

STEM Activities for Families and Children

Curated by the Allegheny Intermediate Unit
Math & Science Collaborative



While your students are off from school, why not engage them in some online STEM activities?

The following resources build students' understanding and skills of STEM concepts while also having fun.

K-2 Resources

Nature Changer Game - Science

https://pbskids.org/plumlanding/games/nature_changer/index.html



In this game children choose an animal, and then play the game to help that animal find what it needs to survive. For example a frog is hunting for insects.

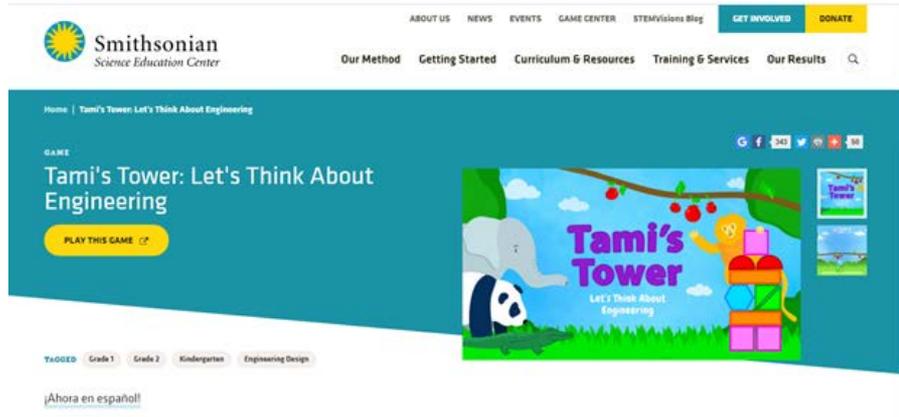
This game is aligned to the science disciplinary core idea of Organization for Matter and Energy Flow in Organisms (LS1.C). As children are playing the game they are engaged in the following element: All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (K-LS1-1).

For more K-2 STEM games from PBS

<https://pbskids.org/plumlanding/games/index.html>

Tami's Tower Game - Engineering Design

<https://ssec.si.edu/tamis-tower>



Tami's Tower engages children in solving problems by building structures from various geometric shapes to help Tami, a golden lion tamarin, reach the fruit. Through playing the game, children experience how different shaped blocks can be used to create a variety of structures, and how these structures act when they are subjected to vibrations of various strength.

Children build their understanding towards the science concept that a great variety of objects can be built up from a small set of pieces (PS1.A), the engineering concept that there is always more than one possible solution to a problem (ETS1.C), and gain experiences with different geometric shapes. .

The Hoop Game :Part-Part-Whole Relationships - Math

<https://earlymath.erikson.edu/the-hoop-game-simple-tossing-game/>

Erikson Institute

Early Math Collaborative

Why Early Math?

Professional Development

SERIES: **FOCUS ON PLAY**

The Hoop Game

September 25, 2018

This is a [Video](#) - for grade levels [Kindergarten](#), [Pre-K](#)
Tagged [Games](#), [Subitizing](#)

Share this:



When children play The Hoop Game they get to explore the part-part-whole relationships within a given number of beanbags. Taking apart and putting together numbers in flexible ways is an important foundation for later number operations.

Start with a small set of beanbags, no more than 5 or 6. Each child gets to toss the beanbags one by one into the hoop. How many land inside the hoop? How many land outside of the hoop? How many beanbags in all? Each round gives children practice seeing and naming smaller parts of a total number in a variety of ways.

For more PreK-2 games like this,

<https://earlymath.erikson.edu/series/focus-on-play>

8 Counting Books that Tackle Big Ideas - Math

<https://earlymath.erikson.edu/8-counting-books-for-school-and-home-that-tackle-big-ideas/>

 8 Counting Books For Sch...
earlymath.erikson.edu



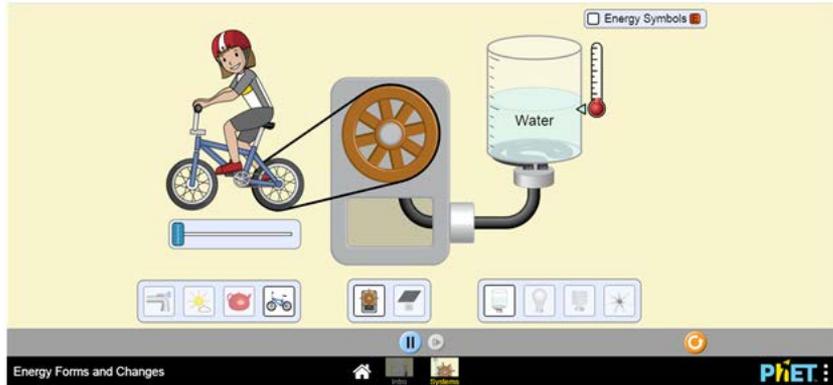
Answering the question, “How many?” is central in children’s everyday lives. Seeking to make sense of the world, children count anything and everything as they make order out of chaos. Counting has rules that children learn through many, many experiences when they engage in counting. Books are effective springboards that **encourage kids to want to count**. To encourage and develop children’s counting knowledge, here are eight books that are common to preK-K classrooms and possibly homes.

More PreK-2 book ideas related to mathematics, <https://earlymath.erikson.edu/series/book-ideas/>

3-5 Resources

Energy Forms and Changes Interactive Simulation - Science

https://phet.colorado.edu/sims/html/energy-forms-and-changes/latest/energy-forms-and-changes_en.html



Explore how heating and cooling iron, brick, water, and olive oil adds or removes energy. See how energy is transferred between objects. Build your own system, with energy sources, changers, and users. Track and visualize how energy flows and changes through your system.

Students learn about Conservation of Energy and Energy Transfer (PS3.B) (4-PS3-2). They make observations to provide evidence that energy can be transferred from place to place (4-PS3-2).

For more elementary school PHET simulations, <https://phet.colorado.edu/en/simulations/category/by-level/elementary-school>

Number Line Party: Rounding to the Tenths Place - Math

<https://wqed.pbslearningmedia.org/resource/mg-bh-math-nbt-party2/number-line-party-rounding-to-the-tenths-place/>

The screenshot shows the PBS Learning Media website interface. At the top, there are logos for PBS LearningMedia and WQED, along with search and sign-in options. A navigation bar includes 'Subjects', 'Grades', 'Standards', and 'For Students'. The main banner reads 'Bring the World to Your Classroom' with a subtext: 'WQED and PBS have curated FREE, standards-aligned videos, interactives, lesson plans, and more for teachers like you.' Below this, the resource title 'Number Line Party: Rounding to the Tenths Place' is displayed, with metadata: 'Interactive Lesson', 'Grades: 4-5', and 'Collection: Math at the Core: Middle School'. A large image shows a woman holding a sign with '15.63' and a man. To the right, a 'You May Also Like' section lists related resources: 'Math at the Core: Middle School' (2:02 Video), 'Number Line Party: Rounding to Whole Numbers' (Interactive), and 'Number Line Party: Rounding to Wholes, Tenths, and Hundredths' (Interactive). On the left side, there are icons for 'Share to Google Classroom', 'Assign or Share', 'Support Materials', and 'Favorite'.

WQED and PBS have curated FREE, standards-aligned videos, interactives, lesson plans, and more for teachers like you.

In the Number Line Party activity, students are asked to create a number line from 0 to 1, plot decimal numbers, and use the idea of distance on the number line to justify whether to round the given decimal number to 0 or 1.

Students are working in the domain of number and operation in base ten for this activity, and more specifically, students are working on understanding our place value system (5.NBT.A.4).

For more activities like this one, <https://wqed.pbslearningmedia.org/>

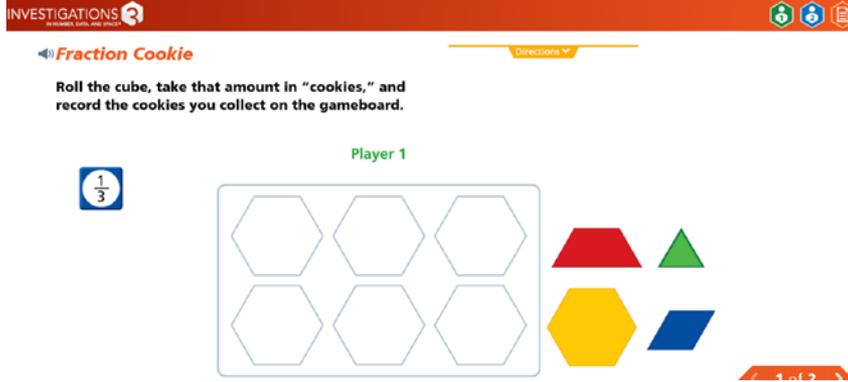
Investigations 3: Fraction Cookie Game - Math

<https://us-school.pearsoned.com/school/772bdac8-fd02-4672-b2ab-15e27fc86bf2/D0678811/player.html>

Fraction Cookie is a game for grades 3-5 that requires students to represent and compare fractions using pattern blocks. Ultimately this will lead to a discussion about equivalent fractions and how they can be represented by a collection of different pattern block pieces.

For example, if one whole cookie is represented by the yellow hexagon, then “ $\frac{1}{2}$ cookie” can be represented with one red hexagon or with 3 green triangles or with one blue rhombus plus one green triangle.

For more games from Investigations <https://media.pk12ls.com/curriculum/math/Investigations3/gamecenter/english/index.html#/Grade:3/>



Explore Mars Rover Game - Science and Computer Science

<https://spaceplace.nasa.gov/explore-mars/en/>



In Explore Mars, you will be driving a rover on [Mars](#) and collecting information about Martian rocks.

First, you will choose a rock to investigate. Then, you'll send a sequence of commands telling the rover how to get to that rock. Don't forget to include the command to analyze the rock!

You will earn points every time you successfully analyze a new Martian rock. If you want a high score, plan carefully. Some rocks are worth many more points than others!

Students will create computational artifacts by choosing from a set of given commands to solve a pre-existing problem (CSTA practice).

For more games from NASA

<https://spaceplace.nasa.gov/menu/play/>

6-8 Resources

Ocean Plastics Video - Science

<https://www.nationalgeographic.org/video/ocean-plastics/>



RESOURCE LIBRARY > VIDEO

Ocean Plastics

Plastic debris is collecting in every corner of our oceans at a rapid pace and wreaking havoc on sea life. National Geographic explorer Heather Koldewey has a profit-making solution to remove one major offender, discarded fishing nets. She shares practical solutions for cleaning up waterways and motivating the world to take action.

GRADES

3-12

SUBJECTS

Biology, Biology: Conservation, Earth Science, Oceanography, Geography, Human Geography, Physical Geography



Plastic debris is collecting in every corner of our oceans at a rapid pace and wreaking havoc on sea life. This video is about National Geographic explorer, Heather Koldewey, who has a profit-making solution to remove one major offender, discarded fishing nets. She shares practical solutions for cleaning up waterways and motivating the world to take action.

The video addresses science concepts of Human Impacts on Earth Systems (ESS3.C), shows the negative impacts of plastic pollution on the ocean and showcased activities to combat it.

For more National Geographic Videos

https://www.nationalgeographic.org/education/resource-library/?q=&page=1&per_page=25&content_type_category=Video

Rescue Robot Mission - STEM

http://learningblade.com/images/uploads/subpage/STEM4Parents-Rescue_Robot.pdf



#STEM4Parents
Rescue Robots

These activities and questions have been designed for you to have engaging discussions with your student about the STEM jobs they are encountering in their Learning Blade schoolwork. Here is an overview of what is included.



Table Talk: These are questions you can ask your student without having any background knowledge in STEM. These will be easy conversation starters.



Dig Deeper: These are questions with suggested links to learn more about different STEM careers to explore with your student.



Home Lab: This is an easy, hands-on activity to do with your STEM student.

In this mission, students are tasked to determine what types of robots are needed for a new rescue unit, and how much this new unit is going to cost the city. Along the journey students will need to determine what tools (i.e. microphones, cameras, computers, electric circuits and sensors) and teammates/experts (i.e. electrical technician, mechanical engineer, computer programmer, and industrial designer) are needed to assist in finding out more about robotics and their use in emergencies.

For additional LearningBlade STEM4Parents resources <http://www.learningblade.com/parents>

Robot Dog vs. Real Dog Activity - Math

<https://math.scholastic.com/issues/2019-20/090219/robot-dog.html#970L>



©Shutterstock.com (Background), Kaburho/istock/Getty Images (Robot), Susan Schenk/Shutterstock.com (Bulldog)

In this activity, students figure out whether a robot dog, such as Aibo, or a real dog is a better financial investment. The activity includes four separate learning experiences built around the question whether a realistic robot dog can be a better pet for certain people.

This activity focuses on statistics and probability and line graphs. It is aligned to STANDARDS CCSS: 8.F.B.5, MP1, MP3, MP5

ESTIMATING CUMULATIVE COSTS

STANDARDS

CCSS: 8.F.B.5, MP1, MP3, MP5
TEKS: 8.4C

STATISTICS &
PROBABILITY
Line Graphs

Robot Dog vs. Real Dog

Can a realistic robot dog be a better pet for certain people?

SEPTEMBER 2, 2019 | By Jennifer Hackett

It barks, it plays, it does tricks, and it begs for attention. In many ways, Aibo is just like any other dog. But there's one major difference: Aibo is an interactive robot pet created by Sony.

But how much is owning an Aibo like owning a real dog? Gail Melson, a professor of psychology at Purdue University in Indiana, studied how kids ages 9 to 15 reacted to Aibo.

Bookmark

Open Magazine View

JUMP TO

Teaching Resources

Text-to-Speech

READING LEVEL

970L

Go with the Flow Game - Science

<https://spaceplace.nasa.gov/ocean-currents/en/>



In **Go With the Flow** you are in a submarine and need to fix the currents to take you where you want to go in order to get the key to the treasure chest full of gold!

You learn about ocean currents while you unlock the hidden treasure!

In **Go With the Flow**, students deepen their understanding of the science concept of the roles of water in Earth's surface processes (ESS2.C) by applying the element, "variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents", to steer their submarine.

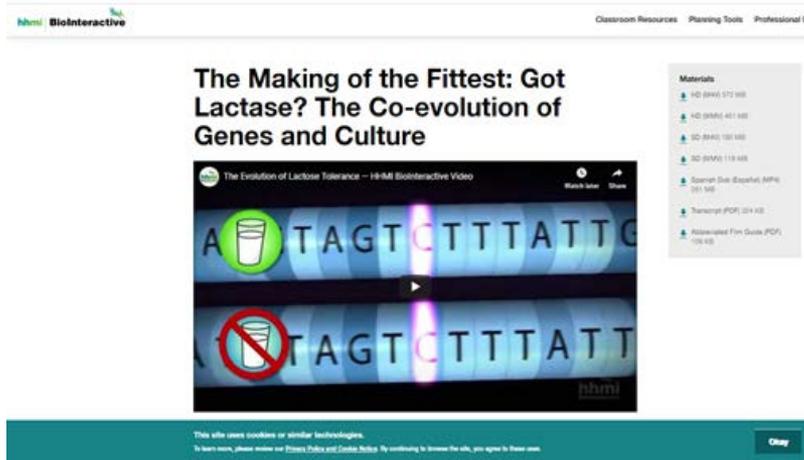
For more games from NASA

<https://spaceplace.nasa.gov/menu/play/>

9-12 Resources

Making of the Fittest: Got Lactase Video - Science

<https://www.biointeractive.org/classroom-resources/making-fittest-got-lactase-coevolution-genes-and-culture>



The screenshot shows the Biointeractive website interface. At the top, there is a navigation bar with the Biointeractive logo and links for 'Classroom Resources', 'Planning Tools', and 'Professional D'. The main content area features a video player titled 'The Making of the Fittest: Got Lactase? The Co-evolution of Genes and Culture'. The video player shows a DNA sequence 'A TAGTCTTTATT' with a green circle containing a glass of milk above the 'A' and a red circle with a slash over a glass of milk below the 'A'. To the right of the video player is a 'Materials' list with several items: '1. 3D (BMM) 572 KB', '2. 3D (BMM) 411 KB', '3. 3D (BMM) 100 KB', '4. 3D (BMM) 118 KB', '5. Scanlon (The Evolution) AP® 201 KB', and '6. Transcript (PDF) 204 KB'. Below the video player, there is a footer with a privacy policy notice and a 'Close' button.

In this film, Dr. Spencer Wells tracks down the genetic changes associated with the ability to digest milk as an adult—a trait called lactase persistence—tracing the origin of the trait to pastoralist cultures that lived less than 10,000 years ago.

Students learn that humans, like all species, evolve and adapt to the environment through natural selection through the example of lactase persistence, a human adaptation that arose in response to a cultural change. (LS4.B: Natural Selection; LS4.C: Adaptation)

More Biointeractive resources

<https://www.biointeractive.org/classroom-resources>

Innovating the Future Virtual Field Trip - STEM

<https://www.boeingfutureu.com/virtual-field-trip>



Full Virtual Field Trip



Chapter 1: Introduction and History



Chapter 2: Inside the Mission



Chapter 3: International Space Station - A Mission Update

Join Boeing and Discovery Education on a mission to inspire the world through aerospace innovation with an exclusive virtual field trip to historic Johnson Space Center in Houston, Texas. This behind-the-scenes tour introduces you to amazing Boeing employees who are working on the launch of the Starliner/CST-100 spacecraft and the deployment of the Space Launch System (SLS). This virtual field trip explores a variety of unexpected roles and functions that led to the development of the Starliner/CST-100 and the SLS. Along the way, you will learn about the unusual paths that have led to these unique careers and the STEM and computer science concepts being applied in the mission.

Trees in a Diagnosis Game - Math

<https://learn.concord.org/resources/1241/trees-in-a-diagnosis-game>



Collections About Register Log In

Dynamic Data Science

The age of data is upon us! Complex datasets underpin nearly every aspect of modern life, demanding data fluency by all students. This set of dynamic data science activities is designed for grades 9-14. By working with data frequently and repeatedly, learners develop experience and competence, gaining fluency with the data moves necessary for structuring, examining, and diving into data, and ultimately building excitement for their ability to work with

Arbor Xenobiological Services

how many caves? 10

malady ague

index	health	hair	eyes	antennas	tactacles	height	weight	c
1	sick	pink	purple	6	0	153	179.2	
2	well	blue	orange	6	0	165.3	229.6	
3	well	blue	purple	6	0	186.3	135.7	
4	well	blue	purple	6	0	322.4	2074	
5	well	blue	purple	6	0	177.6	471.1	

creatures (10 cases)

show diagnosis 'leaves'

Predict by

2 of 10 (20.0%)

health hair eyes ague

TP = 0, TN = 0, FP = 0, FN = 0

refresh everything refresh data

In this dynamic data science activity, students use data to build binary trees for decision-making and prediction. Prediction trees are the first steps towards linear regression, which plays an important role in machine learning for future data scientists. Students begin by manually putting “training data” through an algorithm. They can then automate the process to test their ability to predict which alien creatures are sick and which are healthy. Students can “level up” to try more difficult scenarios.

For more activities like this, <https://learn.concord.org/dynamic-data-science>

Hack Attack Mission - STEM

http://learningblade.com/images/uploads/subpage/STEM4Parents-Hack_Attack.pdf



#STEM4Parents
Hack Attack

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Dig Deeper: These are questions with suggested links to learn more about different STEM careers to explore with your student.



Home Lab: This is an easy, hands-on activity to do with your STEM student.

In this mission, students are tasked to complete their work on a robotics project and assist their school in recovering from being hacked by a rival school. Along the journey students will need to determine, what tools (social media, mobile applications, cyber security, cloud computing, robot development) and teammates/experts (information security analyst, software engineer, web developer, data scientist, UI/Ux designer) are needed to assist in preventing future hacks and recovering their lost data.

For additional LearningBlade STEM4Parents resources <http://www.learningblade.com/parents>

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aiumsc.net

