Grade 5 Science
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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.

5th Grade New Learning Standards at a Glance

Earth and Space Sciences

Condensed Content Statement	Content Elaboration
5.ESS.1 The solar system includes the sun and all celestial bodies that orbit the sun. Each planet in the solar system has unique characteristics.	• Eight major planets in the solar system orbit the sun. Some of the planets have a moon or moons that orbit them. Earth is a planet that has a moon that orbits it. The planets orbits are because of their gravitational attraction to the sun. Moons orbit around planets because of their gravitational attraction to the planets. • Asteroids are metallic, rocky bodies that orbit the sun but are too small to be classified as a planet. A meteor appears when a particle or chunk of metallic or stony matter called a meteoroid enters Earth's atmosphere from outer space. Comets are a mixture of ices (both water and frozen gases) that are not part of a planet. Pluto is classified as a dwarf planet (definition from http://www.nasa.gov). • General information regarding planetary positions, orbital patterns, planetary composition and recent discoveries and projects (e.g., missions to Mars) are included in this content. Tools and technology are an essential part of understanding the workings within the solar system. • Note: Additional information about gravity is found in PS grade 5.
5.ESS.2 The sun is one of many stars that exist in the universe.	• The sun is the closest star to the Earth. Scaled models (3-D or virtual) and graphics can be used to show the vast difference in size between the sun and the Earth. The sun is a medium-sized star and is the only star in our solar system. There are many other stars of different sizes in the universe. Stars appear in patterns called constellations, which can be used for navigation. Because they are so far away, they do not appear as large as the sun. • General facts about the size and composition of the sun are introduced. Details (e.g., age of the sun, specific composition, temperature values) are above grade level. The emphasis should be on general characteristics of stars and beginning to understand the size and distance of the sun in relationship to the Earth and other planets. • Current and new discoveries related to stars and the sun must be included.
5.ESS.3 Most of the cycles and patterns of motion between the Earth and sun are predictable.	• Models, interactive websites and investigations are required to illustrate the predictable patterns and cycles that lead to the understanding of day and night, seasons, years and the amount of direct sunlight Earth receives. Three-dimensional models should be used to demonstrate that the tilt of Earth's axis is related to the amount of direct sunlight received and seasonal temperature changes. • Seasonal change should be expanded in grade 5 to include regions of the world that experience specific seasonal weather patterns and natural weather hazards (e.g., hurricane season, monsoon season, rainy season, dry season). This builds upon making observations of the seasons throughout the school year in the earlier grades and prepares students for understanding the difference between weather and climate.

Life Sciences

Condensed Content Statement	Content Elaboration
5.LS.1 Organisms perform a variety of roles in an ecosystem.	• The content statements for fifth-grade life science are each partial components of a larger concept. The parts have been isolated to call attention to the depth of knowledge required to build to one of biology's foundational theories: dynamic relationships within ecosystems. It is recommended that the content statements be combined and taught as a whole. For example, it is important that the ecological role of organisms is interwoven with a clear understanding that all living things require energy. • Plants and some microorganisms are producers. They are the foundation of the food web. Producers transform energy from the sun and make food through a process called photosynthesis. Animals get their energy by eating plants and other animals that eat plants. Animals are consumers and many form predator-prey relationships. Decomposers (primarily bacteria and fungi) are consumers that use waste materials and dead organisms for food. Decomposers also return nutrients to the ecosystem. • One way ecosystem populations interact is centered on relationships for obtaining energy. Food webs are defined in many ways, including as a scheme of feeding relationships, which resemble a web. This web serves as a model for feeding relationships of member species within a biological community. Members of a species may occupy different positions during their lives. Food chains and webs are schematic representations of real-world interactions. For this grade level, it is enough to recognize that food webs represent an intertwining of food chains within the same biological community. See the next content statement for details on grade-appropriate food webs. • Organisms have symbiotic relationships in which individuals of one species are dependent upon individuals of another species for survival. Symbiotic relationships can be categorized as mutualism where both species benefit, commensalism where one species benefits and the other is unaffected, and parasitism where one species benefits and the other is harmed. • Investigations of locally threatened or endangered species must be conducted and include considerations of the effects of remediation programs, species loss and the introduction of new species on the local environment. • Note: At this grade, species can be defined by using Ernst Mayer's definition "groups of actually or potentially interbreeding natural populations, which are reproductively isolated from other such groups." Assessments will not include the definition of species.
5.LS.2 All of the processes that take place within organisms require energy.	• The content statements for fifth-grade life science are each partial components of a larger concept. The parts have been isolated to call attention to the depth of knowledge required to build to one of biology's foundational theories: dynamic relationships within ecosystems. It is recommended that the content statements be combined and taught as a whole. For example, it is important that the ecological role of organisms is interwoven with a clear understanding that all living things require energy. Virtual simulations and investigations can help demonstrate energy flow through the trophic levels. • Energy flows through an ecosystem in one direction, from photosynthetic organisms to consumers (herbivores, omnivores to carnivores) and decomposers. The exchange of energy that occurs in an ecosystem can be represented as a food web. The exchange of energy in an ecosystem is essential because all processes of life for all organisms require a continual supply of energy. • Satellite imaging, remote sensing or other digital-research formats can be used to help visualize what happens in an ecosystem when new producers (e.g., Tamarisk plants) are introduced into an ecosystem. The information gained should be used to determine the relationship between the producers and consumers within an ecosystem.

Physical Science

Condensed Content Statement	Content Elaboration
5.PS.1 The amount of change in movement of an object is based on the mass* of the object and the amount of force exerted.	• The motion of an object can change by speeding up, slowing down or changing direction. Forces cause changes in motion. If a force is applied in the same direction of an object's motion, the speed will increase. If a force is applied in the opposite direction of an object's motion, the speed will decrease. Generally, the greater the force acting on an object, the greater the change in motion. Generally, the more mass* an object has, the less influence a given force will have on its motion. If no forces act on an object, the object does not change its motion and moves at constant speed in a given direction. If an object is not moving and no force acts on it, the object will remain at rest. • Movement is measured by speed (how fast or slow the movement is). Speed is measured by time and distance traveled (how long it took the object to go a specific distance). Speed is calculated by dividing distance by time. Speed must be investigated through testing and experimentation. Real-world settings are recommended for the investigations when possible. Virtual investigations and simulations also can be used to demonstrate speed. • An object that moves with constant speed travels the same distance in each successive unit of time. In the same amount of time, a faster object moves a greater distance than a slower object. When an object is speeding up, the distance it travels increases with each successive unit of time. When an object is slowing down, the distance it travels decreases with each successive unit of time. • Speed must be explored and tested through investigations (3-D or virtual) inside and outside of the classroom. Video technology can be used to stop movement and measure changes at different steps in the investigations. • Note 1: This content can be taught in conjunction with the following ESS content: Everything on or anywhere near Earth is pulled toward Earth's center by gravitational force. Weight is a measure of this force. The planets are kept in orbit due to their gravitational attraction for the sun. • Note 2: While concepts are related to Newton's second law, remain conceptual at this grade. Knowing the name of the law is not required. Memorizing and reciting words to describe Newton's second law is not appropriate. • Note 3: Although mathematics is applied to the concept of speed at this grade level, its use should support deeper understanding of the concept of speed and not be taught as the primary definition of speed.
5.PS.2 Light and sound are forms of energy that behave in predictable ways.	• Light can travel through some materials, such as glass or water. Light also can travel through empty space, like from the sun to Earth. When light travels from one location to another, it goes in a straight line until it interacts with another object or material. When light strikes objects through which it cannot pass, shadows are formed. As light reaches a new material, it can be absorbed, refracted, reflected or can continue to travel through the new material; one of these interactions may occur or many may occur simultaneously, depending on the material. • Light can be absorbed by objects, causing them to warm. How much an object's temperature increases depends on the material of the object, the intensity of and the angle at which the light striking its surface, how long the light shines on the object and how much light is absorbed. Investigating and experimenting with temperature changes caused by light striking different surfaces can be virtual or in a lab setting. • When light passes from one material to another, it is often refracted at the boundary between the two materials and travels in a new direction through the new material (medium). For example, a magnifying lens bends light and focuses it toward a single point. A prism bends white light and separates the different colors of light. Experiment with prisms and magnifying lenses to observe the refraction of light. • Visible light may be emitted from an object (like the sun) or reflected by an object (like a mirror or the moon). The reflected colors are the only colors visible when looking at an object. For example, a red apple looks red because the red light that hits the apple is reflected while the other colors are absorbed.

	• Pitch can be changed by changing how fast an object vibrates. Objects that vibrate slowly produce low pitches; objects that vibrate quickly produce high pitches. Audible sound can only be detected within a certain range of pitches. Sound must travel through a material (medium) to move from one place to another. This medium may be a solid, liquid or gas. Sound travels at different speeds through different media. Once sound is produced, it travels outward in all directions until it reaches a different medium. When it encounters this new medium, the sound can continue traveling through the new medium, become absorbed by the new medium, bounce back into the original medium (reflected) or engage in some combination of these possibilities. • Light travels faster than sound. Technology and virtual simulations and models can help demonstrate movement of light and sound. Experimentation, testing and investigation (3-D or virtual) are essential components of learning about light and sound properties. • Note: Students are not responsible for knowing the additive rules for color mixing of light other than the fact that white light is a mixture of many colors. The wave nature of sound and light are not introduced at this level nor are parts of the electromagnetic spectrum other than visible light. At this grade, how sound travels through the medium is not appropriate as atoms and molecules are not introduced until grade 6.

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.

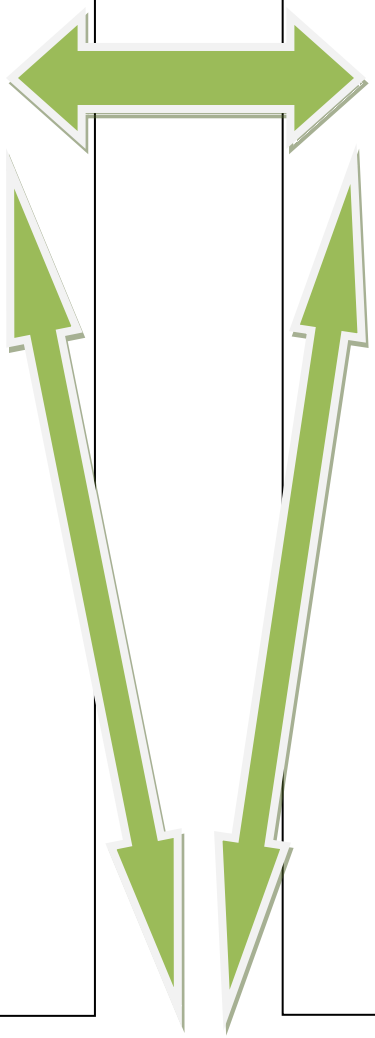
What students are doing during this stage:

- 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.

_____

_____

_____

_____

_____

Draw a picture of how you contributed.

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

_____

_____

_____

_____

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: _____

_____

_____

_____

_____

YOUR "KEY" OUT

Name: _____ Date: _____

_____

_____

_____

_____

YOUR "KEY" OUT

Name: _____ Date: _____

_____

_____

_____

_____

YOUR "KEY" OUT

Name: _____ Date: _____

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_____

SCIENCE Exit Ticket

Name_____ Date _____

Bonus _____

SCIENCE Exit Ticket

Name_____ Date _____

Bonus _____

Quick Write

Name _____

Date _____

Quick Write

Name _____

Date _____

Quick Write

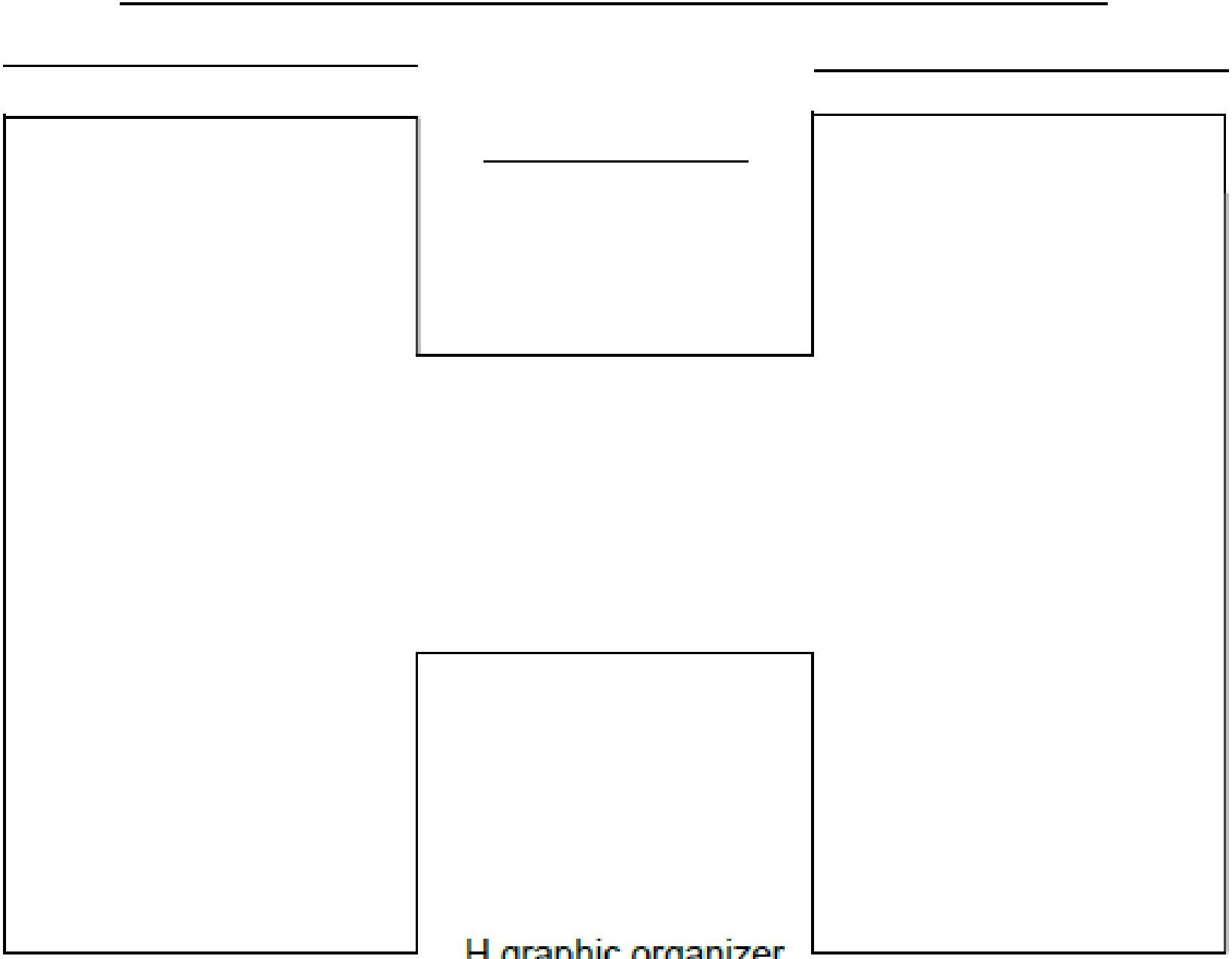
Name _____

Date _____

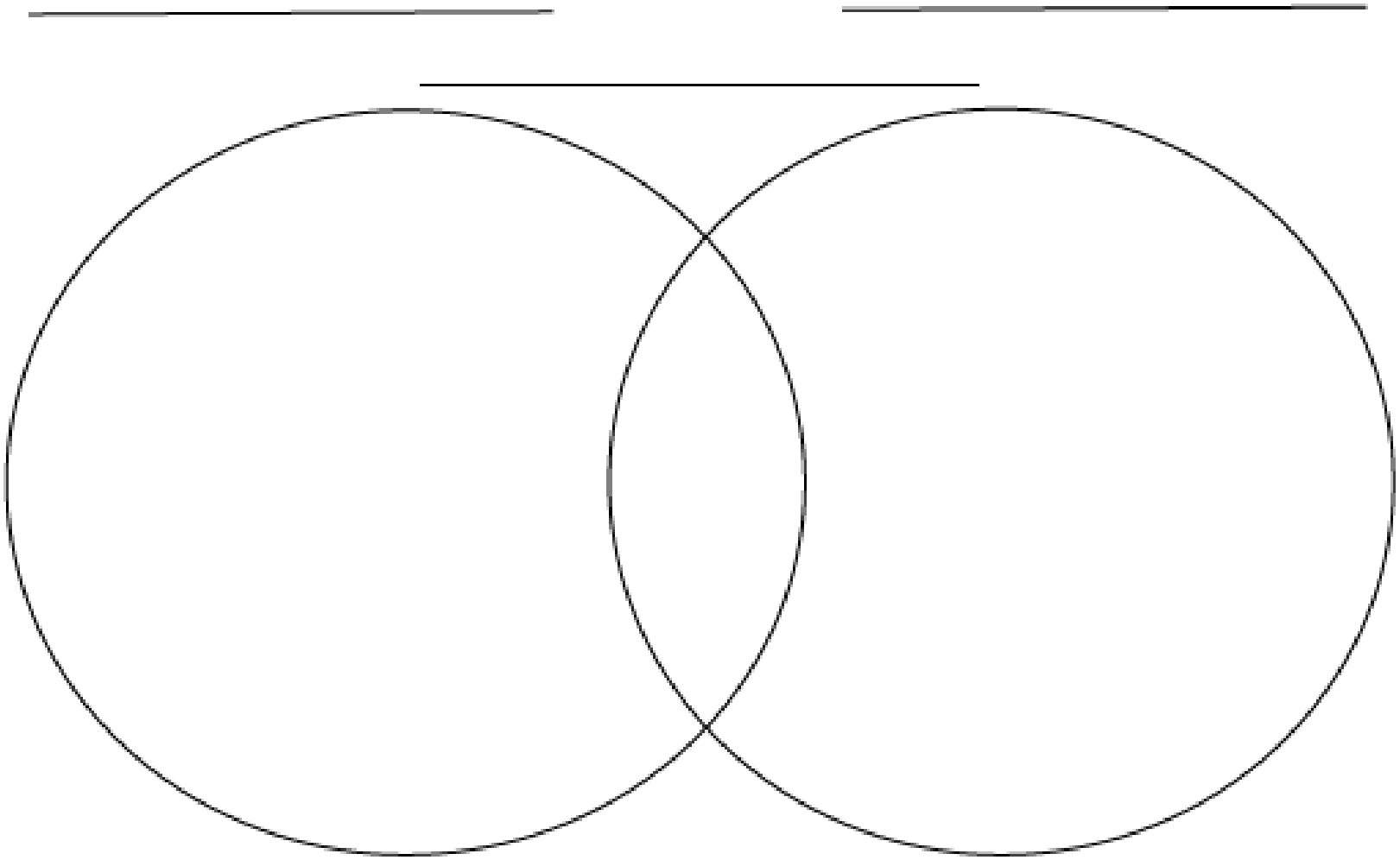
Quick Write

Name _____

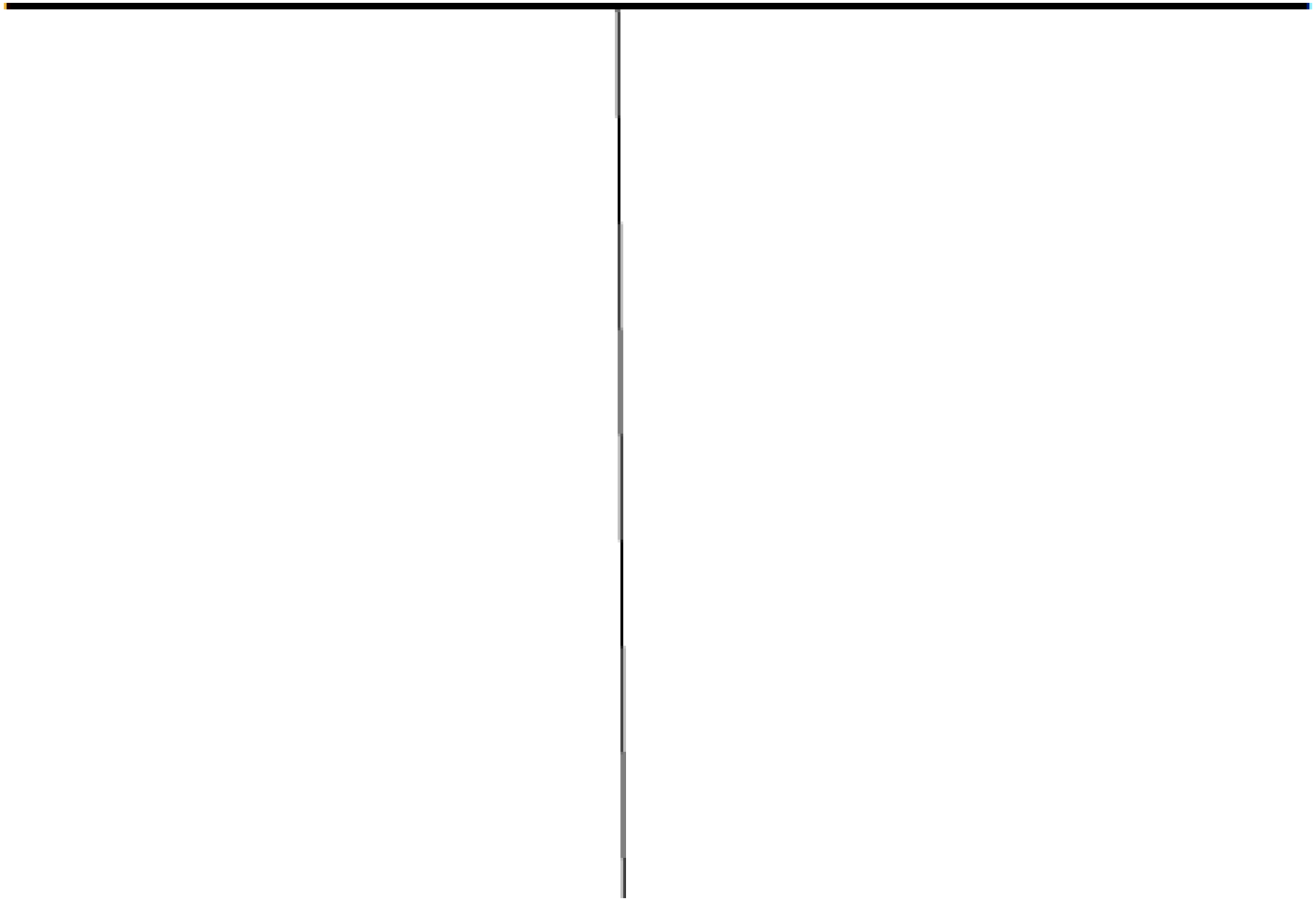
Date _____



H graphic organizer



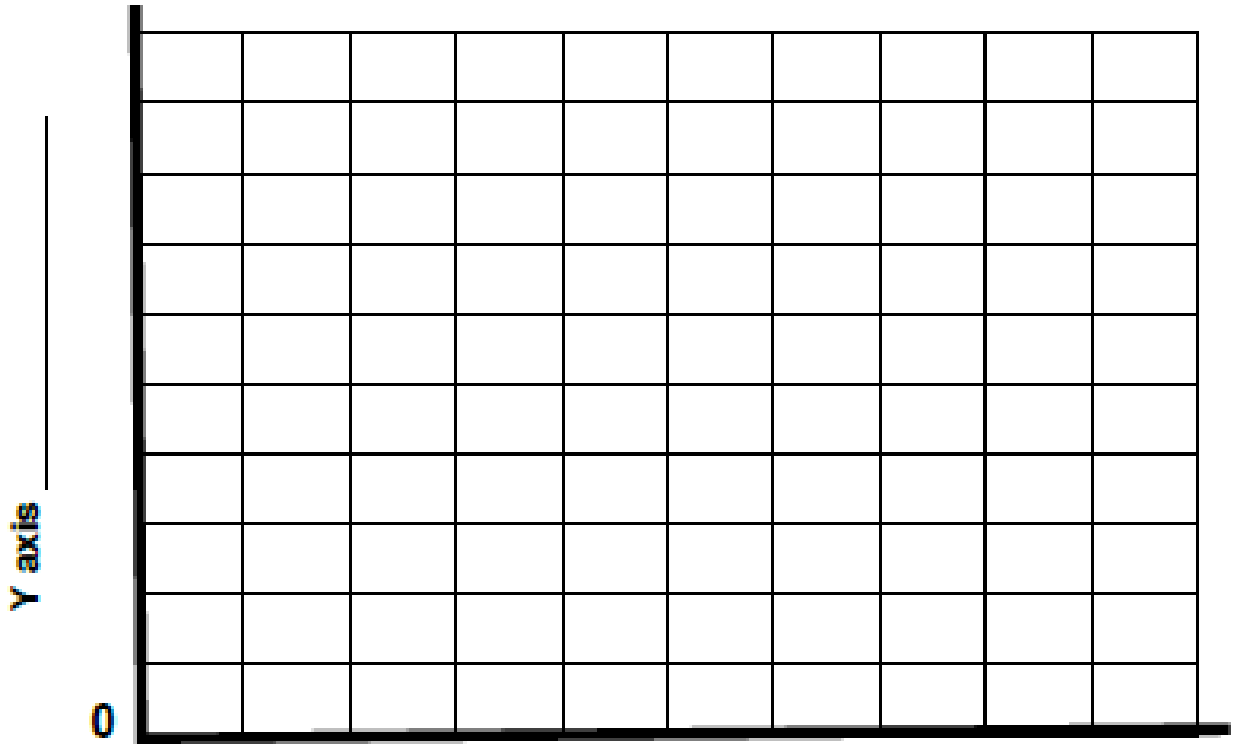
Venn Diagram



T Chart

Name _____

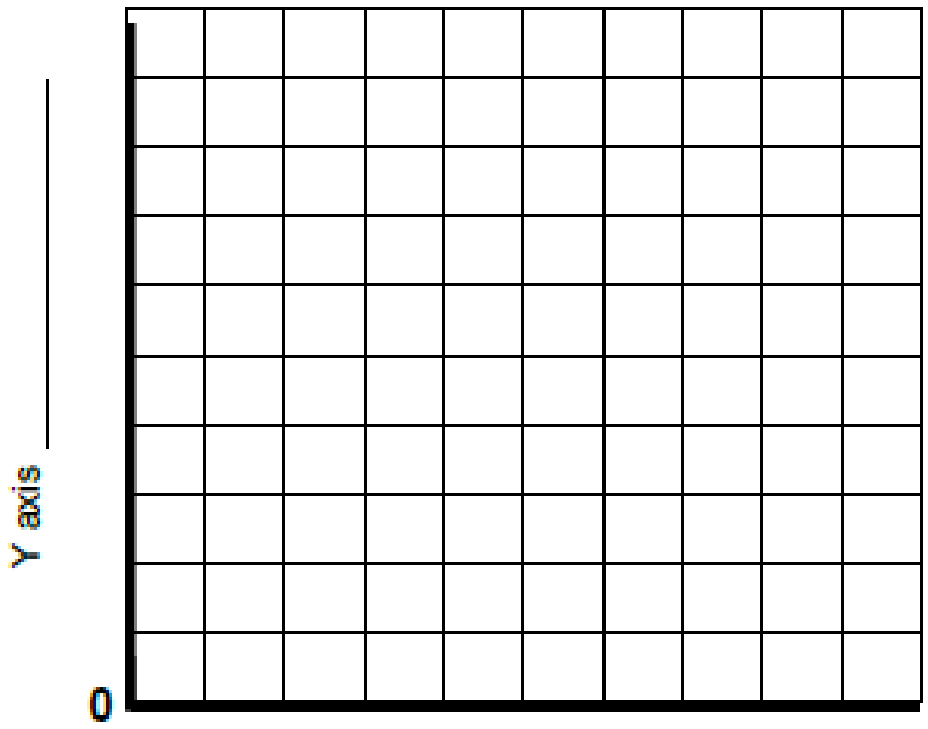
Graph Title: _____



X axis _____

Name _____

Graph Title: _____



X axis _____

CONCLUSION

_____

_____

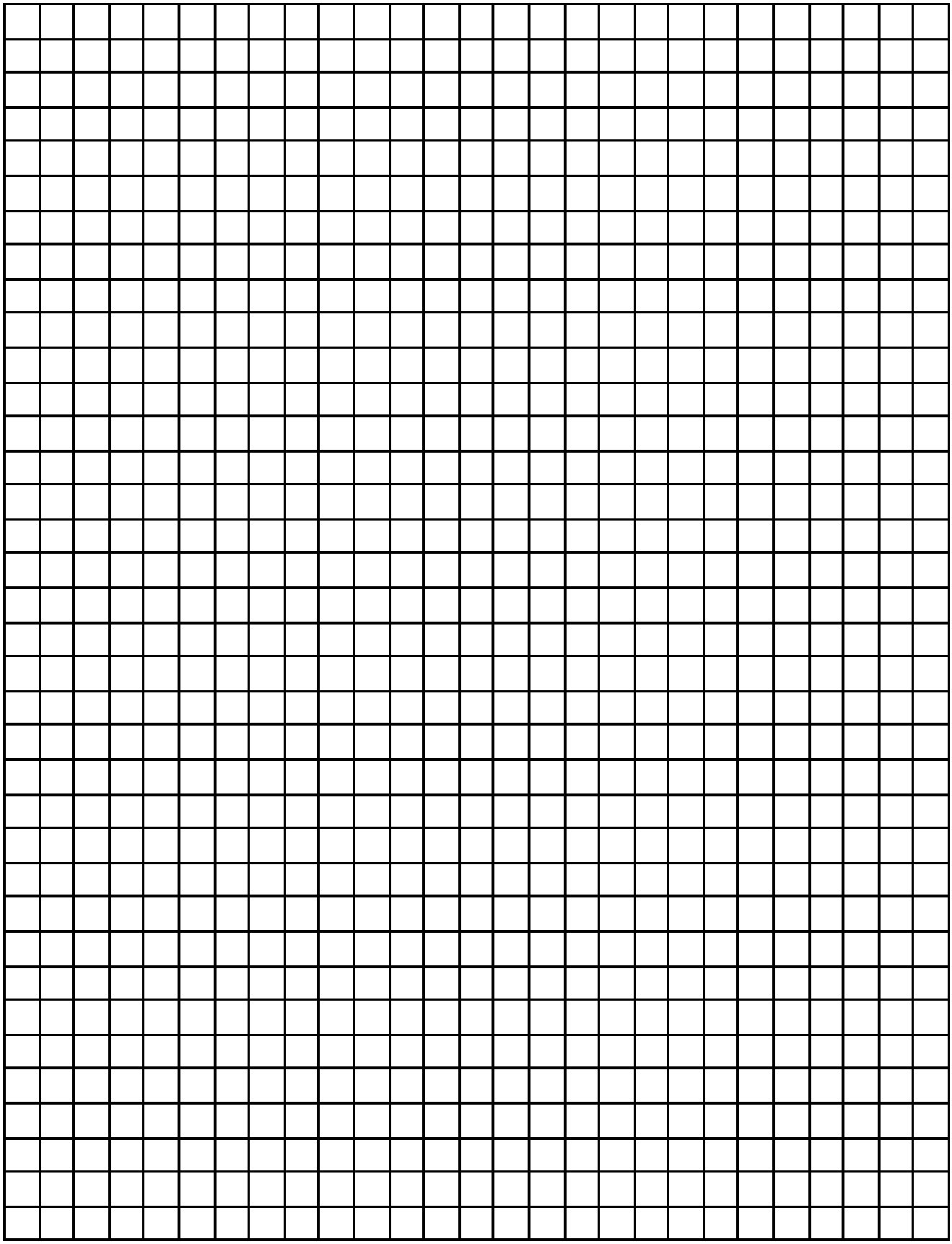
_____

_____

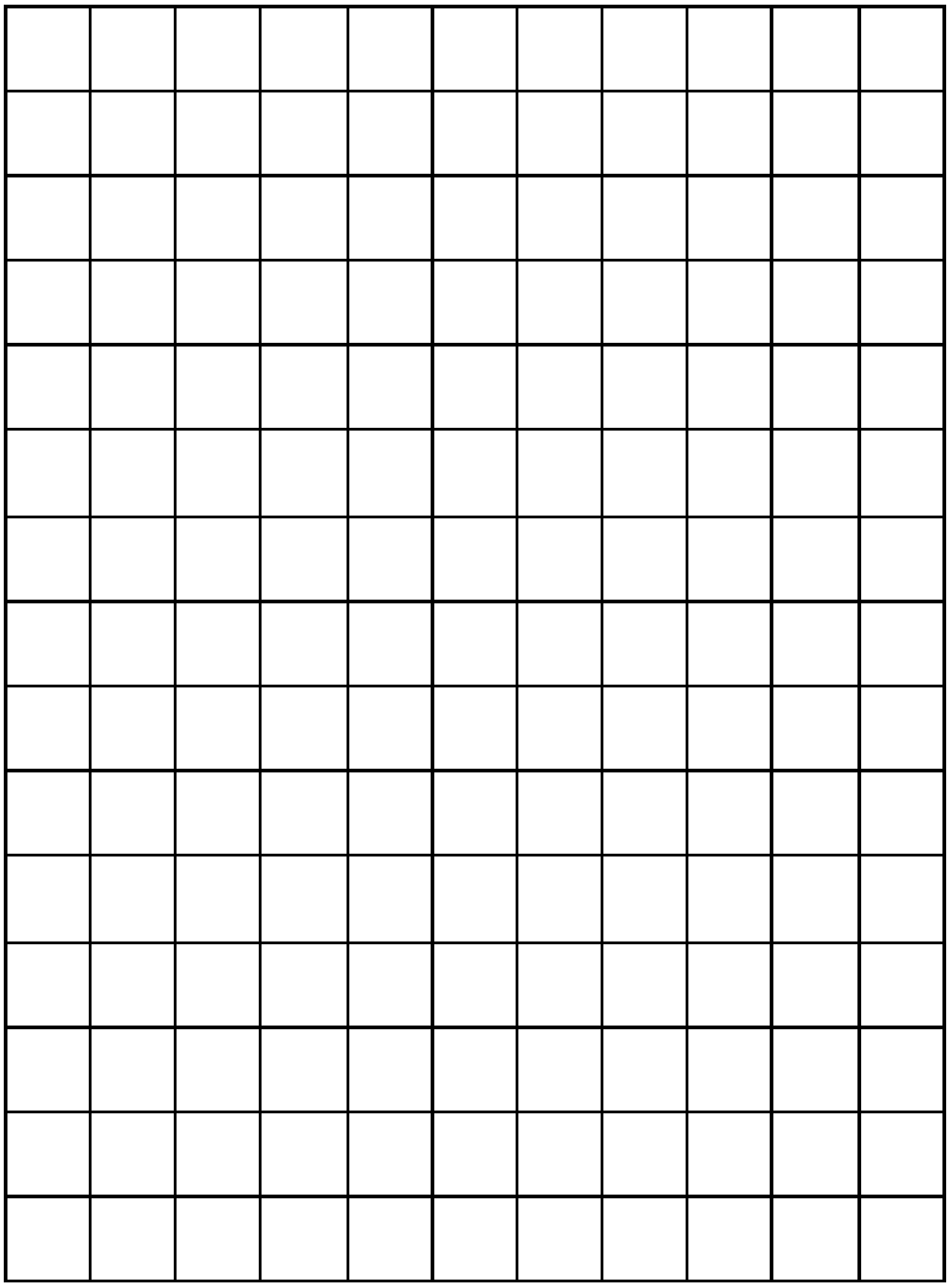
_____

_____

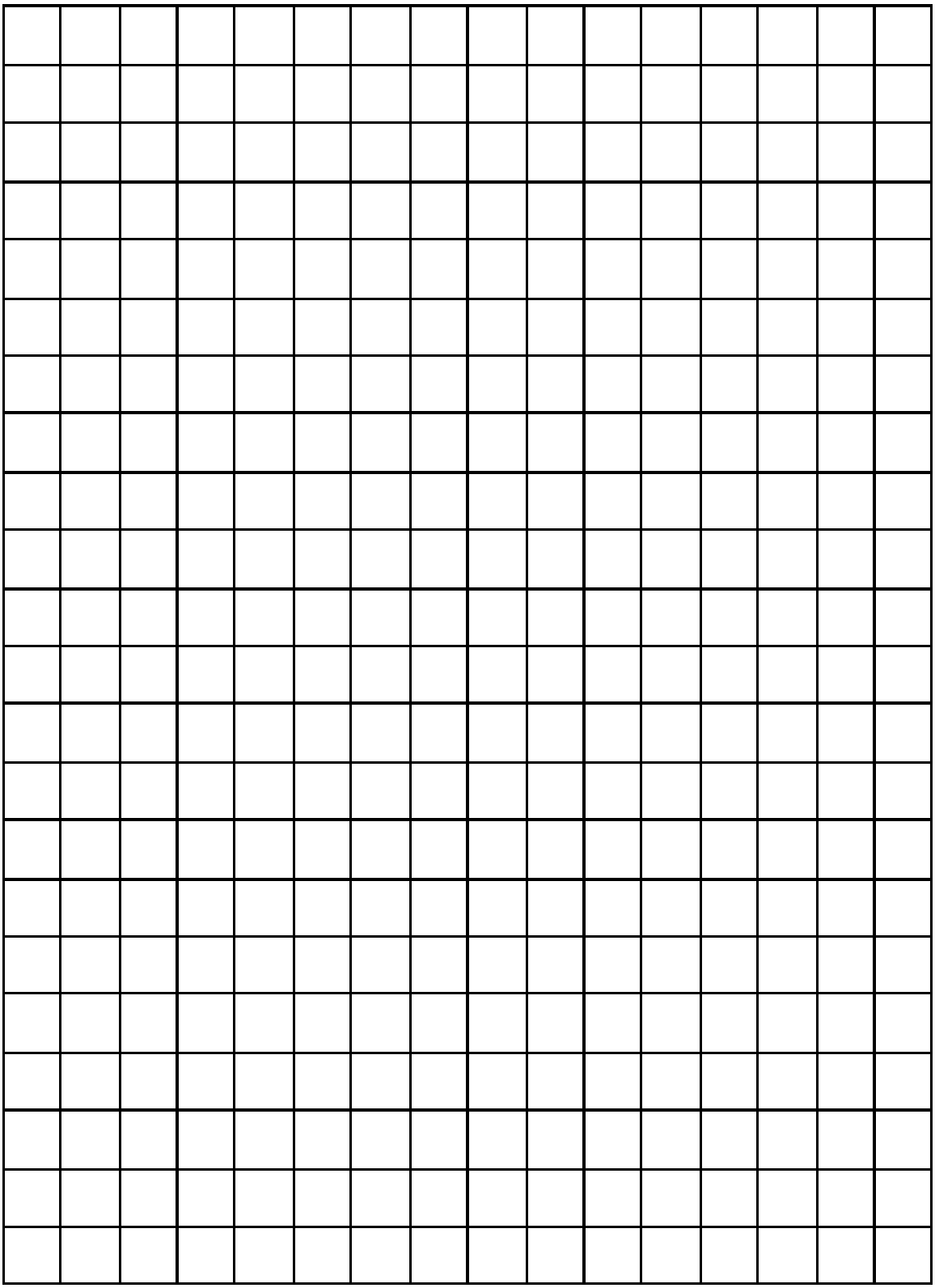
Grid Paper



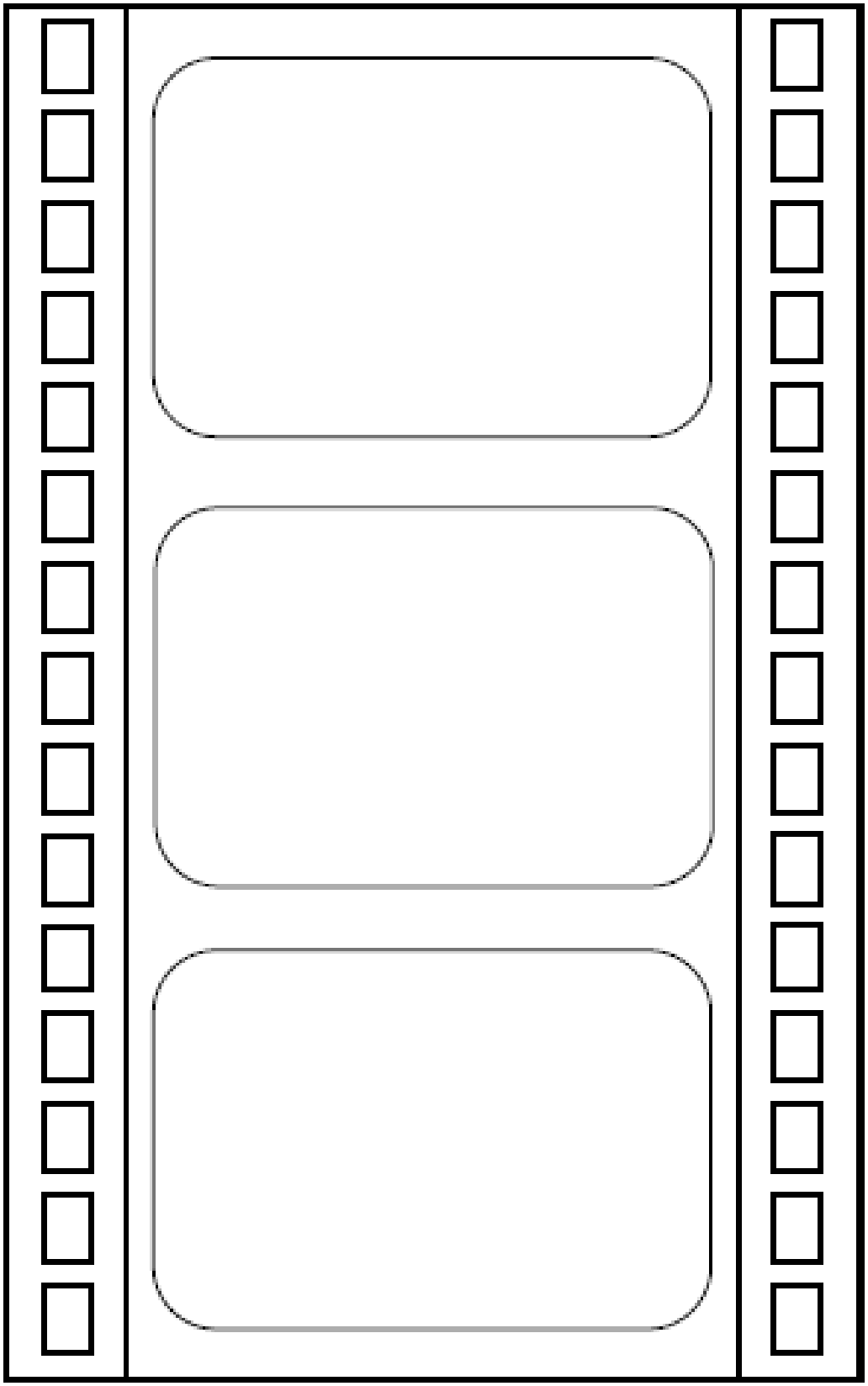
Grid Paper



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

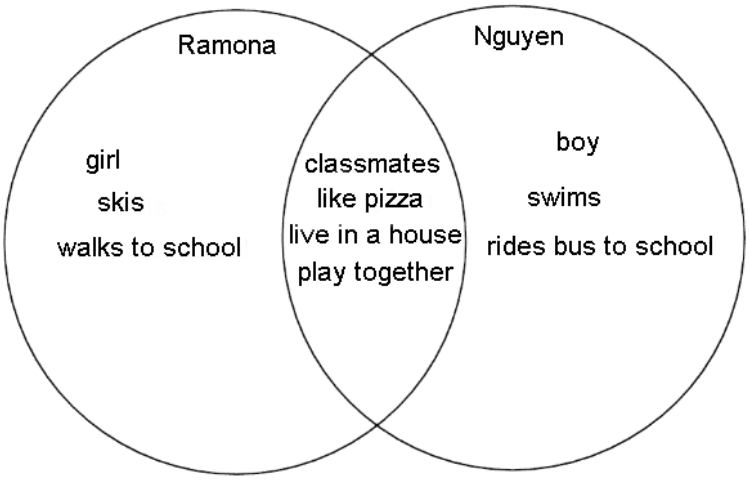
Hougton Mifflin: http://www.eduplace.com/graphicorganizer/

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

Compare/Contrast

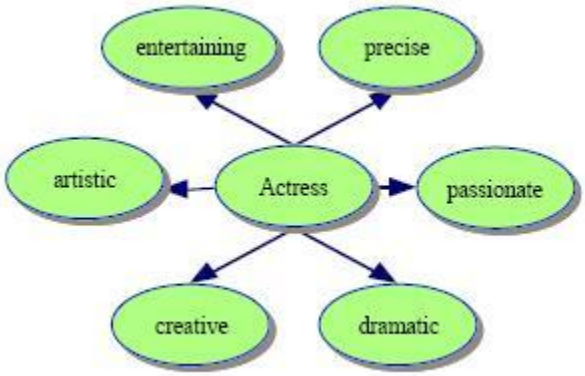
Comparison/Contrast is used to show similarities and differences.

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



Clustering

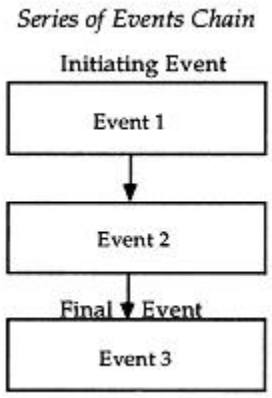
Clustering is a nonlinear activity that generates ideas, images and feelings around a stimulus word. As students cluster, their thoughts tumble out, enlarging their word bank for writing and often enabling them to see patterns in their ideas. Clustering may be a class or individual activity.



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.

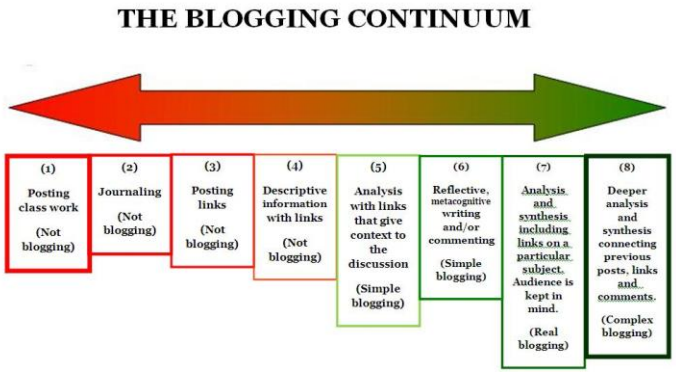
Key questions: What is the first step in the procedure or initiating event? What are the next stages or steps? How does one event lead to one another? What is the final outcome?



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).

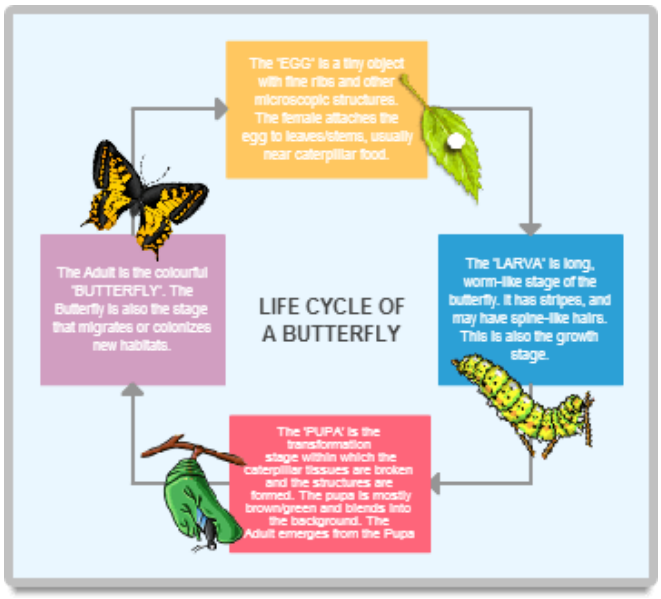
Key frame questions: What is being scaled? What are the end points or extremes?



Cycle

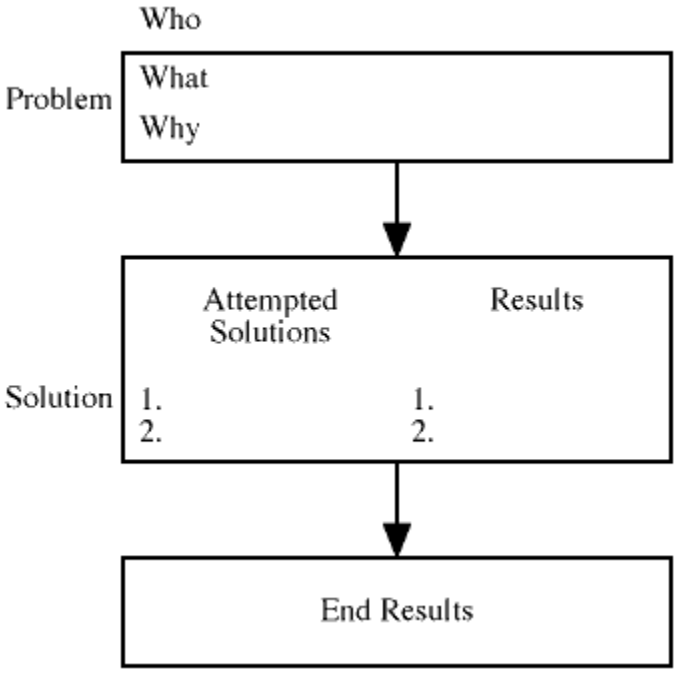
A depiction of a Cycle attempts to show how a series of events interacts to produce a set of results again and again, such as the life cycle or a cycle of poor decisions.

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.

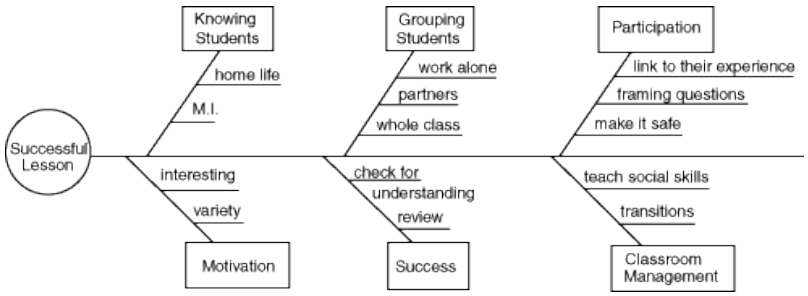
- Write **A** if you agree with the statement
- Write **B** if you disagree with the statement

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.