Grade 4 Science
Table of Contents

The Purpose of the Science Curriculum Guide

The purpose of the Science Curriculum Guide is to provide teachers with all of the components and content which, when fully implemented, will lead to deep alignment of the Youngstown City Schools science Curriculum and Ohio's New Learning Standards.

The Science Curriculum Guide is designed to maximize student achievement and is intended to be followed by all teachers. Much of the Science Curriculum Guide is flexible for teacher's to design their own lessons within the framework of Ohio's New Learning Standards. Student achievement is enhanced when students are taught the content on which they will be tested (content alignment); taught the curriculum in the format that it will be tested (context alignment); and taught the curriculum at the appropriate level of cognition (cognitive alignment). The Science Curriculum Guide contains teaching methodologies that are varied to ensure that students have acquired learning for both long-term and short-term mastery.

This curriculum document is designed to be a working resource. It provides the essential information and example that will assist teachers in providing classroom instruction that maximizes student learning. The strategies contained in this guide are designed to provide guidance to teachers on how to approach key concepts and skills. This curriculum guide cannot replace good teaching, but it can reinforce and guide teachers to provide all students with the skills, knowledge and experiences they will need to succeed in science in Youngstown City Schools and be successful at levels set by the Ohio Department of Education.

It is the intent of the Science Curriculum Guide that teachers and students are successful in meeting the expectations of the state science standards. Therefore, teaching and learning must be an active inquiry process. This means that teachers should take the opportunity to teach science as something in which students are actively engaged. When participating in inquiry, students learn to construct their knowledge and communicate their ideas and learning to others. This includes engaging all students with relevant, real-world activities that develop students' knowledge, verbal and written communication skills and scientific process skills.

The following terms are used throughout this document:
Content Statements: These state the science content to be learned. They are the "what" of science that should be accessible to students at each grade level to prepare them to learn about and use scientific knowledge, principles and processes with increasing complexity in subsequent grades. These statements come directly from the Ohio New Learning Standards Document.

Content Elaboration: This section provides anticipated grade-level depth of content knowledge and examples of science process skills that should be integrated with the content. Content Elaborations also provides information to help identify what prior knowledge students should have and to what future knowledge the content will build. This section comes directly from the Ohio New Learning Standards Document and is the content from which state assessments are being developed.

4th Grade New Learning Standards at a Glance

Earth and Space Sciences

Condensed Content Statement	Content Elaboration
4.ESS.1 Earth's surface has specific characteristics and landforms that can be identified.	• Earth is known as the Blue Planet because about 70 percent of Earth's surface is covered in water. Freshwater is a small percentage of the overall water found on Earth; the majority is oceanic. • There are many different processes that continually build up or tear down the surface of Earth. These processes include erosion, deposition, volcanic activity, earthquakes, glacial movement and weathering. • Beginning to recognize common landforms or features through field investigations, field trips, topographic maps, remote sensing data, aerial photographs, physical geography maps and/or photographs (through books or virtually) are important ways to understand the formation of landforms and features. Common landforms and features include streams, deltas, floodplains, hills, mountains/mountain ranges, valleys, sinkholes, caves, canyons, glacial features, dunes, springs, volcanoes and islands. • Connecting the processes that must occur to the resulting landform, feature or characteristic should be emphasized. This can be demonstrated through experiments, investigations (including virtual experiences) or field observations. Technology can help illustrate specific features that are not found locally or demonstrate change that occurred (e.g., using satellite photos of an erosion event such as flooding).
4.ESS.2 Rocks change shape, size and/or form due to water or ice movement, freeze and thaw, wind, plant growth, gases in the air, pollution and catastrophic events such as earthquakes, mass wasting, flooding and volcanic activity.	• Different types of rock weather at different rates due to specific characteristics of the rock and the exposure to weathering factors (e.g., freezing/thawing, wind, water). Weathering is defined as a group of processes that change rock at or near Earth's surface. Some weathering processes take a long time to occur, while some weathering processes occur quickly. • The weathering process must be observed in nature, through classroom experimentation or virtually. Seeing tree roots fracturing bedrock or the effect of years of precipitation on a marble statue can illustrate ways that rocks change shape over time. Investigations can include classroom simulations, laboratory testing and field observations.
4.ESS.3 The surface of Earth changes due to erosion and deposition.	• Erosion is a process that transports rock, soil or sediment to a different location. Weathering is the breakdown of large rock into smaller pieces of rock. Erosion is what carries the weathered material to a new location. Gravity plays an important role in understanding erosion, especially catastrophic events like mass wasting (e.g., mudslides, avalanches, landslides) or flooding. • Erosion is a "destructive" process and deposition is a "constructive" process. Erosion and deposition directly contribute to landforms and features formation that are included in grade 4. Topographic maps and aerial photographs can be used to locate erosional and depositional areas in Ohio. Surficial geology maps also can illustrate the patterns of glacial erosion and deposition that have occurred. Field trips and field investigations (may be virtual) are recommended as erosional and depositional features that can be seen locally or within the state can help to connect the concept of erosion and deposition to the real world.

Life Sciences

Condensed Content Statement	Content Elaboration
4.LS.1 Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful.	• Ecosystems are based on interrelationships among and between biotic and abiotic factors. Ohio has experienced various weather patterns. Some parts of Ohio hosted glaciers and other parts of Ohio were submerged with water. Ecosystems can change rapidly (e.g., volcanoes, earthquakes, or fire) or very slowly (e.g., climate change). Major changes over a short period of time can have a significant impact on the ecosystem and the populations of plants and animals living there. The changes that occur in the plant and animal populations can impact access to resources for the remaining organisms, which may result in migration or death. The fossil record provides evidence for changes in populations of species. • Researching and investigating specific areas in Ohio (e.g., Cedar Bog, Lake Erie, Hocking Hills, Ceasar Creek, Kellys Island) via field studies, virtual field trips or other references must be used to explore the relationships between previous environments, changes that have occurred in the environments and the species that lived there.
4.LS.2 Fossils can be compared to one another and to present-day organisms according to their similarities and differences.	• Fossils provide evidence that many plant and animal species are extinct and that many species have changed over time. The types of fossils that are present provide evidence about the nature of the environment at that time. As the environment changed so did the types of organisms that could survive in that environment. • The opportunity to learn about an increasing variety of living organisms, both the familiar and the exotic, should be provided. The observations and descriptions of organisms should become more precise in identifying similarities and differences based upon observed structures. Emphasis can still be on external features; however, finer detail than before should be included. Hand lenses and microscopes should be routinely used. Microscopes are used not to study cell structure but to begin exploring the world of organisms that cannot be seen by the unaided eye. Non-Linnaean classification systems should be developed that focus on gross anatomy, behavior patterns, habitats and other features.

Physical Science

Condensed Content Statement	Content Elaboration
4.PS.1 The total amount of matter is conserved when it undergoes a change.	• Some properties of objects may stay the same even when other properties change. For example, water can change from a liquid to a solid, but the mass* of the water remains the same. Parts of an object or material may be assembled in different configurations, but the mass* remains the same. The sum of all of the parts in an object equals the mass* of the object. • When a solid is dissolved in a liquid, the mass* of the mixture is equal to the sum of the masses* of the liquid and solid. • At this grade level, the discussion of conservation of matter should be limited to a macroscopic, observable level. Conservation of matter must be developed from experimental evidence collected in the classroom. After the concept has been well established with experimental data and evidence, investigations can include interactions that are more complex where the mass* may not appear to stay constant (e.g., fizzing tablets in water). • Note: Mass* is an additive property of objects and volume is usually an additive property for the same material at the same conditions. However, volume is not always an additive property, especially if different substances are involved. For example, mixing alcohol with water results in a volume that is significantly less than the sum of the volumes.

4.PS.2 Energy can be transformed from one form to another or can be transferred from one location to another.	• The addition of heat may increase the temperature of an object. The removal of heat may decrease the temperature of an object. There are materials in which the entire object becomes hot when one part of the object is heated (e.g., in a metal pan, heat flows through the pan on the stove transferring the heat from the burner outside the pan to the food in the pan). There are other objects in which parts of the object remain cool even when another part of the object is heated (e.g., in a Styrofoam® cup, very little of the warmth from hot liquid inside the cup is transferred to the hand holding the cup). • Electrical conductors are materials through which electricity can flow easily. Electricity introduced to one part of the object spreads to other parts of the object (e.g., copper wire is an electrical conductor because electricity flows through the wires in a lamp from the outlet to the light bulb and back to the outlet). • Electrical insulators are materials through which electricity cannot flow easily. Electricity introduced to one part of the object does not spread to other parts of the object (e.g., rubber surrounding a copper wire is an electrical insulator because electricity does not flow through the rubber to the hand holding it). • Electrical conductivity must be explored through testing common materials to determine their conductive properties. • In order for electricity to flow through a circuit, there must be a complete loop through which the electricity can pass. When an electrical device (e.g., lamp, buzzer, motor) is not part of a complete loop, the device will not work. Electric circuits must be introduced in the laboratory by testing different combinations of electrical components. • When an electrical device is a part of a complete loop, the electrical energy can be changed into light, sound, heat or magnetic energy. Electrical devices in a working circuit often get warmer. • When a magnet moves in relation to a coil of wire, electricity can flow through the coil. When a wire conducts electricity, the wire has magnetic properties and can push and/or pull magnets. The connections between electricity and magnetism must be explored in the laboratory through experimentation. • Note 1: Exploring heat transfer in terms of moving submicroscopic particles is not appropriate at this grade level. • Note 2: The word “heat” is used loosely in everyday language, yet it has a very specific scientific meaning. Usually what is called heat is actually “thermal or radiant energy.” An object has thermal energy due to the random movement of the particles that make up the object. Radiant energy is that which is given off by objects through space (e.g., warmth from a fire, solar energy from the sun). “Heating” is used to describe the transfer of thermal or radiant energy to another object or place. Differentiating between these concepts is inappropriate at this grade level. This document uses the same conventions as noted in the NAEP 2009 Science Framework (see page 29) where “heat” is used in lower grades. However, the word “heat” has been used with care so it refers to a transfer of thermal or radiant energy. The concept of thermal energy, as it relates to particle motion, is introduced in grade 6. • Note 3: Knowing the specifics of electromagnetism is not appropriate at this grade level. At this point, the connections between electricity and magnetism are kept strictly experiential and observational. • Note 4: Energy transfer (between objects or places) should not be confused with energy transformation from one form of energy to another (e.g., electrical energy to light energy).

Science Exploration Safety Contract

- I will act responsibly at all times while conducting a science investigation.
- During a science exploration, I will wait for instructions before touching any equipment, chemicals, or other materials.
- I will not eat food, drink beverages, or chew gum during science exploration. I will not use science containers for food or drinks.
- I will keep my area clean during a lab.
- I will immediately notify a teacher of any accident (spill, breakage, etc.) or injury (cut, burn, etc.) no matter how small it may appear.
- I will know what to do if there is a fire drill during a science exploration.
- I will handle all living organisms used in a lab activity in a humane manner.
- I will tie back long hair, remove jewelry and wear shoes with closed ends (toes and heels) while conducting science exploration.
- I will not work alone with a science exploration unless instructed to do so.
- I will not take chemicals or equipment out of the classroom unless instructed to do so.
- I will dispose of all chemical wasted according to teacher's directions.
- All chemicals are to be considered dangerous. I will not touch, taste, or smell any chemicals unless specifically instructed to do so.

AGREEMENT:

I, ____, have read each of the statements in the Science Laboratory Safety Contract and understand these safety rules. I agree to abide by the safety regulations and any additional written or verbal instructions provided by the school district or my teacher. This contract ensures that students and the teacher know exactly what is expected of them.

1. Please list any food or contact allergies (e.g. allergy to peanuts, plant, latex, etc.)

   ____

2. Please provide a daytime emergency contact:

   (Contact person) ______________________ (Contact phone #) _________________

3. Student Signature: _______________________________ Date: ____________

4. Parent/Guardian Signature: _______________________ Date: ____________

Optimize	Classify	Communicate
Experiment	Predict	Problem Solving
Measure	Infer	Hypothesize

Optimize To make the best or most effective use of (a situation, opportunity, or resource)	Classify: Group or organize objects or events into categories based on specific criteria	Observe: Use one or more of your senses to perceive properties of objects and events; can be done directly with the senses or indirectly through the use of simple or complex instruments
Problem Solving: Build new mathematical or scientific knowledge through problem solving; solve problems that arise in mathematics, science and in other context; apply and adapt a variety of appropriate strategies to solve problems; and monitor and reflect on the process of mathematical and scientific problem solving	Predict: Anticipate outcomes of future events, based on patterns or experience	Experiment: Design procedures for gathering data to test hypotheses under conditions in which variables are controlled or manipulated
Hypothesize: Pose a testable explanation for observations or events and state it as the expected outcome of an experiment	Infer: Use logical reasoning to make conclusions based on observations	Measure: Make quantitative observations using both nonstandard and standard measure

Control Variables	Interpret Data	Design
Representation	Reasoning and Proof	Constraints
Critique	Compare	Draw Conclusions

Design: Develop procedures for gathering data to test hypotheses	Interpret Data: Make observations of objects or events to make inferences or predictions; write down the observations on paper as notes or display the data in charts, tables or graphs; make predictions, inferences and hypotheses from a set of data	Control Variables: State or control factors that affect the outcome of an experiment
Constraints: Limitations or restrictions on a process or procedure.	Reasoning and Proof: Recognize reasoning and proof as fundamental aspects of mathematics and science; make and investigate mathematical and scientific conjectures; develop and evaluate mathematical and scientific arguments and proofs; and select and use various types of reasoning and methods of proof	Representation: Create and use representations to organize, record and communicate mathematical and scientific ideas; select, apply and translate among mathematical and scientific representations to solve problems; and use representations to model and interpret physical, social, mathematical and scientific phenomena
Draw Conclusions: Interpret data to make conclusions; the final step of an investigation	Compare: Identify common and distinguishing characteristics among objects or events.	Critique: Evaluate (a theory or practice) in a detailed and analytical way.

Name ____ Date ______________

Science Exploration Report

Title of Experiment:	
What did you observe?	
Write a hypothesis that can be tested. (If _____, then ______.)	
Write down the steps of your experiment.	
Variables	
What stays the same every time you do the experiment?	What is the ONE thing that you change?

Create a table below to record experimental findings (attach pages as needed)
Do your results support or disprove your hypothesis? What conclusions can you think of based on your results?
How will you communicate your results?

Inquiry Design Cycle
Teacher Explanation

Define the Problem: The students will identify what needs to be done. They will come back to this stage each tiem they encounter a problem through out the design process. Be sure that students are documenting changes on the Inquiry Design Challenge page or the Daily Notebook.

What students are doing during this stage:

- Making observations
- Lisitng all driving questions

Develop the Solution: This stage involves brainstorming, drawing, modeling, and building. Students are activeely engaged in the solving of or discussion of the problem. During this time students will often swich back and forth between Defining the problem and Optimizing their design. They may not realize they are doing it so remind them to document ideas and modifications.

What students are doing during this stage:

- Collaborating and writing down every idea that may be the solution(brainstorming)
- Sketching what the solution may look like
- Research if anyone else has asked the same or a similar question
- Labeling drawings and selcting material
- Evaluating each idea with the assessment criteria nd scoring rubric
- Selecting the best solution based on the criteria and scoring rubric
- Creating a protoype to test

Optimize/Improve: Students are challenging their own solutions and making their product better in response to the problem. This is where real learning occurs. Working through difficulties and learning "grit" or persistence si an important characteristic to success in any field.

What students are doing during this stage:

- Testing the solution and recording what works or additional problems
- Redrawing a simpler sketch
- Labeling details of the sketch
- Testing different materials

Inquiry Design Cycle

Define the Problem:

What is the problem you want solved?

Develop the Solution:

Sketch possible solutions/choose the best idea.

Optimize/ Improve

Test the solution: Does it solve the problem? Can you explain the solution? Can it be made simpler?

Name ____ Date ____________________

Inquiry Design Challenge

1) Define the problem. While observing, what were the questions that came to your mind?

2) Brainstorm several ways that may solve the problem. Sketch ideas or write out. What do you want the solution to do? Scientific Hypothesis: each solution should be testable. The final solution will be modified and optimized several times after repeated tested.

3) Develop the solution. Pick ONE of your brainstorm ideas. Explain why it will work the best. Scientific Hypothesis: Whould this soluiton answer the problem? Is this the simplest solution?

4) Constraints. Identify materials needed to build your solution. How much time will be required? Where will you obtian the materials? List any safety concerns.

5) Design. Draw a picture of your design. Label each part. Identify the materials used. Describe how it will be created or assembled.

6) Build your prototype. Engineering: Stick to the design and record all modifications.

7) Critique. Did your prototype work as you expected it would?

8) Optimize. Can it be made simpler or with less materials?

9) Define the Problem. Does the solution create any additional problems that need addressed?

Return to Step 1

Science Inquiry Notebook

Name ____ Date ____________________

What phase of the design cycle were you using today? Explain what you did for th design challenge today.

____

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Draw a picture of how you contributed.

Describe 3 things you learned about science or engineering from what you did today.

____

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Features
Five Types of Writing

Type One

- Gets ideas on paper – brainstorming in printed form
- Timed
- Requires a minimum number of lines
- Develops fluency, comfort and confidence
- One draft

Type Two

- Writing that shows the writer knows something about a topic
- It is a correct answer to a specific question
- Can be a quick quiz
- One draft

Type Three

- Writing has substantial content
- Identifies three specific standards called focus correction areas
- Read aloud by writer to listen for fluency and self correct
- Reviewed to see if draft meets certain criteria
- One draft

Type Four

- Writing that is Type Three writing that is read out loud by another person
- Critiqued by that person
- Rewritten with corrections made
- Two drafts

Type Five

- Writing that is of publishable quality
- Multiple drafts

Writing Program Reasoning

To demand more writing and thinking, especially writing, requires more teacher work in an unending cycle of assessment. How do we get students to do more writing and thinking without overwhelming the teacher?

The Collins Writing program being recommended is not designed to turn all teachers into English teachers. The program is designed to help teachers in all content areas achieve their goals by requiring students to think on paper.

Frequent, usually short, writing assignments can be used to increase students' involvement in lessons, check on their understanding of concepts, and promote their thinking about content.

The program can be used to encourage students to take responsibility for their own learning.

The program can be used to refine listening and speaking skills. Some types of assignments require that the students read their writing out loud and listen critically to writing that is being read to them.

Why is Writing Important in Science Classes?

- Writing helps students to synthesize knowledge by improving the learning of content.

- Writing helps students organize their thoughts.

- Writing is a memory aid that entails a higher degree of involvement than listening or reading.

- We write to discover what we know and what we need to learn.

General Guidelines for Teachers Using Type One and Type Two Writing Assignments

- Post the definitions for Type One and Type Two writing in a conspicuous place or places in the classroom.

- Always tell students what type of writing they will be doing.

- Have the students label Type One and Type Two assignments on the top line, left-hand side of the paper.

- Skip lines for all body text.

- Give a quota for the number of lines

- Student should write the entire time.

- Give a limited amount of time for trying.

- Have students underline key words.

Advantages and Disadvantages of Type One Writing

Advantages:

- Spontaneous – requires little preparation by teacher.
- Takes little class time to complete.
- Very easy to evaluate, produces effort or participation grade.
- Provides opportunity for all students to stop and think, to review prior knowledge, and to develop questions.
- When used before instruction, provides opportunity for teacher to assess student knowledge and make decisions about what to teach.
- Special advantage to quiet, less verbal students.
- Promotes writing fluency.

Disadvantages:

- Does not directly improve specific writing skills (sentence variety, organization, word choice, etc.).

Advantages and Disadvantages of Type Two Writing

Advantages:

- Spontaneous – requires little preparation by teacher.
- Quick assessment of student knowledge resulting in quiz grade.
- Promotes active learning by requiring student to produce information rather than simply identify information produced by others (e.g., objective test)
- Promotes content-rich writing.
- Promotes writing fluency.

Disadvantages:

- Does not directly improve specific writing skills (sentence variety, organization, word choice, etc.).

Quick Write: Type One Example

Word Splash

Tell me everything you know about these words:

- Observation
- Inference
- Variable
- Control

Quick Write: Type Two Examples

Who did the variable effect the dissolving candy?

What were three of the most important points from today's class discussion?

Type One Writing

- ✓ Quick write
- ✓ Generating ideas
- ✓ Getting those ideas on paper
- ✓ No right or wrong answer
- ✓ Self edit
- ✓ Minimum number of lines written
- ✓ Time limit
- ✓ Keep writing until time is up
- ✓ Checked for writing minimum number of lines

Type Two Writing

- ✓ Quick write
- ✓ Writing that shows you know something about the topic given
- ✓ Correct answer to a specific question
- ✓ Graded as a quiz
- ✓ Can have a minimum number of lines written
- ✓ Should include vocabulary that applies to the given topic

Exit ticket and Quick write forms for your students.

YOUR "KEY" OUT

Name: ______________________________ Date: ________________

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YOUR "KEY" OUT

Name: ______________________________ Date: ________________

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YOUR "KEY" OUT

Name: ______________________________ Date: ________________

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YOUR "KEY" OUT

Name: ______________________________ Date: ________________

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SCIENCE Exit Ticket

Name________________________________ Date ____________

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Bonus ______________________________________

SCIENCE Exit Ticket

Name________________________________ Date ____________

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Bonus ______________________________________

Quick Write

Name ____________________

Date ______________

Quick Write

Name ____________________

Date ______________

Quick Write

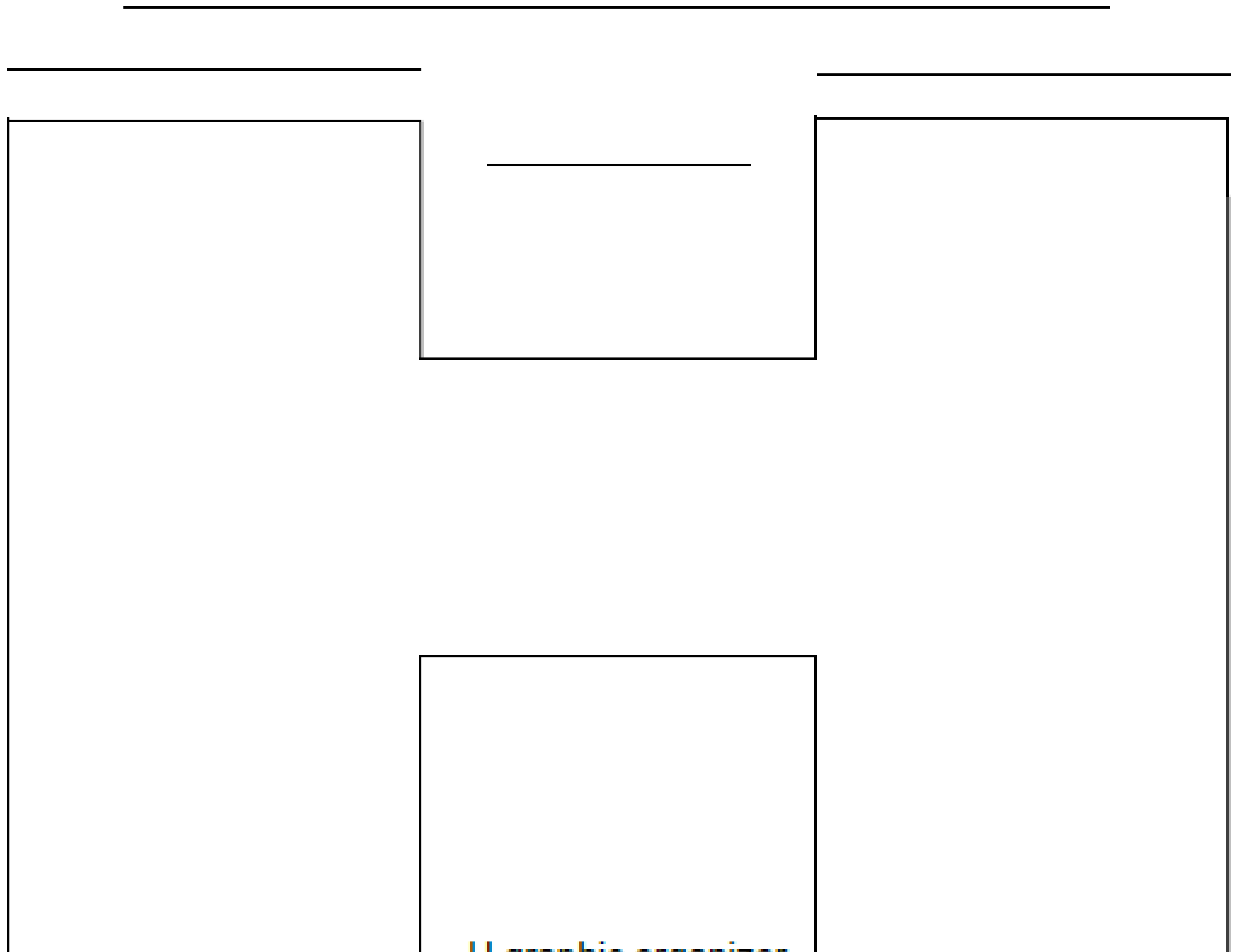
Name ____________________

Date ______________

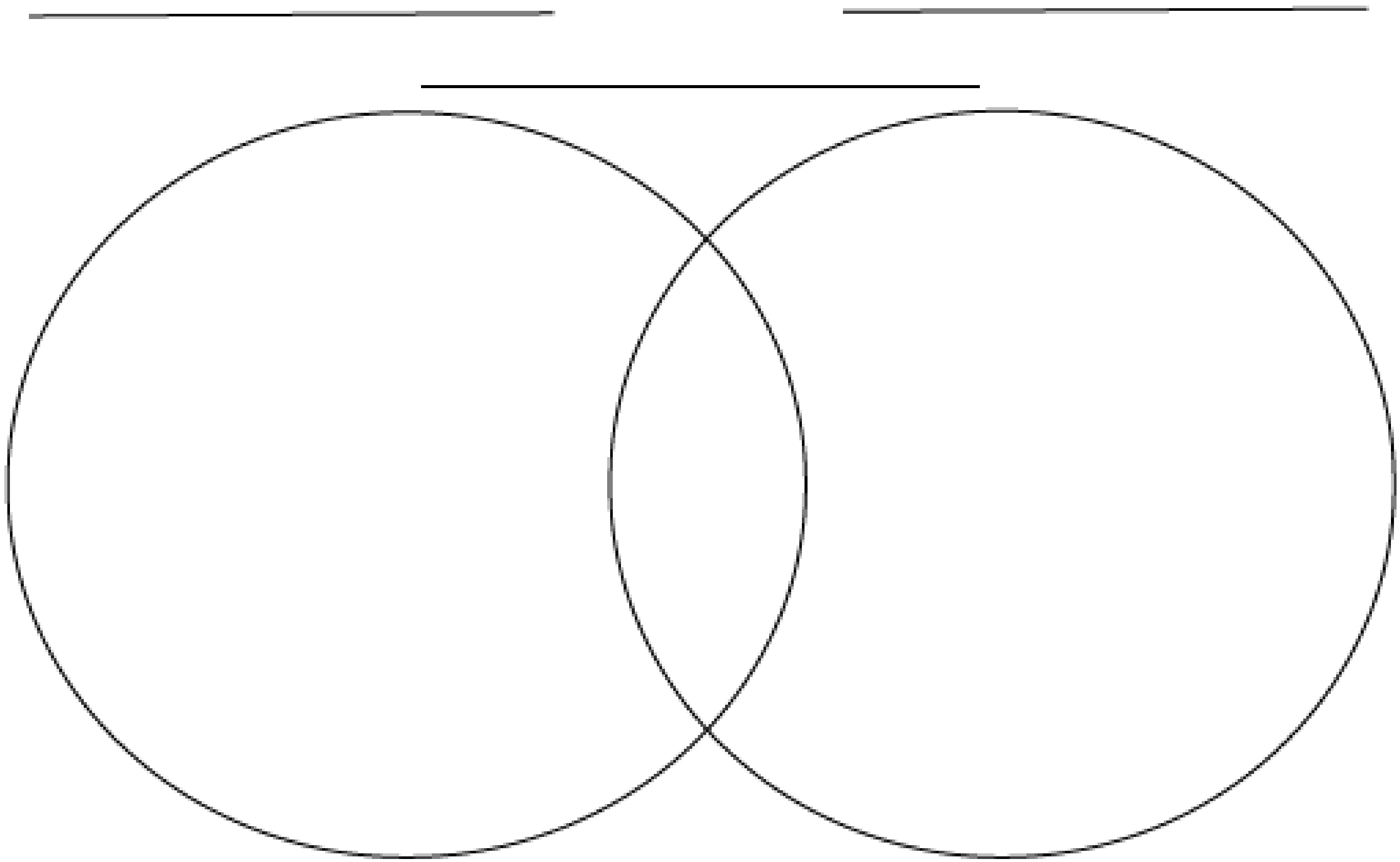
Quick Write

Name ____________________

Date ______________



H graphic organizer



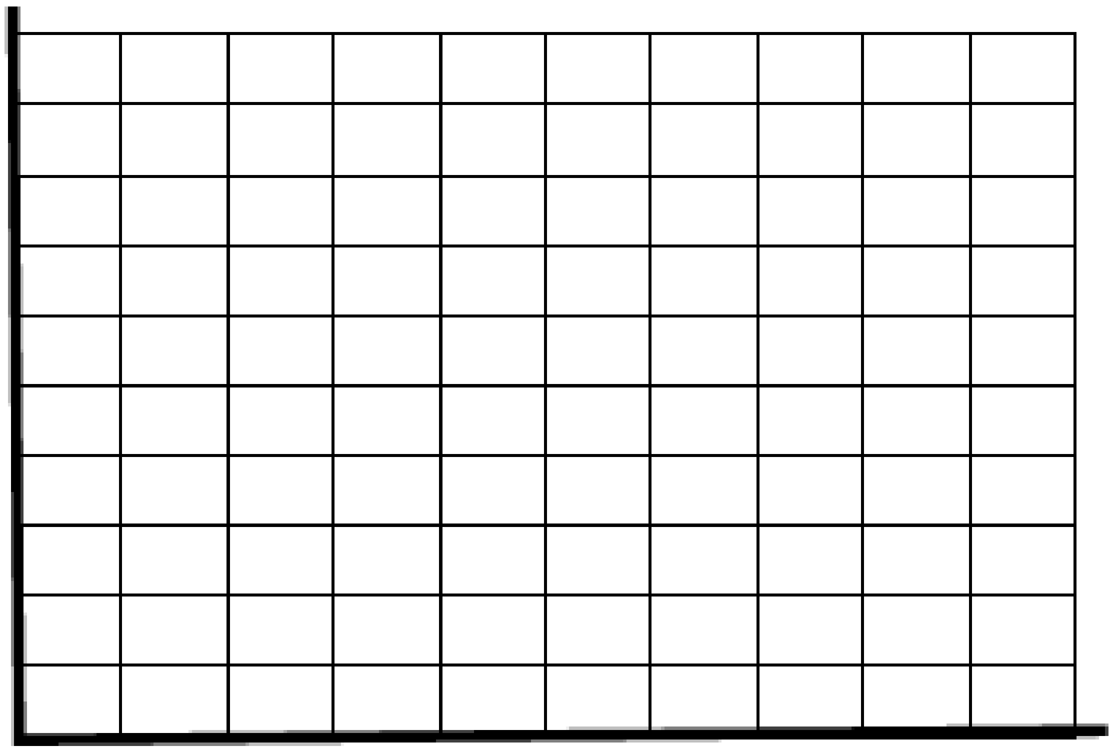
Venn Diagram

T Chart

Name ______________________________

Graph Title: ______________________________

Y axis ____________



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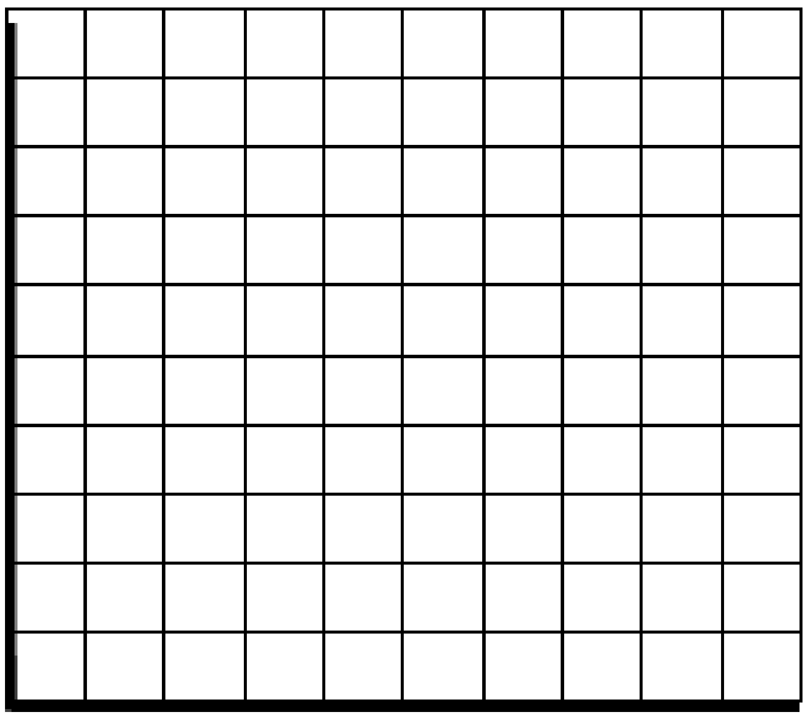
X axis ______________________________

Name ______________________________

Graph Title: ____

Y axis ____________________



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X axis ____

CONCLUSION

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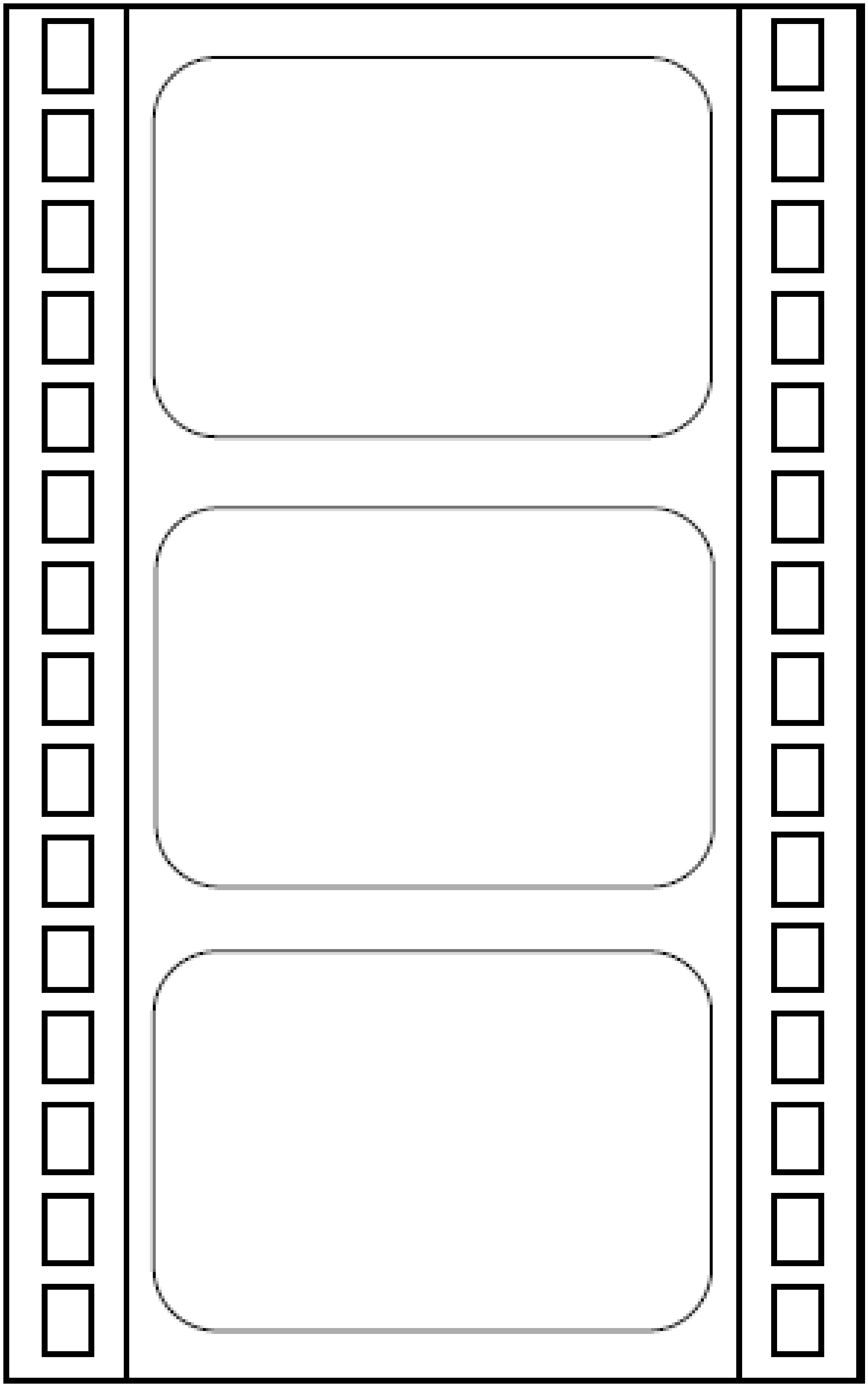
Grid Paper

Grid Paper

1 centimeter grid

Filmstrip template



Cartoon Template

Index Graphic Organizers

Benefits of graphic organizers

- Focus attention on key elements
- Help integrate prior knowledge with new knowledge
- Enhance concept development
- Enrich reading, writing and thinking
- Aid writing by supporting planning rand revision
- Promote focused discussion
- Assist instructional planning
- Serve as assessment and evaluation tool

	Describing	**Compare/ Contrast**	**Classifying**	**Sequencing**	**Causal**	**Decision Making**
Webbing	Brainstorming Web Money Web	Double Cell Diagram	Hierarchy Diagram Research Cycle Cluster Diagram		Squirrels Web	
Concept Mapping	Concept Map	Simile				
Matrix		Venn H T			KWHL	Thinking Grids
Flow Chart			Desktop Folder System	Linear String Expanded Linear String Domino Effect		

Websites for other Graphic Organizers

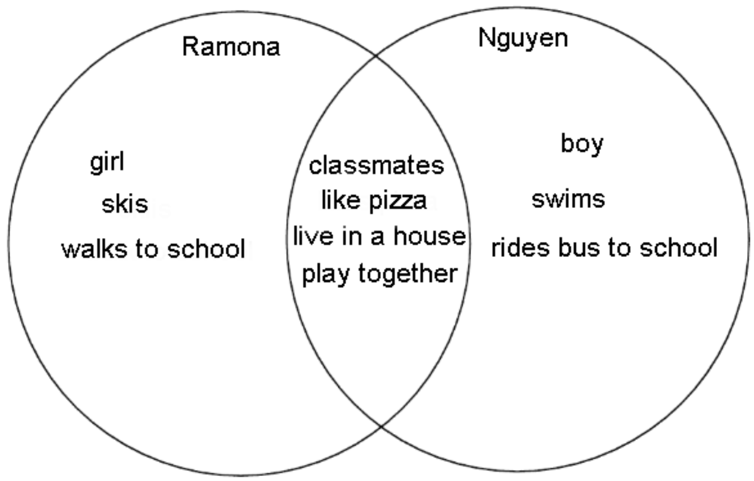
Hougton Mifflin: http://www.eduplace.com/graphicorganizer/

Ed Helper: http://www.edhelper.com/teachers/graphic_organizers.htm

Compare/Contrast

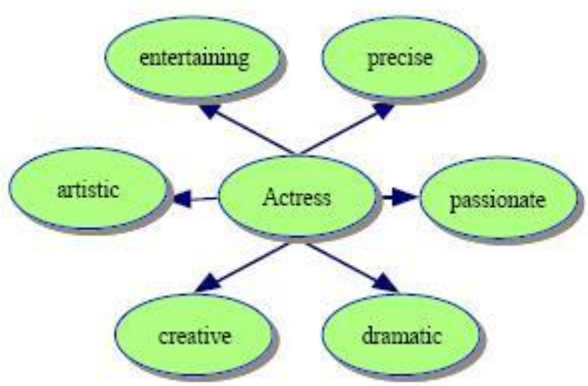
Comparison/Contrast is used to show similarities and differences.

Key frame questions: What are being compared? How are they similar? How are they different?



Clustering

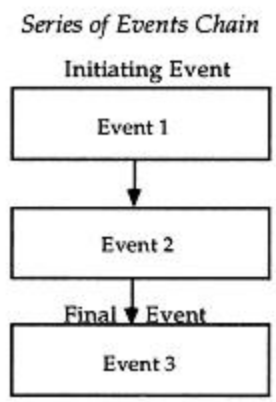
Clustering is a nonlinear activity that generates ideas, images and feelings around a stimulus word. As students cluster, their thoughts tumble out, enlarging their word bank for writing and often enabling them to see patterns in their ideas. Clustering may be a class or individual activity.



Chain of Events

Chain of Events is used to describe the stages of an event, the actions of character or the steps in a procedure.

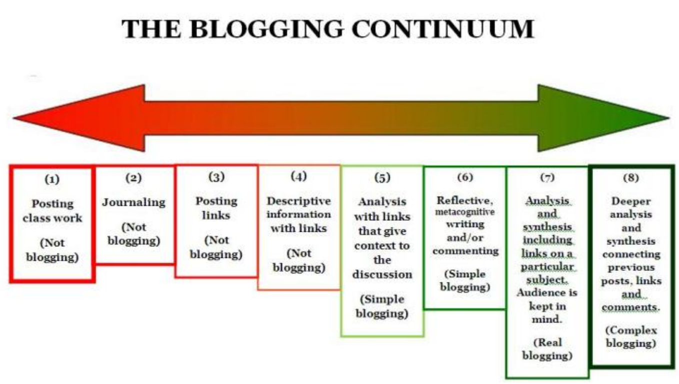
Key questions: What is the first step in the procedure or initiating event? What are the next stages or steps? How does one event lead to one another? What is the final outcome?



Continuum

Continuum is used for time lines showing historical events, ages (grade levels in school), degrees of something (weight), shades of meaning, or rating scales (achievement in school).

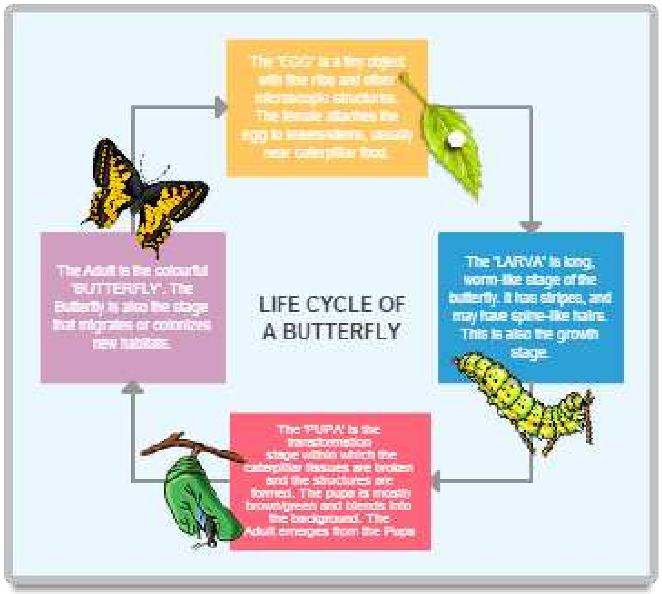
Key frame questions: What is being scaled? What are the end points or extremes?



Cycle

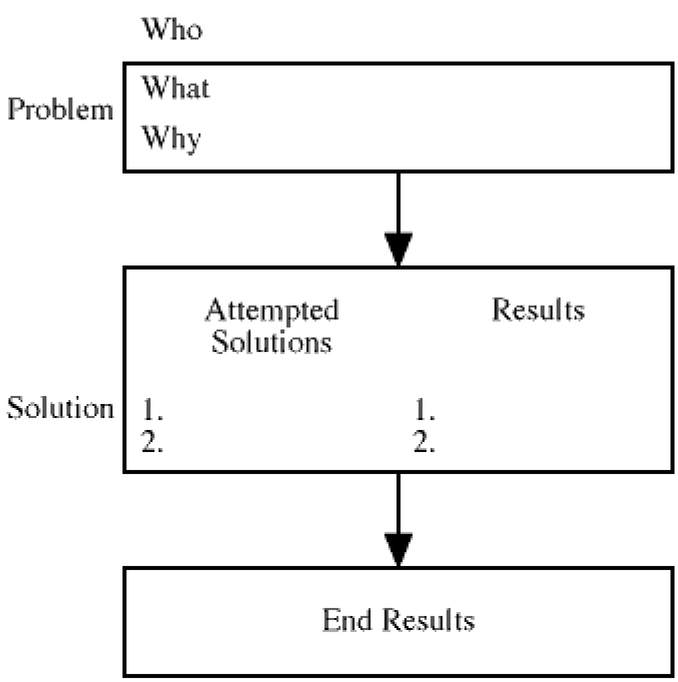
A depiction of a Cycle attempts to show how a series of events interacts to produce a set of results again and again, such as the life cycle or a cycle of poor decisions.

Key frame questions: What are the main events in the cycle? How do they interact and return to the beginning again?



Problem/Solution

Problem/Solution requires student to identify a problem and consider multiple solutions and possible results.



Prior Knowledge Topic Survey

Anticipation/Reaction Guide

Instruction: Respond to each statement twice: once before the lesson and again after reading it.

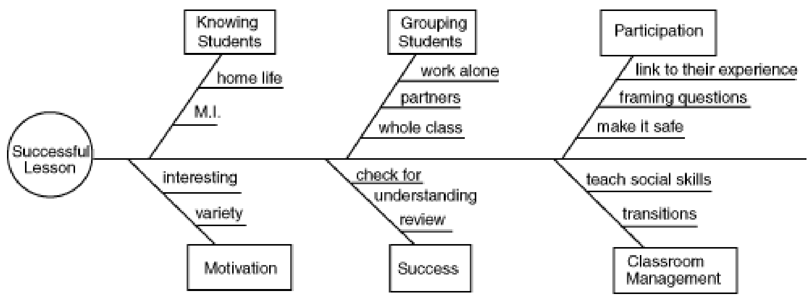
- Write **A** if you agree with the statement
- Write B if you disagree with the statement

Response Before Lesson	TOPIC:	Response After Lesson

Fishbone Mapping

A Fishbone Map is used to show the causal interaction of a complex event (an election, a nuclear explosion) or a complex phenomenon (juvenile delinquency, learning disabilities, etc)

Key frame question: What are the factors that cause X? How do they interrelate? Are the factors that cause X the same as those that cause X to persist?



K-W-L-H Technique

The K-W-L-H teaching techniques is a good method to help students activate prior knowledge. It is a group instruction activity developed by Donna Ogle (1986) that serves as a model for active thinking during reading.

K- Stands for helping students recall what they know about the topic
W- Stands for helping student determine what they want to learn.
L – Stands for helping students identify what they learn as they read.
H- Stands or how we can learn more (other sources were additional information on the topic can be found).

Students complete the “categories” section at the bottom of the graphic organizer b asking themselves what each statement in the “L” section (What We Learned) describes.

They use these categories and the information in the “H” section (How Can We Learn More) to learn more about the topic. Students also can use the categories to create additional graphic organizers. They can use the organizers to review and write about what they’ve learned.