



Information & Activity Book

September 26, 2015 | Chicago, Illinois



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MAP of EXPERIENCE FLOOR

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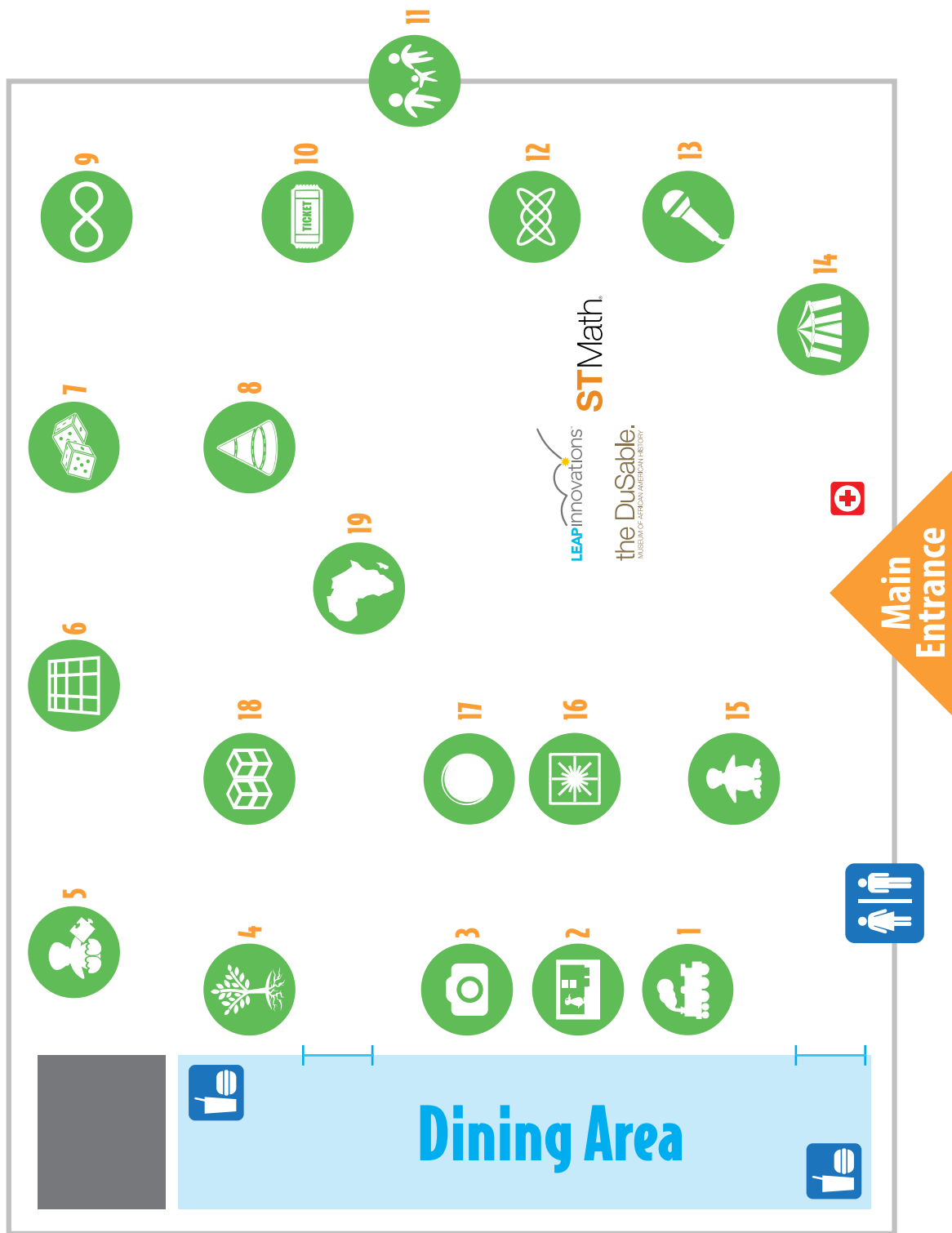


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WELCOME TO THE MATH FAIR!

Dear Math Fair Participant,

Welcome to the Chicago Math Fair: At the Square Root of Fun! Today, we invite you to get your hands on math in exciting and novel ways.

MIND Research Institute and LEAP Innovations are co-powering the Math Fair to give children and youth powerful mathematical experiences beyond the classroom. Mathematical beauty is everywhere in the world around us, and our goal with today's Math Fair is to connect children to the deeper joys and fascinating aspects of mathematics.

By being here, you've already embraced your role in educating and inspiring a new generation of children to love math and learning. Take it a step further today by asking your children questions about their thought processes and experiences throughout the Math Fair. When you go home, use this activity book to continue exploring math in the world all around us.

Thank you for participating in the Chicago Math Fair. With your help, today's experiences will contribute to your child developing a lifelong love of math, problem solving and learning.

Sincerely,

Matthew Peterson, Ph.D.
Co-founder & CEO
MIND Research Institute

Phyllis Lockett
CEO
LEAP Innovations

Queridos Participantes de la Feria de Matemáticas,

Bienvenidos a la Feria de Matemáticas de Chicago: en la raíz cuadrada de la diversión! Hoy, te invitamos a que practiques las matemáticas en formas interesantes y novedosas.

MIND Research Institute y LEAP Innovations le traen la Feria de Matemáticas para dar a los niños y jóvenes poderosas experiencias matemáticas fuera del salón de clases. La belleza de las matemáticas está por todas partes del mundo que nos rodea, y nuestro objetivo de hoy para la Feria de Matemáticas es la de conectar a los niños con las alegrías más profundas y fascinantes de los aspectos de las matemáticas.

Al estar aquí hoy, ya ha aceptado su papel en educar e inspirar a una nueva generación de niños a amar las matemáticas y el aprendizaje. Ahora dé un paso más allá haciéndoles preguntas a sus hijos acerca las experiencias y su proceso de pensamiento durante la Feria de Matemáticas. Cuando llegue a casa, utilice este libro de actividades para seguir explorando las matemáticas a nuestro alrededor.

Gracias por participar en la Feria de Matemáticas de Chicago. Con su ayuda, las experiencias de hoy contribuirán al desarrollo del amor a las matemáticas, la resolución de problemas y el aprendizaje de su hijo/a.

Sinceramente,

Matthew Peterson, Ph.D.
Co-founder & CEO
MIND Research Institute

Phyllis Lockett
CEO
LEAP Innovations



SHARE YOUR EXPERIENCES AT THE MATH FAIR:
#MathFair15

SCHEDULE OF EVENTS

Math Fair Schedule

10:00 a.m.	Math Fair Opens
11:30 a.m.	Food Concessions Open
5:00 p.m.	Food Concessions Close
6:00 p.m.	Math Fair Closes

Game-a-thon Game Design

10:00 a.m.	Game Design Area Open! Come create and build your own game!
5:00 p.m.	Game Area Closes

Math Mystery Theater Performances

10:15 a.m.	12:55 p.m.	3:35 p.m.
10:55 a.m.	1:35 p.m.	4:15 p.m.
11:35 a.m.	2:15 p.m.	4:55 p.m.
12:15 p.m.	2:55 p.m.	

* Space is limited. Arriving 15 minutes prior to scheduled performances is recommended.

South of the Sahara: Origins of Mathematics

Join us for interactive workshops and learn the mathematics behind the Ishango bone, lusona, weaving, and binary communication! Workshops will run every 30 minutes throughout the day with a maximum of 10 participants per workshop.

Family Math Workshops * Space is limited. Arriving 15 minutes prior to scheduled workshops is recommended.

10:15 a.m. & 2:15 p.m. | Room 203

Math Is Everywhere!

(families and students pre-K to 6th grade)

This workshop will help parents and their children see everyday activities through a math lens. You will put your goggles on and see math everywhere, and use math in fun ways with everyday activities!

¡Matemáticas por todas partes!

(familias y alumnos pre-escolar a 6º)

Este taller ayudará a familias a observar nuestras vidas con un lente matemático. Se pondrán sus gafas y observarán que matemáticas se encuentra alrededor de nuestro. Diviértanse mientras encuentran matemáticas en sus actividades diarias.

11:15 a.m. & 3:15 p.m. | Room 205

Build a Skyscraper: The Geometry of Stable Structures

(families and students 2nd grade-college)

In this friendly competition your family will collaborate to build the tallest structure using only straws, newspapers, and masking tape! Discover how Geometry is an essential part of Engineering and Architecture during this fun problem-solving session.

Construya Un Rascacielos: La Geometría de Estructuras Estables

(familias y alumnos 2º a Universidad)

Durante ésta competición amistosa su familia colaborará en la construcción de la estructura más alta usando solamente popotes, periódicos, y cinta adhesiva. Descubran como la Geometría es una parte central de Ingeniería y Arquitectura durante esta sesión entretenida.

12:15 p.m. & 4:15 p.m. | Room 203

Math Homework Without Tears

(pre-K to 12th grade)

Come to this parent workshop to learn strategies to ensure your children are well-equipped to do their homework independently. Learn how to help your children take ownership of their own learning and be more accountable. You will take away quality online resources, strategies to push your child's thinking, and a toolkit for home use.

Tarea Sin Lágrimas (pre-K a 12º)

Participe en este taller para padres y aprenda estrategias para ayudarle apoyar a sus hijos con su tarea. Aprendan como ayudar a su hijo(a) desarrollar la habilidad de tomar responsabilidad sobre su tarea y cumplirla independientemente. Recibirá materiales y recursos para usar en casa.

1:15 p.m. & 5:15 p.m. | Room 205

Games, Games, and More Games! (fun for all)

Games are a great way for families to interact and share fun times. But did you know that many games can also build math aptitude? Play games with your family that build problem-solving skills, strategic thinking, and fluency with the four operations.

¡Juegos, juegos, y más juegos!

(divertido para todos)

Juegos son una buena manera de pasar el tiempo con la familia y desarrollar unidad entre si mismos. ¿Pero sabían que juegos también pueden desarrollar aptitudes matemáticas? En este taller aprenderán juegos para desarrollar estrategias, fluidez con aritmética y razonamiento.

K-12 Game-a-thon Participants



THANK YOU TO ALL THE STUDENTS FOR
SHARING YOUR CREATIVE AND OUTSTANDING
GAME DESIGNS IN THE 2015 GAME-A-THON!



**Congratulations to
our Top 5 entries!**

GAME TITLE	LOCATION
 Mathopoly	Worthington, OH
 The Polygon War	Anaheim, CA
 Fraction Bakery	Piqua, OH
 Tangled Math	Largo, FL
 El Mundo de Fracciones	New Orleans, LA
JiJi Multipli-Cake Dance	Nazareth, PA
Expedition to Chicago	Houston, TX
Fantasy Infection	Chicago, IL
Worlds of Math	Piqua, OH
A Stroll Down the Vibrant Passageway	Piqua, OH
Fraction Avenue	Piqua, OH
Card Sharks	Piqua, OH
Math Balls	Piqua, OH
Don't Lose Your Marbles!	Piqua, OH
Eins	Piqua, OH
Creepy Corners	Frankfort, IL
Geometrica	Dubuque, IA
Math Dash	Tustin, CA
Fraction Four Square	El Cajon, CA
Get to the House	Huntington Beach, CA
Math Run	Anaheim, CA
Mathopolyland	New Orleans, LA
Math Man	El Cajon, CA
Math Attack	Huntington Beach, CA
Handball Charts	Huntington Beach, CA
Mermaids Playing Math	Windsor, CT
Geometry Fun!	Pepper Pike, OH

For additional information on the K-12 Game-a-thon Challenge, see page 45 of this Activity Book,
or learn more at www.mindresearch.org/gameathon

SPONSORS & PARTNERS

Thank you to the generous sponsors*
of the Math Fair!

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THANK YOU TO OUR 2015 SPONSORS

Math Mystery Theater Sponsor



Conic Connections Sponsor



South of the Sahara Sponsor



Blockopolis Sponsor



Fair Sponsors



THANK YOU TO OUR 2015 PARTNERS

Honorary Chair Mayor Rahm Emanuel

Illinois Secretary of Education Beth Purvis



A special thank you to MIND's Board of Directors for their support.

If you are interested in sponsorship opportunities for the 2016 Math Fair, please contact us at
squarerootoffun@mindresearch.org.

MIND Research Institute & LEAP Innovations Information

About MIND Research Institute

MIND Research Institute is a neuroscience and education social benefit organization dedicated to ensuring that all students are mathematically equipped to solve the world's most challenging problems. Early math skills are the greatest predictor of later academic success, and math and problem-solving skills are key to success in today's innovation-driven economy. MIND's distinctive visual approach to math and problem solving is the basis for its innovative, research-proven Spatial-Temporal (ST) Math software for elementary and secondary schools. ST Math is in use by 2,500 schools and 800,000 students in 40 states.

Acerca del MIND Research Institute

MIND Research Institute es una organización de beneficio social neurocientífica y educativa dedicada a garantizar que todos los estudiantes estén matemáticamente equipados para resolver los problemas más difíciles del mundo. Habilidades matemáticas tempranas son el mayor predictor del éxito académico posterior y la clave para el éxito en la economía basada en la innovación de hoy. La manera distintiva visual de resolver problemas matemáticos de MIND es la base de su innovador, programa de ST Math que está siendo utilizada por 2,500 escuelas primarias y secundarias con 800,000 estudiantes en 40 estados.

mindresearch.org



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MathMINDs

Launched in California with MIND Research Institute's first Math Fair in 2014, the MathMINDs Initiative is a movement to shift the cultural perception of math from being scary and frustrating to exciting and essential. To do this, MathMINDs engages the community and students in hands-on mathematical experiences outside the classroom. This year in Chicago, the Math Fair engages young minds as they interact with mathematically-themed activities, games, exhibits and performances.

Mentes Matemáticas

Lanzado en California con la primera Feria de Matemáticas de MIND en 2014, la Iniciativa MathMINDs es un movimiento para cambiar la percepción cultural de matemáticas de ser aterrador y frustrante a ser emocionante y esencial. Para ello, MathMINDs involucra a la comunidad y a los estudiantes en experiencias prácticas matemáticas fuera de clase. Este año en Chicago, la Feria de Matemáticas invita a las mentes jóvenes a que interactúen con actividades matemáticas con juegos, exposiciones y actuaciones.

mindresearch.org/mathminds

About LEAP Innovations

LEAP Innovations bridges the gap between education and innovation for teachers and students from pre-K through college. LEAP Innovations helps educators develop and implement personalized learning environments enabled by technology to tailor instruction to each student's skills, interests and goals. Headquartered at 1871, Chicago's incubator for digital startups, LEAP also helps companies address unmet needs in education.

LEAP Innovations' mission is to connect education and innovation, exponentially advancing teaching and learning in and out of the classroom. Imagine a world beyond the current boundaries of education, where learning is tailored to each student – anytime, anywhere – unlocking their limitless potential. That's the vision LEAP Innovations works towards.

Acerca de LEAP Innovations

LEAP Innovations cierra la brecha entre la educación y la innovación para los profesores y estudiantes de grado pre-escolar hasta la universidad. LEAP Innovations ayuda a los educadores a desarrollar e implementar ambientes de aprendizaje personalizados gracias a la tecnología para adaptar la enseñanza a las habilidades, intereses y objetivos de cada estudiante. Con sede central en la incubadora de Chicago para nuevas empresas digitales conocida como 1871, LEAP también ayuda a las empresas a abordar las necesidades insatisfechas en materia de educación.

La misión LEAP Innovations es conectar la educación y la innovación, de manera exponencial al avance de la enseñanza y el aprendizaje dentro y fuera de clases. Imagina un mundo más allá de los límites actuales de la educación, donde la enseñanza y el aprendizaje están mejorando constantemente para desbloquear las posibilidades del potencial de cada persona. Esa es la visión hacia la que trabaja LEAP Innovations.

leapinnovations.org

 [@leapinchicago](https://twitter.com/leapinchicago)

JOIN THE MATHMINDS MOVEMENT!

Follow MIND Research Institute and share your Math Fair adventure on social media with the hashtags **#MathFair15** and **#MathMINDs**!

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 [@MIND_Research](https://twitter.com/MIND_Research)

 [MINDResearch](https://www.youtube.com/MINDResearch)

 [JiJi Math](https://www.pinterest.com/JiJiMath)

Learn about topics such as how to help your children with math, effective learning strategies, the latest in education research and more.

- Sums & Solutions Blog: blog.mindresearch.org/blog
- Sign up for MathMINDs updates at mindresearch.org/outreach/mathminds
- And of course visit us online at mindresearch.org!

LEARNING STRATEGIES BEHIND THE MATH FAIR

HOW THE MATH FAIR EMPLOYS LEARNING STRATEGIES IN THE EXHIBITS

1 Math has a bad rap for being boring and difficult to appreciate in the real world. The Math Fair will offer many opportunities for families to grow beyond these misconceptions, and to develop new ways for them to enjoy abstract thinking and mathematical modeling. The event tag line is “At the Square Root of Fun” and this theme is a vital consideration in each and every learning experience.

2 A greater impact is possible if the Math Fair cultivates the parents’ existing motivation to help their children succeed. At the Math Fair, parents are encouraged to be actively involved with children at the experiences. Additionally, older youth can support younger family members, and complete their own challenges as role models. Adults may utilize tools such as Inquiry-Based Learning to elicit responses and ideas from children if provided with prompts.

3 The Math Fair is designed for youth and adults of all ages, and for people of differing mathematical abilities. Experiences allow novices to participate and learn key math concepts without prior knowledge, while simultaneously offering opportunities for deeper understanding to more advanced youth.

4 The Math Fair covers a wide range of math concepts, but it is designed to specifically develop the skills and awareness to appreciate and recognize the areas of math that are most conveniently explored outside the classroom.



The first strategy for the Math Fair: Children, families, teachers, and volunteers easily experience Mathematics as Fun!

An important learning strategy for the exhibits is that Families Engage in Math Together, and that parents are empowered to steward their children’s interest in math outside the classroom.

The Math Fair offers various Activities for People with Different Mathematical Abilities.

Experiences reinforce the following mathematical real world concepts: Geometric relationships, Ratio and proportion (scale), and Mathematical Modeling.

ESTRATEGIAS DE APRENDIZAJE DETRÁS DE LA FERIA DE MATEMÁTICAS



CÓMO LA FERIA DE MATEMÁTICAS EMPLEA ESTRATEGIAS DE APRENDIZAJE EN LAS EXHIBICIONES

1 Las matemáticas tienen la mala reputación de ser aburridas y difíciles de apreciar en la vida real. La Feria de Matemáticas ofrecerá muchas oportunidades para que las familias venzan estos conceptos erróneos, y forjen nuevas maneras para disfrutar el pensamiento abstracto y el modelaje matemático. El subtítulo del evento es “En la raíz cuadrada de la diversión,” y este tema es una consideración vital en todas las experiencias de aprendizaje.

La primera estrategia para la Feria de Matemáticas: ¡Los alumnos, familias, maestros y voluntarios experimentan fácilmente las Matemáticas Divertidas!

2 Es posible tener un mayor impacto si la Feria de Matemáticas cultiva la motivación existente de los padres de ayudar a sus hijos a triunfar. Se anima a los padres a participar activamente con sus hijos en las exhibiciones de la Feria de Matemáticas. Además, los jóvenes mayores pueden apoyar a sus familiares menores, y realizar sus propios retos como modelos. Los adultos pueden utilizar herramientas como Aprendizaje basado en método empírico para suscitar respuestas e ideas de los niños, si tienen instrucciones.

Una importante estrategia de aprendizaje para las exhibiciones es que las Familias Participan en Matemáticas Juntos, y que los padres tienen la habilidad de dirigir el interés de sus hijos en las matemáticas fuera del salón de clases.

3 La Feria de Matemáticas está diseñada para jóvenes y adultos de todas las edades, y para gente con diversas habilidades matemáticas. Las exhibiciones permiten a los novatos participar y aprender conceptos matemáticos clave sin conocimiento previo, mientras ofrecen oportunidades simultáneamente para una comprensión más profunda para los alumnos más avanzados.

La Feria de Matemáticas ofrece diversas Actividades para gente con diferentes habilidades matemáticas.

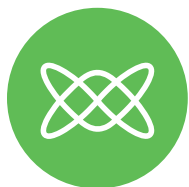
4 La Feria de Matemáticas cubre una amplia variedad de conceptos matemáticos, pero está diseñada específicamente para desarrollar las habilidades y consciencia para apreciar y reconocer las áreas de matemáticas que se exploran más prácticamente fuera del salón de clases.

Las exhibiciones refuerzan los siguientes conceptos matemáticos de la vida real: Relaciones geométricas, Relación y proporción (escala) y Modelaje Matemático.

MATH FAIR EXPERIENCES

DESCRIPTIONS & LEARNING GOALS

Big Seed - Grades 4 and Above



Big Seed is an ST Math game that challenges and trains our spatial-temporal reasoning ability, the ability to think ahead many steps in solving mathematical puzzles. The game corresponds to mathematics spanning a range of advanced mathematics areas, including topology (the study of shapes—particularly knot theory), combinatorics (the branch of mathematics concerning the enumeration, combination, and permutations of sets of elements and the mathematical relations that characterize their properties—including graph theory which is the study of graphs or pairwise relationships of objects), and algebra and group theory (the study of the algebraic structure of groups, central to abstract algebra).

In this experience youth solve Big Seed puzzles on the computer and learn how the solution of these puzzles corresponds to solving equivalent problems with graphs and knots in topology. Youth are introduced to the advanced mathematics and connections involved in the Big Seed game, and see how solving the puzzles and their variations on the computer provides the framework for advanced mathematical modeling enabling predictions and understanding of important problems in biology and chemistry. Youth also experiment with solutions to the tiling puzzles that predict that action of enzymes central to operations for understanding the structure and function of DNA.

Big Seed es un juego de ST Math que estimula y entrena la habilidad de raciocinio espacio-temporal, la habilidad de pensar muchos pasos por adelantado para resolver rompecabezas matemáticos. El juego corresponde con las matemáticas que abarcan una amplia gama de áreas de matemáticas avanzadas, que incluyen topología (el estudio de figuras —en particular la teoría de los nudos), combinatoria (la rama de las matemáticas que trata con la enumeración, combinación y permutaciones de conjuntos de elementos y las relaciones matemáticas que caracterizan sus propiedades —que incluye la teoría de gráficas, que es el estudio de gráficas o relaciones de pares de objetos), y álgebra y teoría de grupo (el estudio de la estructura algebraica de los grupos, central para el álgebra abstracta).

En esta exhibición, los jóvenes resuelven rompecabezas de Big Seed en la computadora y aprenden cómo es que la solución de estos rompecabezas corresponde con resolver problemas equivalentes con gráficas y nudos en topología. Se presenta a los jóvenes las matemáticas avanzadas y conexiones que contiene el juego Big Seed, y ven cómo resolver los rompecabezas y sus variaciones en la computadora provee el marco para el modelo de matemáticas avanzadas que permite hacer predicciones y entender problemas importantes en biología y química. Los jóvenes también experimentan con soluciones a los rompecabezas de azulejos que predicen la acción de enzimas central a las operaciones para entender la estructura y función del A DN.



Download the free Big Seed game app on iTunes to play on the iPad



MATH FAIR EXPERIENCES

DESCRIPTIONS & LEARNING GOALS

Blockopolis - All Ages



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Using the award-winning system from the Imagination Playground, youth of all ages collaboratively experiment with how shapes fit together to create complex structures. The oversized, architectural foam blocks permit free play, while youth develop an appreciation of geometric forms, both 2D and 3D. Activities include comparing polygons with equilateral polygons having an equal number of line segments by measuring segment lengths with a tape measure, and angles between segments with a protractor. Older youth build parabolas, geodesic elements, hexagonal towers, etc.

Usando el sistema galardonado de Imagination Playground, jóvenes de todas las edades experimentan en colaboración cómo es que las figuras se unen para crear estructuras complejas. Los enormes bloques arquitectónicos de hule espuma permiten el juego libre, mientras que los jóvenes forjan un aprecio por las figuras geométricas bidimensionales y tridimensionales. Las actividades incluyen comparar polígonos con polígonos equiláteros que tienen la misma cantidad de segmentos lineales al medir las longitudes de los segmentos con una cinta de medir, y los ángulos entre segmentos con un transportador. Los jóvenes mayores construyen parábolas, elementos geodésicos, torres hexagonales, etc.



Download the Imagination Playground 3D Builder App

Conic Connections - All Ages



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Get hands-on with 3D-printed manipulatives to experience math like never before! Start with Hyperbola Journey, where you will deconstruct a complex puzzle by making connections between seemingly unrelated tools like flashlights and multiplication tables. Afterwards, learn about 3D printing and watch a demo of the layer-by-layer construction used to build every manipulative at the exhibit. Finally, discover the differences between hyperbolas, parabolas, and catenary curves within a life-size schema map of conic connections. Compare circles, ellipses, and reuleaux triangles, and feel the differences when rolling these shapes. Experiment with the effects of varying the coefficients a , b , and c of the standard form of a parabola equation ($y = ax^2 + bx + c$) on the function. This interactive exhibit will encourage critical thinking and creativity in the realm of 3D printing and mathematics.

Participa con objetos manuales imprimidos en 3D para experimentar las matemáticas como nunca antes! Comenzamos con la deconstrucción de un rompecabezas complejo conectando los objetos y situaciones del mundo real y utilizar herramientas matemáticas como las tablas de multiplicar en Hipérbola Journey. Después observar como las impresoras 3D, meticulosamente construyen los propios manipuladores destacados en la exposición. Por último, descubrir las diferencias entre hipérbolas, parábolas y curvas catenarias dentro de un mapa de esquema de tamaño natural de conexiones cónicas. Experimenta con los efectos de la variación de los coeficientes a , b y c de la forma estándar de una ecuación de parábola ($y = ax^2 + bx + c$) de la función. Comparar círculos, elipses y triángulos, y sentir las diferencias al rodar estas formas. Usted se ira de esta taller con una nueva perspectiva sobre las matemáticas y las impresoras de 3D.

MATH FAIR EXPERIENCES

DESCRIPTIONS & LEARNING GOALS

Formula DRT - Grades 4 and Above



Fast moving elements and robotic controls allow for experiences with rates/ratios, movement, time, and speed. Robotic Sphero balls integrating a gyroscope and accelerometer are used to gain intuition (through spatial-temporal reasoning) with classic word problems in mathematics, such as two speeding trains meeting at point along the track.

Elementos móviles rápidos y controles robóticos permiten experiencias con tasa/proporción, movimiento, tiempo y velocidad. Bolas robóticas integrando un giroscopio y acelerómetro se utilizan para obtener la intuición (a través del razonamiento espacio-temporal) problemas matemáticos clásicos tales como dos trenes por exceso de velocidad reunidos en punto a lo largo de la pista.



See page 44 for Formula DRT activity to keep the fun going at home!

Gyro JiJi - Grades 4 and Above



Bright colors and robotic controls in a collaborative space allow for experimentation with orienting objects in 3D space. Gyro JiJi (robotic balls that integrate a gyroscope) allow you to rotate JiJi in ways you've not experienced before. Come and enjoy using Sphero balls to play a favorite challenge game, Upright JiJi! Take the classic MIND challenge game to a whole new level.

Colores brillantes, elementos veloces y controles robóticos en un gran espacio colaborativo permiten la experimentación con proporciones/relaciones, movimiento bidimensional y tridimensional, y tiempo y velocidad. Se usan Gyro JiJi (pelotas robóticas que integran un giroscopio y un acelerómetro) para crear consciencia de desplazamiento angular en 2 planos, al igual que resolver problemas de palabras clásicos en matemáticas, como el de dos trenes en movimiento que se conectan en un punto entre dos ciudades. Los jóvenes resuelven problemas de distancia, proporción y tiempo, orientan objetos en un espacio tridimensional y trazan funciones en una gráfica de coordenadas.

K-12 Game-a-thon - All Ages



For the K-12 Game-a-thon Challenge, students design and build their own math games, film a video of the game, and share it with the Game-a-thon community to promote creativity and math learning. The Top 5 teams are recognized with prizes for a high level of creative design and deep math content. In its second year, the Game-a-thon community has been adding learning opportunities to provide educators and parents with development opportunities such as Game

MATH FAIR EXPERIENCES

DESCRIPTIONS & LEARNING GOALS

Design Workshops for students to learn key skills; and a Starter Kit to use in classrooms or homes as an activity, and expand for curriculum in after-school and summer school programs.

While the Game-a-thon is about students designing math games, they also gain experience in a variety of universal learning outcomes including:

- Collaboration - students have the opportunity to work collectively towards a shared objective and benefit from peer interactions
- Critical Thinking & Problem Solving - students challenge themselves to view math from the perspective of a game designer and determine best approaches to evoke meaningful play
- Creativity & Innovation - students push the boundaries of game design by taking risks and thinking outside the box to find creative solutions
- Design Thinking - students learn design processes including ideating, prototyping, testing, iterating and giving feedback, all in tandem with core game design principles
- Communication - students communicate their ideas and thoughts to others through a summative video presentation of their game
- Math Literacy - students engage meaningfully with math concepts in new ways to build deeper understanding
- Digital Literacy - students have the opportunity to learn and utilize digital tools like video editing and game creation software.

Join the Game-a-thon community by downloading the Starter Kit, watching the students' game entries, and looking to see what Game-a-thon workshops might be happening in your area. Of course, prepare for the 2016 Game-a-thon Challenge, kicking off in January of 2016, by visiting www.mindresearch.org/gameathon.

Para el Desafío de Game-a-thon de grados K-12, los estudiantes diseñan y construyen sus propios juegos de matemáticas, lo graban y comparten con la comunidad de Game-a-thon para promover la creatividad y el aprendizaje de las matemáticas. Los 5 mejores equipos son reconocidos con premios para un alto nivel de diseño creativo y el contenido profundo de matemáticas. En su segundo año, el Game-a-thon le ofrecen a padres y maestros oportunidades de aprendizaje y oportunidades de desarrollo como talleres de diseño para que los estudiantes aprendan habilidades clave; al igual que un estuche para utilizar en clase o en el hogar como una actividad o ampliar el currículo en los programas escolares después de la escuela y de verano.

Mientras que el Game-a-thon se trata de juegos matemáticos diseñados por estudiantes, también adquieren experiencia en una variedad de resultados de aprendizaje universales, incluyendo:

- Colaboración - estudiantes tienen la oportunidad de trabajar en conjunto hacia un objetivo común y beneficiarse de las interacciones entre compañeros
- Pensamiento crítico y resolución de problemas - los estudiantes desafían a sí mismos para ver las matemáticas desde la perspectiva de un diseñador de juegos y determinar los mejores enfoques para evocar juegos significativos
- Creatividad e Innovación - estudiantes retan los límites de diseño del juego, tomando riesgos y pensar fuera de lo común para encontrar soluciones creativas

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- *Pensamiento de Diseño* - los estudiantes aprenden los procesos de diseño, empezando por sus ideas, prototipos, pruebas, iteración y dar retroalimentación, todo en conjunto con los principios de diseño de juegos
- *Comunicación* - estudiantes comunican sus ideas y pensamientos a los demás a través de un video de presentación de su juego
- *Alfabetismo Matemático* - Los estudiantes participan de manera significativa con los conceptos matemáticos en nuevas maneras de construir una comprensión más profunda
- *Alfabetismo Digital* - los estudiantes tienen la oportunidad de aprender y utilizar las herramientas digitales, como la edición y creación de videos y juegos.

Únete a la comunidad de Game-a-thon descargando el estuche para empezar, ver entradas de juego de los estudiantes, y descubre que talleres de Game-a-thon podrían estar sucediendo en su área. Por supuesto, prepararse para el desafío de Game-a-thon, dando inicio en enero del 2016, visitando www.mindresearch.org/gameathon.



Check out the Game-a-thon website for information and to view this year's Game Design entries: mindresearch.org/gameathon



See page 45 for Game-a-Thon Starter Kit activity to keep the fun going at home!

Hop To It! - Grades 5 and Above



Students have seen 100s boards before, but rarely ever in shuffled order. The Hop To It! activity encourages students to think more deeply about the properties of numbers. Far from being a trivial pursuit, the study of numbers (Number Theory) is one of the most iconic and important research fields in mathematics. The great mathematician Carl Gauss said this, "Mathematics is the queen of the sciences, and number theory is the queen of mathematics."

Los estudiantes han visto muchas tablas de juegos antes, pero rara vez en orden alterada. La actividad de El Salto a él! Anima a los estudiantes a pensar profundamente acerca de las propiedades de los números. Lejos de ser una actividad trivial, el estudio de los números (Teoría de Números) es uno de los campos de investigación más emblemáticos e importantes de las matemáticas. El gran matemático Carl Gauss dijo esto: "La matemática es la reina de las ciencias, y la teoría de números es la reina de las matemáticas."



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JiJi Believer - All Ages



Prepare to unleash your inner rockstar! Each year, classrooms showcase their awesome learning culture by participating in the JiJi Believer Video Challenge. JiJi, the math-motivating penguin featured in the ST Math instructional games, is loved by students across the nation. JiJi means many things to many people: a guide, a friend, someone to help overcome obstacles. This annual competition gives students the opportunity to celebrate their success with ST Math and everything they've accomplished with JiJi the penguin by their side. Come and watch this year's championship music videos at the available kiosks and find out how your ST Math classroom can enter a video for next year's competition.

Prepárese para dar rienda suelta a la estrella de rock que lleva dentro! Cada año, clases muestran su cultura increíble de aprendizaje al participar en el concurso de video JiJi Believer. JiJi, el pingüino motivador de matemáticas que aparece en los juegos de instrucción ST Math, es amado por los estudiantes de todo el país. JiJi significa muchas cosas para las personas: una guía, un amigo, alguien que le ayude a superar los obstáculos. Este concurso anual da a los estudiantes la oportunidad de celebrar su éxito con ST Math y todo lo que han logrado con JiJi el pingüino a su lado. Ven y mira videos del campeonato de este año en los quioscos disponibles y descubra cómo su clase ST Math puede entrar en un video para la competencia del próximo año.



Check out the JiJi Believer website for information and to view this year's winners:
www.mindresearch.org/jijibeliever

JiJi's Jamboree - All Ages



In JiJi's Jamboree, youth play in an interactive and immersive virtual environment with the ST Math challenge game "Ice Caves" and experiment with lines of symmetry to solve complex puzzles. The arcade-style interaction allows for a multi-player experience, and gives the feeling of being "inside the game." This experience is further enhanced by Ice Caves game play on tablet computers. For families who want the opportunity to bring home some of the goods featured at the Math Fair, the JiJi Store in this experience space will have these items for purchase.

En el Jamboree de JiJi, los jóvenes juegan en un ambiente virtual interactivo e inmersivo con el juego estimulante de ST Math "Ice Caves" (Cuevas de hielo) y experimentan con líneas de simetría para resolver rompecabezas complejos. El estilo interactivo de maquinitas permite una experiencia para varios jugadores, y da el sentimiento de estar "dentro del juego". Esta experiencia es mejorada aún más con el juego "Ice Caves" (Cuevas de hielo), jugado en tabletas. Para las familias que quieren la oportunidad de traer a casa algunas de las cosas que están en la Feria de Matemáticas, que incluyen copias de las películas "Flatland" y libros y artículos conmemorativos de la Feria de Matemáticas, la Tienda de JiJi en este espacio de exhibición tendrá a la venta estos artículos.

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LazerBox - Grades 3 and Above



LazerBox brings MIND Research's 2D ST Math software game, Kickbox, to a 3D, live experience and creates a variety of challenge levels for many people to play simultaneously. The use of lasers and mirrors build an appreciation for lines of symmetry and angles and triangles. Through manipulating the line of travel for lasers, players predict how the laser path will reflect from mirrors to create angles, and parallel and perpendicular lines to hit targets. Players optimize and limit guessing and iterations to defeat competitors in timed challenges.

LazerBox trae el juego de computadora bidimensional de MIND Research, ST Math, Kickbox, a una experiencia tridimensional en vivo, y crea una variedad de niveles estimulantes para que mucha gente juegue simultáneamente. El uso de láseres y espejos brindan un aprecio por las líneas de simetría, los ángulos y triángulos. Al manipular la línea de desplazamiento de los láseres, los jugadores predicen cómo se reflejará el haz del láser de los espejos para crear ángulos, y líneas paralelas y perpendiculares para dar en blancos. Los jugadores optimizan y limitan el adivinar e iteraciones para derrotar a sus competidores en desafíos cronometrados.



Download the free Kickbox game app on iTunes to play on the iPad



Lil' Mathematicians Zone - 5 years and Younger



This exhibit is designed to provide engaging and accessible play-based learning experiences to children ages five and under, where they feel safe and comfortable exploring various math concepts, including geometry, number sense, and algebra. Children engage in open-ended exploration and discovery of these concepts with facilitation and guidance from early childhood education mentors. By incorporating age-appropriate, stimulating activities that promote children's abilities and interests, the Zone provides flexible environments that inspire active communication and encourage investigation and questions. The exhibit also creates a venue that fosters collaboration, where children work together and learn from each other.

As children work in the Lil' Mathematicians Zone, they develop key math concepts and skills, including recognizing and naming written numerals; counting using one-to-one correspondence; sorting and classifying objects by attributes; comparing objects by length, weight and other measurements; identifying, comparing and analyzing a variety of shapes, including three-dimensional shapes; combining different shapes to create a design; identifying positions of objects in space; and applying simple mathematical strategies to solve problems.

In addition to the domains of mathematics learning, children also build crucial skills in other

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complementary aspects of their overall development, including language development and literacy skills, gross and fine motor skills, as well as social skills. By integrating learning across different domains, a child's learning experience and growth are enriched. This exhibit also aims to promote parent awareness that math is everywhere, even at home. By actively participating in their children's exploration time at the exhibit, parents are exposed to the many ways which they can support, enhance and extend their children's learning so that their children are successful in their future mathematical endeavors.

"Esta exhibición está diseñada para brindar experiencias de aprendizaje atractivas y accesibles, basadas en juegos, a niños de hasta cinco años de edad, donde se sienten seguros y a gusto explorando diferentes conceptos matemáticos que incluyen geometría, sentido de los números y álgebra. Los niños participan en una exploración abierta y descubrimiento de estos conceptos con facilitación y guía de mentores de educación infantil temprana. Al incorporar actividades estimulantes y adecuadas a su edad que fomentan las habilidades e intereses de los niños, la Zona provee ambientes flexibles que inspiran la comunicación activa, y fomentan la investigación y las preguntas. La exhibición también crea un lugar que fomenta la colaboración, donde los niños colaboran y aprenden los unos de los otros.

Cuando los niños trabajan en la Zona de matematiquitos, forjan conceptos y aptitudes matemáticas clave, que incluyen reconocer y nombrar números escritos; contar usando una correspondencia exacta; ordenar y clasificar objetos por atributos; comparar objetos por longitud, peso y otras medidas; identificar, comparar y analizar una variedad de figuras, que incluyen figuras tridimensionales; combinar diferentes figuras para crear un diseño; identificar posiciones de objetos en el espacio; y aplicar estrategias matemáticas simples para resolver problemas.

Además de los dominios del aprendizaje de las matemáticas, los niños también forjan aptitudes cruciales en otros aspectos complementarios de su desarrollo general, que incluye desarrollo del lenguaje y aptitudes de alfabetización, aptitudes motrices gruesas y finas, al igual que aptitudes sociales. Al integrar el aprendizaje entre diferentes dominios, se enriquece la experiencia de aprendizaje y el crecimiento de un niño. Esta exhibición también busca promover la consciencia en los padres de que las matemáticas están por doquier, aun en la casa. Al participar activamente en el tiempo de exploración de sus hijos en la exhibición, los padres son expuestos a las muchas maneras en que pueden apoyar, mejorar y ampliar el aprendizaje de sus hijos para que sus hijos sean exitosos en sus proyectos matemáticos futuros."



Check out the Math Fair resources page for more Lil' Mathematician activities



See page 28-35 for Lil' Mathematician activities to keep the fun going at home!

Locked Up - Grades 3 and Above



Blue lines denote a handicap parking spot and green ones denote 20-minute parking. But, in geometry we just study lines and not their colors. Geometry doesn't worry about the color of an object, it instead classifies by lengths and curvature. But, geometry doesn't look at all aspects. Is an object twisted? How many times does it cross over itself? How many holes does an object have? Are two locations next to each other? These are all questions asked outside of traditional geometry, but within graph theory, knot

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theory, and topology.

You've probably already used topology without even realizing it. Transit maps like the one below rely on mathematical topology. The map is not geographically exact – the train doesn't travel in a perfectly straight line and the stops are not exactly the same distance apart in real life. But, that's OK because we aren't worried about distances or curvature; we are just interested in knowing the next stop. These two maps are topologically equivalent - you can maneuver the transit system successfully with either one.

Escape from everyday geometry to explore topology and knot theory. Search for a structure that may not seem apparent or traditional to create or undo the various links. It's all about links locking you together, but not as completely as you expect.



Topological Map



Topological Map & Geographical Map

Cuando de manejar se trata las líneas azules indican un lugar de estacionamiento para discapacitados y las verdes estacionamiento de 20 minutos. Pero, en la geometría estudiamos las líneas y no sus colores. El estudio de geometría no nos preocupamos por el color de un objeto, si no por lo largo y las curvas. Pero, la geometría no se fija en todos los aspectos. Se tuerce un objeto? ¿Cuántas veces se cruza sobre sí misma? ¿Cuántos agujeros tiene un objeto? Son dos lugares al lado del otro? Estas son todas las preguntas fuera de la geometría tradicional, pero dentro de varias teorías.

Usted probablemente ha utilizado topología sin siquiera darse cuenta. Mapas de tránsito como el que a continuación se basan en la topología matemática. El mapa no es geográficamente exacta - el tren no viaja en una línea perfectamente recta y las paradas no son exactamente la misma distancia en la vida real. Pero, eso está bien, porque no estamos preocupados por distancias o curvatura; estamos simplemente interesados en conocer la próxima parada. Estos dos mapas son equivalentes topológicamente - se puede maniobrar el sistema de tránsito con éxito con cualquiera de ellos.

Escape de la geometría diaria para explorar la topología y teoría de nudos. Busque de una estructura que no puede parecer aparente o tradicional para crear o deshacer los diversos enlaces. Todo es cuestión de enlaces que bloqueo juntos, pero no tan completamente como usted espera.



See page 27 for Locked Up activity to keep the fun going at home!



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Math Midway 2 Go - All Ages



In cooperation with the Museum of Mathematics in New York, MIND Research presents this traveling exhibit that consists of six separate activity stations with the titles “Funny Face,” “Ring of Fire,” “Numberline Tightrope,” “Miles of Tiles,” “Roller Graphicoaster,” and “Organ Function Grinder.” At each station, youth learn about the different terms in mathematical functions, tessellation patterns, the number line, 2D projections in solids, graphing solid surfaces, and the real world reasons to create and analyze complex curves. For example, the “Ring of Fire” exhibit helps youth to connect two- and three-dimensional geometry by illuminating the polygons hidden within a polyhedron’s cross section. Youth predict and describe the different and often surprising shapes they can find within various translucent solid models. The “Numberline Tightrope” provides opportunities to explore families of numbers, positive and negative and integers, patterns and much more.

En cooperación con el Museo de Matemáticas, MIND Research presenta esta exhibición itinerante que consiste de seis estaciones por separado con los títulos “Cara graciosa,” “Anillo de fuego,” “Cuerda floja de línea numérica,” “Millas de Azulejos,” “Montaña Gráfica,” y “Molino de Funciones.” En cada estación, los jóvenes aprenden acerca de los diferentes términos en funciones matemáticas, patrones de teselación, la línea numérica, proyecciones 2D en sólidos, gráficas de superficies sólidas y las razones de la vida real para crear y analizar curvas complejas. Por ejemplo, la exhibición “Anillo de fuego” ayuda a los jóvenes a conectar geometría bidimensional y tridimensional al iluminar los polígonos escondidos dentro de la sección transversal de un poliedro. Los jóvenes predicen y describen las diferentes y, a menudo, sorprendentes figuras que encuentran dentro de los diferentes modelos sólidos translúcidos. La “Cuerda floja de línea numérica” brinda la oportunidad de explorar familias de números, enteros positivos y negativos, patrones y mucho más.



Check out our Lesson plans for MM2Go via the Math Fair resources page.

Math Mystery Theatre - All Ages



The Math Mystery Theater’s talented performers will transport you to the Candy Counter where Dum Dum and the Candy Maker will delight, entertain and educate children and parents alike. Gumballs galore coupled with hilarious foibles and follies will engage the audience as they actively participate in solving mystery equations with state-of-the-art interactive technology developed by MIND Research Institute.

Sponsored by



Using virtual classroom technology on tablet computers situated throughout the theater, young audience members interact with the on-stage action, helping the Candy Maker and Dum Dum solve a sticky situation involving estimation, arithmetic, and logic with even and odd numbers. The action takes place in a colorful candy laboratory and includes an Alien Laser Ray!

MATH FAIR EXPERIENCES

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Los talentosos actores de esta obra teatral los transportaran al Contador de Dulces donde Dum Dum y el Dulcero “Candy Maker” les deleitaran y educaran a estudiantes y a padres por igual. Bolitas de chicles a montones con debilidades hilarantes y locuras se acoplará a la audiencia, ya que participan activamente en solucionar problemas matemáticos utilizando tecnología interactiva diseñada por MIND Research Institute.

Utilizando la tecnología virtual de clases en tabletas situadas en todo el teatro, los jóvenes miembros de la audiencia interactúan con la acción en el escenario, lo que ayuda al Dulcero y a Dum Dum a resolver una situación difícil que implica la estimación, la aritmética y la lógica con números pares y nones. La acción tiene lugar en un laboratorio caramelo colorido e incluye un rayo láser de Extraterrestres.



See page 25-26 for Math Mystery Theatre activity to keep the fun going at home!

Math Solution Stations - Grades K and Above



Youth play ST Math games on tablet computers in an age-appropriate, collaborative workspace, use touch computers to solve problems together, and model math problems with digital math manipulatives. All problem-solving activities contribute toward the overall Math Fair experience. The math challenges include specially chosen puzzles from the ST Math classroom objectives for either grades K-3 or 4-8. (Pre-kindergarten and kindergarten children are served with ST Math puzzles in the Lil’ Mathematician’s Zone.)

Additionally, more complex problems require the participation of several youth, using digital and math manipulative resources on a touch table, and facilitated by a math coach who is present in the station. This think-tank environment encourages collaborating with peers to solve complex math problems, and utilizing skills learned at different exhibits.

Los jóvenes están en un espacio colaborativo adecuado a sus edades para jugar los juegos de ST Math en tabletas, usan computadoras táctiles para resolver problemas juntos y modelan problemas de matemáticas con manipulativos de matemáticas digitales. Todas las actividades de resolución de problemas contribuyen a la experiencia general de la Feria de Matemáticas. Los retos de matemáticas incluyen rompecabezas selectos de los objetivos del salón de ST Math para los grados K-3 o 4-8. (Los niños de pre-kínder y de kínder estarán con los rompecabezas de ST Math en la Zona de matematiqitos.)

Además, los problemas más complejos requieren la participación de varios jóvenes en una zona, usando recursos digitales y manipulativos de matemáticas en una mesa táctil, y facilitados por un coach de matemáticas que está presente en la zona. Este ambiente de reflexión alienta la colaboración con compañeros para resolver problemas de matemáticas complejos, y utilizando aptitudes aprendidas en diferentes exhibiciones.



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See page 37-38 for Math Solution Station activity to keep the fun going at home!

Roots of Math - All Ages



This visually engaging, interactive experience profiles the lives of mathematicians from the past five hundred years. It provides inspiration to learn and do math at higher levels by learning about the accomplishments of mathematicians, and seeing the value those discoveries have produced for modern society. Visitors read and interpret timelines and narratives from iPad apps such as “The Minds of Modern Mathematics” and realize that math concepts that were developed long ago are still in common use today.

Esta exhibición interactiva con atractivo visual presenta las vidas de matemáticos de los últimos quinientos años. Presenta inspiración para aprender y hacer matemáticas a niveles más elevados, al aprender acerca de los logros de matemáticos, y ver el valor que esos descubrimientos han producido para la sociedad moderna. Los alumnos leen e interpretan líneas de tiempo y narrativas de aplicaciones de iPad como “The Minds of Modern Mathematics” (Las mentes de la matemática moderna) y se dan cuenta de que los conceptos matemáticos que fueron desarrollados hace mucho siguen siendo usados comúnmente hoy en día.



- View the Biographies of Women Mathematicians, Agnes Scott College
- Download the free IBM Minds of Modern Mathematics iPad Application

South of the Sahara: Origins of Mathematics - All Ages



Transport yourself across time and space to Africa, South of the Sahara, to experience the origins of mathematics. Revisit history through a new perspective and find out how math was a strong fabric of everyday life through the arts, architecture, games, weaving and more! Play ancient brain-building games and discover how ancient cultural practices inspired the modern day computer!

Transpórtate a través del tiempo hacia África, al sur del Sahara a vivir los orígenes de matemáticas. Revive la historia a través de una perspectiva nueva y averigua como las matemáticas eran una fuente fuerte de la vida cotidiana a través de las artes, arquitectura, juegos, tejido y mucho más. Juega rompecabezas antiguos y descubre como la cultura antepasada es fuente de inspiración de la computadora actual.



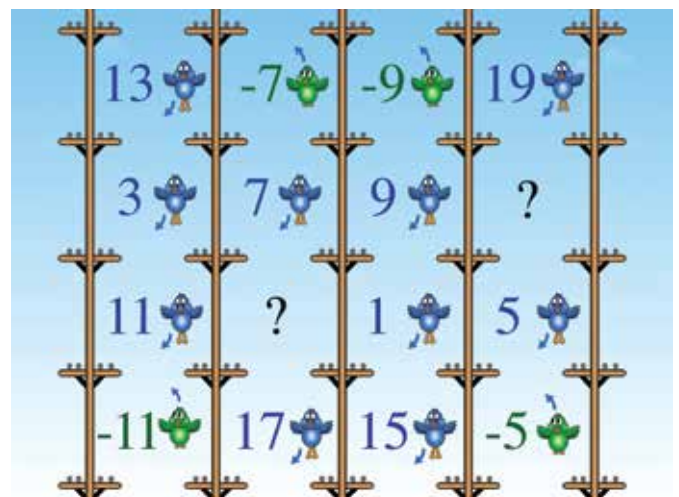
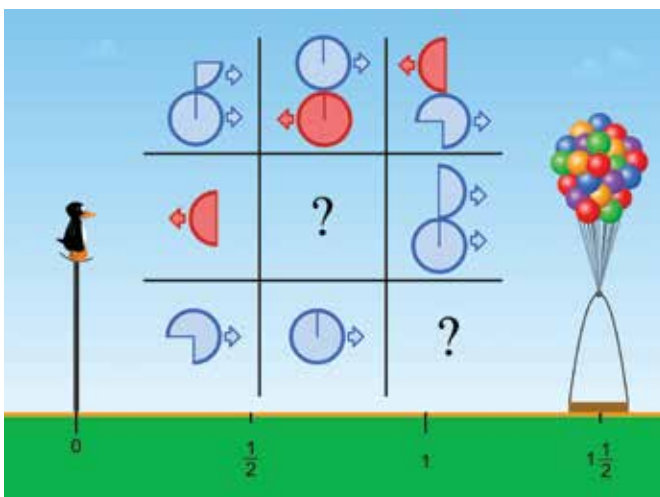
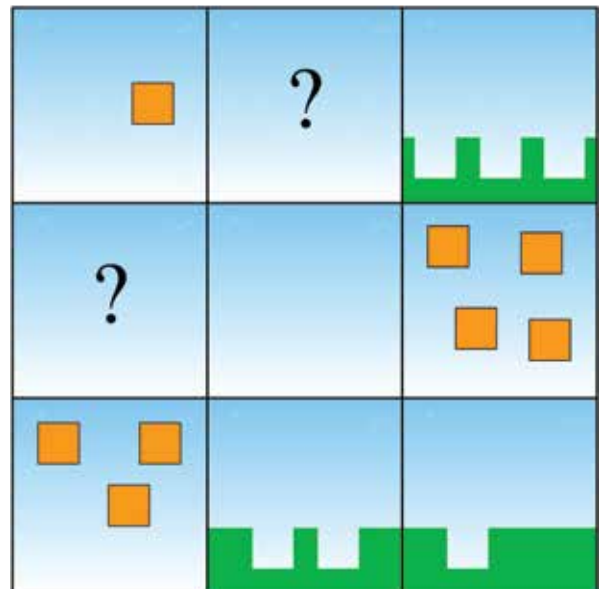
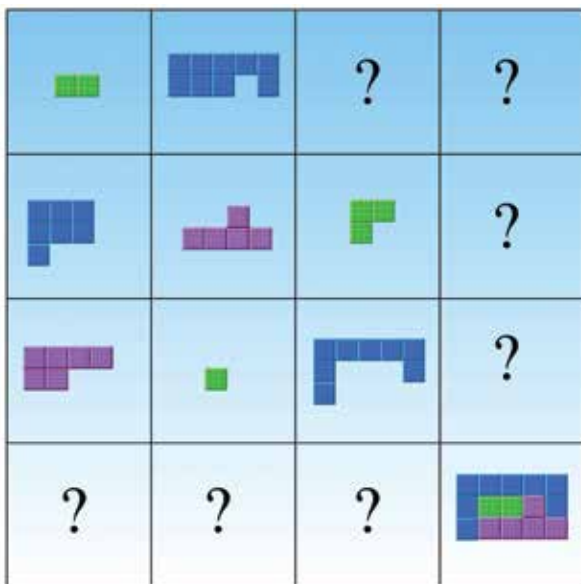
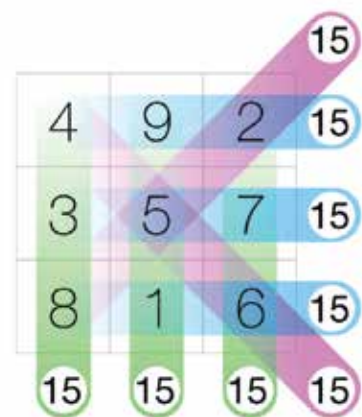
See page 39-43 for South of the Sahara activities to keep the fun going at home!

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MATH ACTIVITIES FOR HOME

MAGIC SQUARES

A magic square is an arrangement of distinct numbers (each number is used once) in a square grid, where the numbers in each row, column, and main diagonals all add up to the same number.



For answers, visit www.mindresearch.org/mathfair/resources.

MATH ACTIVITIES FOR HOME

MATH MYSTERY THEATER: RIDDLES

LOGIC PUZZLE

Dum Dum is trying to follow the Candy Maker's newest recipe for gumballs, but the Candy Maker's directions are a little confusing. There are five ingredients that Dum Dum must put in the pot in the correct order or the recipe could be ruined:

Fruity Flavor is $\frac{1}{2}$ the volume of the pot
Gummy Goop is $\frac{1}{3}$ the volume of the pot
Hyacinth Honey is $\frac{1}{4}$ the volume of the pot
Jolly Juice is $\frac{1}{5}$ the volume of the pot
Kiwi Kicker is $\frac{1}{6}$ the volume of the pot



Gumball Recipe

Add the ingredients in the following order:

1. The 2nd and 3rd ingredients added together are less than half of the volume of the pot.
2. The Gummy Goop is added after the Jolly Juice but before the Fruity Flavor
3. The Hyacinth Honey is added two places after the Kiwi Kicker.

Can you help Dum Dum figure out the recipe?

NUMBER SENSE



The Candy Maker bought 3 different size bags of Pluto Pops at the Intergalactic Candy Conference, but space customs wants to know exactly how many Pluto Pops in total are in the bags. Unfortunately, the labels on the bags use alien numbers! The Candy Maker knows that the 2 smaller bags add up to the same amount as the larger bag, and the Candy Maker can tell by looking that the smallest bag has at least 20 pops in it. The Candy Maker also knows that alien numbers are either all straight lines or all curvy lines depending on whether the number is even or odd, but the Candy Maker can't remember which is which!

By looking at the labels, can you help the Candy Maker figure out how many Pluto Pops he bought?

MEASUREMENT



The Candy Maker's new recipe for super stretchy saltwater taffy calls for exactly 4 cups of super stretchy syrup. But Dum Dum forgot to do the dishes, and the measuring cups are all dirty! Dum Dum has a 3-cup measure and a 5-cup measure, but not a 4-cup measure. If the amount of syrup is off by even a little bit, the taffy won't be stretchy and the Candy Maker will be extremely disappointed.

Can you figure out how Dum Dum can get exactly 4 cups of syrup using only the 3-cup and 5-cup measures?

WEIGHT



The Candy Maker insists that all of the jars weigh the same amount, but one of the jars in the new shipment weighs too much! Dum Dum has to figure out which jar is too heavy using the balance scale in the laboratory. But there are 9 jars and there's only enough time to weigh things twice before the Candy Store opens.

Can you help Dum Dum figure out which of the 9 jars is too heavy using the scales only twice?

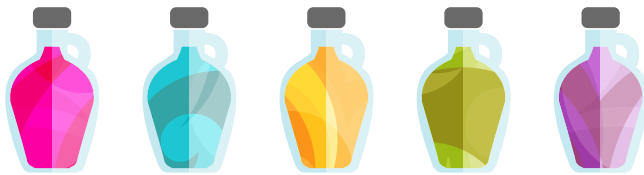
MATH ACTIVITIES FOR HOME

MATH MYSTERY THEATER: ANSWERS

LOGIC PUZZLE

ANSWER: Neither the Fruity Flavor or Gummy Goop can be added second or third, since those two ingredients must fill less than half the pot (step 1). The Gummy Goop can't be added first since it comes after the Jolly Juice, and it can't be added last since it comes before the Fruity Flavor. That means the Gummy Goop is added fourth (step 2). Fruity Flavor is added last since that's the only spot after the Gummy Goop. Finally the Hyacinth Honey must be added third in order to be two places after the Kiwi Kicker, which is added first (step 3). By process of elimination, the Jolly Juice is second. Unfortunately $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6}$ is greater than 1...the pot overflowed and the recipe was ruined anyway! Poor Dum Dum!

1. Kiwi Kicker
2. Jolly Juice
3. Hyacinth Honey
4. Gummy Goop
5. Fruity Flavor



NUMBER SENSE



ANSWER: Even though the Candy Maker can't remember if straight lines or curvy lines are odd or even, he can figure it out by looking at the labels. Both of the smaller bags have straight-line numbers, but the bigger bag has curvy lines. That means the straight lines must be the odd numbers because an odd plus an odd makes an even number (or in this case, straight lines plus straight lines make curvy lines!), while an even plus an even would still be even. He can also tell that the two numbers on each bag are the same number, and that when he adds the two smaller numbers together he still gets a two-digit number. That means the smaller bag could be either 11 or 33, or adding it to the middle bag would make a 3-digit number on the biggest bag. And since the Candy Maker can tell by looking that the smallest bag has more than 11 Pluto Pops, that leaves only 33. The only number that works for the middle bag is 55, which means the biggest bag has 88 Pluto Pops. His total number of Pluto Pops is $33 + 55 + 88 = 176$.

MEASUREMENT



ANSWER: Dum Dum fills the 5-cup measure and pours it into the 3-cup measure, leaving 2-cups in the 5-cup measure. He empties the 3-cup and pours the 2 cups into the 3-cup measure. He then fills the 5-cup measure again and uses it to fill the 3-cup measure the rest of the way. This takes exactly 1 cup of syrup, leaving exactly 4 cups in the 5-cup measure.

WEIGHT

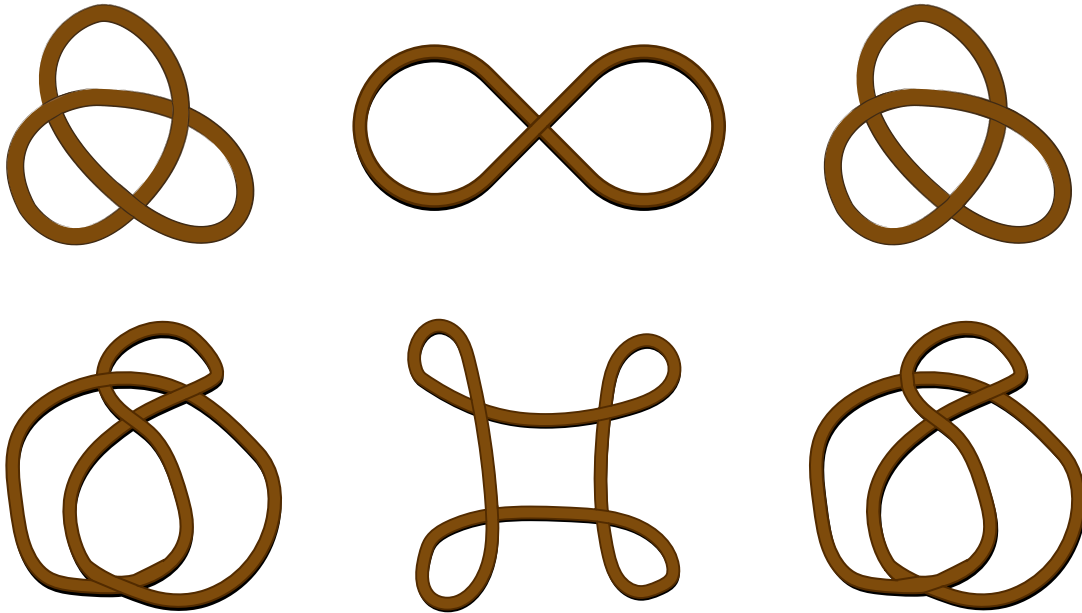


ANSWER: Divide the 9 jars into groups of 3. Weigh two groups. If one group is heavier, the heavy jar is in that group. If they balance, the heavy jar is in the third group. Now weigh two jars from the heavy group. If one is heavy it will tip the scales. If the scales balance, the third jar is the heavy one.

MATH ACTIVITIES FOR HOME

LOCKED UP

Knot or not? Find all the unknots (not knots) - the ones that can be untwisted to just be a plain loop.

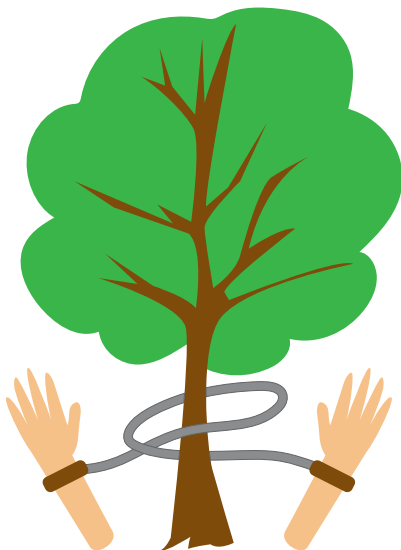


If you played Untangled, see if you can undo the following tangles.
Use **D** for the move "Duck Duck Goose" and **M** for "Merry-Go-Round."
What sequence of moves undoes

• **DDMDMD**

• **DDMMMDD**

• **DMMMMM**



Imagine that you are in the handcuffs and locked around the tree. Like in Cuff-linked, can you get free from the tree without removing the handcuffs?

MATH ACTIVITIES FOR HOME

LIL' MATHEMATICIANS ZONE: ACTIVITY 1

This activity develops and reinforces children's number sense skills, including numeral recognition and one-to-one correspondence skills. Children build their understanding of shape characteristics and properties by putting together different shapes to make new shapes. In addition, it helps children learn letter formation and develop other important skills such as problem-solving skills, fine motor skills and artistic skills.

INSTRUCTIONS

Color By Number & Quantity

Have your child identify and match the corresponding quantity of "stars" to its numeral and color combination to fill in JiJi and make JiJi come alive! Have him/her trace the dashed lines to learn the basic form of each numeral and letter.

Jigsaw JiJi

Once JiJi is colored in, cut along the dashed lines to get 8 different parts of JiJi (2 eyes, 1 beak, 2 flippers, 2 feet, 1 body). Now, work with your child to try to put JiJi back together again!

Esta actividad desarrolla y refuerza las aptitudes de sentido de los números de los niños, que incluyen reconocimiento de los números y correspondencia uno a uno. Los niños forman su comprensión de las características y propiedades de las figuras al unir diferentes figuras para formar nuevas figuras. Además, ayuda a los niños a aprender a formar letras y desarrollar otras aptitudes importantes, como resolución de problemas, aptitudes motrices finas y aptitudes artísticas.

INSTRUCCIONES

Colorear por colores y cantidad

Pida a su hijo/a que identifique y relacione la cantidad correspondiente de "estrellas" con su combinación de número y color para colorear a JiJi y ¡hacer que JiJi cobre vida! Pídale que trace las líneas punteadas para que aprenda la forma básica de cada número y letra.

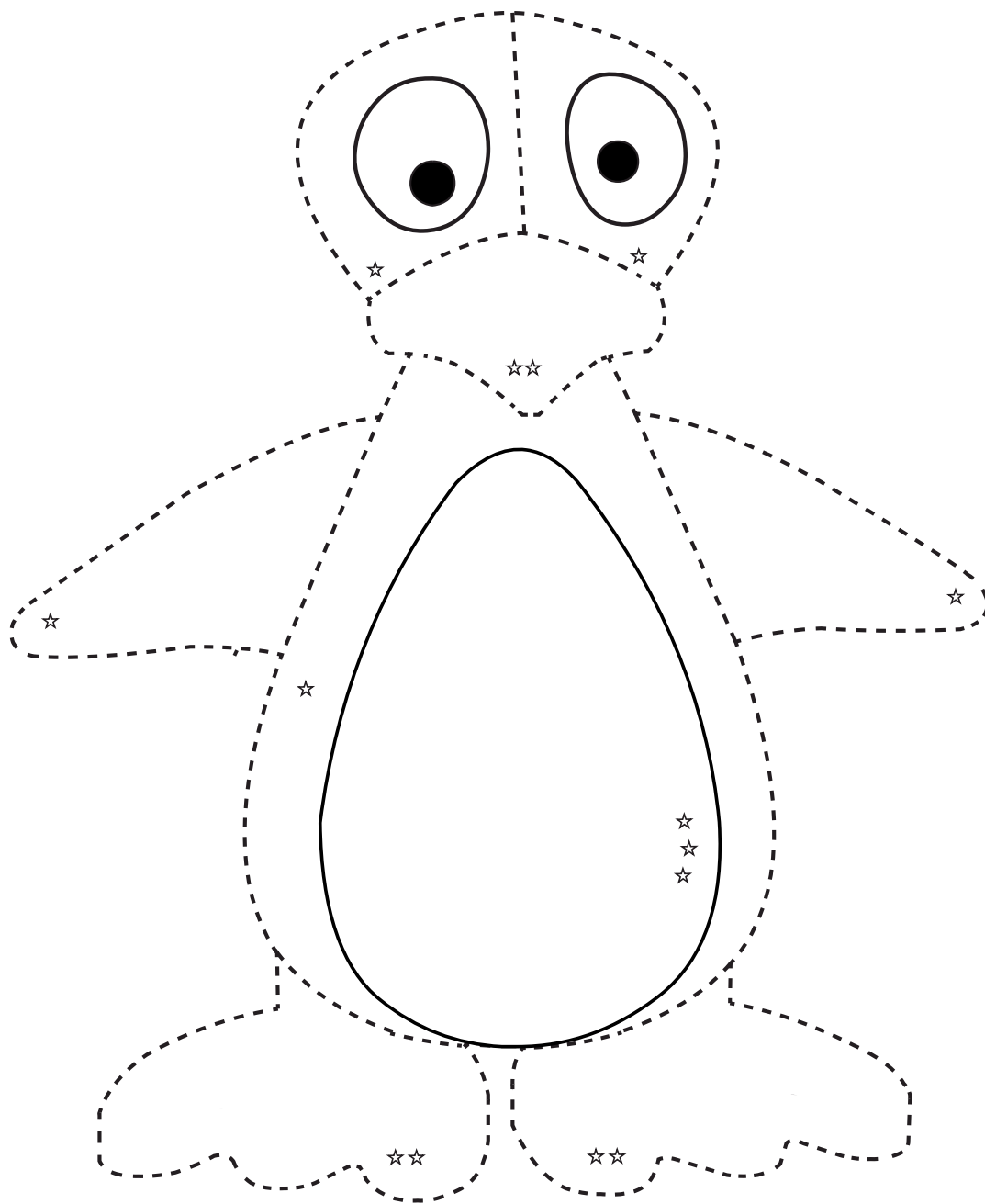
Rompecabezas JiJi

Una vez que se colorea a JiJi, recorte por las líneas punteadas para obtener 8 partes diferentes de JiJi (2 ojos, 1 pico, 2 aletas, 2 patas, 1 cuerpo). Ahora, ¡trabaje con su hijo/a para formar de nuevo a JiJi!



MATH ACTIVITIES FOR HOME

LIL' MATHEMATICIANS ZONE: ACTIVITY 1



1 black

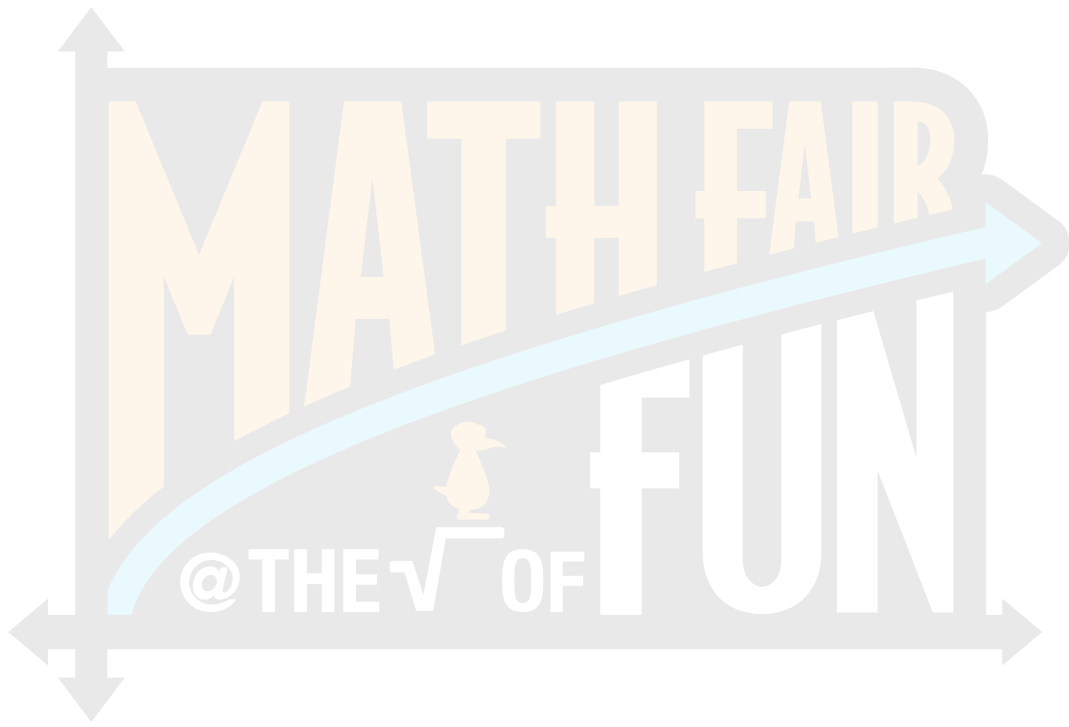
2 orange

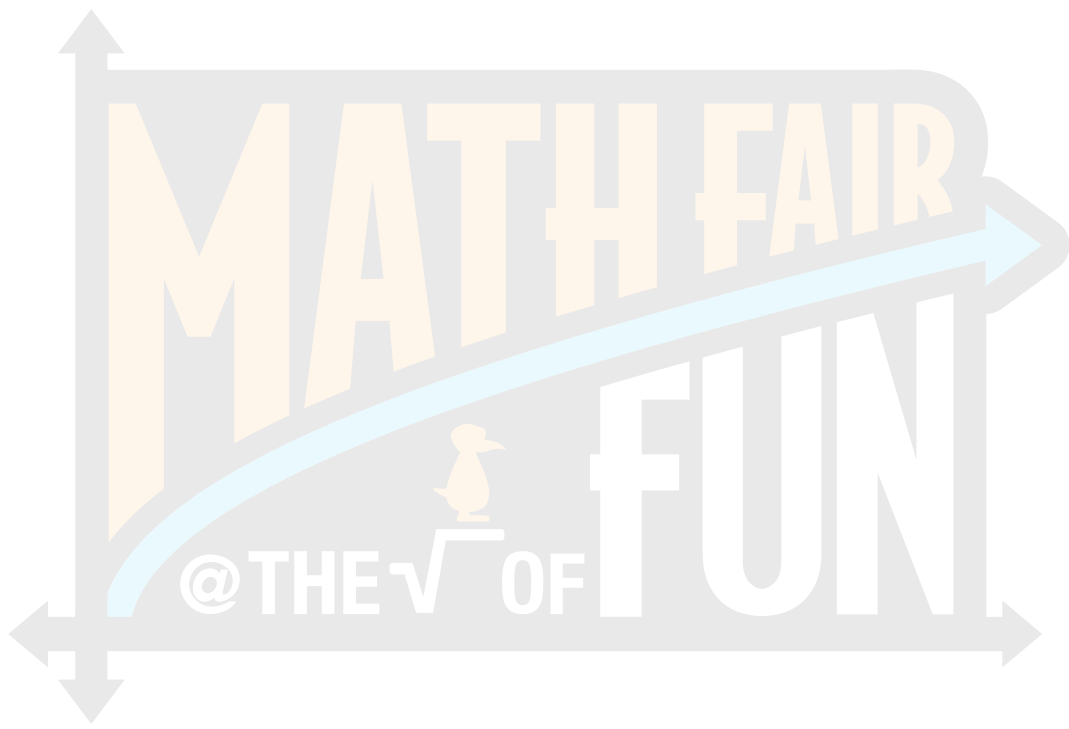
3 white

1 negro

2 naranja

3 blanco







MATH ACTIVITIES FOR HOME

LIL' MATHEMATICIANS ZONE: ACTIVITY 2



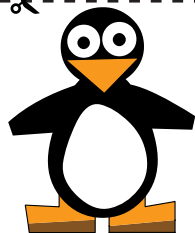


1 

2 

3 

4 



MATH ACTIVITIES FOR HOME

LIL' MATHEMATICIANS ZONE: ACTIVITY 2

This activity helps develop children's understanding of straight and orthogonal lines (lines that interact at 90 degree angle), and their ability to interpret information on a grid.

INSTRUCTIONS

Where's JiJi?

- Cut the dashed lines along both axes to create slits. In addition, cut the attached JiJi top and JiJi bottom strips and the JiJi card.
- Insert the JiJi top strip through any slit along the vertical axis (with pictures) and JiJi bottom strip through another slit along the horizontal axis (with numerals). Ignore the labels on the axes for now.
- Have your child place the JiJi card on the square where the JiJi top and JiJi bottom will meet. Allow him/her to move the strips to explore how they work, but make sure each strip is always moving in a straight line. When the JiJi top and JiJi bottom meet (intersect at a 90 degree angle), tell your child that JiJi has been found!
- Insert the strips through other slit combinations and have your child place the JiJi card on the square where JiJi is. Allow him/her to manipulate the strips to test out the answer.
- Now, incorporate the labels on both axes - real-life objects on the vertical axis and the numerals on the horizontal axis. For example, insert both strips through respective slits and ask, "JiJi went to buy two wheels for JiJi's bicycle. Can you place the JiJi card on the square where you think JiJi is?" To accomplish this task, your child will need to find the square where the wheel and numeral 2 intersect. Be creative with the scenarios.

Esta actividad ayuda a desarrollar la comprensión de los niños sobre líneas rectas y ortogonales (líneas que interactúan en ángulos de 90 grados), y su habilidad para interpretar información en una tabla.

INSTRUCCIONES

¿Dónde está JiJi?

- Recorte por las líneas punteadas por ambos ejes para crear aberturas. Luego recorte las tiras adjuntas de la mitad de arriba de JiJi y la mitad de abajo de JiJi y la tarjeta de JiJi.
- Inserte la tira de arriba de JiJi por cualquier abertura del eje vertical (con imágenes) y la tira de abajo de JiJi por otra abertura del eje horizontal (con números). Ignore las etiquetas de los ejes por ahora.
- Pida a su hijo/a que coloque la tarjeta de JiJi en el cuadro donde se encontrarán la mitad de arriba de JiJi y la mitad de abajo de JiJi. Permítale mover las tiras para explorar cómo funcionan, pero asegúrese de que cada tira se mueva siempre en línea recta. Cuando se encuentren JiJi de arriba y JiJi de abajo (intersección en ángulo de 90 grados), ¡dígame a su hijo/a que se ha encontrado a JiJi!
- Inserte las tiras en otras combinaciones de aberturas y pida a su hijo/a que coloque la tarjeta de JiJi en el cuadro donde está JiJi. Permítale que manipule las tiras para probar la respuesta.
- Ahora, incorpore las etiquetas en ambos ejes: objetos de la vida real en el eje vertical y los números en el eje horizontal. Por ejemplo, inserte ambas tiras por sus aberturas respectivas y pregunte: "JiJi fue a comprar dos llantas para su bicicleta. ¿Puedes colocar la tarjeta de JiJi en el cuadro donde piensas que está JiJi?" Para lograr esta tarea, su hijo/a necesitará encontrar el cuadro donde intersectan la llanta y el número 2. Sean creativos con las situaciones.

MATH ACTIVITIES FOR HOME

LIL' MATHEMATICIANS ZONE: Measuring with Bugs! / Midiendo con Bichos

This activity helps familiarize children with various measurement concepts. Children learn to identify length as one of the measurable attributes of line segments and shapes, and they understand that length can be measured with nonstandard units, e.g., same-sized paperclips, arranged end to end.

INSTRUCTIONS

- ① Cut out the ladybug ruler and the caterpillar ruler and use them to practice measuring!
- ② Measure each line segment in ladybugs and in caterpillars and record each answer in the box.
- ③ Color in a triangle that has a side of length **2** .
- ④ Color in a rectangle that has a side of length **3**  and a side of length **2** .

Esta actividad ayuda a familiarizar a los niños con diferentes conceptos de medición. Los niños aprenden a identificar longitud como uno de los atributos medibles de segmentos de líneas y formas. Ellos entienden que la longitud se puede medir con unidades no estándar, por ejemplo, clips del mismo tamaño, puestos uno tras otro.

INSTRUCCIONES

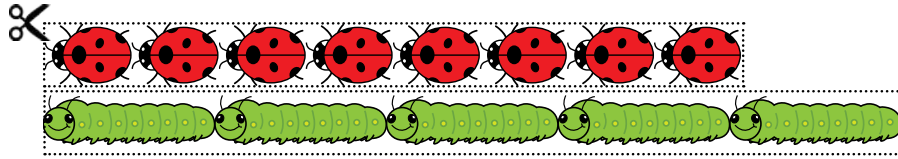
- ① ¡Corta la regla de mariquitas y la regla de orugas y utilízalos para practicar las medidas!
- ② Mide cada segmento de línea usando mariquitas y usando orugas y registra cada respuesta en el cuadro.
- ③ Colorea un triángulo que tiene un lado de longitud **2** .
- ④ Colorea un rectángulo que tiene un lado de longitud **3**  y un lado de longitud **2** .



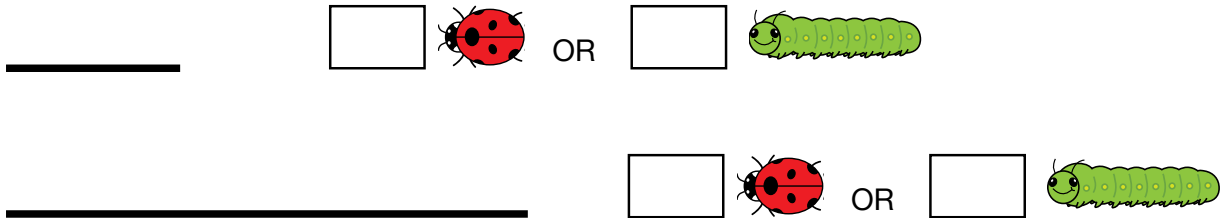
MATH ACTIVITIES FOR HOME

LIL' MATHEMATICIANS ZONE: Measuring with bugs! / Midiendo con Bichos

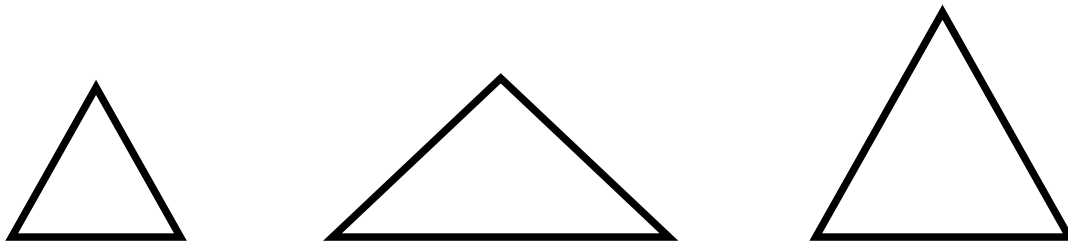
1



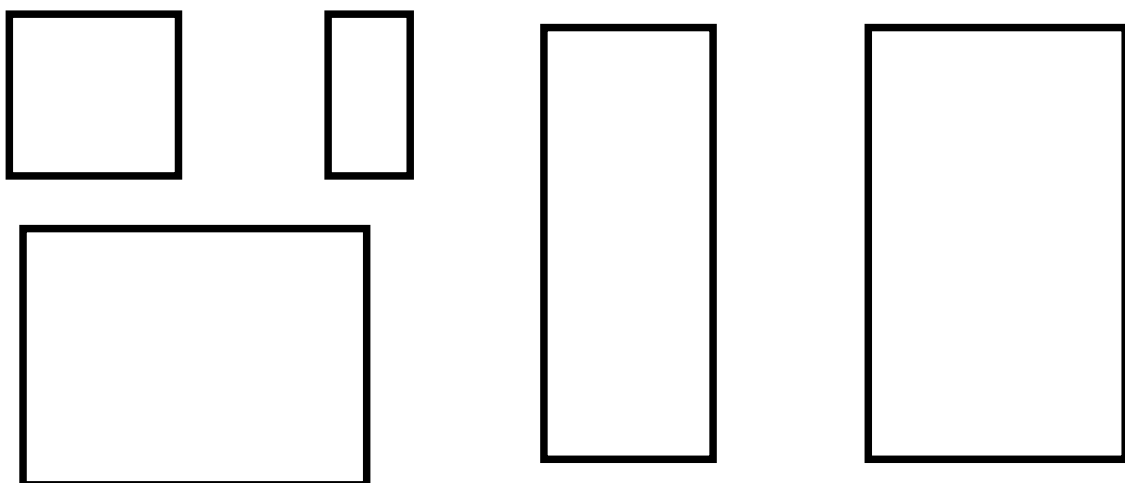
2

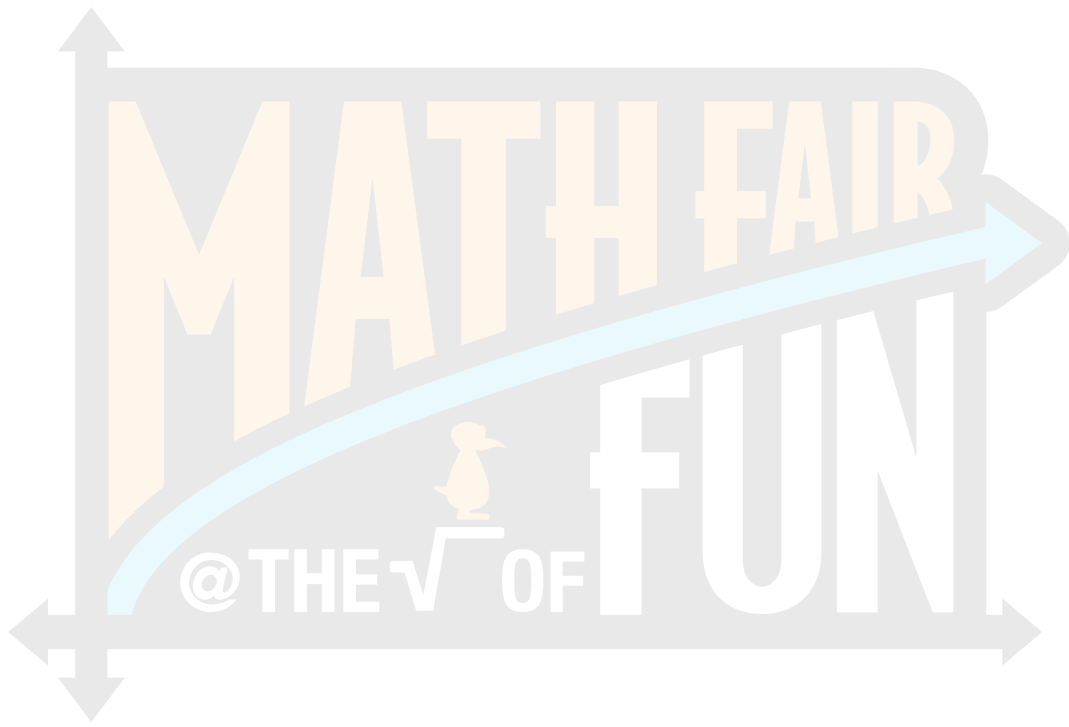


3



4





MATH ACTIVITIES FOR HOME

MATH SOLUTION STATION 1

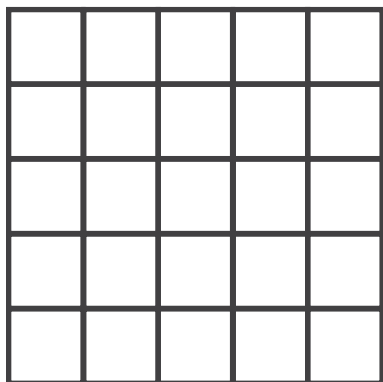
Using the digits 1, 2, 3, 4, 5, 6, 7, 8, 9 each exactly once, solve the multiplication problem.

$$\begin{array}{r}
 1 \square \square 36 \\
 \times \quad \quad 236 \\
 \hline
 \square 26 \square \square \\
 46308 \\
 + \square 08 \square \square \\
 \hline
 3642 \square 96
 \end{array}$$

For answers, visit www.mindresearch.org/mathfair/resources.

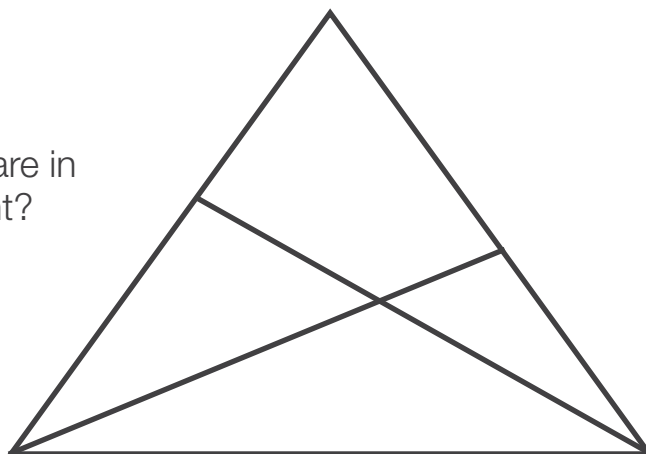
MATH ACTIVITIES FOR HOME

MATH SOLUTION STATION 2



How many squares are in the shape on the left? Each small box is a square.

How many triangles are in the shape on the right?



A Mobius strip is made by taking a long strip of paper and connecting the ends with a half-twist; turning it into a surface with only one boundary.

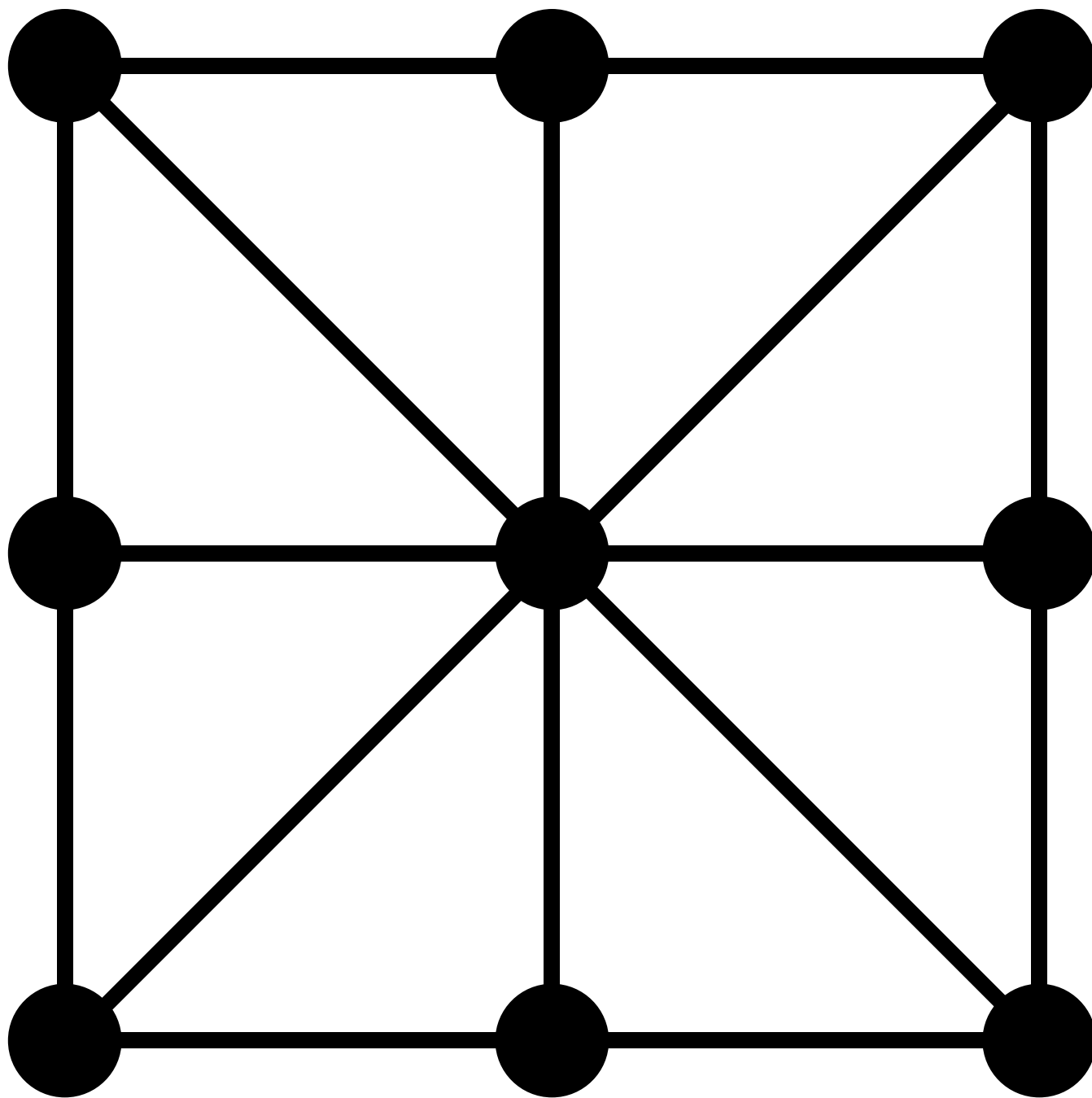
If you gave a strip of paper 2 half-twists, would it result in a surface with only one boundary or two ? How about if you gave it 3 half-twists?





MATH ACTIVITIES FOR HOME

SOUTH OF THE SAHARA: ACHI GAME BOARD



See page 43 for game rules.

MATH ACTIVITIES FOR HOME

SOUTH OF THE SAHARA: ACHI HISTORY & MATH QUESTIONS

Connect Three

Though Achi is a game played by the Asante people of Ghana, it may seem familiar to you because it's played similarly to tic-tac-toe. Like tic-tac-toe, the goal in Achi is to get three in a row; however, unlike tic-tac-toe, the game doesn't end in a tie if no one wins after placing all of the pieces on the board. Instead, players continue to move their pieces around the board until one player succeeds in getting three in a row.

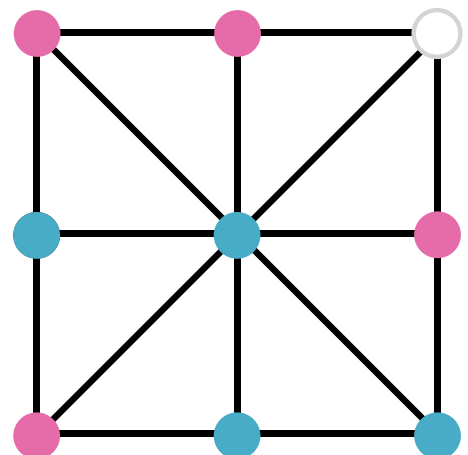
Asante children use light and dark colored stones and play on a simple 9-point board drawn on the ground, while older players may use a more elaborate board carved in wood.

Math is powered by axioms

Achi is structured to naturally lead to questions that can be resolved through logic and deduction. This act of asking and exploring questions that arise from the structure of a system inspired the ancient Greek mathematician Euclid to document the fundamental assumptions and structure of geometry in a list of "axioms." Euclid's work was so influential that he became known as the "Father of Geometry". His groundbreaking axiomatic method is still used in mathematical research today, more than two thousand years later.

View the image on the left and use the fundamental assumptions of Achi to tackle the following questions:

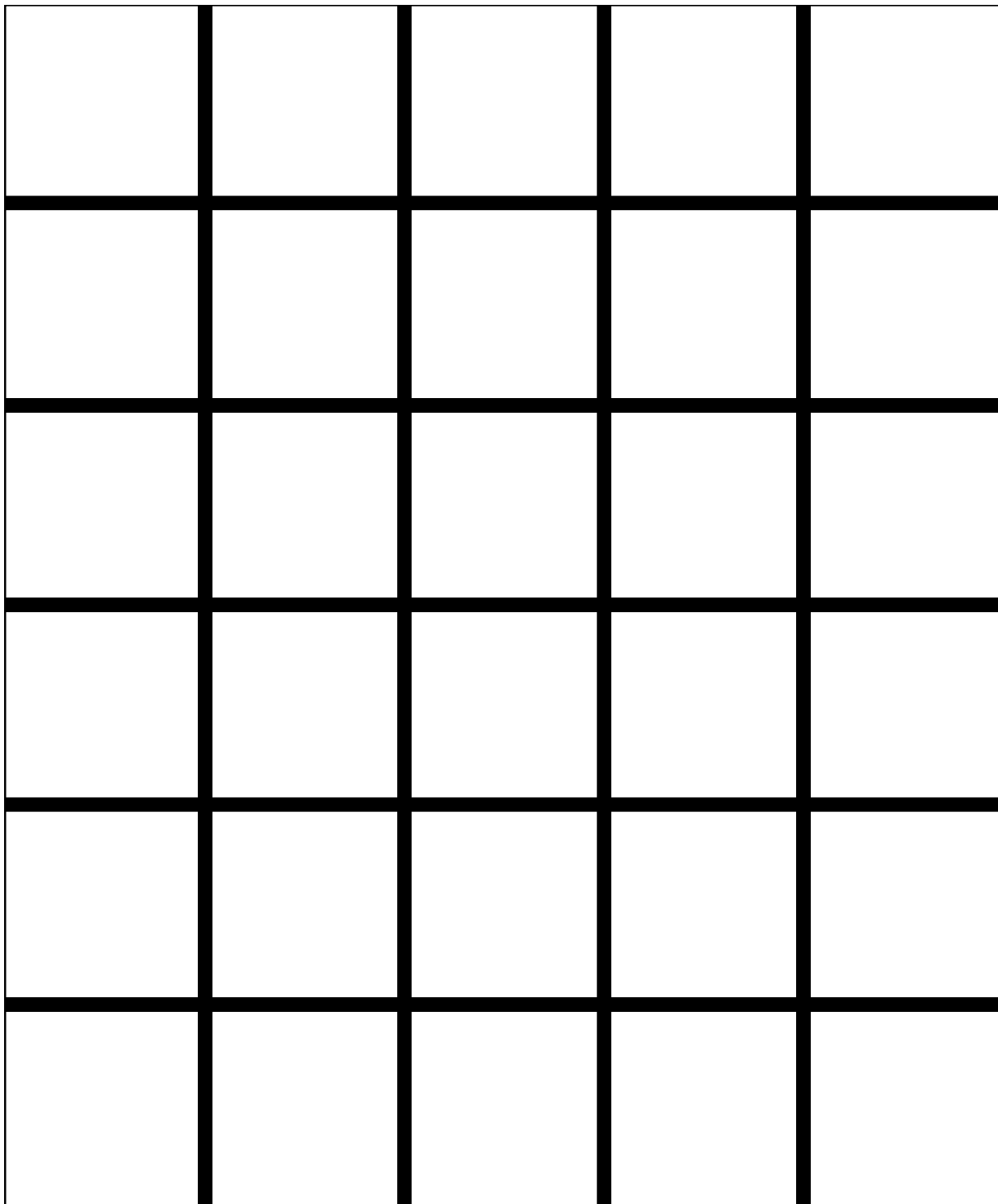
- *Would you rather be the player that goes first or second in a new game?*
- *It is the blue player's turn. There is a way that one of these players is guaranteed to win. Would you rather be the pink player or the blue player?*





MATH ACTIVITIES FOR HOME

SOUTH OF THE SAHARA: DARA GAME BOARD



See page 43 for game rules.

MATH ACTIVITIES FOR HOME

SOUTH OF THE SAHARA: DARA HISTORY & MATH QUESTIONS

Mental Wrestling

Also known as Derrah, this centuries-old game is traditionally played by the Dakarkari people in what is now the Sokoto State region of Nigeria.

Originally, the two players each chose 12 distinctive stones or pieces of pottery as their markers on a 5x6 grid drawn on the ground.

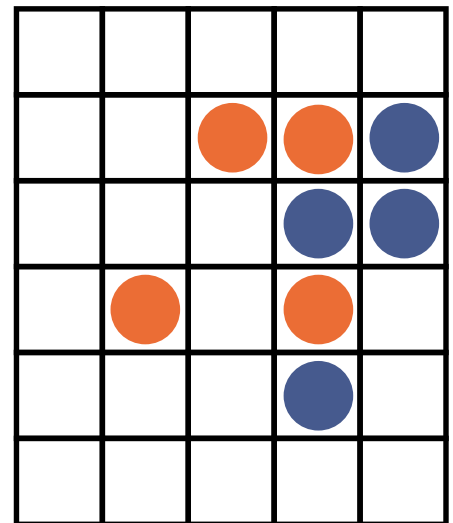
Historical accounts show that wrestling played a large part in the education of Dakarkari youth. Dara is like a form of mental wrestling, teaching mathematical thinking and problem solving to outmatch an opponent.

Game theory exposure

Game theory is the mathematical study of strategic decision-making, something that Dara has a lot of! Dara is the ancestor of chess, sharing a focus on deductive reasoning and multi-step problem solving, but differing in that the placement stage is also a part of the strategy.

Test your strategic decision-making with this question:

- *There is a way that one of these players is guaranteed to win. Would you rather be the orange player or the blue player? It is the orange player's turn.*



MATH ACTIVITIES FOR HOME

SOUTH OF THE SAHARA: GAME RULES (ACHI & DARA)

ACHI

How to win

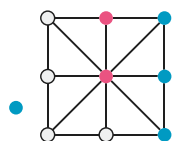
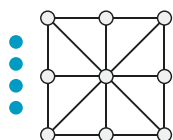
Be the first to connect 3 of your rocks in a row, vertically, horizontally, or diagonally.



Game Setup

4 rocks per player

Empty board



Blue wins!

Phase I: Place rocks

1. Place rocks on the board

Players take turns placing one rock at a time on the empty spaces of the board.

If a player connects 3 rocks in a row during this phase, he/she wins the game.

Connections can be vertical, horizontal, or diagonal.

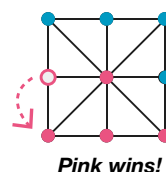
Phase II: Move rocks

2. Move rocks to empty spaces

Once all 8 rocks have been placed on the board, one space will be left empty. Players take turns moving one of their rocks to an empty space next to it.

3. Move when possible

If a player can move, he/she must move. If a player cannot move, his/her turn is skipped.



Pink wins!

DARA

How to win

Be the first to capture 10 of your opponent's rocks.

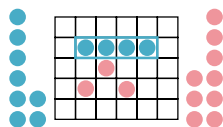
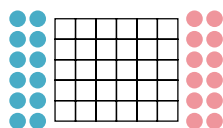


Game Setup

12 rocks

per player

Empty board



×

Phase I: Place rocks

1. Place rocks on the board

Players take turns placing their rocks on empty squares.

2. Avoid placing more than three rocks in a horizontal or vertical row

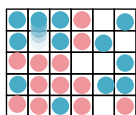
Having more than 3 rocks of the same color in a row is not allowed at any time.

Phase II: Move rocks

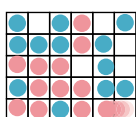
3. Move a rock horizontally or vertically to an empty square

Once all rocks have been placed on the board, players take turns moving one of their rocks one space horizontally or vertically, but NOT diagonally.

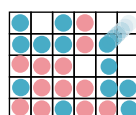
If a player cannot move, his/her turn is skipped.



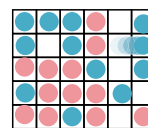
✓



✓



×



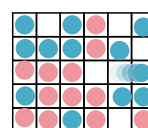
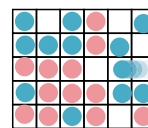
4. Capture an opponent's rock

Capturing happens after all rocks have been placed. To capture, a player lines up a new horizontal or vertical row of 3 of his/her rocks.

When this connection is formed, the player can remove any one of the opponent's rocks from the game. Only one rock can be captured per move, even if multiple connections of 3 are created with one move.

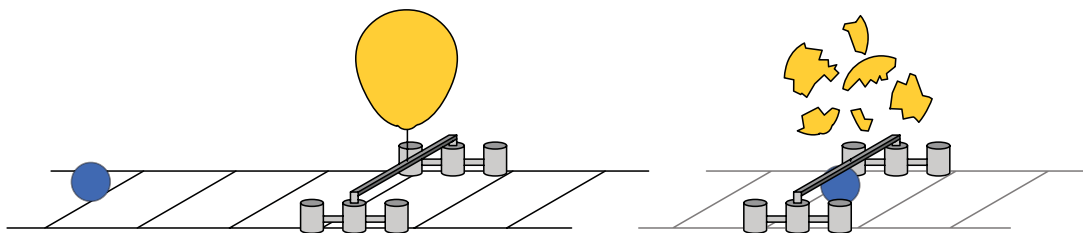
Is reforming the same connection acceptable?

Each connection of three rocks can be reformed only once by moving one rock out and back in to capture another rock.



MATH ACTIVITIES FOR HOME

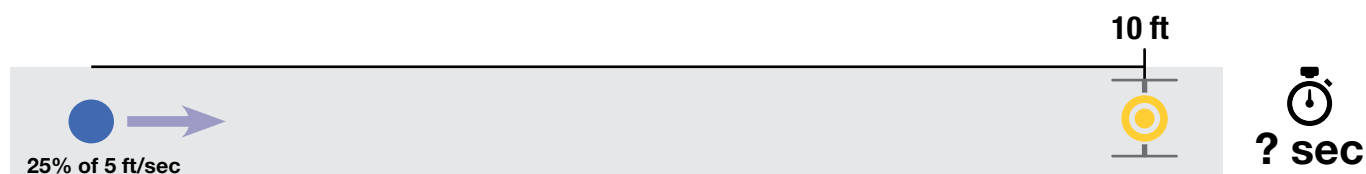
Formula DRT



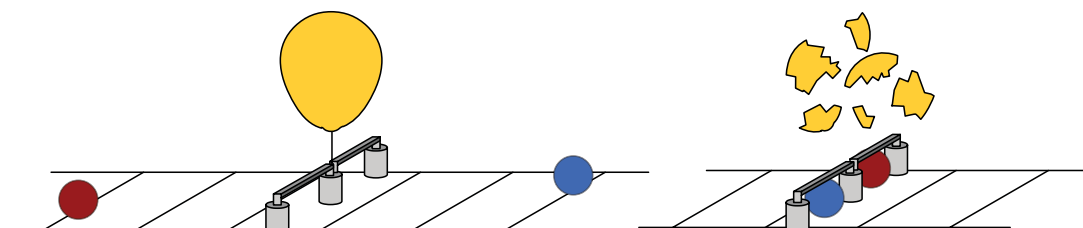
Get the Gyro JiJi to land under the laser boxes..... and the balloon will pop.



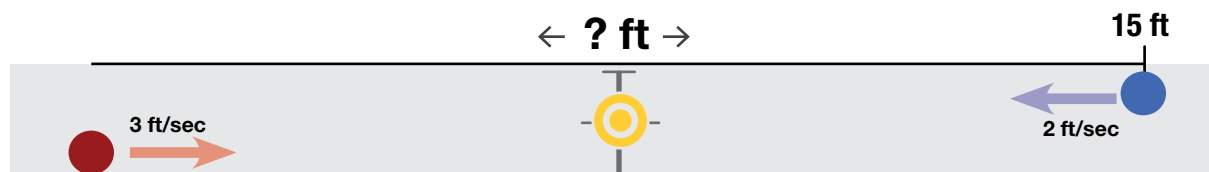
Gyro JiJi Blue needs to go a distance of 15 feet. Gyro JiJi Blue travels at a speed of 3 feet/second. How long should Gyro JiJi Blue travel to end up under the laser box, so it will pop the balloon?



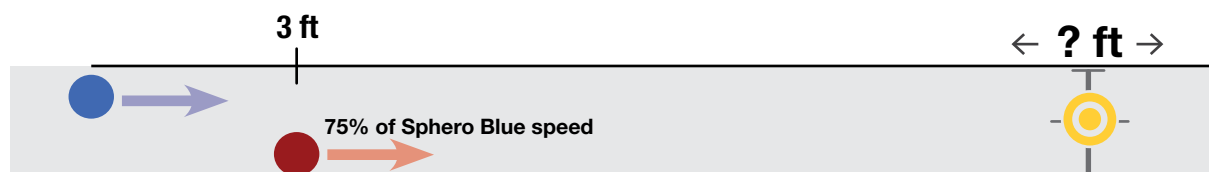
The max speed of Gyro JiJi Red is 5 feet/second. If Gyro JiJi Red needs to travel 10 feet and travels at 25% of its max speed, how long does it take to end up under the laser box, so it will pop the balloon?



Get both Gyro JiJis to pass under the balloon popper at the same time to make the balloon pop.



Gyro JiJi Red travels at 3 feet/second. Gyro JiJi Blue travels at 2 feet/second. Gyro JiJi Red and Gyro JiJi Blue are 15 feet apart. They both start at the same time. Where should you place the balloon popper, so both Gyro JiJis pass under it at the same time and pop the balloon?



Gyro JiJi Red is 3 feet ahead of Gyro JiJi Blue and travels at 75% of Gyro JiJi Blue's speed. They both start at the same time. Where should you place the balloon popper so both Gyro JiJi pass under it at the same time?

For answers, visit www.mindresearch.org/mathfair/resources.

MATH ACTIVITIES FOR HOME

Game-a-thon: STARTER KIT



Design and Build a Math Game!

This “lite” version of the Game-a-thon Starter Kit helps inspire the creative process and provides a framework of questions to promote critical thinking for individuals or teams to design a math game.

For additional resources, visit: mindresearch.org/gameathon

CHOOSE A MATH CONCEPT

What are the math learning goals you want to explore in the game?

BRAINSTORM THE GAME

Number of players is ____ . Game type (circle one:) board - card - digital - other: _____

What materials / tools do you need to build the game?

What is the theme of the game?

What are the different rules for playing the game?

How does a player or team win the game?

MATH ACTIVITIES FOR HOME

Game-a-thon: STARTER KIT

PROTOTYPE, TEST, AND GATHER FEEDBACK

What makes the game challenging and interesting?

What strategies does a player or team use to win?

What works well in the game?

What needs to be improved?

REFLECT AND ITERATE

What modifications can you make to improve the game?

Join the Game-a-thon community!

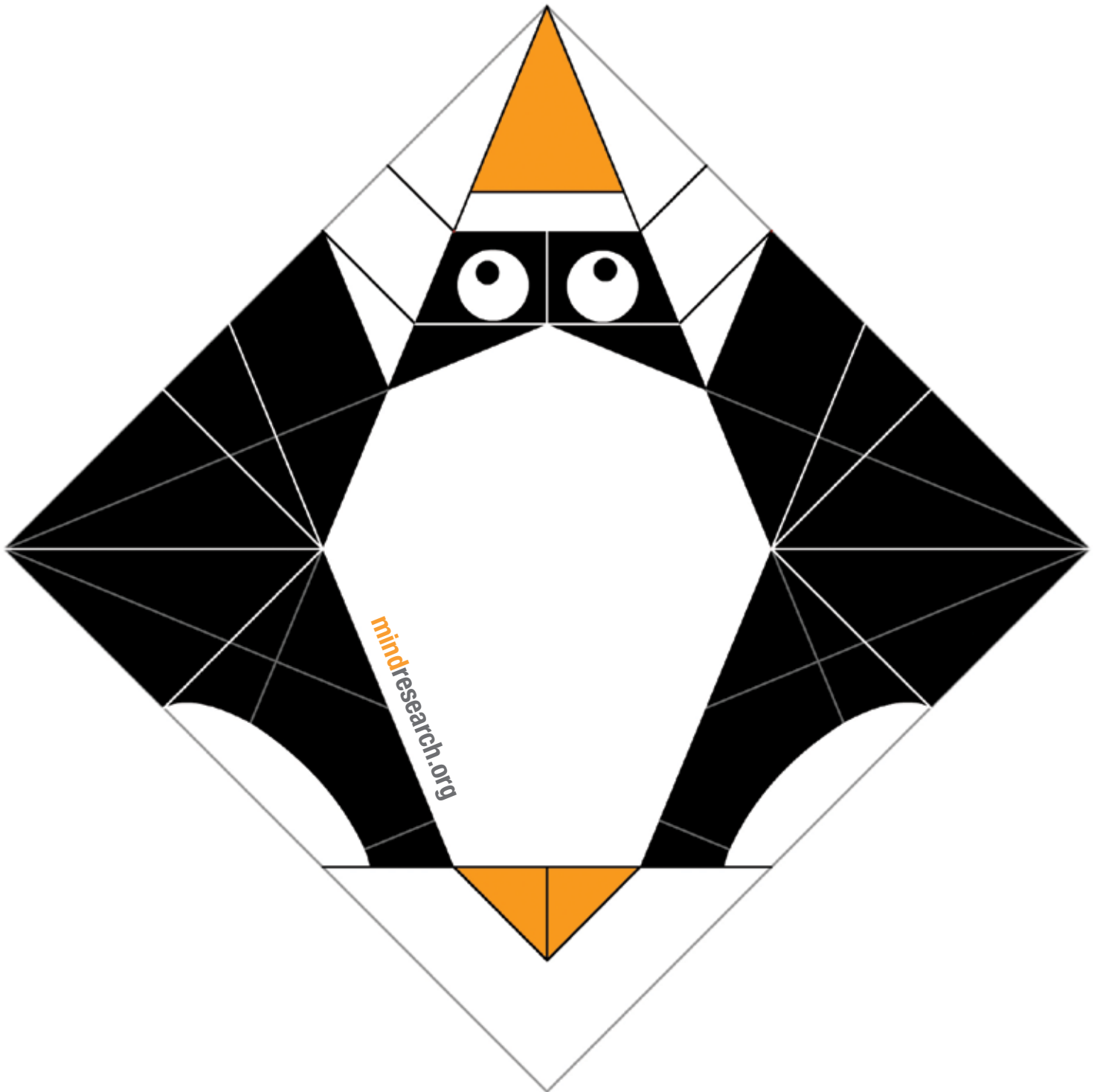
For more information and to participate in the 2016 Game-a-thon Challenge, visit the Game-a-thon website: mindresearch.org/gameathon

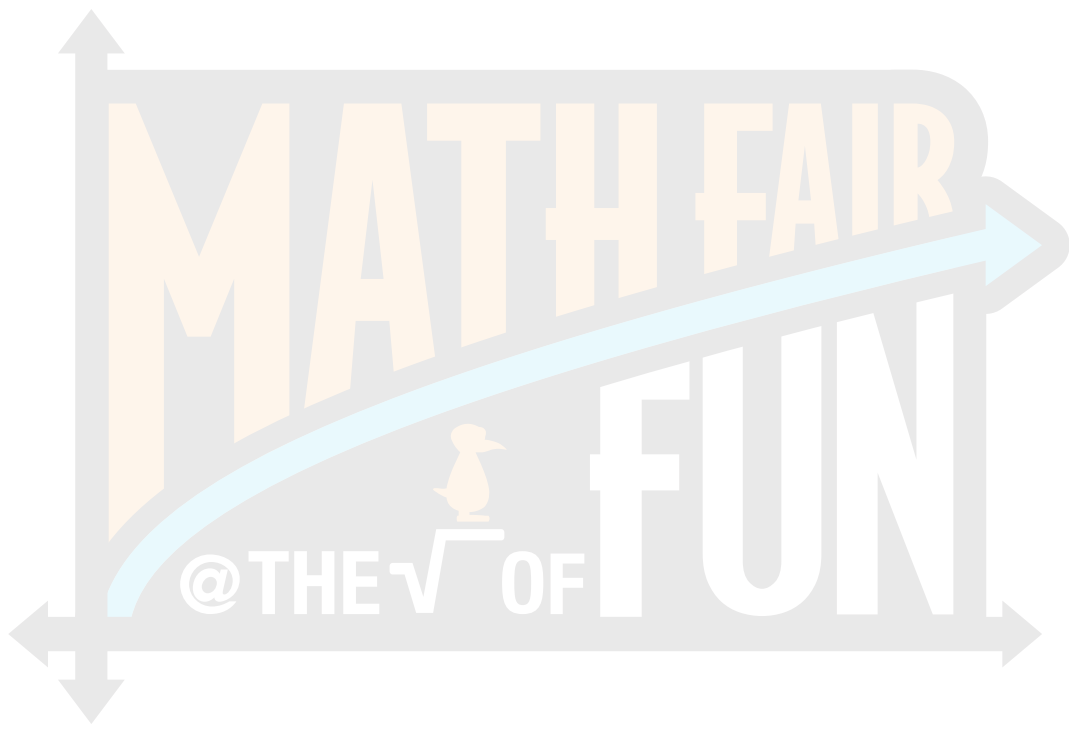
Questions and feedback? Send to: gameathon@mindresearch.org



MATH ACTIVITIES FOR HOME

ORIGAMI Jiji





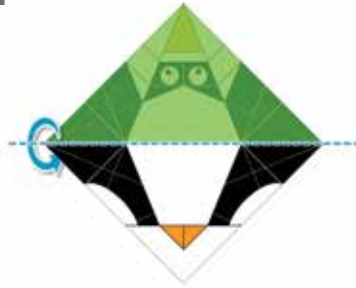
MATH ACTIVITIES FOR HOME

ORIGAMI Jiji INSTRUCTIONS

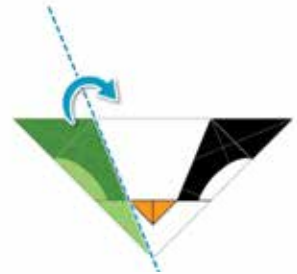
1.



2.



3.



4.



5.



6.



7.



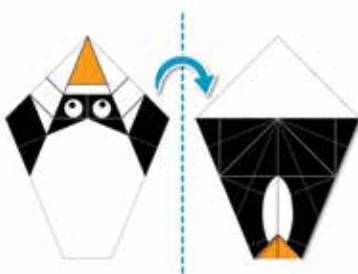
8.



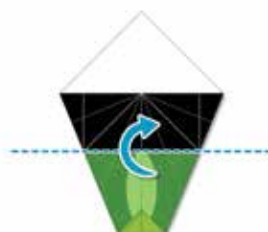
9.



10.



11.



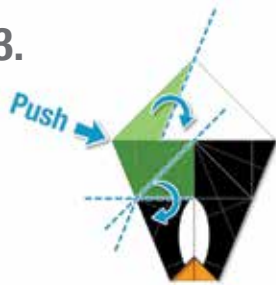
12.



MATH ACTIVITIES FOR HOME

ORIGAMI Jiji INSTRUCTIONS

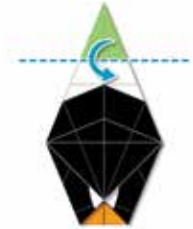
13.



14.



15.



16.



17.



18.



19.



20.



Store Items

JiJi Dogtag \$2

Imagination Playground Kits \$6

JiJi Lanyard \$1

JiJi Doll \$13

JiJi Nylon Drawstring Bag \$4

Pencils (5) \$3

Rulers (4) \$1

Math Fair Calculator \$7

JiJi Believer Sunglasses \$2

JiJi Headphones \$20



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