touch the **Table Tools** button.



2. Touch the **Select** button.



3. Enter data in a cell:
  - a. Touch the first table cell where you want to enter data.
  - b. Touch the **Data Entry** button and enter a number or text (depending on what type of data set you created).



4. Repeat the previous step to enter data in other cells.

## Displaying manually entered data

Once you have created a data set, it is available to be shown in any data display such as a graph. Complete these steps to select the data set for display.

1. Touch the **Tools** button of a graph, digits display, table, or meter to open the tools palette.



2. Touch the **Properties** button to open the Properties screen.



3. Touch the **Measurement:** box and select the data set.
  4. Touch **OK**.
- 

## Editing manually entered data

- 
1. If the table tool palette is not already open, touch the **Table Tools** button.



2. Touch the **Select** button.



3. Touch the table cell containing the data that you want to change.
4. Touch the **Data Entry** button and change or delete the number or text.





# Building SPARKlab pages

## Starting a new SPARKlab page

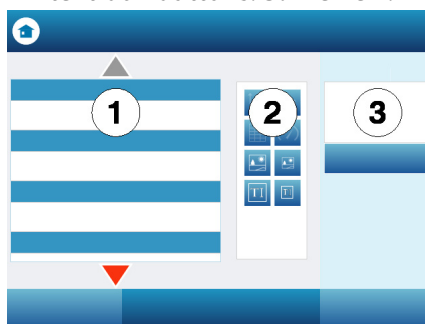
Complete one of these steps to start building a new page:

- From the Home screen, touch **Build**.
- From within an existing SPARKlab, touch the **New Page** button.



The Page-build screen appears.

**Page-build screen:** 1. Measurements. 2. Data display, image box, and text box buttons. 3. Preview.



## About adding elements to a SPARKlab page

A SPARKlab page is built by adding elements one at a time in the Page-build screen. As elements are added, they are shown in the preview section of the Page-build screen.

Each page can contain multiple displays, images, and text boxes. The maximum number of elements on a page depends on the sizes of the elements.

A page can contain:

- up to two large elements,

- up to six small elements, or
- one large element and up to two small elements.

The large elements are:

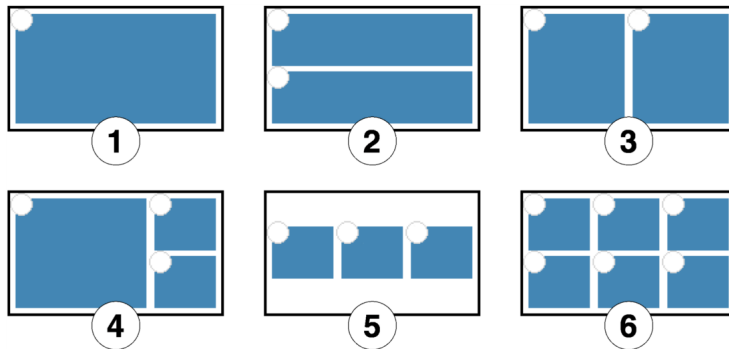
- graphs,
- tables,
- large image boxes, and
- large text boxes.

The small elements are:

- digits displays,
- meters,
- small image boxes, and
- small text boxes.

As you add elements to a page, they are automatically arranged and aligned.

**Examples of screen layouts:** **1.** One large or small element. **2.** Two large elements. **3.** Two small elements. **4.** One large and two small elements. **5.** Three small elements. **6.** Six small elements.



## Removing an element

Elements can be removed while the Page-build screen is still open. Elements are removed in the reverse order in which they were added.

- 
- Touch the **Undo** button.



The most recently added element is removed from the preview.

---

Touch the **Undo** button again to remove another element.

## Adding a display to a SPARKlab page

In the Page-build screen, complete one or more of the following tasks to add displays.

### Adding a graph

Complete these steps in the Page-build screen:

1. Touch one or two measurements (or other variables) to select them.  
If you select just one measurement, it will be plotted on the y-axis with time on the x-axis. If you select two measurements, the first selected will be plotted on the y-axis, and the second selected will be plotted on the x-axis.
2. Touch the **Graph** button.



A graph is added to the preview.

If you have finished adding elements to the page, touch **OK** to exit the Page-build screen.

### Adding a table

Complete these steps in the Page-build screen:

1. Touch one or more measurements or other variables (up to six) to select them.
2. Touch the **Table** button.



A table is added to the preview.

If you have finished adding elements to the page, touch **OK** to exit the page-build screen.

### Adding a digits display

Complete these steps in the Page-build screen:

1. Touch one measurement or other variable to select it.

2. Touch the **Digits Display** button.



A digits display is added to the preview.

If you have finished adding elements to the page, touch **OK** to exit the Page-build screen.

## Adding a meter

Complete these steps in the Page-build screen:

1. Touch one measurement or other variable to select it.
2. Touch the **Meter** button.



A meter is added to the preview.

If you have finished adding elements to the page, touch **OK** to exit the Page-build screen.

## Adding a text box

Start these steps in the Page-build screen:

1. Touch the large or small **Text Box** button.



A text box is added to the preview.

2. Optionally, add other elements to the page.
3. Touch **OK**.

The new page containing the empty text box appears.

4. Touch the text box and enter text.

You can enter text (such as experiment instructions) as part of the initial experiment setup or leave the text box empty as a place to enter notes or answers to questions during the experiment.

---

## Adding an image

To add an image to a SPARKlab page, you first add an image box in the Page-build screen and later load an image from a saved file into the image box.

Use an image with the pixel dimensions of:

- $640 \times 354$  (full page),
- $640 \times 175$  (half page horizontal),
- $317 \times 354$  (half page vertical),
- $417 \times 354$  (2/3 page), or
- $209 \times 175$  (1/6 page).

Start these steps in the Page-build screen:

1. Touch the large or small **Image Box** button.



An image box is added to the preview.

2. Optionally, add other elements to the page.
3. Touch **OK**.  
The new page containing the empty image box appears.
4. On a computer, save an image file to a USB flash drive (or other USB storage device).
5. Connect the flash drive to USB port of the SPARK.
6. On the SPARKlab page, touch the image box.  
The image palette appears.
7. Touch the **Load** button.



A list of folders and images on the USB flash drive appears.

8. Touch an image file to select it.
9. Touch **Load**.  
The image from the selected file appears in the image box.
10. Optionally, touch the image to hide the image palette.
11. Optionally, remove the USB flash drive.

## Removing or replacing an image in a image box

- 
1. Touch the image to open the image palette.
  2. Do one of the following:
    - Touch the **Remove** button to delete the image.



- Touch the **Load** button to load a new image file from a connected USB flash drive.



## Locking an image

Once an image is locked it cannot be changed or removed. However, the SPARKlab page that contains the locked image can be deleted.

- 
1. Touch the image to open the image palette.
  2. Touch the **Lock** button.



## Deleting a SPARKlab page

- 
- While viewing the page in a SPARKlab, touch the **Delete Page** button.



# Saving and sharing

## Saving a SPARKlab

Complete these steps to save your work on the SPARK or on a USB flash drive (or other USB storage device):

- 
1. Optionally, connect a USB flash drive to the SPARK.
  2. Touch the **Sharing** button to open the Sharing screen.



3. Touch **SAVE FILE AS**.  
The File-save screen opens.
  4. Touch the **Name:** box and enter a name for your experiment.
  5. If you plan to save the lab on a USB flash drive touch **USB**.
  6. Optionally, touch a folder to select it.  
The experiment will be saved in the selected folder.
  7. Optionally, touch an existing file to select it.  
The selected file will be overwritten.
  8. Touch **SAVE**.  
The experiment is saved, and the SPARK returns to the Sharing screen.
  9. Touch **Done** to return to your SPARKlab.
- 

After you have saved a file once using the procedure above, you can quickly save the file again by touching **SAVE FILE** instead of **SAVE FILE AS** in the Sharing screen.

## Printing a lab

The SPARKlab cannot be printed directly; however, you can capture SPARKlab pages in the journal and print the journal

You will need a compatible USB printer. Most USB inkjet printers manufactured by HP are compatible with SPARK.

Complete these steps to take snapshots of SPARKlab pages and print the snapshots:

- 
1. On each SPARKlab page that you wish to print, touch the **Snapshot** button.



Each time you touch the **Snapshot** button, the Snapshot Quick View appears briefly and an image of the page is added to the journal.

2. Connect a printer to USB port of the SPARK.
3. Touch the **Sharing** button to open the Sharing screen.



4. Touch the **JOURNAL** tab.
  5. Touch **PRINT JOURNAL** to open the journal print page.
  6. Touch **OK**.  
The journal is printed, and the SPARK returns to the Sharing screen.
  7. Touch **Done** to return to your SPARKlab.
- 

## Exporting data

To export data, you will need a USB flash drive (or other USB storage device). The data that you have collected will be saved on the flash drive in a tab-delimited text file that can be opened on a computer.

Note that exporting data is *not* equivalent to saving the lab. If you plan to later reopen your work on the SPARK, you must also save the lab.

Complete these steps to export data:

- 
1. Connect a flash drive to USB port of the SPARK.
  2. Touch the **Sharing** button to open the Sharing screen.



3. Touch **EXPORT DATA** to open the export data page.
4. Touch the **Name:** box and enter a filename.
5. Touch **EXPORT**.

A data file is saved on the USB flash drive, and the SPARK returns to the Sharing screen.



- 
6. Touch **Done**.
- 

To view the saved data, connect the flash drive to a computer. Open the file in a spreadsheet program, mapping program, word processor, or text editor.

## Opening a saved lab

- 
1. If necessary, touch the **Home** button to return to the Home screen.



2. In the Home screen, touch **Open**.
  3. Touch the **SAVED WORK** tab.
  4. If necessary, touch the folder where the file is saved.
  5. Touch the file that you would like to open.
  6. Touch **OK**.
- 

The lab opens.

## Opening a lab saved on a USB flash drive

- 
1. Connect a USB flash drive (or other USB storage device) to the SPARK.
  2. Touch the **Date/Time/Battery** icon to open the Device Tools screen.



3. Touch **Manage Files**.
  4. Copy or move the lab from the flash drive to the SPARK (see next section).
  5. Optionally, disconnect the USB flash drive.
  6. Open the file as described in "Opening a saved lab" on page 57.
-

## Managing files and folders

### Deleting a file or folder

- 
1. Touch the **Date/Time/Battery** icon to open the Device Tools screen.



2. Touch **Manage Files** to open the Manage Files screen.
  3. Touch **DELETE FILES**.  
A list of file locations, folders, and files appears.
  4. If necessary, touch the folder and subfolders that contain the file or folder.
  5. Touch the file or folder that you want to delete.
  6. Touch **Delete**.
- 

### Moving a file

Complete these steps to move a file between folders within the SPARK, or between the SPARK and a USB flash drive (or other USB storage device).

- 
1. Optionally, connect a USB flash drive to the SPARK.
  2. Touch the **Date/Time/Battery** icon to open the Device Tools screen.

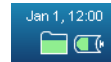


3. Touch **Manage Files** to open the Manage Files screen.
  4. Touch **MOVE FILES**.  
A list of file locations, folders, and files appears.
  5. Touch the location (**SPARK** or **USB**) of the file that you want to move.
  6. If necessary, touch the folder and subfolders that contain the file.
  7. Touch the file that you want to move.
  8. Touch **NEXT**.
  9. Touch the destination (**SPARK** or **USB**).
  10. Touch the folder and subfolders where you would like the file to be moved.
  11. Touch **MOVE**.
-

## Copying a file

Complete these steps to copy a file between folders within the SPARK, or between the SPARK and a USB flash drive (or other USB storage device).

- 
1. Optionally, connect a USB flash drive to the SPARK.
  2. Touch the **Date/Time/Battery** icon to open the Device Tools screen.



3. Touch **Manage Files** to open the Manage Files screen.
  4. Touch **COPY FILES**.  
A list of file locations, folders, and files appears.
  5. Touch the location (**SPARK** or **USB**) of the file that you want to copy.
  6. If necessary, touch the folder and subfolders that contain the file.
  7. Touch the file that you want to copy.
  8. Touch **NEXT**.
  9. Touch the destination (**SPARK** or **USB**).
  10. Touch the folder and subfolders where you would like the copy of the file to be saved.
  11. Touch **COPY**.
-



# Keeping a journal

The journal allows you to keep a record of your work in a series of pictures and captions as your science investigation progresses.

These steps outline the process of keeping a journal. See the following tasks for detailed instructions.

- 
1. Take a snapshot.  
An image of the SPARKlab page is recorded.
  2. Optionally, add a caption to the snapshot.
  3. Repeat the previous steps at anytime during your science investigation.
  4. Save, export, or print the journal.
- 

## Taking a snapshot

At any time during your science investigation, complete these steps to save an image of the SPARKlab page.

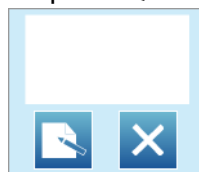
- 
- Touch the **Snapshot** button.



---

The SPARK records an image of the SPARKlab page, and the Snapshot Quick View appears briefly.

The Snapshot Quick View



You can let the Snapshot Quick View close automatically or use the buttons in the Snapshot Quick View to open the journal or delete the snapshot.

## Opening the journal

- 
- Touch the **Journal** button.

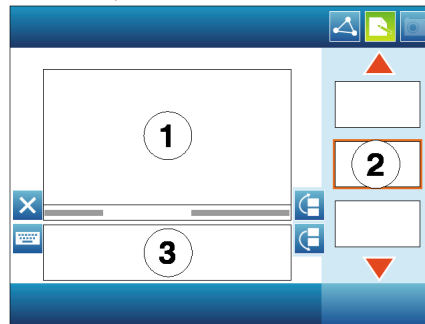


## Adding a caption to a snapshot or editing an existing caption

- 
- Touch the **Edit Caption** button to open the on-screen keyboard, where you can enter or change the caption.



1. Journal entry. 2. Thumbnails. 3. Caption area



## Navigating in the journal

- 
- In the journal, touch a thumbnail on the right side of the screen to view a journal entry.
  - Touch the arrows to scroll through the thumbnails
-

---

## Deleting a journal entry or snapshot

- 
- In the journal or the Snapshot Quick View, touch the **Delete** button to delete the currently visible journal entry.



## Rearranging journal entries

- 
- In the journal, touch the **Move Journal Entry Up** button or **Move Journal Entry Down** button to change the position of the currently visible entry.



## Closing the journal

- 
- Touch **Done** to close the journal and return to the SPARKlab.
- 

## Saving a journal

Do one of the following to save a journal:

- 
- Save the entire lab.  
See "Saving a SPARKlab" on page 55.  
The journal is saved as part of the lab.
  - Export the journal.  
See next task.  
The journal is saved in format that can be viewed in a web browser.
-

## Exporting a journal

To export a journal, you will need a USB flash drive (or other USB storage device). The journal will be saved on the flash drive as a group of files that can be viewed in a web browser on a computer.

Note that exporting the journal is *not* equivalent to saving the lab. If you plan to later reopen your work on the SPARK, you must also save the lab.

Complete these steps to export a journal:

- 
1. Connect a USB flash drive or other USB storage device to the SPARK.
  2. If you are currently viewing the journal, touch **Done** to return to the SPARKlab.
  3. Touch the **Sharing** button to open the Sharing screen.



4. Touch the **JOURNAL** tab.
  5. Touch **EXPORT JOURNAL** to open the journal export page.
  6. Touch the **Name:** box and enter a name for your journal.
  7. Optionally, touch a folder on the flash drive where you would like the journal to be saved.  
If you skip this step, the journal will be saved in a folder at the root level of the flash drive.
  8. Touch **EXPORT**.  
The SPARK creates a new folder on the flash drive with the filename that you entered and saves a group of text and image files plus an HTML file in it. It returns to the Sharing screen after these files have been saved.
  9. Touch **Done** to return to your SPARKlab.
- 

To view the saved journal, connect the flash drive to a computer and open the HTML file in a web browser.

## Printing a journal

To print a journal, you will need a compatible USB printer. Most USB inkjet printers manufactured by HP are compatible with SPARK.

- 
1. Connect a printer to USB port of the SPARK.
  2. If you are currently viewing the journal, touch **Done** to return to the SPARKlab.



- 
3. Touch the **Sharing** button to open the Sharing screen.



4. Touch the **JOURNAL** tab.
  5. Touch **PRINT JOURNAL** to open the print journal page.
  6. Touch **OK**.  
The journal is printed, and the SPARK returns to the Sharing screen.
  7. Touch **Done** to return to your SPARKlab.
-



# Common tasks

## Turning pages

- 
- Touch the arrows of the **Page Navigator** to turn to the next page or previous page.



- Touch the center of the **Page Navigator** to open a menu from which you can select any page in the SPARKlab.
- 

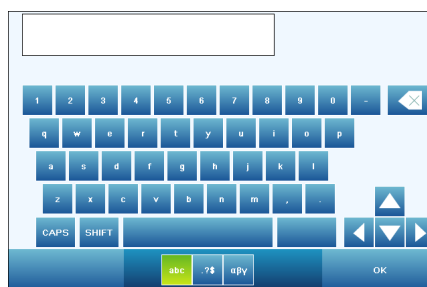
## Returning to the Home screen

- 
- Touch the **Home** button to close a SPARKlab and return to the Home screen.



## Entering text and numbers using the on-screen keyboard

The on-screen keyboard opens when the SPARK is ready to accept text or number input.



- 
- To enter capital letters, touch **CAPS** or **SHIFT**.

- To enter punctuation and other symbols, touch the **Punctuation** button.



- To enter Greek letters, touch the **Greek Letters** button.



Touch **CAPS** or **SHIFT** to switch between lowercase and uppercase Greek letters.

- To enter subscript and superscript numbers, use the number keys on the Greek keyboard. Touch **CAPS** or **SHIFT** to switch between subscript and superscript.
  - To start a new line, touch **RETURN**.
  - When you have finished entering text or a number, touch **OK**.
- 

## Creating a new folder

When you save, move, or copy a file, you will see the option to create a new folder. Complete these steps to create a new folder.

- 
1. Touch the existing folder that will contain the new folder.  
You can skip this step if you are creating a new folder on a USB flash drive (or other USB storage device).
  2. Touch **New Folder**.
  3. Enter the name of the new folder.
- 

A new folder is created.

## Reactivating the SPARK Science Learning System when it is in sleep mode

If the SPARK has received no input for several minutes, it may go into sleep mode. To reactivate it, do one of the following:

- 
- Touch the screen.  
This will reactivate the SPARK only if it is in Screen Sleep mode. See “About sleep modes” on page 73.
  - Press and hold the power button.

- Press one of the record buttons.  
If the SPARK is in Screen Sleep mode, this will also cause it to start or stop data recording or keep a data point.
- 

## Turning off the SPARK Science Learning System

- Press and hold the power button on the bottom of the SPARK.
- 

## Opening the About SPARK screen

1. Touch the **Date/Time/Battery** icon to open the Device Tools screen.



2. Touch **About SPARK** to view information about the firmware version installed on the SPARK.
-



# Managing the device

## Setting the language

- 
1. Touch the **Date/Time/Battery** icon to open the Device Tools screen.



2. Touch **Languages**.
  3. Touch the **Languages** box and select a language.
  4. Touch **OK**.
  5. Touch **Done**.
  6. Turn the SPARK off and on again.
- 

## Updating the SPARK Science Learning System

- 
1. Check the firmware version installed on the SPARK:
    - a. Touch the **Date/Time/Battery** icon to open the Device Tools screen.



- b. Touch **About SPARK**.
2. Visit [www.pasco.com/spark](http://www.pasco.com/spark) to check for the latest update.
  3. Follow the instructions on the website to download and install the update.
  4. Also check for the latest version of this user's guide on the website.
-

## Charging the battery

1. Connect the SPARK to the AC Adapter.



2. Connect the AC Adapter to a wall outlet.

---

The battery begins to recharge.

## How battery status is indicated

When the SPARK is turned on, the **Battery** icon indicates battery status.

Battery icons: full, low, and nearly empty



When the SPARK is connected to AC power, the status light indicates battery status:

**Constant green**

fully charged

**Flashing green**

battery sleep mode

**Constant red**

low battery

**Flashing red**

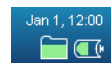
charging





## Setting the date and time

1. Touch the **Date/Time/Battery** icon to open the Device Tools screen.



2. Touch **Set Date & Time** to open the Set Date & Time screen.
3. Set the date, time, and time zone.
4. Touch **OK**.
5. Touch **Done**.

## About sleep modes

There are two types of sleep mode that the SPARK may go into to conserve battery charge:

### Screen Sleep mode

Screen Sleep mode occurs when the SPARK is running on battery power and has received no user input for a certain amount of time. The screen goes dark, but the SPARK will continue to record data (if it is recording). If the SPARK is recording data, the record buttons continue to flash blue.

### Battery Sleep mode

Battery Sleep mode occurs when the SPARK is running on battery power, has received no user input for a certain amount of time, *and* is not recording data. The screen goes dark and power to the sensors is cut off. The status light flashes green.

Status light



## Customizing sleep modes

Complete these steps to set the amount of idle time that will elapse before the SPARK goes into each type of sleep mode:

- 
1. Touch the **Date/Time/Battery** icon to open the Device Tools screen.



2. Touch **Display Settings** to open the Display Settings screen.
  3. Touch the **Screen Sleep Time (Battery) [minutes]** arrows to adjust the idle time for Screen Sleep mode.
  4. Touch **OK**.
  5. Touch **Power Settings** to open the Power Settings screen.
  6. Touch the **Battery Sleep Time [minutes]** arrows to adjust the idle time for Battery Sleep mode.
  7. Touch **OK**.
  8. Touch **Done**.
- 

## Adjusting the screen brightness

- 
1. Touch the **Date/Time/Battery** icon to open the Device Tools screen.



2. Touch **Display Settings** to open the Display Settings screen.
3. Touch the **Screen Brightness** arrows to adjust the screen brightness.

4. Touch **OK**.
  5. Touch **Done**.
- 

## Calibrating the touch-screen

- 
1. Hold down both record buttons and touch the screen three times.  
The first of a series of green boxes appears.
  2. Touch the center of each green box.
  3. Touch **OK**.
- 

## Product End of Life Disposal Instructions

This electronic product is subject to disposal and recycling regulations that vary by country and region. It is your responsibility to recycle your electronic equipment per your local environmental laws and regulations to ensure that it will be recycled in a manner that protects human health and the environment. To find out where you can drop off your waste equipment for recycling, please contact your local waste recycle/disposal service, or the place where you purchased the product.

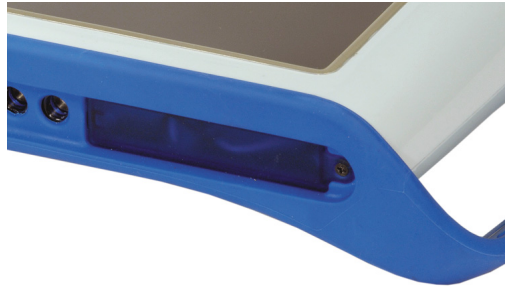


The European Union WEEE (Waste Electronic and Electrical Equipment) symbol (above) and on the product or on its packaging indicates that this product *must not* be disposed of in a standard waste container.

## SPARK Battery Replacement and Disposal Instructions

**Removal/Replacement- Tools required: #0 or #1 Phillips screw driver.**  
Remove the single screw holding the battery door (see figure), and remove the

battery door from the SPARK. Disconnect the battery cable, and slide out the Li-Poly battery pack. Reverse these instructions to replace the battery.



**Battery Disposal-** Batteries contain chemicals that, if released, may affect the environment and human health. Batteries should be collected separately for recycling, and recycled at a local hazardous material disposal location adhering to your country and local government regulations. To find out where you can drop off your waste battery for recycling, please contact your local waste disposal service, or the place where you purchased the product.



The Lithium Polymer (Li-Poly) rechargeable battery used in this product is marked with the International symbols (above) to indicate the need for the separate collection and recycling of batteries.

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