The learner will understand and use data and simple probability concepts.

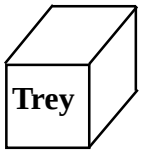
Notes and textbook references

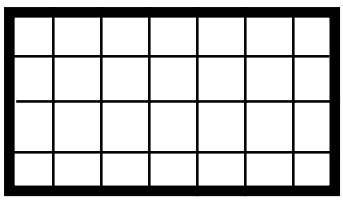
4

4.01 Collect, organize, describe and display data using line plots and tallies.

We live in an information world. Sometimes the information we need is not readily observable and data must be collected. What is the question we need to ask to get the information we want? How can we collect the information? How should we organize and display the information we have collected in order best to examine the relationships within the data? Gathering information, organizing it, and creating appropriate displays are tasks first accomplished as part of the group and later mastered individually. Students' mastery of basic graphing skills should be accompanied by understandings of how information can be useful. Teachers must encourage children to think beyond the obvious, to make observations and predictions, and continually to ask questions. Graphing should not be taught as a unit but interwoven into the curriculum throughout the year. It offers many opportunities for integrating math lessons with other content areas.

A. Observe whether student records his opinion by placing a marker (or the object) correctly on the graph. For graphing activities throughout the year, cubes made from milk cartons can be used for individuals to mark their choices. Write the child's name on one side of a cube, attach a snapshot on another face of the cube, write "yes" on another side, and "no" on the fourth side. Graphing mats made with masking tape and plastic trash bags, painters' drop cloths, old window shades, or oil cloth make graphing lessons fun and easy. Desk top grids that are laminated are also helpful in graphing activities in which Unifix cubes or other smaller objects are used as markers.





Notes and textbook references

B. Have student scoop up a handful of pattern blocks. Ask child to sort the blocks and place them on a grid. Ask child to explain about this graph. "Would another student doing the same activity have the same blocks?

If you repeated this activity would you have the same blocks? Explain."

Graph opinions and preferences, data collected by students, classroom information (attendance, weather), and the results of simple experiments.

C. In a group compare the length of each other's names. "Whose name is longest? Are there any students whose names are the same lengths? Is anyone's name shorter than the others? What other questions could be answered based on the graph?"

S	A	M	U	E	L					
K	A	T	I	E						
W	I	L	L	I	A	M				

D. Have students choose a question they would like to answer. For example, "How do most students come to school?" Have them decide how they will gather and record the information. Ask the students to make a chart or graph to show what they found. "What categories need to go on the display? Would the results of the survey vary if the information was gathered on a rainy day instead of a sunny day?"

E. Many items are packaged by weight. Does this mean that there are the same number of things in each package? Have students use a balance to compare unopened packages and then count and graph the number of items in each package (individual packs of mixed fruits, M& M's, homemade cereal mixtures, peanuts in the shells, bags of wrapped candies, etc.)

F. Read the story *Owl Moon.* Have each child create an owl using pattern blocks. The children record their owl using either pattern block stamps or paper cut-out pattern blocks. After the children have created their owl, they will do two activities:

• Create a graph showing the pattern blocks they used. See Blackline Master IV - 54.

Notes and textbook references

• Write about the pattern block owl or about the book *Owl Moon* by Jane Yolen.

G. Ask student to explain information on a graph the child helped to create. In addition to obvious questions about the most, least, same, and how many, teachers should include predictive and opinion questions.

H. Students should be encouraged to bring in charts and graphs from newspapers and magazines. While the subject material may be sophisticated, simple questions about most, least, the same, etc. can be determined and discussed.

I. "Supply students with pieces of confetti cut-outs e.g. holiday shapes, animal shapes etc. On the blackboard provide numerical data for the students to create pictorial graphs on their prepared grids. "Make a graph to represent four Christmas trees, six wreaths, two candy canes and five gingerbread men."

J. Have students create three different representations of the same set of data. Example: Glue M&M's on the first grid. On the second grid, draw and color M&M's to represent the same information that is on the first one. Lastly, represent the same data with tallies. Discuss how the three grids are same and how they are different. See Blackline Masters IV - 52 and IV-53.

A good resource for data investigations is <u>The Used Numbers</u> series, published by Dale Seymour.

K. Have students make milk carton cubes with their names, favorite colors, animals, fruits, toys and number decorating each of the six faces. Using adding machine tape for the horizontal axis and the chalkboard ledge as support students can "vote" to participate in various surveys. The concrete graph thus created can then be analyzed, discussed and later transferred to a paper grid.

4.02 Describe events as certain, impossible, more likely or less likely to occur.

A. Student will give logical responses to questions related to real life situations. For example, "The weather man is predicting that it will rain

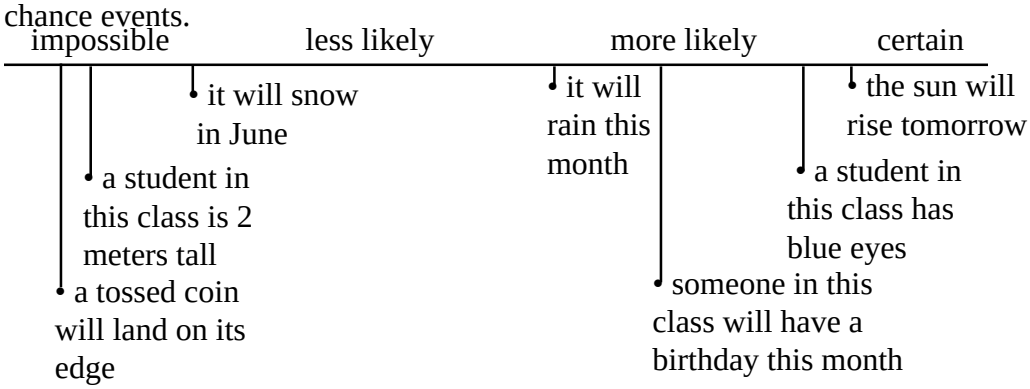
Notes and textbook references

tomorrow. Should you take an umbrella or wear a raincoat to school?"

B. "If I have four red Unifix cubes in a brown bag and take one out, what color cube could I pull out? If I add one yellow cube to the bag and then pull out a cube, what color am I most likely to get?"

C. "If I roll a number cube (regular die), am I likely to roll six more often than any other number since that is my favorite number?" Ask the students to predict what might happen when the die is rolled 20 times. Have the students experiment and record the results.

D. Students can list a variety of events in their experience that may or may not occur. A poster or chart can be created to sort the events according to certain, more or less likely and impossible. Deciding where to place an event and the rationale for its placement helps students consider factors for chance events.



E. Put ten colored markers or snap cubes in a glass or transparent container. Two should be of color A and eight of color B. Ask students about the probability - more or less likely of drawing, without looking, a marker of color A, of color B. What happens if there are three of color A and seven of color B? four and six? five and five? Have students explain and justify their responses.

F. Display spinners with a variety of sectors. Ask students to choose between or among them as to the one most (least) favorable in a game or contest. See Blackline Master IV - 55 through IV - 58.

Notes and textbook references

Why make a connection between literature and mathematics?

The use of literature in the classroom can . . .

- integrate mathematics into other curriculum areas
- provide a meaningful context for mathematics
- support the art of problem posing
- demonstrate that mathematics develops out of human experience
- foster the development of number sense
- address humanistic, affective elements of mathematics
- celebrate mathematics as a language
- provide an esthetic dimension to mathematical learning

(adapted from Whitin & Wilde, Read Any Good Math Lately? 1992)

Notes and textbook references

Some Suggestions for Surveys through the Year

August-September

- favorite stories
- letters in your name
- last year's teacher
- lunch choices
- favorite ice cream
- vacations
- birthdays
- favorite books
- eye or hair color
- number in family
- number of seeds in your watermelon slice

October

- favorite apple
- seeds in pumpkin
- Holloween costumes
- Jack O 'Lantern faces
- types of leaves
- Holloween candy
- favorite vegetables
- County fair attraction
- Columbus' voyage - would you go along or stay home?

November

- favorite storybook character
- heights of students
- syllables in names
- favorite number
- daily weather
- shoes on students
- favorite tree
- favorite dessert
- favorite food for Thanksgiving

December

- favorite toy for boys
- favorite reindeer
- favorite subject
- favorite month
- favorite toy for girls
- favorite decoration
- home/away for holidays
- favorite day
- who works hardest elves, reindeer or Santa?

Notes and textbook references

January

- favorite snow activity
- gloves or mittens
- winter clothing
- favorite lunch
- types of weather
- favorite TV show
- what pet would you like to have?

February

- valentine candy choice
- number of teeth lost
- will the groundhog see its shadow?
- Washington's birthday: wig or no wig
- Lincoln's birthday: live in a log cabin or not?
- color of toothbrush
- brand of toothpaste
- number of books read
- favorite circus animal
- favorite clown face
- favorite way to eat peanuts

March

- favorite math game
- Irish or not
- favorite way to eat potatoes
- favorite cereal
- favorite ACC team
- lions or lambs
- color of eyes
- favorite fruit
- 2-door or 4-door cars in parking lot

April

- favorite Spring flower
- how many rainy days
- favorite color
- favorite songs
- favorite jelly bean flavor
- favorite sport

May-June

- field day events
- class trips
- vacation plans
- favorite baseball team
- what will you plant in your garden?

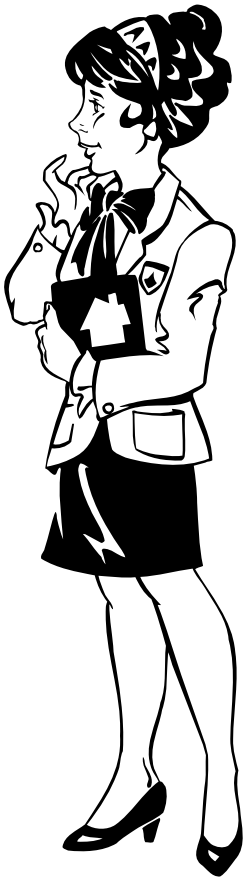
Asking good questions . . .

Planning for instruction is always based on what we know about our students as well as the content outlined in the *Standard Course of Study*. Knowing what students understand and the processes they are using requires that we gather information beyond what they are able to put in writing.

Asking the right question is important, but knowing what question to ask next is even more difficult. Preparing a list of possible questions helps when you are focusing on a specific set of objectives; however, flexibility is also important since how students respond influences the next question. Give students "thinking time" before rephrasing a question or going ahead. Ten seconds of wait time is not long (It only seems that way!).

When assessment is designed to focus on student understanding, questions include more than just ones about basic knowledge. Good questions investigate process, attitude, relationships, and communication of ideas. Responses to these questions may be oral, written, or demonstrations.

Since the same questions may be used in initial teaching and exploring, as well as evaluating, building and maintaining a collection of good questions seems appropriate. Here is a starter list.



- *What can you tell me about this?*
- *Why do you say that?*
- *What do you think will happen?*
- *Who might use this information?*
- *What did you do first?*
- *Why did that work?*
- *How did you decide?*
- *What do you need to do next?*
- *What is most important to know about this?*
- *Is that the only possible answer?*
- *What did not work?*
- *Where could you get more information?*
- *How are you sure your answer is correct?*
- *How did you organize the information?*
- *Could you make a different problem?*
- *Does this answer make sense?*
- *Could you extend the pattern?*
- *Could you find another way to solve this problem?*
- *How did you and your partner work together?*
- *How would you explain this to someone younger?*