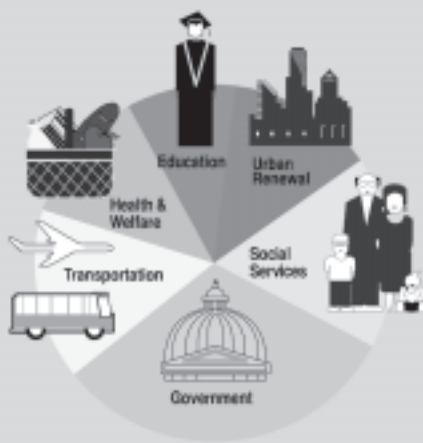


Survey Research

GRADE 8



OVERVIEW

Concerns about current issues and the study of statistics come together in this unit on survey research.

Students analyze examples of surveys to identify their key features. From a critical question (research question) based on a class theme, pairs of students generate survey questions and conduct their research. Examining the data they collect, students design graphic displays, draw conclusions, and are challenged to present their findings in unique ways.

This unit features the use of technology to record and present data. The outcomes addressed are from the Grade 8 math curriculum.

Unit Goals

In this unit, students can:

- analyze examples of surveys to understand how to ask questions, make predictions, and identify bias
- identify the purpose of different surveys and who will benefit from the data that is gathered
- learn why it is important to conduct surveys ethically
- design and conduct a survey focused on a research question
- use appropriate methods and technologies to collect, tabulate, and conduct statistical analysis
- present conclusions using poster charts, overheads, or computer presentations

Notes

Approximate time: six to seven hours of instructional time.

Teachers may want to adapt this unit so that it addresses all of the outcomes in the data analysis section of the Mathematics 8 curriculum.

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Plan the Research	page 6
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BRITISH
COLUMBIA

Ministry of Education
Education Technology Branch

WHAT THE UNIT OFFERS

Lessons	Approximate Time	Curriculum Connection
<p>1. DEVELOP THE CONTEXT</p> <p>Students analyze examples of survey research to identify the features. Students consider the purposes behind the development of surveys and the processes used in the research.</p>	<p>one 45-minute classes</p>	<p><i>Mathematics</i></p> <ul style="list-style-type: none"> • formulate statistical questions for investigating real-world situations • select, use, and defend appropriate methods of collecting data <ul style="list-style-type: none"> – design and use surveys – research using a range of media • select, use, and defend appropriate methods of displaying data • present analyses and conclusions based on displayed data • determine and use the most appropriate measure of central tendency in a given context • identify bias in data presentations
<p>2. PLAN THE RESEARCH</p> <p>The class considers various themes for their research projects. They clarify the requirements of the research task and consider how spreadsheets can help them in their research.</p>	<p>three 45-minute classes</p>	
<p>3. GATHER INFORMATION</p> <p>Students conduct their research, enter their information into a spreadsheet, and make final adjustments to their spreadsheets and plans.</p>	<p>two 45-minute classes</p>	
<p>4. INTERPRET AND REFINE</p> <p>Students articulate their findings, draw conclusions, and prepare presentations.</p>	<p>one 45-minute classes plus homework time</p>	
<p>5. SHARE INFORMATION</p> <p>Students create, display, and defend their presentations.</p>	<p>two 45-minute classes</p>	
<p>6. THINK BACK, THINK AHEAD</p> <p>Students compile a file of their work in the unit, reflect on their findings, and set new goals for future learning.</p>	<p>one 30-minute class</p>	

Research Emphases*	Technology Opportunities	Assessment
<p>➔ FOCUS</p>	<p>Using software to protect privacy Using the Internet to research ethics in research Keyword searches Webbing using Inspiration</p>	
<p>➔ FOCUS</p>	<p>RS 1: Technology Focus: Using Spreadsheets in Surveys (page 18) RS 2: Technology Focus: Survey Example (page 19) Using a word-processing program to create and update plans</p>	
<p>➔ FIND AND FILTER</p>	<p>Using e-mail to conduct a survey Using a spreadsheet program to create a data-collection sheet</p>	
<p>➔ WORK WITH THE INFORMATION</p>	<p>RS 1: Technology Focus: Using Spreadsheets in Surveys (page 18) RS 2: Technology Focus: Survey Example (page 19) Using a word-processing program to present conclusions</p>	
<p>➔ COMMUNICATE</p>	<p>Incorporating a feedback feature into a web page Using presentation software to enhance presentation Using clip art, creating graphics</p>	
<p>➔ REFLECT</p>		<p>Teacher: RS 7: Survey Research Rating Scale (page 27) Teacher: RS 8: Using Spreadsheets in Surveys Rating Scale (page 29)</p>

*Based on BCTLA's Research Quest developed in 2000.

1. DEVELOP THE CONTEXT

In this lesson, students analyze examples of survey research to identify the predictions made, sample used, graphic displays presented, and conclusions made. Students summarize their findings to consider the purposes behind the development of surveys and the processes used in the research.

Think About Surveys

Students recall what they know about Internet surveys and consider ethics of research.

- Ask students to think about the different ways that people are surveyed on the Internet. (e.g., They may be asked directly to fill out a form, or they indirectly surveyed by software that tracks what they look at when they are on-line.)
- Ask: "Why are web site owners interested in collecting this information? Is it ethical to gather information about people without their knowledge?"



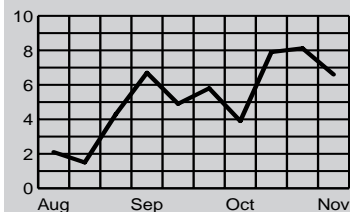
GET ON - LINE

To find out more about ethics and other aspects of survey research, visit the ministry's web site, www.bced.gov.bc.ca/technology/6-9.htm, and click on Sample Units.

Examine Surveys

Students use a form provided to guide their analysis of examples of survey research.

- If possible, have students locate and bring to class examples of surveys from newspapers, magazines, government publications, and the Internet.
- Alternatively, locate and provide one or more examples of survey research for the class to analyze.
- Invite small groups to select one of the examples to analyze. Provide each group with a copy of RS 3: Survey Analysis to guide their analyses.



Technology Opportunities

You could have students investigate software that protects your privacy by letting you know if you are being tracked when you visit particular web sites (e.g., freeware from Internet Explorer called Privacy Companion).

Some students might use the Internet to find out more about the importance of ethics in research.

If you ask students to locate examples of surveys on the Internet, this lesson is an opportunity to work on developing keyword search abilities.

Research Process

➔ Focus

Find and Filter
Work with the Information
Communicate
Reflect

Summarize Ideas

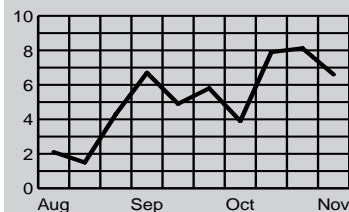
Groups of students present their analyses of a research study by addressing a set of given questions:

- Who sponsored the survey? For what reasons might the sponsor have conducted this survey?
- Were there any predictions made about the results? What were they?
- What did you notice about the questions asked? Are there any other questions you would have asked if you were doing the survey? Are there any questions that are “questionable” (e.g., unethical, biased, leading)?
- Are the conclusions logical and supported by the data?
- Did you notice any evidence of bias in the data presentation?
- Was there any part of the research you would have done differently?
- Do you notice any general themes in the surveys? (e.g., Are they mostly about media, politics, lifestyles, beauty, advertising, or dress codes?)
- For what purposes do people tend to do survey research—what generalizations can you make about survey research?
- Who will benefit from the information that has been gathered?



GET ON - LINE

To find suggested Internet sites on lesson plans for mathematics, visit www.bced.gov.bc.ca/technology/6-9.htm, and click on *Sample Units*.



Technology Opportunities

Students could use Inspiration to present their ideas in a non-linear format.

Research Process

➡ Focus

Find and Filter

Work with the Information

Communicate

Reflect

2. PLAN THE RESEARCH

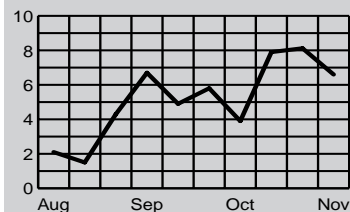
In this lesson, students work as a class to consider various themes for their research projects. They clarify the requirements of the research task. They also consider how spreadsheets can help them in their research.

Then students work in pairs to select or develop a research question (critical question) related to the theme chosen by the class and develop survey questions.

Decide on a Theme

Students select a theme around which they develop their research studies.

- Have students brainstorm some possibilities for themes. For example:
 - Media
 - Food
 - Lifestyles
 - Politics
 - Travel
- Discuss current issues and concerns related to each of the themes. Then brainstorm critical questions for the two or three themes that students identify as the most appealing. As a class, make a final decision on a theme for their research projects.



Technology Opportunities

RS 1: Technology Focus: Using Spreadsheets in Surveys suggests a way to introduce students to the value of spreadsheets in the survey research process.

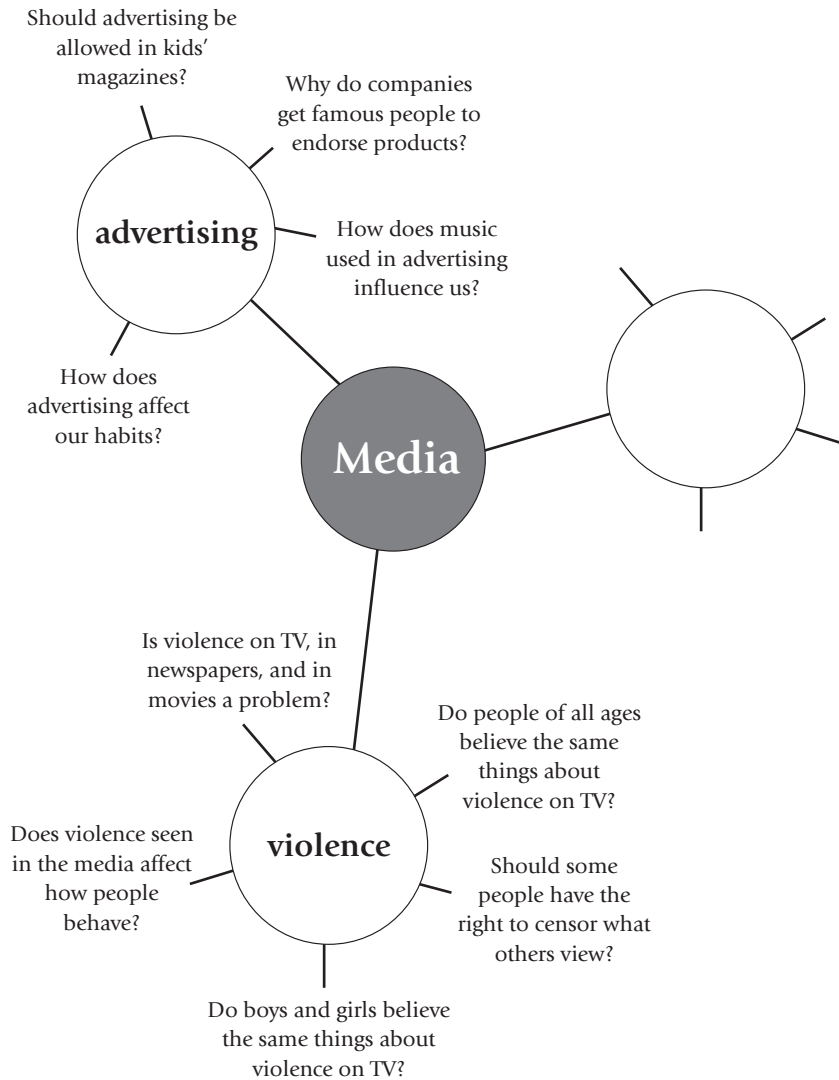
RS 2: Technology Focus: Survey Example is an example that works through the basic steps of using a spreadsheet to record data and present it in graphic form.

Research Process

➡ Focus

*Find and Filter
Work with the Information
Communicate
Reflect*

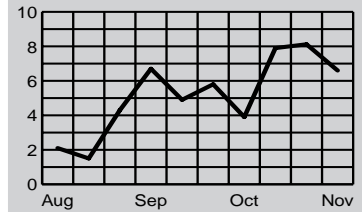
Brainstorming Critical Questions



Clarify the Research Task

Students discuss how they will approach their research tasks.

- Discuss the need for validity, reliability, and the use of ethical practices in their research.
- Explain that to ensure relatively valid statistical results, they need to include at least 30 people in their sample.
- Explain that the sample should be random to ensure reliability of the information gathered. (In a random sample, each member of a population has



Technology Opportunities

Research Process

➔ Focus

Find and Filter
Work with the Information
Communicate
Reflect

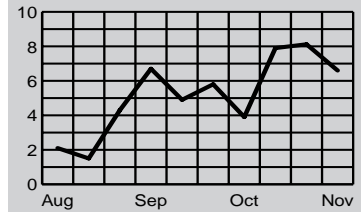
the same chance of being picked. If each member within a population does not have an equal chance of being picked, the sample is biased.)

- Ask: "How many questions should you ask? How do you decide how many?" Explain that they should ask at least five questions of each participant.
- Ask: "How do you plan to conduct your research—by asking subjects to complete a written questionnaire, interviewing people face to face, or interviewing people on line via an e-mail survey?" Discuss the benefits and limitations of each.
- They need to plan their questions so that they result in data that can be analyzed by calculating either mean, median, or mode. They should also include a comparison in their research (e.g., compare responses by gender), and present data in a graphic format.
- Discuss editing and improving their work. For example, explain how using field test results can help them improve their questions. Suggest that they field test their questions by asking at least four people to respond to the survey and then use the findings to improve the questions. Also explain how to review their questionnaires and procedures for ethical considerations.
- On an overhead or using handouts, show students RS 7: Survey Research Rating Scale and RS 8: Using Spreadsheets in Surveys Rating Scale to clarify how their work will be evaluated.

Develop Survey Questions and Individual Plans

Students develop research plans.

- As a class, review and discuss RS 4: Research Plan. Explain that you would like students to work in pairs to create a research plan for your review. Tell them that although they may need to adjust this plan as they work, it is important to focus their work by starting with a plan.
- Point out to students that before they complete the plan, they need to work together to develop their survey questions. Remind them that the questions they develop must produce data that can be manipulated in the ways outlined in the requirements for the project (i.e., mean, median,



Technology Opportunities

Have students show their edits in colour or use a tracking feature in order to demonstrate what they did to improve their questions. If you are unable to get colour printouts to review, students can underline changes.

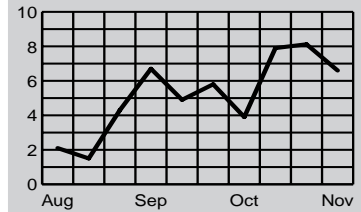
Research Process

➔ Focus

*Find and Filter
Work with the Information
Communicate
Reflect*

or mode; comparison). Suggest that they follow this process:

- articulate their research question (i.e., the critical question that the findings of the research will answer)
 - brainstorm as many survey questions as they can that relate to the research question and enter them into a word-processing document
 - narrow down the number of survey questions by revising, combining, and deleting questions
 - answer the survey questions themselves and compare the answers with their partners' answers
 - explain how each survey question relates back to the research question
 - try the survey questions out on at least four other students
 - edit the survey questions
- Once students have developed their survey questions, they can go on to complete their plans.



Technology Opportunities

Students could enter the headings from RS 4: Research Plan into a word-processing file. They could then date changes (or use a tracking feature) to record how their plans changed during the project.

NOTES ABOUT SAMPLES

Remind students that the way they collect the data can influence the conclusions they can draw. A sample can give misleading results. If they are unfamiliar with this idea, provide them with examples where faulty conclusions may have been drawn because of the size or nature of the sample taken. For example:

- A chocolate exporter tested the quality of a shipment of products by opening one case and checking his favourite, the middle chocolate on the top layer of one box. The chocolate was fine, so he decided that the whole shipment was fine. Was this a reasonable conclusion?
- A survey asked parents and grandparents questions about clothing styles for teenagers. The results reported that teenagers preferred to wear uniforms to school and colourful leisure suits for shopping. Were these reasonable conclusions?
- One survey asked a group of 15-year-olds if they found the Internet a good way to meet friends. A second interview asked a group of 65-year-olds the same question. Why might the two surveys point to very different conclusions?

Research Process

➡ Focus

Find and Filter

Work with the Information

Communicate

Reflect

3. GATHER INFORMATION

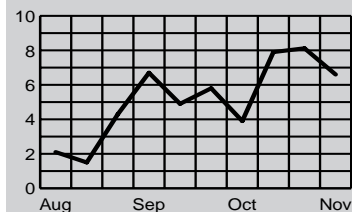
In this lesson, students conduct their research, enter their information into a spreadsheet, and make final adjustments to their spreadsheets and plans.

Conduct the Research

Students finalize their research plans and conduct the research.

- Ask students to think about how they might get different results if they collect data by talking directly to people, as compared to asking them to fill out an electronic or print questionnaire. Why might they get different results? What are the pros and cons of each approach? They might also consider what the difference would be if the survey was done anonymously instead of the person putting his or her name on it.
- Have two pairs of students work together to check over each others' data-collection tools (i.e., questionnaire, record sheet, or on-line survey) and to explain to each other how they are going to make their contacts and keep track of the paper flow and/or electronic files.
- Review for students the appropriate way to approach people in the school or community when doing the research. Develop some guidelines if students are going to use e-mail to collect their data. For example, they will only want to contact people they know.
- Consider having the class make a chart to brainstorm guidelines for conducting the research. For example:

Conducting Research	
Good Ideas	Not-So-Good Ideas
Tell those you want to participate exactly what you are doing and why you are doing it.	Make up on-the-spot instructions for completing the survey.
Do not disturb other classes.	Bug people to help.
Be polite.	Ask a person after they have said no.



Technology Opportunities

Students could be encouraged to see what it is like to conduct a virtual interview by developing a questionnaire that is completed by e-mail.

If students plan to interview people, they can use a spreadsheet program to create record sheets for recording responses. They design the spreadsheet as they plan for entering data, then adjust the cell sizes so that they have room to write in the cells when the page is printed out. The data collected can then be transferred to the electronic file.

Research Process

Focus

Find and Filter

Work with the Information
Communicate
Reflect

4. INTERPRET AND REFINE

In this lesson, students articulate their findings, draw conclusions, and prepare presentations.

Plan the Tabulation and Display of Data

Students do some preliminary work before entering their data.

- Once students have gathered their data, ask them to review their plans for tabulating and displaying it before they do their full tabulation. Ask them to try a few samples to see if:
 - their spreadsheets will work as they planned
 - the method of calculating central tendency that they chose still seems to be appropriate
 - they will be able to create the graphs they planned to create
- As a class, discuss any problems they are having. Ask students to identify whether the problems are arising from the research or from the technical aspects of the project. Encourage other students to offer solutions based on their own experiences.
- You may also need to provide individual support to some students and/or work through common problems as a class (e.g., using an LCD projector).

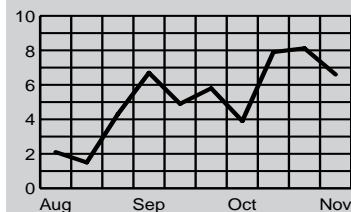
Analyze Information

Distribute copies of RS 6: Analysis of Findings. As a class, discuss the information required and the reasons why this information is important. Then ask students to work in their pairs to complete the sheet. Remind students to put all information in their own words.



GET ON - LINE

To find out more about how data is represented and can be misrepresented, visit the ministry's web site, www.bced.gov.bc.ca/technology/6-9.htm, and click on Sample Units.



Technology Opportunities

If you did not use RS 1: Technology Focus: Using Spreadsheets in Surveys and RS 2: Technology Focus: Survey Example as suggested in Lesson 2, you may find them useful now.

Students could enter the headings from RS 6: Analysis of Findings into a word-processing file.

Research Process

Focus

Find and Filter

➡ **Work with the Information**

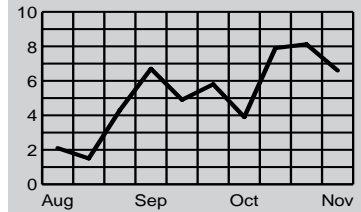
Communicate

Reflect

Plan Presentations

Students discuss options to make presenting their findings interesting.

- They might hold a class fair where they invite another class, parents, or interested community members to observe and participate. Students can use the chosen theme to help them design invitations.
- They could simulate a media event where volunteers present their findings while other students role-play reporters and ask questions about each research presentation.
- They could develop a class report or magazine article that discusses the issues related to the theme and presents the findings of each of the studies.
- They could go hi-tech and put students' findings on the school web site.
- They might make other interesting suggestions.



Technology Opportunities

Research Process

Focus

Find and Filter

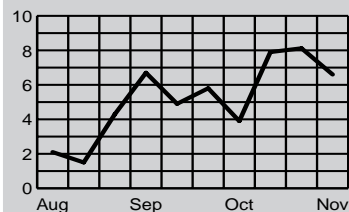
➡ **Work with the Information**

Communicate

Reflect

5. SHARE INFORMATION

In this lesson, students create, display, and defend their presentations.



Technology Opportunities

If students choose to present their findings by means of a web site, they can create a space for feedback, where other students are encouraged to post comments and suggestions.

If students are comfortable with the basics of working in spreadsheets, they could enhance their presentations with clip art or graphics.

Individual Plans for Presentations

Pairs of students make specific plans for a way to present their conclusions.

- Remind students that their ideas must fit with the overall class plan for presentation.
- Suggest ways the students might show their surveys, results, and graphs to the class. For example, students might:
 - print out the documents they have created (e.g., survey questions, plans, data analyses, graphs), paste them on poster board, and display them around the classroom for easy viewing by others
 - create overhead or slide-show presentations
 - insert their documents (or portions) into PowerPoint or HyperStudio to create presentations

If students are going to present their work to others orally, have pairs rehearse by presenting their conclusions and defending them to a group of peers. Provide the groups of peers with small cards or pieces of paper. Have the peers write one commendation and one suggestion for improvement about each of the following: the sample, the graphic display, the conclusions, the limitations.

Research Process

Focus

Find and Filter

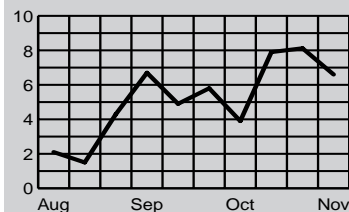
Work with the Information

➡ **Communicate**

Reflect

6. THINK BACK, THINK AHEAD

In this lesson, students compile a file of their work in the unit, reflect on their findings, and set new goals for future learning.



Technology Opportunities

Self-Assessment

Have the pairs of students put together a file of their work to demonstrate that they can do the following:

- state a research question that requires a comparison
- identify an appropriate population to survey
- make a logical prediction about the findings
- ask questions that clearly and ethically address the research question
- use technology to record and present information
- use appropriate statistics (e.g., know when to use mean, median, or mode to interpret the data)
- use appropriate methods to display the data (e.g., graphic displays have complete titles, legend, and labels and are accurate, precise, and easy to read)
- identify bias in data presentations
- clearly and logically communicate analyses and conclusions based on the data

Unit Evaluation

RS 7: Survey Research Rating Scale and RS 8: Using Spreadsheets in Surveys Rating Scale provide a convenient way to record your evaluations of student performance in this unit.

Reflect on Findings

Students discuss what they learned.

- After students have completed their files of work, ask them what they learned about the theme as a whole.
- Ask questions such as:
 - What surprised you?
 - Were any ideas you had earlier confirmed by the findings?
 - What new questions do you have about your topic?
 - What new goals will you set for the next time you do research?

Research Process

Focus

Find and Filter

Work with the Information

Communicate

➡ **Reflect**

VARIATIONS

Political Campaign

To illustrate the concept of using surveys to gauge public opinion, a class could undertake a political campaign. Two fictitious political parties could be formed, complete with a leader, a cabinet, and some political advisors. Students could also be asked to play the roles of reporters, members of the public, and a polling agency. The political parties would be asked to develop a platform around issues of importance to the class. The polling agency would then be responsible for interviewing members of the public on a regular basis, to see how they are responding to each of the campaigns. The results would be reported out on a regular basis by members of the media.

The class could be asked to make predictions, prior to election day, about which political party they think will be successful.

Following election day, students could be asked to analyze and illustrate the results and to consider whether polling members of the public throughout the campaign made a difference to the election outcome.

School Exchange

To explore the idea of using the Internet as a survey tool, teachers could see if a Grade 8 class in another school would be interested in exchanging some on-line interviews. This idea could be extended to include a class that is in another district, at the other end of the country, or even in another country.

Students would then create some survey questions that the students in the other school would respond to by e-mail, and vice versa. Predictions would be made and data collected and analyzed.

The findings could be presented on a web site so that the other school would be able to access the results and the interpretations.

Students could be asked: "What special challenges did you face when you were trying to gather data through virtual interviews? How did you verify who had actually completed the questionnaire? Do you think you would have had a higher response rate if you were conducting your interviews in person?"

RESOURCE SHEETS

RS 1: Technology Focus: Using Spreadsheets in Surveys

RS 2: Technology Focus: Survey Example

RS 3: Survey Analysis

RS 4: Research Plan

RS 5: How to Present Data

RS 6: Analysis of Findings

RS 7: Survey Research Rating Scale

RS 8: Using Spreadsheets in Surveys Rating Scale



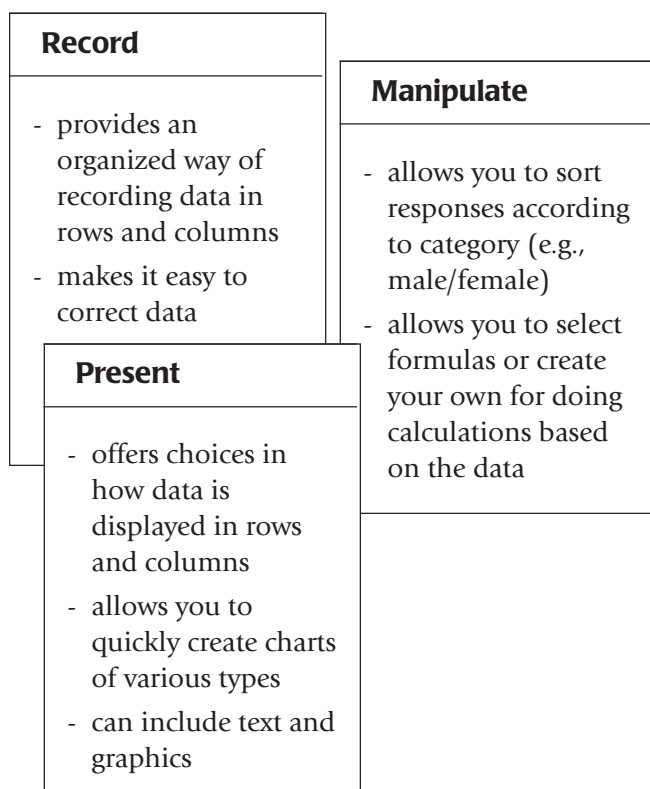
RS 1: TECHNOLOGY FOCUS: USING SPREADSHEETS IN SURVEYS

This unit assumes that students are familiar with what spreadsheet programs are used for and are able to open and close a spreadsheet file and do basic manipulation of cells.

Spreadsheets are an efficient way for students to record, manipulate, and present data collected in surveys.

Review as a class what students know about spreadsheets. Ensure that they are familiar with the concepts of data cells and formulas.

- Discuss ways in which they think a spreadsheet can help them record, manipulate, or present data in their survey research projects. Build on students' knowledge by explaining features as required (e.g., students may not have seen spreadsheets that include charts). You might develop a class organizer similar to the following:



- Unless students have had previous experiences in this type of project, have them work through a simple example of how you use a spreadsheet to sort data, calculate mean, and create a bar graph. You could work through a sample as a class, either on overheads or using an LCD projector. Alternatively, students could work through the example individually or in pairs and then discuss what they found as a class. RS 2: Technology Focus: Survey Example illustrates some of the key skills and concepts required for using spreadsheets to record, manipulate, and present data. This is a simple example, based on one question. The actual spreadsheet features used by your students will depend on their level of experience, the hardware and software available, and the scope of their projects.
- Then focus on the mathematical aspects of the task. Discuss with the class the use of mean, median, and mode with different sets of data and for different purposes (e.g., grades on a test, bowling scores, population density). Most spreadsheet programs have functions for specific calculations, but you may want to discuss with students what the underlying formulas are. Have students then alter the sample to calculate median and then mode.
- Finally, invite students to experiment with the various graph types offered in the spreadsheet program. After they have had time to do this individually or with a partner, discuss which types might be most relevant to their purposes. RS 5: How to Present Data includes some information that may help with this discussion. (Bar graphs are usually most relevant to survey projects.)

RS 2: TECHNOLOGY FOCUS: SURVEY EXAMPLE

This resource sheet illustrates some of the key skills and concepts required to use a spreadsheet to record, manipulate, and present survey data. The examples shown are based on a simplified survey on Grade 8 fitness that consists of one question only.

The spreadsheet features discussed are:

1. setting up a table for entering data
2. sorting by one characteristic (student/parent)
3. using the AVERAGE function to calculate the mean
4. selecting a chart type to display the results of a calculation
5. making simple modifications to graphs to enhance the display

The program used was Excel 2000. The specific commands may vary with other versions of Excel and with other programs, but the basic steps are the same.

This explanation assumes a basic understanding of how to enter data in a spreadsheet and how formulas work. Excel 2000 has an extensive Help feature that can be used to locate the various features and options described here if they are not obvious in the menus or toolbars.

The Critical Question: Who is most fit—students or parents?

Survey Question: How many hours of vigorous exercise do you get in a week (break into a sweat)? Round responses to the nearest half hour.

Sample: All students in Grade 8 in our school and their parents.

1. Setting Up a Data Table

- Begin by writing a title for the spreadsheet in a cell at the top of the file. The cell will expand to include the text. Use additional cells for any other information that would help make the survey understood.
- Set up the rows and columns appropriate for your raw data. The program will automatically figure out when you are entering text and when you are entering numbers in a cell.
- Label this table Raw Data. In the example shown here, the S/P category (for student/parent) and the Hours category are essential for the desired calculations. The names just help keep track of who has been surveyed. The Border feature has been used to draw lines to show the grid. The Format feature has been used to make both the title and the table label bold.
- Under the Edit feature, landscape page layout has been selected and the top margin reduced to one inch to ensure that the file tables and graphs can be printed out on an 8.5 x 11 sheet.

Grade 8 Fitness Survey Results
Question: How many hours per week do you spend in strenuous exercise (break into a sweat)?
Responses rounded to nearest half hour.

Raw Data

Name	S/P	Hours
Jim	S	0
Mario	S	2
Clara	P	2.5
Arno	S	4
Lois	P	2
Gerdeep	P	1
Colin	S	3.5
Alana	P	0
Raven	P	3
Sam	S	4.5
Helena	P	2
Cora	P	2.5
Harmic	P	1
Ravi	S	0
Howard	S	3
Gerta	P	1.5
Eric	S	5.5
Sam	S	2
Lazlo	S	1.5
Mia	P	3.5
Jennifer	P	0
Santok	S	2
Lionel	S	1
Francois	P	1
Sanyi	S	0
Mo	S	2

Format: Bold
Border

continued...

RS 2: TECHNOLOGY FOCUS: SURVEY EXAMPLE ...continued

2. Sorting

- Once data has been entered into the table, a simple way to get the information you need to compare student and parent responses is to sort the table by student/parent. You can do this with the original table, but it is usually a good idea to keep a separate record of the data as it was recorded and do manipulations on a copy.
- Copy the entire table and place it beside the original. (This is done by using the pointer to select the cells and choosing the Copy option under the Edit feature.) Then select the entire second table.
- Next, choose the Sort option under the Data feature. This offers a choice of sorting by the different headings for each column. Choose S/P. The data will rearrange itself so that all the parents are grouped in a continuous sequence of cells, followed by the students.

Grade 8 Fitness Survey Results

Question: How many hours per week do you spend in strenuous exercise (break into a sweat)?

Responses rounded to nearest half hour.

Sorted by Parent or Student

Name	S/P	Hours
Clara	P	2.5
Lois	P	2
Gerdeep	P	1
Alana	P	0
Raven	P	3
Helena	P	2
Cora	P	2.5
Harmic	P	1
Gerta	P	1.5
Mia	P	3.5
Jennifer	P	0
Francois	P	1
Siso	P	3.5
Delia	P	2
Sharon	P	0
Kathleen	P	3.5
Jim	S	0
Mario	S	2
Arno	S	4
Colin	S	3.5
Sam	S	4.5
Ravi	S	0
Howard	S	3
Eric	S	5.5
Sam	S	2
Lazio	S	1.5

3. Calculating Mean

- The mean of a range of numbers can be calculated by using the AVERAGE function in the spreadsheet program. To do this, decide on an area on the page where you would like to display the results of your calculations. In this space, enter a label for each calculation in a cell. In the cell beside it, enter the formula in the correct format.

The formula includes the range of cells to be used in the calculation. For example, to find the mean of the values in cells G8 to G23, the formula would look like this:

=AVERAGE(G8:G23)

Once you press Enter, the cell will contain the results of the calculation. There are also functions for MEDIAN and MODE that work in the same way.

- In the following example, the formula has also been written out in the cell beside the one that does the actual calculation. This is just to clearly display what the calculations are. So that the program doesn't interpret this information as a formula, it has been written without the initial equals sign that indicates the beginning of a formula. For clarity, the calculations and explanations have been put in a box and the label made bold.

Calculation of Mean By Population (Students and Parents)

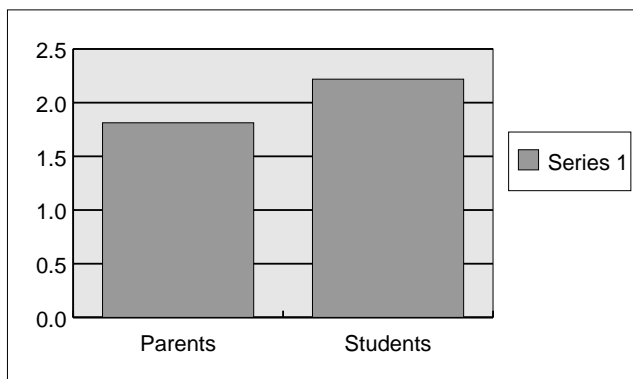
Parents	1.8125	AVERAGE (G8:G23)
Students	2.21875	AVERAGE (G24:G39)

continued...

RS 2: TECHNOLOGY FOCUS: SURVEY EXAMPLE...continued

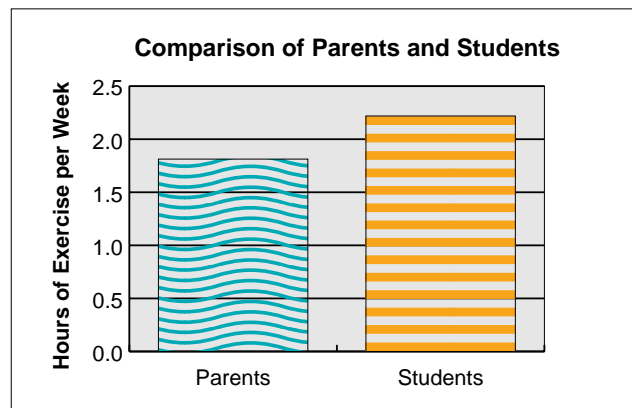
4. Creating a Bar Graph

- The Charts feature allows you to display data in a variety of formats. You can use this feature to create a bar graph comparing the mean for parents and students.
- The first step is to select cells that you want included in the graph. In this example, it is the “parents” and “students” labels, plus the formula boxes.
- Once you have selected the cells to display in a graph, the next step is to select the Chart feature. This will give you a visual display of different types of charts. In the sample here, the Columns option was selected. A chart is automatically created.
- The chart can then be moved to a suitable location on the spreadsheet and made larger or smaller to suit needs.



5. Enhancing the Display

- As shown, the basic chart created by the program rarely meets the needs of a meaningful display. The Chart Options feature offers a variety of options such as adding or deleting labels, using colour and patterns, and changing the grid.
- In the following sample, the basic chart was modified in these ways to make a clear chart that could print out in black and white.
 - The Chart Options feature was used to add a title to the graph and to label the Y axis. To get to the Chart Options, first click on the chart, then on the Chart feature.
 - The legend (Series 1) in the original was selected and deleted.
 - Each of the columns was given a different pattern. This is done by double clicking on the column. A window then appears that offers you the choice of a variety of colours and fill patterns.



- If you want to use colour to distinguish between the two columns, then do not delete the legend (Series 1). Instead, double click on the columns to give each a colour. A legend that labels each colour correctly will automatically be created. You can then delete the labels on the X axis.

RS 3: SURVEY ANALYSIS

Name: _____ Date: _____

Survey Title: _____

Survey Form: paper questionnaire (_), telephone survey (_), interview (_), on-line (_)

Who sponsored the survey?	
What were they trying to find out? What is the critical (research) question they are pursuing?	
What sample was used (who are they asking and how many of each population are they asking to do the survey)?	
What predictions did they make about the results?	
What types of graphic display were used to present the results? Were they clear and easy to read?	
Did you notice any evidence of bias in the data presentations?	
What conclusions were drawn from the data? Did they respond to the research question and relate to the survey population?	

RS 4: RESEARCH PLAN

Names: _____ Date: _____

Our research (critical) question is:

Our survey questions are:

Our sample will be:

Our reasons for selecting this sample are:

continued...

RS 4: RESEARCH PLAN...continued

Our predictions about the findings are:

The graphs we will use to display our findings are:

Our reasons for using these graphs are:

Our method(s) of calculating central tendency will be (mean, median, mode) because:

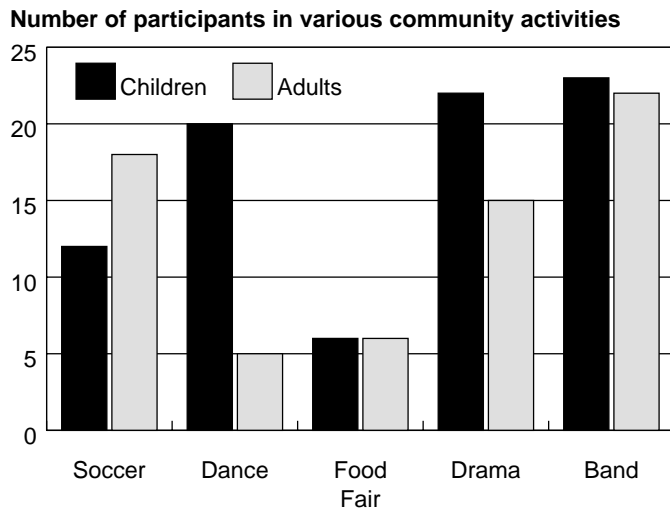
We have attached a printout of the spreadsheet design we plan to use.

RS 5: HOW TO PRESENT DATA

Graphs are a good way to present data in a visual way so that it is easier to see big ideas and patterns. Here are four kinds of graphs to help you display your data.

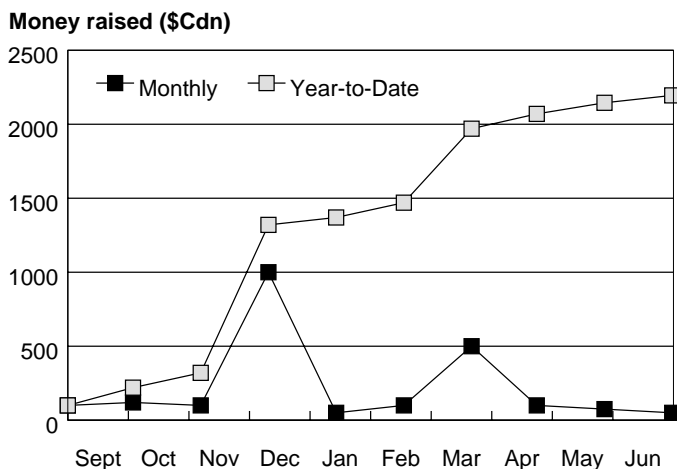
Bar graph

Bar graphs are useful for comparing two or more sets of statistics. For example, the bar chart below compares the number of children to the number of adults that participate in various community activities.



Line Graphs

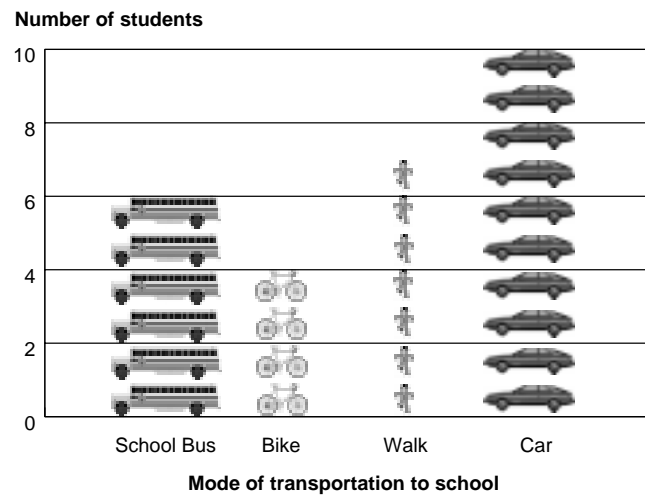
Line graphs compare two variables and are good for showing how something changes over time. The line graph below shows two things: (1) how much money has been raised by the school on a monthly basis, and (2) how much money has been raised over the duration of the school year.



Pictograph

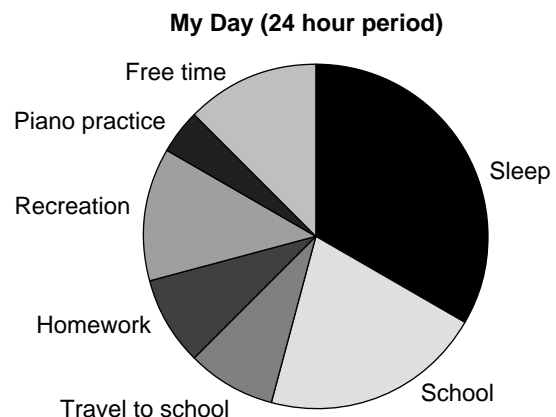
A pictograph makes a bar graph more interesting by clearly illustrating the main idea of your topic.

For example, the graph below illustrates the different ways that students use to get to and from school. The different means of transportation are illustrated not only numerically but also by different icons.



Circle or Pie Graph

Circle or pie graphs are different from the three previous graphs in that they don't plot data on horizontal and vertical axes. Instead, pie charts are used to display percentages and to compare the different parts that make up a whole. The pie chart below illustrates how one student divides up the 24 hours in one day.



RS 6: ANALYSIS OF FINDINGS

Names: _____ Date: _____

Conclusions

Summarize what you found out about *each* of the survey questions you asked.

Interpretation

Interpret your findings by writing jot-notes or paragraph answers to these questions.

- What do the findings mean? (What “big ideas” do these findings tell you about your main research question?)

- Are there any surprises? How did your findings compare to the predictions you made prior to conducting the survey?

- Was there some part of the questionnaire or the way that the data was collected that could account for any differences?

- What were the limitations of the study? (i.e., Was the sample biased? How might this have affected the results?)

RS 7: SURVEY RESEARCH RATING SCALE

Names: _____ Date: _____

	Not Demonstrated	Partially Evident	Fully Evident	Exceptional
The Research Focus <ul style="list-style-type: none"> research question is clearly stated includes comparisons identifies population includes prediction 				
Data Collection <ul style="list-style-type: none"> uses appropriate sample survey questions are clear recording is appropriate applies ethical practices 				
Calculations and Analyses <ul style="list-style-type: none"> uses appropriate statistics is accurate 				
Choice of Display <ul style="list-style-type: none"> includes all required displays chooses appropriate displays 				
Presentation: Graphic Displays <ul style="list-style-type: none"> have complete titles, legend, labels are accurately plotted are precise (any bias identified) are clear, easy to read 				
Conclusions <ul style="list-style-type: none"> are clearly communicated logically follow from analysis identify population of interest respond to research question 				

Overall Rating (Circle one, based on the definitions on the following page).

4 – outstanding 3 – good 2 – minimally satisfactory 1 – partial 0 – unsatisfactory

continued...

RS 7: SURVEY RESEARCH RATING SCALE...continued

Data Analysis: Overall Rating

4 OUTSTANDING

Fully achieves, and may go beyond, the requirements of the task. Shows complete and solid understanding of the mathematical processes and concepts involved. Evidence of purposeful and thoughtful use of mathematics. Precise and clear throughout.

3 GOOD

Achieves the requirements of the task. Shows substantial understanding of the mathematical processes and concepts involved, but may include minor flaws, omissions, or gaps (i.e., the reader has to make some inferences). Evidence of purposeful use of mathematics and mathematical thinking. Generally clear, complete, and accurate.

2 MINIMALLY SATISFACTORY

Achieves most of the requirements at least at a minimal level. May demonstrate some gaps or flaws in understanding of mathematical processes or concepts. Representations tend to need more elaboration than is presented (e.g., may overemphasize data displays without offering interpretation of results; may overgeneralize results).

1 PARTIAL

Achieves some limited requirements of the task. Tends to be fragmented, incomplete, or unclear. Some evidence of understanding mathematical concepts and processes, although serious gaps are often apparent. Evidence of inadequate mathematical thinking (e.g., inappropriate display or interpretation of results). May be disorganized or illogical.

0 UNSATISFACTORY

Does not achieve the requirements of the task. No evidence of appropriate mathematical thinking, understanding, or application.

RS 8: USING SPREADSHEETS IN SURVEYS RATING SCALE

Names: _____ Date: _____

	Requires Extensive Help	Requires Some Help	Can Work Independently	Able to Help Others
<ul style="list-style-type: none"> sets up appropriate rows and columns for recording data 				
<ul style="list-style-type: none"> sets up appropriate formulas 				
<ul style="list-style-type: none"> uses basic chart functions (Select, Title) 				
<ul style="list-style-type: none"> uses simple editing (cut, paste, drag) and formatting (font, border) functions to arrange data, text, and charts in a readable way 				
<ul style="list-style-type: none"> keeps track of current version of file (doesn't "lose" data) 				
<ul style="list-style-type: none"> successfully uses spreadsheet results for final presentation (e.g., printouts, web sites) 				

Overall Rating (Circle one, based on the definitions on the following page).

- 4 – outstanding
- 3 – good
- 2 – minimally satisfactory
- 1 – partial
- 0 – unsatisfactory

continued...

RS 8: USING SPREADSHEETS IN SURVEYS RATING SCALE...continued

Overall Rating

4 OUTSTANDING

Fully achieves, and may go beyond, requirements of the task. Shows complete and solid understanding of how spreadsheets can be used to record, manipulate, and present data. May show some creativity in the use of the features.

3 GOOD

Achieves the requirements of the task. Shows substantial understanding of how spreadsheets can be used to record, manipulate, and present data.

2 MINIMALLY SATISFACTORY

Achieves most of the requirements at a minimal level. May demonstrate some gaps or flaws in understanding of how spreadsheets are used to record, manipulate, and present data. (Recording may be strong but manipulation and presentation aspects weaker.)

1 PARTIAL

Achieves some limited requirements of the task. Tends to be incomplete or unclear. (May have gaps or errors in recording, as well as problems with manipulation and presentation.)

0 UNSATISFACTORY

Does not achieve the requirements of the task. Data, formulas, or charts are incomplete in significant ways or non-existent.

