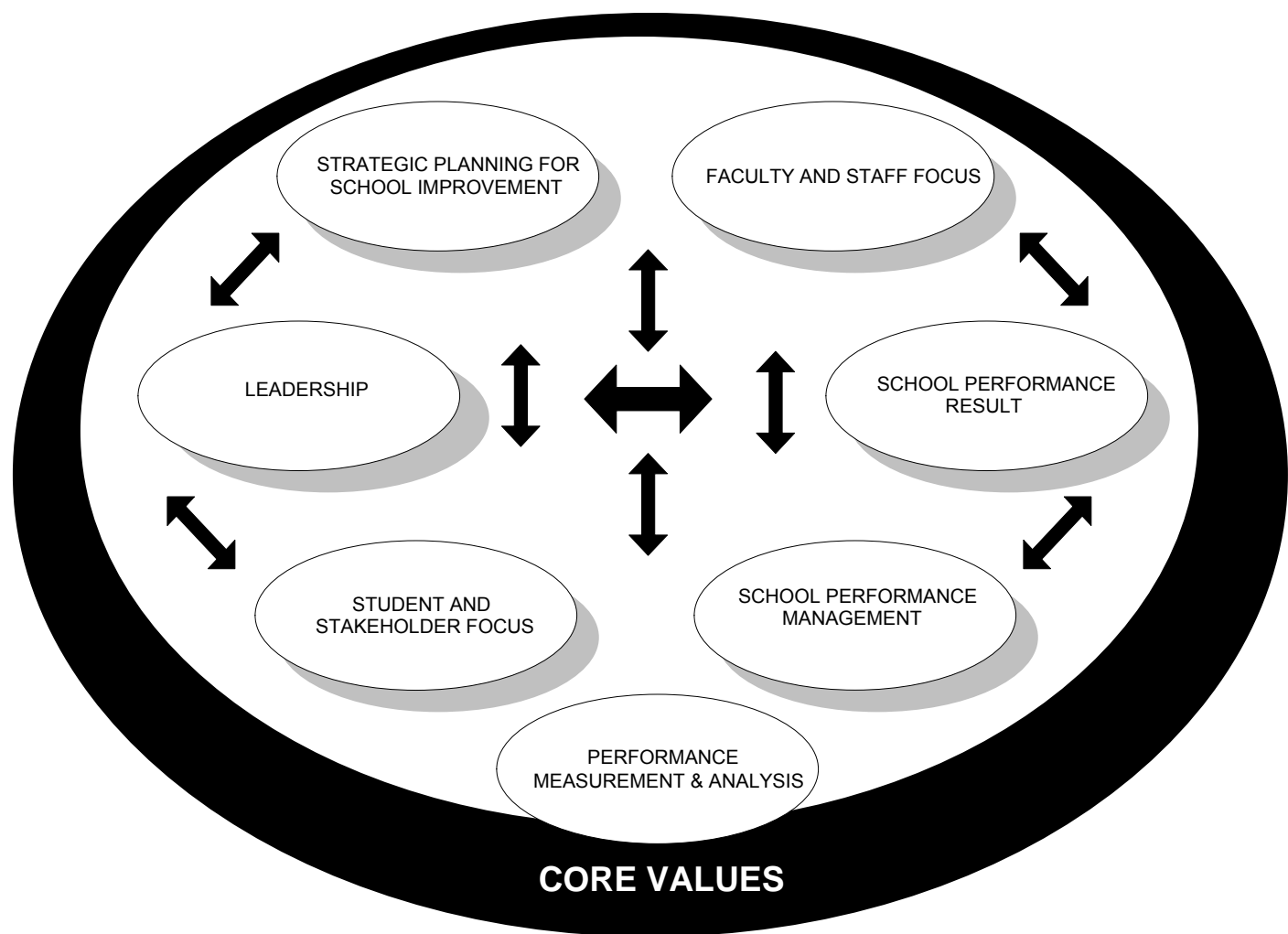
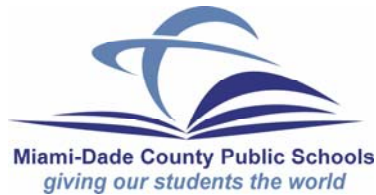


## DATA-DRIVEN DECISION MAKING REFERENCE GUIDE





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## Introduction

**What is data-driven decision making?** Data-Driven decision making refers to the use of selected, appropriate analytical tools to gather data that will enable decision makers (educational and business) to make wiser decisions than they could make without the availability of such data.

**What is the purpose of data-driven analysis?** The data gathered permit the user(s) to gain insight into how to make improvements at a classroom, school or district level. By using graphical problem-solving techniques, students are able to chart their own learning process. It is likely that students will participate in classroom activities if they are given the opportunity to understand how using analytical tools will help them. Collected and analyzed data help teachers, administrators, and district personnel to make informed decisions.

**What are the benefits of using graphical representations to analyze data?**

- Participants can chart the learning process.
- They empower students to produce higher quality work.
- Participants can use them to monitor a work process to identify opportunities for improvement.
- They enable users to finalize the action steps needed to solve a problem.
- They enable users to pinpoint the most probable cause of a problem.
- They enable users to implement work process improvements.
- They provide simple, yet powerful, ways to visualize information.
- They provide a concrete order or structure for anything.
- They show trends over time (positive or negative).
- They can be used in a student's portfolio in academics or behavior.

**How does data relate to Performance Excellence?** Collecting and analyzing data is critical to performance excellence. By analyzing data, improvements can be made at a class level, school level, district level, or state level.

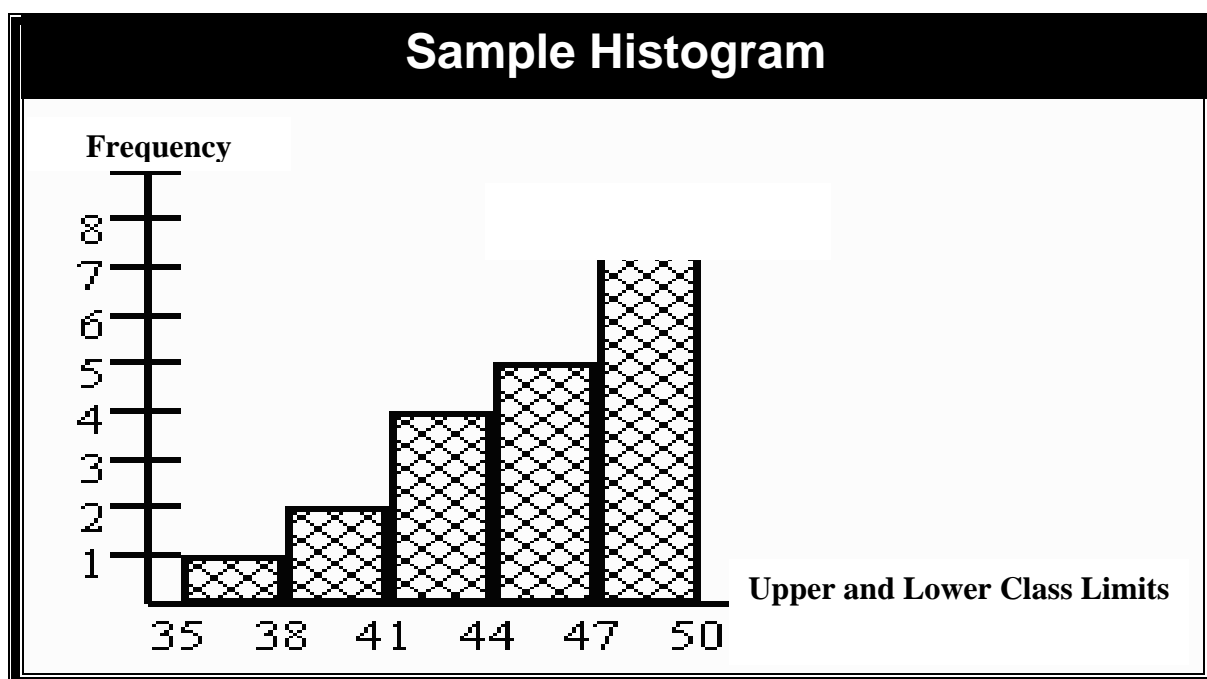
# Histogram

**What is a Histogram?** A histogram is an analytical tool that visually represents data. It uses bars to show how often something occurs. The height of the bars indicates the number of correct answers. The number of students with the lowest range of correct answers begins at the left.

**When should a Histogram be used?** It is used to make decisions about a process, product, or procedure that could be improved after examining the variation (Example: Should the school invest in a tutoring program for Algebra I after examining the grade distribution?)

**How is a Histogram constructed?**

1. Decide on the process to be measured. This could be time, weight, size, frequency of occurrences, test scores, etc.
2. Gather the data to be represented on the graph.
3. Prepare a frequency table from the data.  $N$  = the number of data points.  $R$  = the range between the smallest value in the set subtracted from the largest value. Calculate the range of the data by subtracting the smallest number in the data set from the largest.
4. Draw a histogram from the frequency table. On the vertical line draw the frequency scale and on the horizontal line draw the scale related to the variable you are measuring.
5. Interpret the graph by looking at the shape of the distribution.



## Scatter Plot

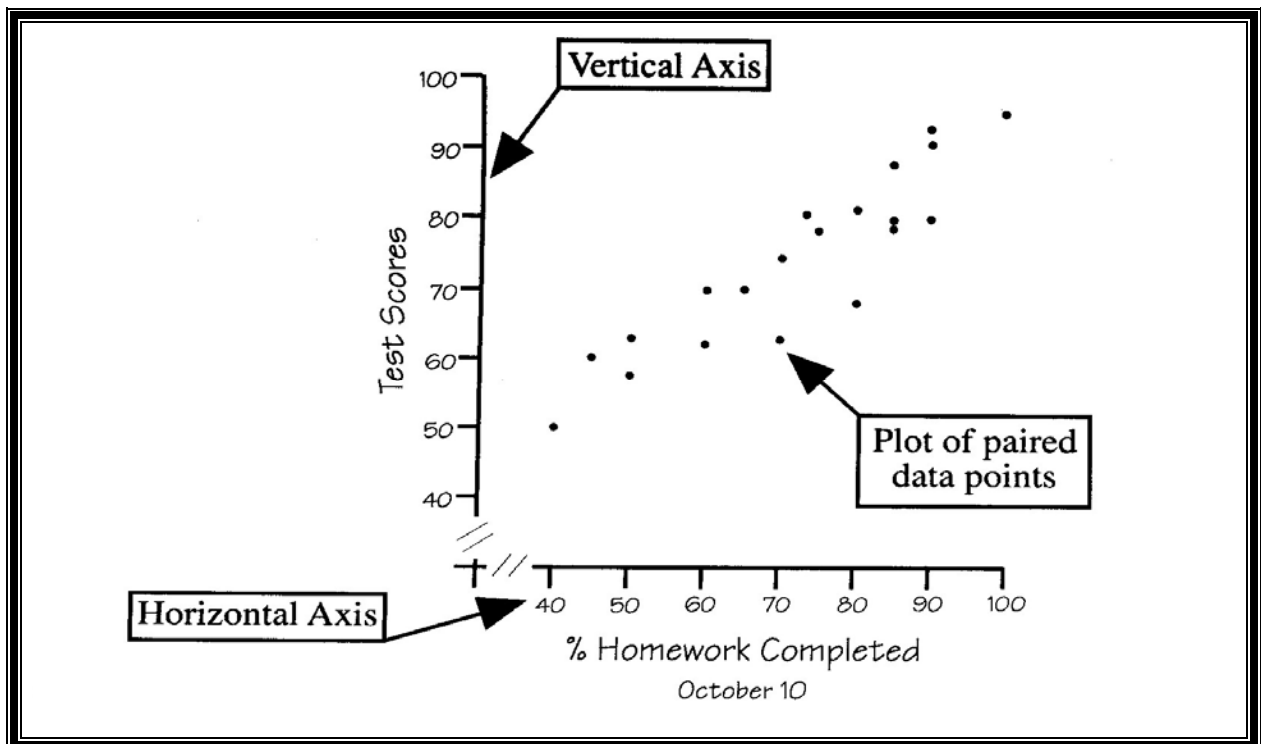
**What is a Scatter Plot?** A Scatter Plot graphs two variables against each other and displays the relationship between the two. The shape or scatter of the points tells you if the factors are related, and if so, how they influence each other.

**When should a Scatter Plot be used?** It is used to determine whether the performance of one factor is related to the performance of another. The two factors can be two factors suspected of relating to the same quality characteristic.

**How is a Scatter Plot constructed?**

1. Draw and label the horizontal and vertical axis.
2. Scale each axis using the vertical axis for the variable to be predicted and using the horizontal axis used for the observed value.
3. Plot the points.
4. Interpret the scatter diagram. Look for the relationship between the two factors in order to make improvements.

## Sample Scatter Plot



## Run Chart

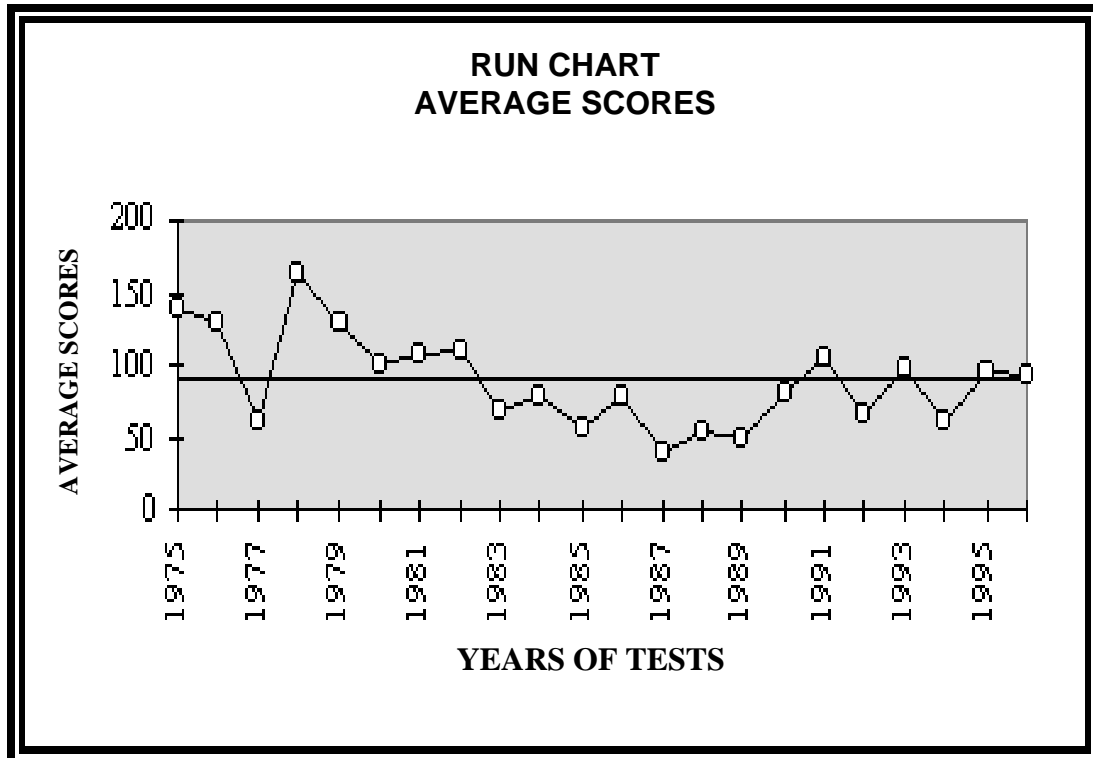
**What is a Run Chart?** A run chart is a line graph that shows the performance of one or more processes over time.

**When should a Run Chart be used?** It is used to provide insight needed for improvement and to document improvements. It may be used for individuals or for a whole class.

**How is a Run Chart constructed?**

1. Decide on the process performance measures to be used.
2. Gather the data.
3. Create a graph with one vertical line and one horizontal line.
4. Plot the data.
5. Draw a horizontal line at the average value.
6. Interpret the chart. Is it where the teacher wants the results to be relative to the class goal?

## Sample Run Chart



## Plus Delta Chart



**What is a Plus Delta Chart?** The Plus Delta Chart provides feedback on a specific topic being addressed. It is a simple chart with two columns. One side is the Plus side on which participants list what they felt worked well. The other side is the Delta side on which they write the things that need to improve.

**When should a Plus Delta Chart be used?** It should be used to determine what worked well and what needs improvement. It can be used to evaluate a lesson, a field trip, discipline, or a unit.

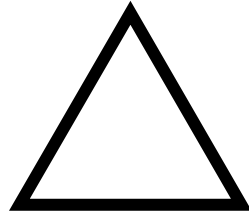
**How is a Plus Delta Chart constructed?**

1. Brainstorm aloud or have participants think about what they thought worked (+) and what needed improvement ( $\Delta$ ).
2. List the areas that are strengths in the Plus column and the areas that need to improve in the Delta column.
3. Analyze the results and make improvements based on the analysis.
4. Set your goals and use consensus building when making decisions about prioritizing activities.

## Plus Delta Chart

	
leap frog bull frog read signs on cones	be good listeners follow Mr. Watch's directions put only 1 foot in a hoop stop moving when we are told to stop

## Plus Delta Chart





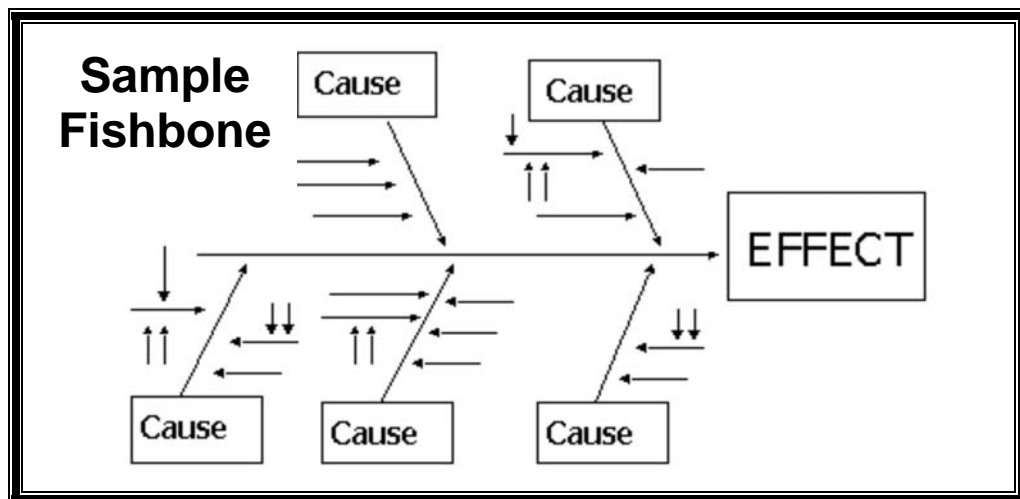
# Fishbone Diagram

**What is a Fishbone Diagram?** A Fishbone Diagram is an analysis tool that provides a systematic way of looking at effects and the causes that create or contribute to those effects.

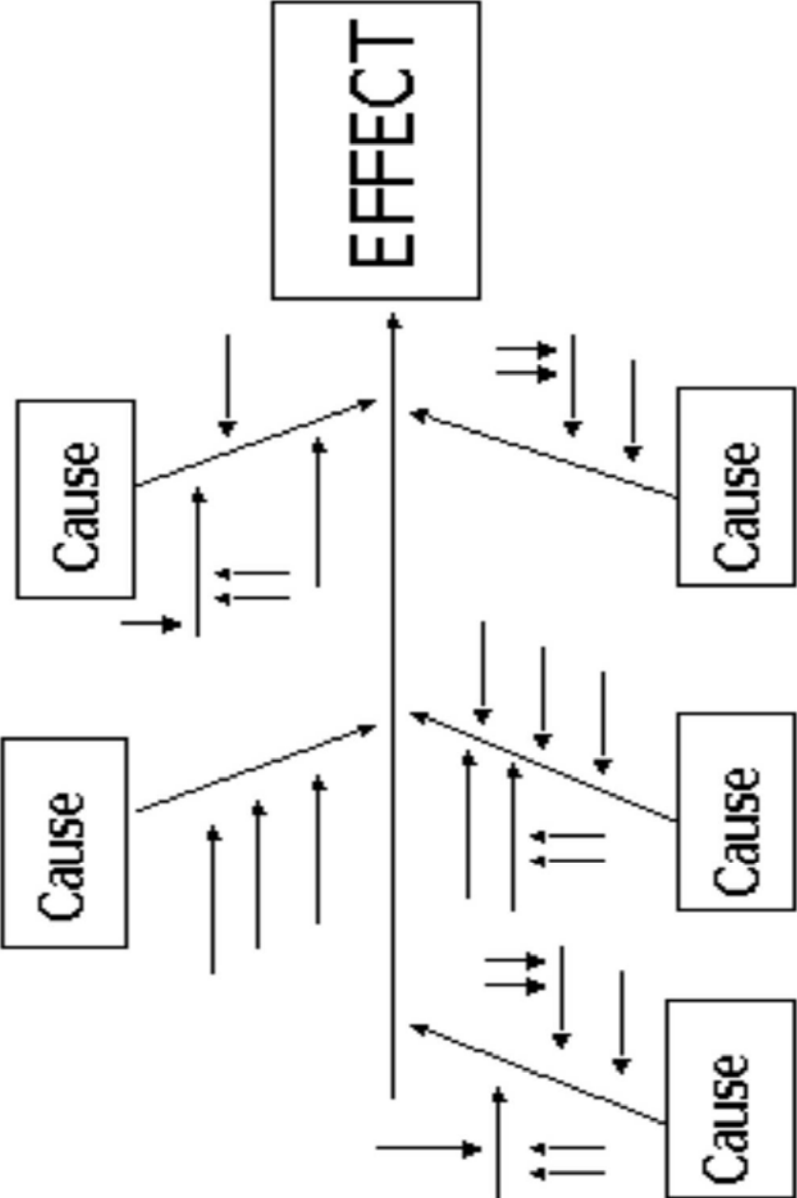
**When should a Fishbone Diagram be used?** It may be used to analyze a problem that is complex, to sort and segregate the possible causes of a problem, or to represent relationships between an effect and its causes.

## How is a Fishbone Diagram constructed?

1. Brainstorm or use the data collected to generate causes needed to build the diagram.
2. Write the problem statement in a box on the right hand side of the diagram.
3. Identify major cause categories and connect them to the spine of the fishbone diagram.
4. Use an idea-generating technique to identify the factors within each category that may be affecting the problem/issue and/or effect being studied.
5. Repeat this procedure with each factor under the category to produce sub-factors.
6. Continue until no additional useful information is produced by asking, "Why is that happening?"
7. Analyze the results of the fishbone. Do this by looking for those items that appear in more than one category. These become the "almost likely causes."



# Fishbone Diagram



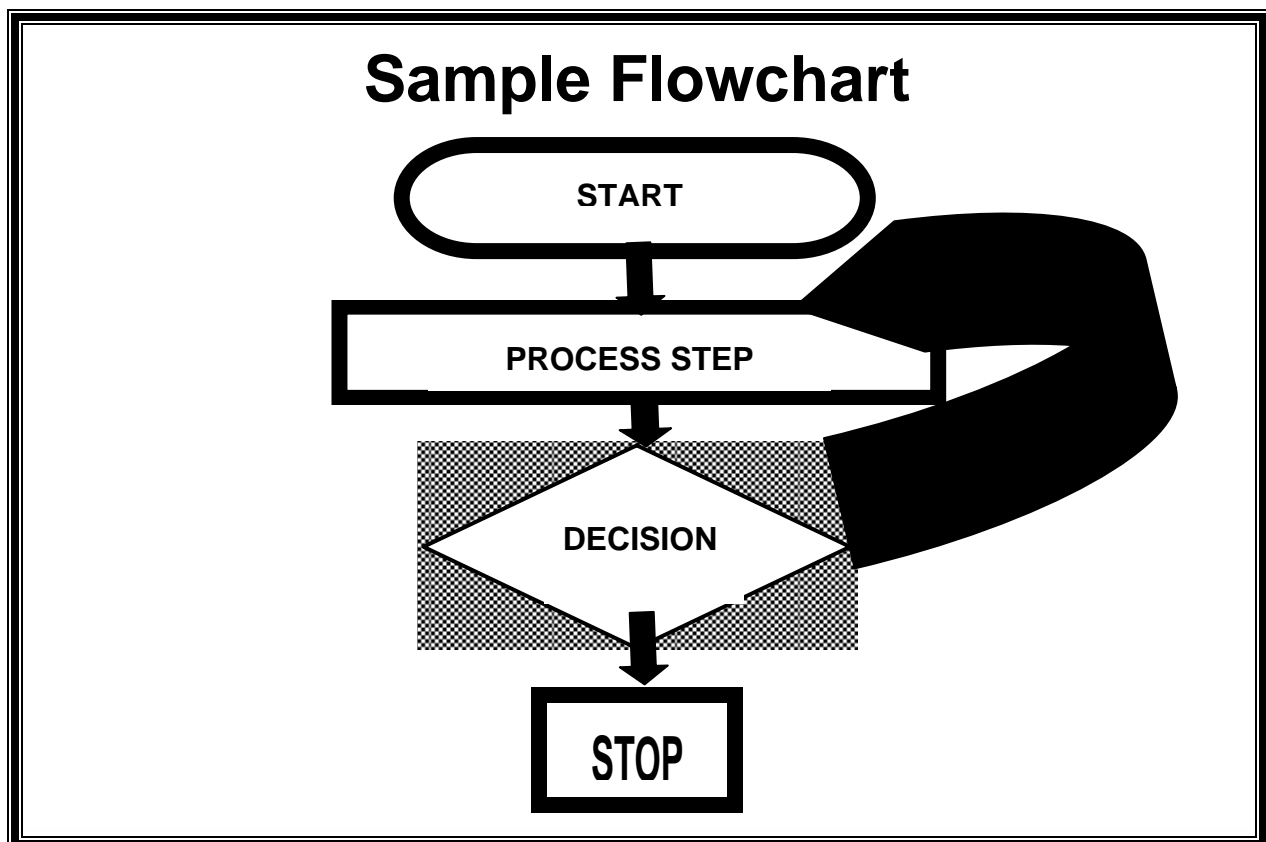
# Flow Chart

**What is a Flow Chart?** A flow chart is a graphic representation of the steps in a process.

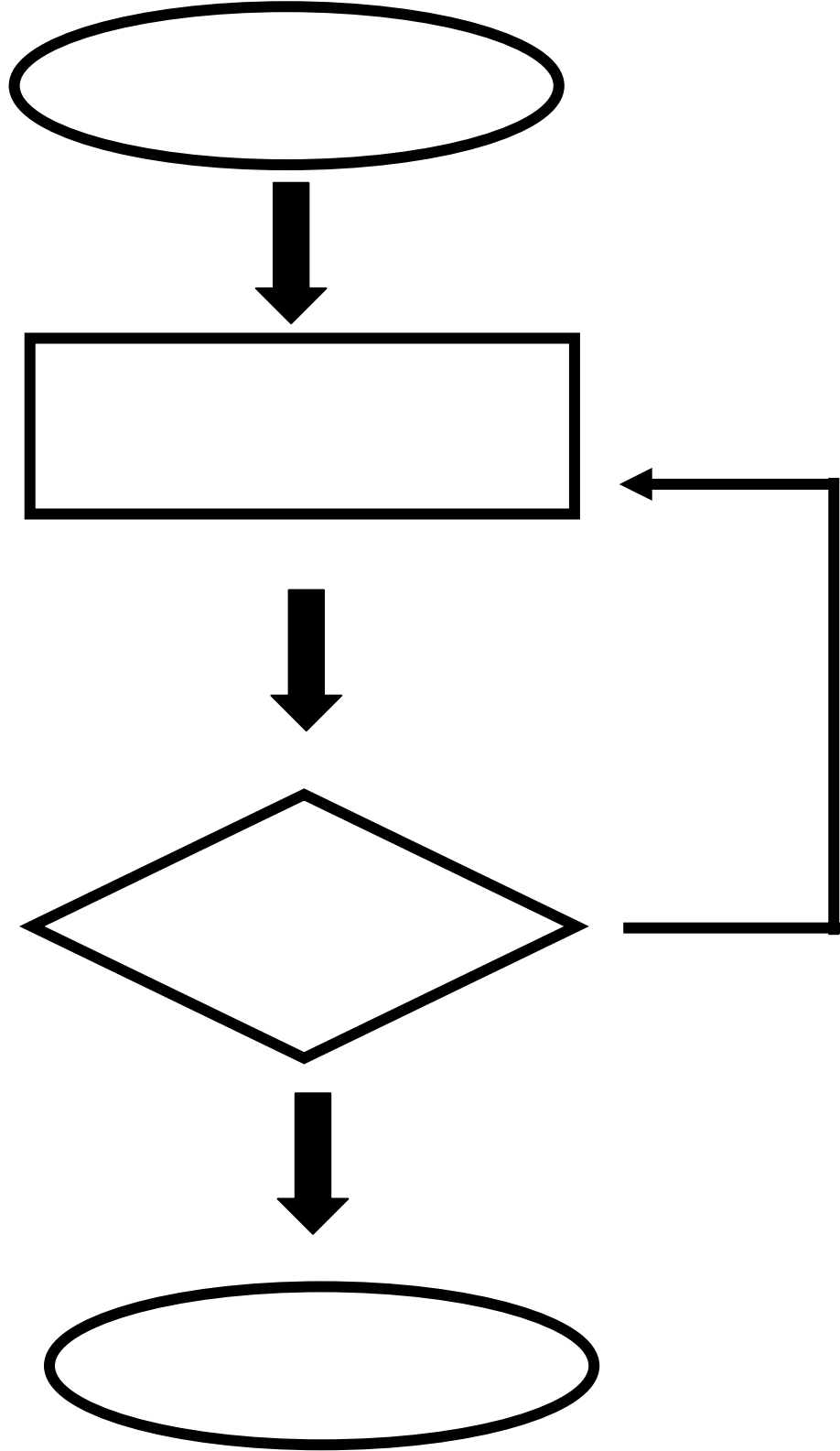
**When should a Flow Chart be used?** It is used to illustrate procedures on a variety of topics. Examples are: how to check out a library book or solve a math problem.

**How is a Flow Chart constructed?**

1. Decide if the process will be charted as it is or as it should be.
2. Determine the boundaries of the process. Where does the process start and end?
3. Determine what the steps in the process will/should be.
4. Sequence the steps in a logical order. Use Post-it® notes in order to be able to move them around. Draw the flow chart using the appropriate symbols.
5. Analyze the flow chart asking questions such as the following:
  - Is the process being run the way it should be?
  - Is the process being followed as charted?
  - How different is the current process from an ideal one?



# Flowchart



# Pareto Chart

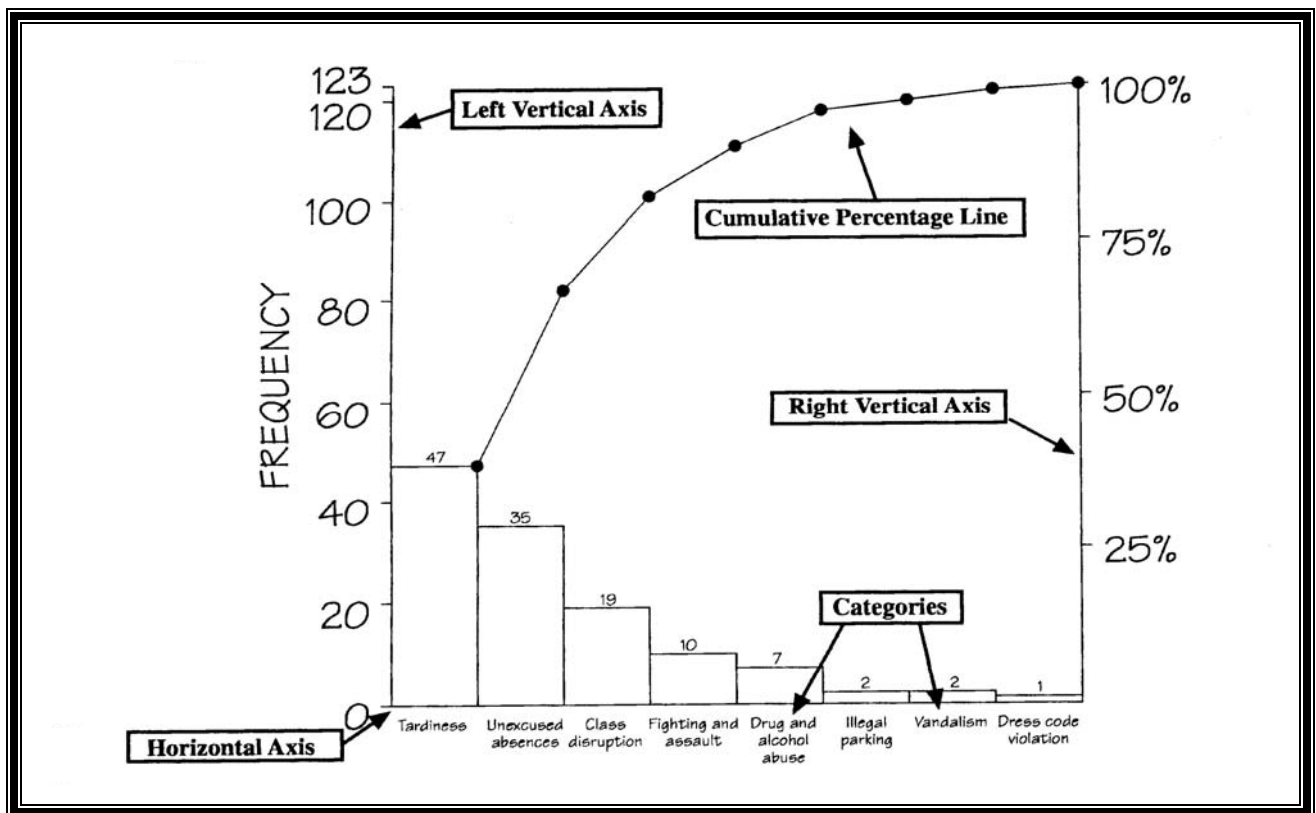
**What is a Pareto Chart?** A Pareto Chart is a bar graph that ranks errors from most significant to least significant. It utilizes a vertical bar graph in which the bar height reflects the frequency or the impact of errors.

**How is a Pareto Chart used?** It may be used to analyze whichever topic you choose. For example, you can analyze discipline in a school.

**How is a Pareto Chart constructed?**

1. Decide on the problem to be studied.
2. Choose the problem area(s) that will be monitored, compared, and rank ordered.
3. Choose the time period for the study.
4. Gather the necessary data for each problem.
5. List the problem categories in descending order from left to right on the horizontal line and the frequencies on the vertical line.
6. Interpret the results. Generally, the tallest bars indicate the biggest contributors to the overall problem. Deal with these problem categories first!

## Sample Pareto



# Affinity Diagram

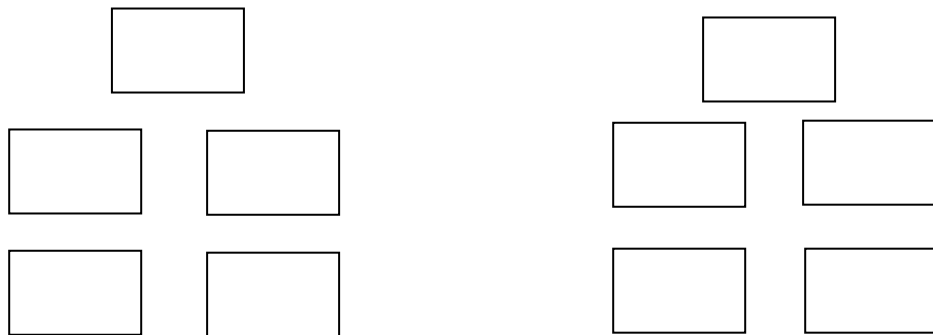
**What is an Affinity Diagram?** An Affinity Diagram is a management and planning tool used to organize ideas into natural groupings in a way that stimulates new, creative ideas.

**When should an Affinity Diagram be used?** It is used at the beginning of a unit or course of study or to write a mission statement to categorize ideas into natural groupings.

**How is an Affinity Diagram constructed?**

1. Decide on the topic to be categorized.
2. Have participants write different ideas or responses on a Post-it ® note.
3. Post the written responses on the board.
4. Discuss the ideas and rearrange them into natural or related groupings.
5. Label the categories and put short responses into statements and write them on a chart.
6. Analyze the chart and discuss it with the class.

## Sample Affinity Diagram





## CATEGORIES AND DATA-DRIVEN DECISION CHARTS

CATEGORY	*SAMPLE TOOLS	* SAMPLE ACTIONS
<p style="text-align: center;"><b><u>LEADERSHIP</u></b></p> <p>This category examines how a leader considers the needs and expectations of all students and stakeholders. The leader promotes clear values and clear societal responsibilities associated with school operations.</p>	Affinity Diagram	<p>Work with stakeholders to write a mission, vision, and core values statement.</p> <p>Set specific goals for achievement levels.</p>
<p style="text-align: center;"><b><u>STRATEGIC PLANNING FOR SCHOOL IMPROVEMENT</u></b></p> <p>This category considers the needs and expectations of all stakeholders as they make data-based decisions regarding their future direction.</p>	Pareto Chart	Develop classroom activities that are aligned with the strategies of the action plans developed in the strategic planning process, such as improving discipline.
<p style="text-align: center;"><b><u>STUDENT AND STAKEHOLDER FOCUS</u></b></p> <p>This category examines how the organization determines the needs, expectations, and preferences of its students and stakeholders.</p>	Plus/Delta Chart Scatter Plot	Monitor students' and stakeholders' satisfaction with school activities.
<p style="text-align: center;"><b><u>PERFORMANCE MEASUREMENT &amp; ANALYSIS</u></b></p> <p>This category examines the organization's information selection process and how the organization analyzes performance data and uses that information.</p>	Run Chart Histogram Scatter Plot	<p>Students monitor their progress by the use of personal data portfolios.</p> <p>Administrators can monitor FCAT results by sub-test or by grade level. They can track trends to determine if completing homework is related to higher test scores.</p>
<p style="text-align: center;"><b><u>FACULTY AND STAFF FOCUS</u></b></p> <p>This category examines how the organization enables faculty and staff to develop and utilize their full potential, aligned with the organization's objectives.</p>	Plus/Delta Chart Histogram Run Chart	Stakeholders use quality tools to monitor professional development, training, and innovation among faculty and staff.
<p style="text-align: center;"><b><u>SCHOOL PROCESS MANAGEMENT</u></b></p> <p>This category examines how the organization designs, implements, and improves educational programs and support programs based on comprehensive data and input from all stakeholders.</p>	Flow Chart Histogram Run Chart Fishbone Diagram	Stakeholders use quality tools to design and monitor the effectiveness of educational programs and support programs. Students can use a flowchart to examine the steps they must take to solve a math problem.
<p style="text-align: center;"><b><u>SCHOOL PERFORMANCE RESULTS</u></b></p> <p>This category examines the organization's use of informational data to increase learning. It provides data users with confidentiality and reliability.</p>	Run Chart Histogram	The students' FCAT results are compared to track trends and make comparisons.

\* The sample actions are specific to the sample tools; however, these actions and tools are "**Samples**" and not inclusive of all tools/actions that may be used.

The School Board of Miami-Dade County, Florida adheres to a policy of nondiscrimination in employment and educational programs/activities and strives affirmatively to provide equal opportunity for all as required by:

**Title VI of the Civil Rights Act of 1964** – prohibits discrimination on the basis of race, color, religion, or national origin.

**Title VII of the Civil Rights Act of 1964**, as amended – prohibits discrimination in employment on the basis of race, color, religion, gender, or national origin.

**Title IX of the Educational Amendments of 1972** – prohibits discrimination on the basis of gender.

**Age Discrimination in Employment Act of 1967 (ADEA)**, as amended – prohibits discrimination on the basis of age with respect to individuals who are at least 40.

**The Equal Pay Act of 1963**, as amended - prohibits sex discrimination in payment of wages to women and men performing substantially equal work in the same establishment.

**Section 504 of the Rehabilitation Act of 1973** – prohibits discrimination against the disabled.

**Americans with Disabilities Act of 1990 (ADA)** – prohibits discrimination against individuals with disabilities in employment, public service, public accommodations, and telecommunications.

**The Family and Medical Leave Act of 1993 (FMLA)** – requires covered employers to provide up to 12 weeks of unpaid, job-protected leave to “eligible” employees for certain family and medical reasons.

**The Pregnancy Discrimination Act of 1978** – prohibits discrimination in employment on the basis of pregnancy, childbirth, or related medical conditions.

**Florida Educational Equity Act (FEEA)** – prohibits discrimination on the basis of race, gender, national origin, marital status, or handicap against a student or employee.

**Florida Civil Rights Act of 1992** – secures for all individuals within the state freedom from discrimination because of race, color, religion, sex, national origin, age, handicap, or marital status.

**School Board Rules 6Gx13- 4A-1.01, 6Gx13- 4A-1.32, and 6Gx13- 5D-1.10** prohibit harassment and/or discrimination against a student or an employee on the basis of gender, race, color, religion, ethnic or national origin, political beliefs, marital status, age, sexual orientation, social and family background, linguistic preference, pregnancy, or disability.

*Veterans are provided re-employment rights in accordance with P. L. 93-508 (Federal Law) and Section 295.07 (Florida Statutes), which stipulate categorical preferences for employment.*