ADVANCED LEARNING LABS

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TO ENGAGE, ACTIVATE, AND GROW OUR STUDENTS

GRADES K–1

Systems

ENGLISH LANGUAGE ARTS

Language is a system that consists of the words we use to write and speak. Words can be sorted by creating a system for organizing them.

Write or draw a picture of 15 words that come to mind when you think of "Inventors." Sort the words into at least 3 categories with 3-5 words in each category. Name each category. Try reorganizing them into new categories with different names.

- How is understanding the meaning of words important in this activity?
- How did you choose the names you gave each category?
- How did thinking about the attributes (characteristics) of each word help you re-sort them?
- What new or big ideas do you now have about Inventors?

SOCIAL STUDIES

Systems provide an organized way of doing things.

Rules are a system that provides procedures by which humans live. They govern our homes, schools, and communities. Reflect on the following questions:

- Are rules important? Why or why not?
- What rules do you follow in your home and at school?
- Are there any rules that you think are unnecessary?

Make a list of rules you follow at school. Rank them from least to most important. Why did you rank them that way? Create a list of rules that establish a system for interacting with your friends. For example, "Listen to each other."

- Why did you choose these rules?
- How will they help your friendships?
- Should your friends have input on the rules too? Why or why not?

SCIENCE

The earth, sun, and moon are in a system together. We can observe this system in our daily lives. The sun and the moon move across the sky as viewed by us here on the earth. This is why the moon appears to change shape. Watch the following video to learn more about this system and some special occurrences that can happen. Listen for science terms and pay attention to the diagrams in the video. https://bit.ly/2Clx5gP.

After watching the video, draw your own diagram of the sun, earth, and moon system. Draw lines to represent how they move around each other. Label the parts of the system. Draw another diagram to show the positions of the sun, moon, and earth during an eclipse.

How are the diagrams similar and different?

MINDFULNESS

The way our feelings and emotions interact throughout our bodies can be compared to a weather system. We can describe our feelings by using weather words. For example, sunny might be used to mean happy or foggy for tired.

Lie on the floor and close your eyes. Breathe slowly and deeply. Think about what you are experiencing in each area of your body and how it relates to a weather system.

- What weather words can you use to describe parts of your body?
- Draw an outline that represents your body. Create a weather map that illustrates your body's weather system. For example, if your heart is troubled, you might draw a cloud over your heart.
- How are emotions like a weather system?

Systems

LOGIC PUZZLE

Systems can be helpful in solving logic puzzles. Find the cost of each item in the puzzle.

stickers	erasers	stickers	= 3.25
stickers	erasers	peppermints	= 2.25
peppermints	erasers	stickers	= 2.25
= 3.50	= .75	= 3.50	

- Which item did you find the cost of first? Why?
- After you found the cost of one item, how did you use it to help you solve the rest of the puzzle?

Challenge: Create a logic puzzle for someone else to solve. Discuss the system they used

.

FIELD STUDIES

There are many systems that help our communities run smoothly. Have you ever thought about how mail makes it from the sender to the recipient?

Watch this video and learn about how the United States Postal Service works: https://thekidshouldseethis.com/post/united-states-postal-service-systems-at-work

- How does this video make you think about systems in a new way?
- What additional aspects of your community are run by a system?

Write a letter to someone you love. Mail the letter. Consider the system that piece of mail will go through to reach its destination. Describe the system to a family member.

RESEARCH EXPLORATIONS

A system is made of elements (parts), boundaries (limits or edges), interactions, input, and output. Watch this video to explore human body systems: https://bit.ly/3glB7Vp

- What are the elements of each system?
- What are the boundaries?
- What interactions happen between the parts?
- What comes out of the system?

Choose one of these systems: kitchen, library, garden. Draw and label a diagram with the parts of the system or make a chart that organizes your thoughts.

- What overall statement can you now make about systems?
- List a few examples of items that are NOT a system?

MATH

Numbers are a system we use to help us understand and communicate about quantity and value in our world. How many ways are there to represent a number?

Pick a number between 1 and 100. Show this number in as many different ways as you can.

- Can you use words? Numerals? Objects?
- Which way is the easiest to communicate the number to someone else?
- Are different situations better for using different ways to show a number?
- How is each individual number an important part of our number system?

Take a picture or create a piece of artwork showing all the different ways you discovered to represent the number.

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TO ENGAGE, ACTIVATE, AND GROW OUR STUDENTS

GRADES 2–3

Systems

ENGLISH LANGUAGE ARTS

Text features, found in informational text, form a system to help the reader locate important information in an efficient manner.

How do the following informational text features play a role in the organizational system of a text: index, glossary, table of contents, headings, illustrations, diagrams, charts, fonts, captions, electronic menus and sidebars, icons, search terms and/or hyperlinks? Which element of the system do you think is the most important? Why?

Using an informational text of your choice, pose a question about the topic and utilize the system of informational text features to help answer your question.

Create a "How to" guide in the form of an article, YouTube video, or Powerpoint presentation to help others use this system to find information efficiently.

SOCIAL STUDIES

Our governmental system has three main branches: executive, judicial and legislative. What are the principles and procedures that create the framework of our governmental system? How do these three branches translate to local government?

Research and create a flow chart of the local government system in your community. Consider the following:

- Where do you fit in as part of the system?
- Is there a part of your local governmental system you feel is stronger than the others? Why? Weaker? Why?
- How could the strengths of the system be capitalized upon to reinforce the weaker parts of the system?

Watch this video to help you get started with your research. https://www.youtube.com/watch?v=gs6lqZEe4Rk

SCIENCE

How does poop help an ecosystem? Just ask the lemurs! In Madagascar, lemurs are saving the trees, and conservationists are saving the lemurs. Read more about how it's working:

- https://www.futurity.org/lemurs-madagascar-trees-seeds-1801232/
- https://www.pri.org/stories/2014-12-30/lemur-poop-might-save-madagascars-forests-and-economy

If plants, like trees, are to survive, then their seeds must be scattered, or dispersed. Read more about this system here: https://www.kidsdiscover.com/parentresources/seed-dispersal/

Imagine you're a plant. What would be your method for dispersing seeds? Create a drawing or write a skit and act out your system.

MINDFULNESS

One way to keep our mind and body connection healthy is to create a system and a space to help keep calm when needed.

Channel the inner mindful interior designer in you by thinking of what you would need in a space to help you feel calm. Consider the following:

- Choose a location for your space.
- Are there things that when you look, touch, smell, taste or hear them they immediately calm you? If so, add them to your space. Decorate and/or describe your space with items that engage the five senses

Finally, create a system of what you will do when you enter the space feeling upset. Consider a checklist of techniques that work for you, things you need to reflect on, or a journal to record your thoughts and feelings. Post your system directions at the entrance of your space and follow them when you are upset and stressed.

Systems

LOGIC PUZZLE

A cipher is a systematic way of writing in code. Pigpen cipher uses simple geometric symbols as substitutions for letters. Read the article "Pigpen Ciphers" from the October 2017 edition of beanz Magazine at this link: https://www.kidscodecs.com/pigpen-ciphers/

Notice the symbols and examples in the article, which solve encrypted messages throughout. Try your hand at creating cipher encrypted messages using the Pigpen Ciphers system.

FIELD STUDIES

A coding system is a system of signals used to represent letters or numbers in transmitting messages. Many kinds of coding systems have existed throughout history. Read the article at this link and learn about "10 Codes and Ciphers Most Commonly Used in History": https://www.enkivillage.org/types-of-codes.html

- List similarities within the systems.
- Why were the coding systems created?

Write a message in one of the codes discussed in the article. Ask a family member or friend to try cracking the code. Create your own original coding system that may one day join the list of "10 Codes and Ciphers Most Commonly Used in History."

RESEARCH EXPLORATIONS

Our number system originated in India more than 1,000 years ago. This "Hindu-Arabic" system is called "base ten" because it consists of 10 symbols (0, 1, 2, 3, 4, 5, 6, 7, 8, 9) that can be used to represent any number. The "value" of the symbol depends on what "place" the symbol is in. Therefore, it is defined as a "base ten place value" number system. This system is not the only system ever used, nor is it the only system in use today.

Research the Mayan number system (base 20), the Egyptian number system (a "face value" system), and the Chinese Number system (an additive base 10 system).

Use the knowledge you gained to create your own symbols and number system. Determine if your number system will be base 10 and place value, or more like the Egyptians, Mayans, or Chinese systems.

MATH

If I had a million dollars...What could you do with $1,000,000?

In this scenario, assume you started with two million dollars and donated the first million. To treat yourself, family and friends, brainstorm a list of things you would buy.

As you brainstorm, predict the cost of each item. Estimate as close to one million as possible. How close were you in reality?

Reflect on this experience. Was it more or less challenging than you expected? What surprised you the most about this activity?

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GRADES 4–5

Systems

ENGLISH LANGUAGE ARTS

Like a system of roads connecting on a map to show a larger view of a location, words in books connect to tell a larger story. Determining the correct meaning of unknown or multiple-meaning words is best accomplished when using a system of strategies/ routes to find the meaning, such as context clues, word parts, word relationships, and reference materials.

Using a piece of text that interests you, find a word that is unfamiliar to you or has multiple meanings. Create a "map" of the word and the strategies or "routes" of the system surrounding it that help to discern its meaning.

For example: Circle the word and underline the context clue that gives a hint to its meaning, explain and label it, "Route 1." Highlight prefixes and/or roots found in the word and give their meaning as "Route 2", etc.

SOCIAL STUDIES

A system is defined as a set of principles or procedures according to which something is done, an organized framework or method. The economic system in the United States (and world) relies upon production, specialization, technology and division of labor. How do these different elements impact the system and economic growth in the U.S.?

Using the site below, research the elements of the economic system in the U.S. After researching, choose one element of the system to eliminate.

What would be the impact on the system?

Create a cartoon strip or flip book to show the impact of removing that element of the economic system that includes a powerful title.

Use this site for resources: https://www.thebalance.com/us-economy-facts-4067797

SCIENCE

When a disease or a disorder affects a major body system, often other body systems are also impacted. Osteogenesis Imperfecta (OI) is a rare disorder caused by a mutation in the gene responsible for bone formation, which causes them to be fragile and break easily. There are 15 known types of OI, some so severe that babies have had broken bones as a result of a diaper change.

Using what you know about the major body systems, make predictions about effects that OI can have on the rest of the body. How do you think OI affects the daily lives of those who have the disorder?

Create a T-Chart with body functions in one column, and as you review the following website, record how OI affects that system in the other column.
https://oif.org/

MINDFULNESS

The nervous system is known by many as the "control center" of the body and the Vagus Nerve is referred to as the "Meditation Highway."

Read the following articles on mindfulness and the nervous system:

- https://eocinstitute.org/meditation/meditation-relaxes-your-nervous-system/
- https://buddhaweekly.com/science-center-vagus-nerve-meditation-highway-parasympathetic-nervous-system-meditation-works-body/

Using the information from the articles, create an infographic that shows how parts of the nervous system are metaphors. Include the impact of mindfulness techniques such as meditation on this system.

Share your infographic with a friend or family member.

Systems

LOGIC PUZZLE

A cipher is a systematic way of writing in code. Julius Caesar used a substitution type of writing to encode military messages. One system Caesar used was shifting alphabet letters 3 to the right, meaning an "A" would become a "D" when he was writing. To decode, or decrypt, a person would see a "D" and then shift 3 letters to the left to decode the "D" as representing an "A".

Try to solve this encrypted message, using the Caesar Cipher system:

Travhf jvgubhg rqhpngvba vf yvxr fvyire va gur zvar

This tool on the website below allows you to adjust the shift of letters and will help you encrypt and decrypt messages: https://www.xarg.org/tools/caesar-cipher/

Now, try to create encrypted codes on your own!

FIELD STUDIES

A coding system is a system of signals used to represent letters or numbers in transmitting messages. Many kinds of coding systems have existed throughout history.

Explore the codes at Braingle here: https://www.braingle.com/brainteasers/codes/

- What are the different systems used to create codes?
- Are there codes that are patterns? Do you notice any patterns that are familiar?

Choose one of the code systems described on the website and write a message using that system. What happens to the systems if you were to combine two codes? Try two more coding systems, writing messages for family and friends to decipher.

RESEARCH EXPLORATIONS

Bionic body parts? Science fiction or real? While sci-fi is, by definition, a mix of science and fiction, there are real bionic body parts that have been developed and are in use today.

When a major body system is affected by an injury or a disorder, other body systems and the quality of life for the person can be impacted. Investigate the real-life bionic body parts at these websites:

- https://magazine.hms.harvard.edu/articles/life-and-limb
- https://www.niso.org/niso-io/2020/11/three-advances-prosthetics

Think like a prosthetic designer. Brainstorm and create an illustrated description of a bionic body part that would help improve the life of someone with an injury or disorder.

MATH

Ancient measurements were often based on body parts, which posed problems because everyone's "foot" is not the same length. Over time, standard ways of measuring were developed, meaning units of measurement were the same everywhere (a foot=12 inches). Currently, most of the world (aside from the U.S., Liberia, and Myanmar) uses the metric system. For more information on the metric system visit this link: https://usma.org

Solve these decimal and customary unit comparisons on the following website: https://usma.org/decimal-nature-of-the-metric-system

Using your knowledge of both systems, make an argument for metric measurements. Create your own "Top 10" list as seen here: https://bit.ly/39eiGVR. Make sure each reason is supported with a mathematical example. For example, if you state, "It's easier to make conversions," create a math problem that supports this claim.

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GRADES 6–7

Systems

ENGLISH LANGUAGE ARTS

Most people have systems (routines or processes) for what they do - how they make a peanut butter and jelly sandwich, how they study for a test, or how they get ready for school in the morning.

Think about one of your systems. What are the individual steps in the process? What would someone else need to know to follow your system?

Write a detailed explanation of your system or process for accomplishing a task. Provide specific details that will allow a person to be able to follow the process without a visual.

To check your effectiveness, ask someone to read and follow your directions. How successful were they? Reflect on your process and make any clarifying changes.

SOCIAL STUDIES

Throughout time, societies and civilizations have created different systems of social structures.

Numerous countries in Europe, and Japan in Asia had feudal systems. Watch the videos to learn more about these feudal systems:

- European feudalism: https://www.khanacademy.org/humanities/world-history/medieval-times/european-middle-ages-and-serfdom/v/feudal-system-during-the-middle-ages
- Japanese feudalism: https://www.khanacademy.org/humanities/world-history/medieval-times/medieval-japan/v/shoguns-samurai-and-the-japanese-middle-ages

Summarize each feudal system and create a diagram showing the similarities and differences between them.

SCIENCE

The human body contains eleven major organ systems. All of these systems must interact with each other to sustain life. Using a book or internet resources, summarize the general function of each system.

Select five or more of the body systems and create a visual that shows how each of the systems interacts with the other four to sustain life.

Use your own creativity to design a visual of your choice or you can use the sample one provided on this website: https://docs.google.com/document/d/1snl5zKgsVtpra0zWG-NeP8oz8Zv1DAA9094DwNQGCMk/edit?usp=sharing

MINDFULNESS

Your immune system is a collection of structures and processes that helps protect against disease or potentially damaging foreign bodies. Read about the benefits of meditation on the immune system at the following site: https://bit.ly/2W4oj3S

Try this easy meditation activity to help relieve stress. Find a comfortable spot and close your eyes. Imagine going to that special place. It could be a place where you have vacationed, a relative's home, or a place you've always wanted to visit.

Let your mind wander and pretend that you are on a mental vacation. When you're ready, open your eyes and return home. You can practice this strategy anytime without packing a suitcase. Meditating for just a few minutes a day helps you feel balanced, focused, and in control.

Systems

LOGIC PUZZLE

Adam is trying to develop a system to pull out socks from a drawer while in the dark. Adam needs to pull out a pair of black socks.

There are 53 socks in the drawer:

- 21 identical blue
- 15 identical black
- 17 identical red

What is the minimum number of socks Adam must pull out to be 100% sure he has at least two black socks? Explain your reason.

FIELD STUDIES

The first law of thermodynamics, also known as the Law of Conservation of Energy, states that energy can neither be created nor destroyed; it can only be transferred or changed from one form to another.

Watch the Khan Academy video and study how energy flows through ecosystems: https://www.khanacademy.org/science/high-school-biology/hs-ecology/trophic-levels/v/flow-of-energy-and-matter-through-ecosystems

Select a particular ecosystem, such as rain forest, desert, tundra. Use a creative format of your choice, such as a song, skit, poster, or another format that explains to a younger student how energy flows through that ecosystem.

RESEARCH EXPLORATIONS

Weather systems are simply the movement of warm and cold air across the globe. These movements are known as low-pressure systems and high-pressure systems. High-pressure systems are rotating masses of cool, dry air. High-pressure systems keep moisture from rising into the atmosphere and forming clouds.

Watch the video at this link and learn how these pressure systems create different types of weather: https://www.youtube.com/watch?v=aiYyCurh_SU

Use the information at the Boy's Life website below to create a weather barometer: https://boyslife.org/hobbies-projects/projects/143865/make-a-weather-barometer/

Use your new barometer to collect data for a month. Be sure to note the weather each day in your science notebook. How did your barometer help predict the weather?

MATH

Weather is created by movements of low and high pressure systems moving across our globe. Knowing how the systems move and interact helps meteorologists predict the weather. Use this chart to track weather predictions and actual weather for 7-10 days: https://bit.ly/2PyuN7u

Organize your temperature data in a double box and whisker plot to compare the predicted to actual temperature for each day. Record what the plot reveals regarding the data, making sure to discuss the measures of center and variability for your data sets.

What percent of the time was the prediction correct? Find out what it means to predict a 40% chance of rain by visiting this site: https://www.wivb.com/weather-news/40-chance-of-rain-heres-what-the-probability-of-precipitation-actually-means/

Email your local meteorologist, copying your teacher or parent. Politely report your findings and ask how they use math to predict weather.

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GRADES 8–9

Systems

ENGLISH LANGUAGE ARTS

In 1824, Speaker Henry Clay of Kentucky spent two days in Congress making a speech entitled, "In Defense of the American System." This American System, which Clay proposed, was the first government-sponsored attempt to invigorate the economy.

Read and annotate Clay's speech at this link: https://www.senate.gov/artandhistory/history/resources/pdf/AmericanSystem.pdf

For support annotating texts, visit this site: https://learningcenter.unc.edu/tips-and-tools/annotating-texts/

Delineate and evaluate the argument and specific claims in the speech using the graphic organizer: https://bit.ly/3jZwHOD

SOCIAL STUDIES

A person with a job makes money, but in most cases, he/she also spends some of that money for goods and services that are needed or desired. A budget is a system or plan for how the money will be spent. Budgeting allows you to determine the amount of money that is required for needs and how much is left for wants.

Think about five goods or services that you would like to be able to afford. Research to discover how much each will cost, including taxes, and shipping, if applicable. Develop a plan that includes the amount you would need to make and save each week, and for the length of time to purchase each of the items.

After drafting the budget, are there any of these items that you have decided are not worth the costs? If so, name the items and explain why.

SCIENCE

In physical and chemical changes:

- Particles don't disappear or get created; their arrangements change.
- All the matter must be accounted for. Matter does not turn into or appear from energy.
- There is no change in mass when a substance moves in and out of the gas state.

Read each of the closed system scenarios at this link: https://docs.google.com/document/d/18761kinKEgWrZfxDRNFrV-UlNhGSjrQ6lXEtlkLXWkw/edit?usp=sharing

There may appear to be an apparent change in mass but reflect on the scenario to determine an alternative hypothesis that explains what is happening

MINDFULNESS

Stress is very damaging to the systems of the body. Read the article at the link below to better understand the effect of stress on your body: https://bit.ly/3eh5ikM

Could you go an entire day without your phone?

Devices such as smartphones contribute to our stress. They distract us from being present, aggravate our worries, and contribute to FOMO (fear of missing out). Pay attention to how spending time on devices makes you feel. Refrain from using technology for one hour. What will you do with that time? Could you spend it with others? Could you take a walk or read? Try something different like cooking, working in the yard, or organizing a family game night.

Journal about your time away from technology. What did you do? Where did you go? Did you accomplish something you otherwise would not have? Did you feel less stressed and healthier?

Systems

LOGIC PUZZLE

Would you like to become better at solving grid- type logic puzzles? Watch the video to understand how deductive thinking is used to solve a logic puzzle: https://www.youtube.com/watch?v=loyetRWK3VU

Print and solve a logic puzzle about dinosaurs at this link: https://docs.google.com/document/d/1nXfhvVmypltJPv1c0EdT1mpBwH98Qxi_mu1C9dNext0/edit?usp=sharing

Try solving more logic grid puzzles at the Brainzilla website: https://www.brainzilla.com/logic/logic-grid/

FIELD STUDIES

Frontal systems, also called weather fronts or fronts, are boundaries between air masses of different temperatures. There are four kinds of fronts: cold fronts, warm fronts, stationary fronts (i.e., warm or cold fronts that are not moving), and occluded fronts (i.e, when a cold front takes over a warm front).

Learn more about weather fronts at this website: https://bit.ly/2W5fVRs

For two weeks, use radio, television, newspaper, or internet sources to learn about the daily forecast and weather. In a chart format of your choice, record the temperature and precipitation each day and include if a front is approaching, present, or departing. How do the fronts seem to impact temperature and precipitation?

RESEARCH EXPLORATIONS

The Earth we live on is a small part of a larger system called the Solar System. Explore this complex system using the following links:

- https://solarsystem.nasa.gov/
- https://spaceplace.nasa.gov/
- https://www.jpl.nasa.gov/missions/

Use your research to write a poem about the Solar System. Include at least one fact you already knew and one fact you learned.

Visit the following link for guidance on choosing the style of poem you want to write: https://examples.yourdictionary.com/what-are-different-types-of-poems.html

For more inspiration, visit the NASA Space Poetry site and read poems written by NASA scientists: https://www.jpl.nasa.gov/edu/learn/slideshow/nasa-space-poetry/

MATH

Nora was selling tickets at the high school dance. At the end of the evening, she picked up the cash box and noticed a dollar lying on the floor next to it. She said, "I wonder whether the dollar belongs inside the cash box or not."

Number of tickets	Individual (1 ticket)	Couple (2 tickets)
Price	$5	$8

Nora counted $800 in the cash box. She had ticket stubs for the 191 students in attendance. Does the dollar belong inside the cash box?

Construct and use a system of equations to explain your thinking.

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GRADES 10-12

Systems

ENGLISH LANGUAGE ARTS

Many poems, such as a lyric or ballad, follow a specific structure, format, or "system".

Poetryfoundation.org describes an ekphrastic poem as a "vivid description of a scene or, more commonly, a work of art. Through the imaginative act of narrating and reflecting on the 'action' of a painting or sculpture, the poet may amplify and expand its meaning."

Choose a piece of art that interests you. Find something in your home or school to write about or use the link below to view art collections at the Metropolitan Museum of Art in New York City: https://www.metmuseum.org/art/collection

Using the piece of art for inspiration, tap into your imagination and create an original ekphrastic poem!

SOCIAL STUDIES

The United States Supreme Court has a systematic process for deliberating and deciding the verdict for all cases. How do you feel about this school's decision to ban t-shirts? Watch the video here: https://www.youtube.com/watch?v=2yhBduw2jQk

Review the Jacobs v. Clark County School District case at the website below to learn more: https://caselaw.findlaw.com/court/us-9th-circuit/1204345.html

Create a multimedia presentation about the decision that was made in this case. Include answers to these questions:

- Track the system that was used to reach a decision. Was it fair and impartial?
- Should freedom of speech be absolute, or should it be limited?
- How far should the government take censorships, and what are the limits?

SCIENCE

There are 11 human body systems which work in conjunction with other systems to keep the body functioning in homeostasis. Learn more about body systems from Khan Academy: https://bit.ly/2PvXYYQ

Create a mind map using 5 of the body systems. Label the systems and their functions, including the organs that are part of each system. The following website provides information on how to create a mind map: https://www.mindmapping.com/

Imagine that one of the organs from the 5 systems has gone missing in action (MIA). Design a poster for the public that includes:

- a picture of the organ
- its function and location in the body
- a description of your missing organ affects the 5 systems
- the reward if returned (be creative)
- a bonus section - if not returned, what happens to the body

MINDFULNESS

High school is the perfect time to create a support system. A good support system consists of people you can trust and turn to for guidance, which may include your family, friends, teachers, classmates, and/or other professional people. Create your own personal support system. Consider the following questions:

- Who is a part of your support system and why?
- What role will the teacher and other school staff play?
- How will you communicate with them?
- What do you hope to achieve?
- How will you know if the support system is effective?

For more information and resources on developing your support system, visit the University of Buffalo Social Work site: https://bit.ly/2OEKSbd

Systems

LOGIC PUZZLE

Cogwheels are gears that rotate together to create a turning system.

Consider the following:

- There are two cogwheels on a table.
- The bigger one has 10 teeth and is fixed to the table.
- The smaller one has 5 teeth and revolves around the bigger one.

If the smaller cogwheel makes one full rotation around the bigger cogwheel, how many rotations will it make with respect to the table?

FIELD STUDIES

The earth's climate system has been greatly affected by the increasing amount of greenhouse gases, or global warming. COVID-19 caused the world to pause, which led to a decrease in emissions from cars. Air pollution dropped in many countries and the carbon footprint has been reduced.

Even though this drastic change in lifestyle affected the whole country, it only minimally reduced global warming. To learn more, visit the Global Climate Change with NASA website: **https://climate.nasa.gov/climate_resource_center/interactives**

At the NASA site, use the time machine to see how Earth's climate has changed over the years. Use the Global Ice Viewer to discover how ice is slowly melting. Finally, test your knowledge with the "It's a Gas" quiz on carbon dioxide and global warming.

RESEARCH EXPLORATIONS

Every state is different, and every state is the same! How can that be? Make a list of state systems you would like to know more about. Read the information provided at the links below to learn about NC, NC's government, and NC's relationship to the United States government.

https://www.nc.gov/about

www.civics.org

www.sog.unc.edu

Compare North Carolina to another state, possibly one where you have previously lived or would like to live. Create a tool that shows the similarities and differences in these states such as Venn Diagram, graphs, or a digital presentation

MATH

The United States government gathers information about American citizens through the Census Bureau. This system gathers data every decade.

Research NC's Census data based on gender and location at this website: **https://data.census.gov/cedsci/profile?g=0400000US37&q=North%20Carolina**

Create an infographic, a collection of graphic elements and text that provides an easy-to-understand overview of a topic. Be sure to include the following essential information:

- What might be the causes for changes in population?
- Which race and ethnic groups seem to be growing and declining? Why do you think this is happening?
- How is the level of educational attainment changing in NC?
- Include other data points that you find interesting.

Systems

Reference Guide

For more information on creating infographics, visit this site: https://www.canva.com/create/infographics/

K-1 Logic Puzzle:

Solution: Erasers=$.25; Stickers= $1.50, Peppermints= $.50

6-7 Logic Puzzle:

Solution: Adam must pull out 40 to guarantee he pulls out two black socks. He could pull out 21 blue plus 17 red plus 2 black.

8-9 Logic Puzzle:

Solutions can be found at the Brainzilla site: https://www.brainzilla.com/logic/logic-grid/

10-12 Logic Puzzle:

Solutions:

1. The answer is three rotations in total. Two because of the ratio 10:5, one more because of the movement of the smaller cogwheel. https://www.puzzleprime.com/brain-teasers/insight/cogwheels/
2. After 18 rotations of the smaller gear and 11 rotations of the bigger gear, the marked teeth will be together again. https://aplusclick.org/t.htm?level=12;q=3938

ADVANCED LEARNING LABS

Collaboration between NC Department of Public Instruction and AIG Teachers across the state

TO ENGAGE, ACTIVATE, AND GROW OUR STUDENTS

SYSTEMS

NC STANDARDS ALIGNMENT

Grade Span	English/ Language Arts	Social Studies	Science	Math
K-1	L.1.5	K.C&G.1 1.C&G.1.1	ESS.1.1.1	NC.1.NBT.7
2-3	RI.3.5	3.C&G.1.1	LS.3.2.2	NC.3.NBT.2
4-5	L.5.4	5.E.1.3	LS.5.1.2	NC.4.MD.1
6-7	W.6.2	6.B.1.2	LS.7.1.4	NC.7.SP.3 NC.7.SP.4
8-9	RI.9-10.8	EPF.MCM.1.1	PS.8.1.4	NC.M1.A-REI.6 NC.M1.A-REI.12
10-12	W.9-10.3 W.11-12.3	FP.C&G.3.4	LS.Bio.1.1	NC.M1.S-ID.1