

ADVANCED LEARNING LABS

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

TO ENGAGE, ACTIVATE, AND GROW OUR STUDENTS

GRADES

K-1

Balance



ENGLISH LANGUAGE ARTS

Forming an opinion can be like a balancing act because you must consider the pros (advantages) and cons (disadvantages) of an issue.

Choose an issue such as "Should students have nightly homework?" and consider the pros and cons. Decide where you stand on the issue.

Through writing, drawing, or dictating, introduce your topic and state your opinion. Provide a reason for your opinion based on a balanced examination of the issue.

Provide a reason that includes how you developed your opinion based on a balanced examination of the issue. In closing, restate your opinion and explain why you chose to take that position. Be sure to use correct punctuation, capitalization, and spelling.

How did thinking about both sides of the issue prior to writing help you form your opinion?



SOCIAL STUDIES

The relationship between supply and demand works to create an economic balance. Supply refers to the amount of goods and services available, and demand refers to the amount of goods and services people want to buy. Think about how the law of supply and demand relates with this activity.

Imagine you see this headline, "Eating Watermelon Improves Your Eyesight." Consider the impact this headline might have on supply and demand:

- How might this headline impact people's demand for watermelon?
- If more people start buying watermelon, how will this impact the supply?
- How does demand impact the cost of goods?

Extension: Create your own headline. Make a list of the ways your headline might impact supply and demand. You might think about items related to recent events in your headline, such as toilet paper, or disinfectant wipes.



SCIENCE

A balance scale is a tool scientists use to measure the weight or mass of a sample. Visit this website to practice using a balance scale: <https://pbskids.org/sid/games/pan-balance>.

Use this experience to determine how much objects weigh. Collect 5-10 objects around your home. Hold two objects, one in each hand.

Which one is heavier? Continue comparing the objects in pairs and organize them in order from lightest to heaviest. After you have made your prediction, use a scale if you have one (digital, kitchen scale or a balance) and choose a family member to help you weigh each object. Record the weight.

- Was your prediction of lightest to heaviest correct?
- How can a balance help us determine the weight of an object?
- When is using a balance not effective for measuring weight?



MINDFULNESS

How do you maintain balance while walking? Find a straight path in your house such as a line in the flooring or on a sidewalk near your yard. You can also use chalk, string or masking tape to make a straight line.

Stand on the line with one foot in front of the other, holding them firmly to the ground. With your arms out to the side so they are parallel to the ground, and without looking down at your feet, try walking in a straight line, placing the back of your heel against the toes of your opposite foot. Now try walking it more quickly while continuing to keep your feet on the line.

- What strategies did you use to keep your balance?
- How was walking in this way different from walking normally??
- In what areas is balance important in your life?

Balance



LOGIC PUZZLE

Analogies are comparisons that require an examination of the relationships between two objects. For an analogy to be balanced, determine the relationship between the first two items in order to form a similar relationship between the second two items.

Example: Knife is to cut, as ruler is to ? The answer would be "measure" because a knife is used to cut the way a ruler is used to measure. Complete the following analogies:

- Apple is to fruit as broccoli is to ?
- Up is to down as on is to ?
- Car is to road as boat is to ?
- Toe is to foot as finger is to ?
- Big is to giant as small is to ?
- Bed is to bedroom as stove is to ?

Create your own analogy examples for a friend or family member to solve.



FIELD STUDIES

Humans need balance in the foods we eat to keep us healthy and strong. What is a balanced diet? Watch this video and then answer the question, "Why do we need to eat a balanced diet?" <https://www.pbs.org/video/d4k-nutrition-video-short-gioayd/>

Now that you know WHY we need a balanced diet, Watch the video "My Plate," to learn about a simple guide that will help you know what your plate should look like at each meal: <https://www.youtube.com/watch?v=Ebm04EO91U>

Now it's your turn to plan "your plate" that is balanced with healthy foods.

Challenge: Ask a family member to help you plan and cook a balanced meal. How did you and your family like the meal?



RESEARCH EXPLORATIONS

Structures must be balanced to support weight. For this exploration, you will build a structure that can hold as many pennies as possible. The pennies should be placed 4 inches above the base of the structure.

You may only use the following materials: 10 sheets of paper, 6 straws, and 1 foot of tape in your design.

Reflect on your observations by answering the following questions:

- How many pennies did your structure hold?
- How was balance important in the design?
- What was the most difficult part of the building process?
- What additional materials would have been helpful to use?
- How could you change your design to hold more pennies?



MATH

Fill in the empty boxes so the scales balance.

$$5 + \square = \square + 4$$



$$\square + 10 = \square - 10$$



$$50 - 25 = 15 + \square$$



$$12 + 2 + 10 = 6 + 6 + \square$$



- Which ones can you fill in with more than one answer?
- Can you explain how a math equation is like a scale that is balanced?



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GRADES

2–3

Balance



ENGLISH LANGUAGE ARTS

Read an informational article or book on a topic that interests you. As you read, look for at least three key points the author uses to support each main idea just as a designer creates a balanced stool using at least three legs that confidently supports your weight.

Create a video that explains the main idea of the article and the key details that support the main idea or explain the main idea and key details using a stool graphic organizer.

Want an extra challenge? Find at least two other informational articles on the same subject and repeat the exercise to see if there are similar main ideas or other viewpoints on the subject. Before you know it, you'll have an authentic "woodshop of ideas" that you've fully analyzed.



SOCIAL STUDIES

An economic term when there is balance between supply and demand is called equilibrium.

Watch this video to learn about supply and demand: <https://youtu.be/N-2mF0rGgUQ>. As you watch, look for ways that supply and demand affect the choices an individual makes.

Use the information you learn to answer the following questions:

- How do consumer choices impact the balance of supply and demand?
- Is balance always advantageous from an economics standpoint? Why? Why not?
- Discuss this with a friend or family member.

Create your own music, dance, or movie video, using a favorite song or movie that demonstrates your understanding of equilibrium in relation to supply and demand. Include how supply and demand impacts both buyers and sellers.



SCIENCE

An ecosystem's balance can be affected by how well plants survive and grow in the environment. The "Conscious Challenge" website provides information on how the delicate balance of earth is being upset and what we can do to help.

Visit the website and watch the three short videos (the first focuses on terms related to extinction): <https://www.theconsciouschallenge.org/>

What did you learn about the problems with Hawaii's ecosystem? How are new plants harming the population of native plants? How are humans harming the ecosystem? What can humans do to help the plants?

Share your findings with your family.



MINDFULNESS

Practicing mindfulness can help us notice and acknowledge unbalanced feelings without judgment and restore us to a more balanced emotional state.

One way to achieve that balance is to "clean house."

Cleaning house means physically clearing your house or room of clutter, but also mentally clearing your mind of thoughts that worry you and are having a negative impact on your life.

Look around your room, turn on some quiet music, and quietly organize and declutter to achieve a more balanced space. After you finish, reflect on the stresses that have been weighing on your heart and mind, and write those down. Then symbolically throw them away and let them go.

Here are some tips for "Mindfulness for Kids" <https://www.mindful.org/mindfulness-for-kids/>

Balance



LOGIC PUZZLE

Balance Puzzles

Each of the scales below is balanced – with equal weight on the two sides. Remove as many blocks as possible so that each remains balanced.



If the blue ball weighs 12 ounces, how much does each of the other blocks weigh?



FIELD STUDIES

Similar to a tightrope walker holding a stick to maintain balance, some animal tails serve the same function. The cheetah, kangaroo, and squirrel, among others, use their tails to maintain balance as they run and jump. Humans can have trouble with balance too. Researchers in Japan have created a mechanical tail, modeled after the structure from the tail of a seahorse, to help increase or boost one's sense of balance.

Read more about their research and structures of a seahorse tail at these links:

- <https://bit.ly/2CeonA>
- <https://www.smithsonianmag.com/science-nature/why-seahorses-have-square-tails-180955802/>

Use what you have learned about how tails are an important part of maintaining balance and create your own "Tall Tale" (or "Tall Tail") about a human with a seahorse tail. Remember, a Tall Tale is a fictional story that exaggerates the truth and is meant to be humorous. Share your story with friends and family.



RESEARCH EXPLORATIONS

Have you ever played Jenga? Or built structures with Kapala blocks? It's a lesson in balance and fun, but did you realize that it's also a lesson in structural engineering?

Read the following article about structural engineering:

<https://science.howstuffworks.com/engineering/structural/5-things-jenga-teaches-structural-engineering.htm>.

After reading, experiment with different materials around your house and try to build a structure that capitalizes on the principles of structural engineering discussed in the article. How tall can you make your structure? How strong/ solid? How does balance play into your design?



MATH

When solving math equations, the value of each side must be the same to be equal, or balanced. Algebra is the part of math where letters or symbols are used to represent unknown numbers. To problem solve, you use the information that is provided to "balance" both sides of the equation in order to figure out each unknown number.

This website uses a virtual pan balance to illustrate solving algebra problems: <https://www.nctm.org/Classroom-Resources/Illuminations/Interactives/Pan-Balance---Shapes/>

The "weights" used for the balance are geometrical shapes. Use the shapes to make the scale balance. Then, try to figure out what number/weight each shape represents.



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GRADES

4–5

Balance



ENGLISH LANGUAGE ARTS

Read an informational article or book on a topic that interests you. As you read, look for at least three key points the author uses to support each main idea just as an architect creates a balanced stool using at least three legs that confidently supports your weight.

Create a set of stool blueprints that explain the main ideas (seats) of the article or book and the reasons and evidence (legs) that support which seats (main ideas).

How many main ideas did your informational text have? Are they balanced with reasonable evidence?

For an extra challenge: if some of the main ideas are not well supported, research and add additional evidence that will support the main ideas.



SOCIAL STUDIES

Balanced budgets are often emphasized in politics and business, but they are also important on a personal level. As a consumer, it is important to be able to evaluate and balance the costs and benefits of spending, borrowing and saving.

Watch this video: <https://vimeo.com/398340269>; and reflect on the balance between spending, borrowing and saving. Think about your own budget and how you want to balance your income (allowance, jobs, gifts, etc.) and your expenses (fun, food, gifts, etc.) with what you choose to save or share/donate.

Create your own budgeting sheet or choose one of the free budgeting worksheets that can be found here: <https://www.moneyprodigy.com/kids-budget-worksheets/>. Set financial goals for yourself in areas you'd like to improve and/or grow.



SCIENCE

Animal extinction, pollution, and climate change are just some of the ways an ecosystem's balance can be affected. The "Conscious Challenge" website provides information about how the delicate balance of earth is being upset and what we can do to help.

Visit the website to learn more about extinction:

<https://www.theconsciouschallenge.org/ecologicalfootprintbibleoverview/extinction-animals>

Brainstorm with your family how you can be part of the solution to help restore balance and contribute to making a positive change for our earth. How will you help reduce your carbon footprint? What can you do to inform others about the need to make changes in their lifestyles?



MINDFULNESS

School, friends, sports, family, chores and more... juggling so many thoughts, feelings and situations can cause you to feel physically and emotionally unbalanced. How can you balance taking care of both your mind and body? Visit the following site to learn about ways to practice self-care that will help keep your mind and body healthy: <https://kidshelpline.com.au/teens/issues/looking-after-yourself>

Choose one or two options from each focus area such as sleep, diet, movement, self-expression and taking a break, and try putting them into practice to maintain a healthy balance in your life mentally and physically.

Reflect at the end of the week on how you feel physically, mentally and emotionally. Do you feel more centered and balanced?

Balance



LOGIC PUZZLE

You have \$50, and spend all of it...but where did the extra \$1 come from?

| Spent | Balance |
|-------|---------|
| 20 | 30 |
| 15 | 15 |
| 9 | 6 |
| 6 | 0 |
| 50 | 51 |

Spending only \$50, can you create a spending scenario where the "spent" total equals the "balance" total?

Now, create another scenario where the "balance" total is greater than \$51. How large can you make the "balance" column while still only spending \$50?



FIELD STUDIES

Dating back to ancient Greece, funambulists (tightrope walkers) often performed their seemingly superhuman feats of balance to entertain. This tradition has been passed down through family generations to the present day. Where have you seen tightrope walkers?

There is evidence of tightrope walking out of necessity for a small village in Russia. What do you think might be the reason for this need?

Use this link to learn more: <https://uk.reuters.com/article/russia-dagestan/russian-villages-tightrope-walking-prowess-idUKNOA03867920070830>

For extra fun, watch a video and train yourself to walk a tightrope! <https://allarts.org/programs/circus/circus-diy-how-to-walk-a-tightrope/>



RESEARCH EXPLORATIONS

Cooking shows on tv talk a great deal about balancing flavors. What do they mean? Explore the following links to learn more about different flavor profiles and how chefs around the world use them:

- <https://www.cooksmarts.com/articles/study-flavor-profiles/>
- <https://youtu.be/TBBuY-sQrR4>

Now that you know about how to balance various flavors, update one of your favorite dishes or create a completely new dish.

Choose one of the following ways to share your dish: video your own cooking show episode with you as the host, or design your own menu of balanced flavor dishes with brief descriptions of each.

Take it a step further and prepare the actual dish to allow your family and friends to taste the balance of flavors themselves!



MATH

Balance Quest Goal: Fill in the gaps to "balance," or zero out each side of the puzzle at the link below. One side will equal a negative number and the other side will equal the same positive number.

Rules:

- Values in each white box equal the sum of the adjacent half-height boxes.
- Shaded boxes must include ALL numbers from -8 through 8 (except 0)
- Numbers must NOT duplicate among the white boxes, or among the shaded boxes, but duplicate numbers CAN exist between the white and shaded boxes.

<https://www.puzzles-to-print.com/number-puzzles/balance-quest/small-grid-easy.pdf>



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GRADES

6-7

Balance



ENGLISH LANGUAGE ARTS

A common sight in U.S. courts is the symbol of Lady Justice - blindfolded, carrying a balance and a sword, and stepping on a snake and a book. She is the Ancient Roman personification (i.e., giving human traits to something nonhuman) of justice.

Read more about Lady Justice's symbology: <https://civiconlineresourcecommunity.org/meaning-of-lady-justice>.

How does this symbol impact our lives today?

As you consider the idea of Lady Justice, what impact does the personification of justice as a woman have on citizens? Why do you think a woman was chosen instead of a man? State your claim and provide clear reasons and relevant evidence to support it.

This link provides examples of stories with personification: <https://www.goodreads.com/shelf/show/personification>



SOCIAL STUDIES

After World War II, the United States and Soviet Union engaged in a state of hostility called the Cold War. Unlike a hot war, with opponents firing at one another, the Cold War was marked by threats, propaganda, and encouraging other countries to join your side.

Because each nation had nuclear weapons and knew that the other country did as well, there was a balance of power known as mutually assured destruction (MAD). Learn more about the weapons here: <https://youtu.be/gVunIJOyfB0>. Scholars believe that the U.S. and the Soviet Union came closest to engaging in a hot war during the Cuban Missile Crisis. Listen to this TED talk to learn more: <https://youtu.be/bwWW3sbk4EU>

In your journal, analyze the effect of the Cold War and the threat of MAD on life in the U.S. Did MAD bring balance or imbalance to the world? How does this impact us today?



SCIENCE

Any push or pull is a force. Forces that are equal in size but opposite in direction are called balanced forces. Balanced forces do not cause a change in motion. When you push against a wall, and if neither you nor the wall will move, the force is balanced. Unbalanced forces are not equal and opposite. For example, if a large dog and a small dog are both tugging at the same stick, then the stick is going to move toward the large dog. This is an unbalanced force.

Design a series of activities for a younger student using common items to help them understand the difference in balanced and unbalanced forces.

Share your activities using a format of your choice (e.g., activity sheet, video, etc.).



MINDFULNESS

Living a balanced life sounds nice, but many students struggle with balancing all of their responsibilities and relationships.

Try mapping out the important parts of your life to determine if you need more balance. Follow the directions at this link, and use the example as a guide: <https://docs.google.com/document/d/16rEvWd32mb5q4cW1SN8hSQIQ-H-KW8Ak9TTJdRRjto/edit>

What does your pie graph say about the balance in your life? Is it round and full or does it look like leftovers? If the circle was a tire on a car, what would your ride feel like? Would it be smooth or bumpy? What areas of your life do you need to work on to attain life balance?

List 5-10 goals that will improve certain areas of your life "pie."

Balance



LOGIC PUZZLE

Scenario: An evil warden holds you prisoner but offers you a chance to earn your freedom. Your freedom will be decided by your ability to find a counterfeit coin.

Visit the Genuine or Counterfeit?

Logic Puzzle link: <https://docs.google.com/document/d/1GB982zBdG1B3B3CNxLM208wdu35jim0yhznPxrTklo/edit?usp=sharing>



FIELD STUDIES

Balance in art refers to the sense of distribution of perceived visual weights that offset one another. Both symmetry and asymmetry can be used to create balance.

Using this link, read the article to gain a deeper understanding of balance in art: <https://www.sophia.org/tutorials/design-in-art-balance-and-contrast>

Create a piece of art that shows balance using either symmetry or asymmetry.



RESEARCH EXPLORATIONS

Have you ever played or watched a game of tug of war? If the forces on both sides are balanced, no one moves. If the forces are unbalanced, one team will win. Watch this video that provides some examples of balanced and unbalanced forces: <https://youtu.be/LTXu8ih668>

A hovercraft uses air to propel itself across a smooth surface. Create your own hovercraft with a few simple objects. <https://youtu.be/tFmIJr8uel>

Experiment with the type of surface you choose for your hovercraft to glide on. Do some surfaces work better than others? How does the balance or unbalance of forces help the vehicle lift and move?

Create a new sport which uses a hovercraft for recreation. Describe your sport. What are the rules? How is the game scored? How did balanced and unbalanced forces apply to your sport? Could you have played your sport on the moon?



MATH

A mathematical equation is like a balance. The two expressions on either side of the equal sign must remain equivalent. When solving an equation it is important to perform the same computation on both sides to maintain equivalency or balance.

Visit: <https://solveme.edc.org/Mobiles.html> and play with several different mobiles. The mobiles get more challenging as you progress.

After having fun with the mobiles (be careful this can be addictive), write the equation for five of the mobiles and solve them algebraically.

Try to build your own feature and have a friend or family member try to solve it.



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GRADES

8–9

Balance



ENGLISH LANGUAGE ARTS

Many times in your school career you will be asked to conduct research on a topic and then present the results in a variety of formats such as paper, speech, or digital presentation. In informational/ explanatory writing, it is important to do so in a fair and balanced way. This is different than in an argumentative piece of writing where you are asserting a particular claim.

Choose and conduct research on a topic that you have seen discussed in the press where there are two or more opposing viewpoints. Try to find as many unbiased sources as you can. If you decide to include biased sources in your research, make sure that you review sources from both sides.

Create a blog or podcast and practice presenting the information with an objective tone. Make sure that you develop the topics with well-chosen, relevant, and sufficient details.



SOCIAL STUDIES

People travel by car, plane, boat, and train to destinations across our state, nation, and the world. It was not always this simple, though.

Read about the history of transportation in North Carolina. How have transportation changes brought a balance of opportunities across the state? The article was written in 2006, so as you read it, think about any changes since that time. <https://www.ncpedia.org/transportation/history>

Starting with the information from this article as well as other sources (e.g., NCDOT, Amtrak, etc.) create a print or digital resource map, using the link below, of our state showing major transportation pathways (e.g., interstates, ferries, light rail, etc.).

<https://mapmaker.nationalgeographic.org/>

How do these resources allow us to move people, goods, and ideas?



SCIENCE

You may have heard people say that it is important to have a balanced diet, but what exactly does this mean? The United States Department of Agriculture (USDA) has an entire website and app dedicated to helping us build healthy eating habits, one choice at a time. The website even has recipes: <https://www.choosemyplate.gov/>

The Centers for Disease Control (CDC) also has guidelines on how we can eat a healthy and well-balanced diet: https://www.cdc.gov/healthyweight/healthy_eating/index.html

Using the knowledge you have gained about recipes and guidelines on how to eat a well-balanced diet, compare diets from various regions around the world. How does the quality of health change within these regions? What might cause these differences in overall health?



MINDFULNESS

Discovering a set of stacked stones, or cairns in nature, reminds us of those who walked the path before us. Visually, the stones remind us of the balance needed for a content life. As the linked video illustrates, looking at stacked stones can be quite zen-like: <https://youtu.be/bETs6Fbr5dY>

Stone stacking requires your full attention on the task and in the present to find each stone's center of gravity and its connection to the other stones.

Create your own cairn by using stones found in your yard or other objects around your house. Be sure to take a picture since it may not last long.

Some people place a wish on each stone and believe the wish comes true when the stack falls.

Before creating a cairn in a public park, read this U.S. National Parks Services's article for guidelines: <https://www.nps.gov/articles/rockcairns.htm>

Balance



LOGIC PUZZLE

You have been given 12 balls that all weigh the same except for 1 which is heavier or lighter than all the others. However, you don't know which ball it is. How can you make sure you know which ball is the heaviest/lightest in only 3 weighings?



FIELD STUDIES

In the modern world, almost everyone is a photographer. The cameras that are embedded in smartphones now take higher quality photos than professional cameras did a decade ago. Have you ever noticed that some people just seem to take really amazing shots?

Read about five kinds of balance in photography to help you improve your photography skills:
<https://www.nyfa.edu/student-resources/five-kinds-photography-balance-you-need-to-understand/>

After reading the article, use a phone or a camera to take several photos utilizing each photo to demonstrate your understanding of at least one of the principles in the article.

Compare these photos to ones you have taken previously. Can you see a difference?



RESEARCH EXPLORATIONS

The Broomstick Challenge has made a few rounds on social media. According to many Instagram posts, the ability to stand a broom up on its own happens on certain days due to the gravitational pull. Try to balance a broom vertically. Actually, the ability to balance the broom has less to do with the alignment of planets than the center of gravity of the broom. Watch the video for a great explanation: <https://youtu.be/QfATP-arvCg>

Another balancing trick uses a 3-foot wooden dowel and playdoh. Use a meter stick or yard stick if you do not have a dowel. Place a lump of modeling clay about the size of your fist eight inches from the end of the dowel. Try balancing the dowel on the end closest to the clay. Flip the dowel and try to balance it on the other end. Why does it balance easier on one end? View this video to learn more about how rotational inertia influences balance: <https://youtu.be/lkPwu7nf1U>



MATH

The balance, or final amount, in a bank account depends on how much money is placed in the account (principal), the interest rate, how many times per year the interest is compounded and how long the money stays in the account. For more information about compound interest, watch the Khan Academy video: <https://bit.ly/2VVH8G7>

Scenario: You started saving for a car six years ago by putting \$5,000 in the bank. Your bank pays an interest rate of 1.25% compounded monthly. What is the balance in the account?

What if, instead of putting \$5,000 in the bank, you saved it in a safe place at home and added \$200 to it each year? Use a graphing calculator to graph both scenarios. How are the graphs similar? How are they different?

Why do banks call it a balance?



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GRADES
10-12

Balance



ENGLISH LANGUAGE ARTS

At some point in your educational career you will probably have to write a discussion essay. In writing a discussion essay, it is critical to have a balanced view. This makes discussion essays distinct from persuasion essays, for which only one side of the argument is given. In a discussion essay, the writer has to clearly present arguments for and against a topic before stating recommendations and opinions.

Write your own discussion essay. Be sure your information is balanced. One topic example is: Social implications of continued social media dependency.

Use this link to find additional topic examples:
<https://ieltsliz.com/discussion-essay-sample-questions/>



SOCIAL STUDIES

"A lie can travel halfway around the world while the truth is putting on its shoes." - Mark Twain.

Did Mark Twain actually say that? The way news travels has changed throughout history from a few major newspapers to social media outlets. This brief Ted Ed video explains how our society is becoming inundated with unbalanced information: <https://ed.ted.com/lessons/how-false-news-can-spread-noah-tavlin>

Create a TedTalk defending your position on this question: Does the media have a responsibility to publish the truth? Make sure your TedTalk includes the following considerations:

- How does "fake news" circulate so quickly?
- Should writers be responsible for verifying the accuracy of information?
- Should the media be made responsible for the information they publish?



SCIENCE

For a chemical equation to follow the Law of Conservation of Mass, it must be balanced. An equation is balanced when the number of atoms of elements on the reactants side is equal to that of the product side.

Use the link below to practice balancing chemical equations with a game.

https://phet.colorado.edu/sims/html/balancing-chemical-equations/latest/balancing-chemical-equations_en.html

Write your own balanced chemical equations.



MINDFULNESS

According to Harvard Medical School, yoga reduces heart rate, lowers blood pressure, eases respiration, and even helps with depression and anxiety.

Research yoga and its health benefits. It's an activity you can do rain or shine from the comfort of your own home, and for free.

Participate in the yoga session through this video link to learn how to achieve focus on mental balance: <https://www.youtube.com/watch?v=Aak5arZOpc>

Don't forget to relax and breathe.

Balance



LOGIC PUZZLE

You are given a set of scales and 12 marbles. The scales are of the old balance variety, which is a small dish that hangs from each end of a rod that is balanced in the middle. The device enables you to conclude either that the contents of the dishes weigh the same or that the dish that falls lower has heavier contents than the other.

The 12 marbles appear to be identical. In fact, 11 of them are identical, and one is a different weight. Your task is to identify the unusual marble and discard it. You are allowed to use the scales three times if you wish, but no more than three.

Note that the unusual marble may be heavier or lighter than the others. Your task is to identify it and determine whether it is heavy or light.



FIELD STUDIES

What is keeping the Leaning Tower of Pisa from toppling over for the past 800 years? Gravity. The tower does not fall because its center of gravity has been kept within its base. Read about it here: <http://www.towerofpisa.org/leaning-tower-of-pisa-facts/>.

Watch the TED-Ed video on how it was created and remains standing today: <https://youtu.be/HFqf6aKdOC0>

To imitate the leaning tower, find a safe spot, stand still with both feet planted firmly together and arms to your sides. Did you feel your center of gravity shifting? Now try leaning to the other side. Did your feet move from their spot? Just like the Leaning Tower of Pisa, your center of gravity is maintaining your balance. How do engineers take the center of gravity into account when designing structures today?



RESEARCH EXPLORATIONS

What would the world do without social media? Do you find yourself checking Instagram and TikTok multiple times throughout the day? What about the members in your household? Everything needs a balance, even social media. Spending too much time on social media often causes us to lose sight of what reality truly is. <https://www.socialmedia.biz/how-to-balance-social-media-with-real-life/>

Spend a week recording the number of times you and 2 other family members checked into your social media accounts. Create a daily log and mark the number of times you sign in. Tally the days and analyze the information.

What would you consider an excessive amount? Is it consuming most of your time? What can you do to find a balance between real life and social media?



MATH

Phoenix wants to start saving money to travel across the world. She puts \$100.00 into her new savings account. The account earns 9% interest, compounded continuously. She plans to fly in first-class and the tickets are \$975.

1. How long will it take for Phoenix to have enough money in her account to buy the tickets?
2. How much will be in the account after 5 years?

Use the formula $A = Pe^{rt}$ where A is the balance (final amount), P is the principal (starting amount), e is the base of natural logarithms (≈ 2.71828), r is the interest rate expressed as a decimal, and t is the time in years.



Balance Reference Guide

2-3 Logic Puzzle:

Solution:

blue = 12; orange = 12 blue ball = 12; blue star = 4 blue = 12; orange = 6

blue = 12; green = 6

https://drive.google.com/file/d/0B624p_IrRSi0QzU3bGpBOWw5S0U/view

4-5 Logic Puzzle:

Solution: The "balance" and "spend" columns do not have to match, and in most cases, will not match. They are not always equivalent because you cannot compare them in that way. The amount in the "balance" is what is left over and depending on how much you "spend," equals what is left (the "balance") and therefore, if you only spend \$1 at a time, you will always have large numbers left over. Whereas, if you spend all of it at one time, you will have \$0 in the "balance."

6-7 Logic Puzzle:

Solution: If the coin picked by the warden is real then the scale would display 0 or an even number. If the coin is fake then the scale will display an odd number.

8-9 Logic Puzzle:

Solution: If the coin picked by the warden is real then the scale would display 0 or an even number. If the coin is fake then the scale will display an odd number.

10-12:

Logic Puzzle Solution: <http://www.bridbles.com/2011/10/hardest-balance-logic-puzzle.html>.

Math Solution: \$156.83

Work on more problems with IXL: <https://www.ixl.com/math/algebra-2/continuously-compounded-interest-word-problems>