STEM
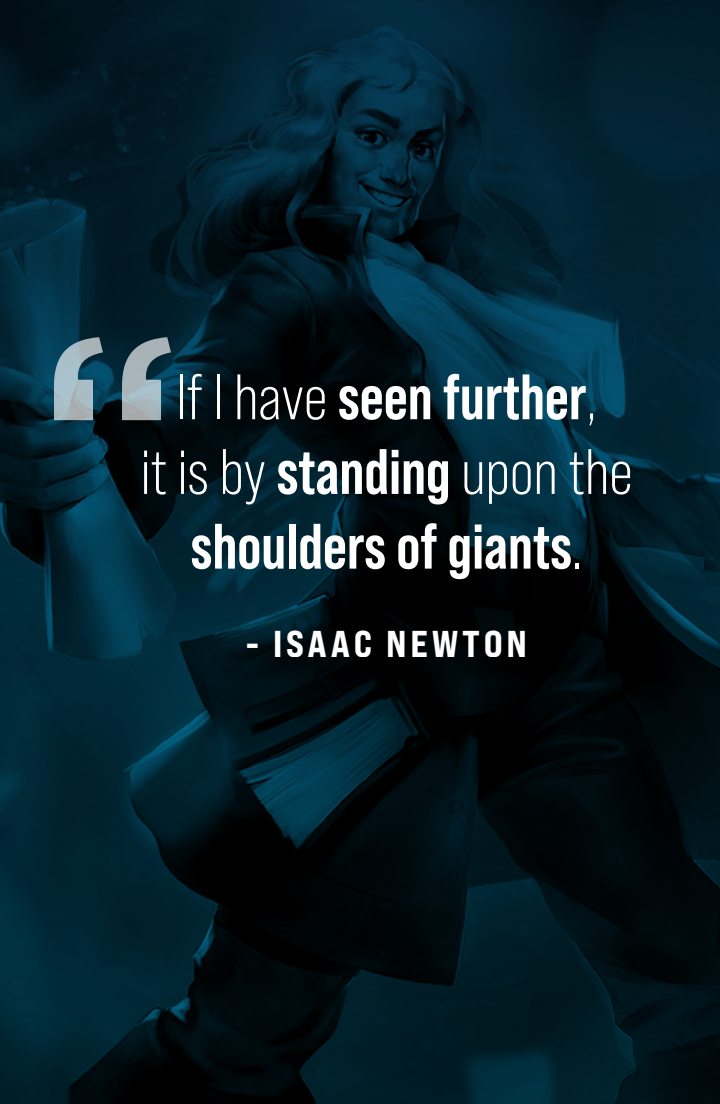
EPIC HEROES

"If I have **seen further**, it is by **standing** upon the **shoulders of giants**.

- ISAAC NEWTON

STEM
EPIC HEROES

RULES OF PLAY

GRACE HOPPER
Hero of Technology

GAME
OVERVIEW

STEM Epic Heroes is a light strategy card game for 2-4 players.

Each player competes to score the most points by collecting sets of cards and disrupting opponents.

OBJECTIVE:

Be the player with the most points when the game ends.

Score points by collecting "Discovery Cards" and using "Enhancement Cards".

Disrupt the game with "Inspiration Cards", which allow you to steal cards and points from other players.

STEM Epic Heroes contains two decks of cards:

HERO DECK

Drawn and held in each player's hand as hidden cards.

DISCOVERY DECK

Played as community cards in the center of the table to create "the Field."

STEM TYPES

All cards in the game have a STEM type corresponding to a specific icon and color. Some Discovery Cards have two types. These are known as "split cards."
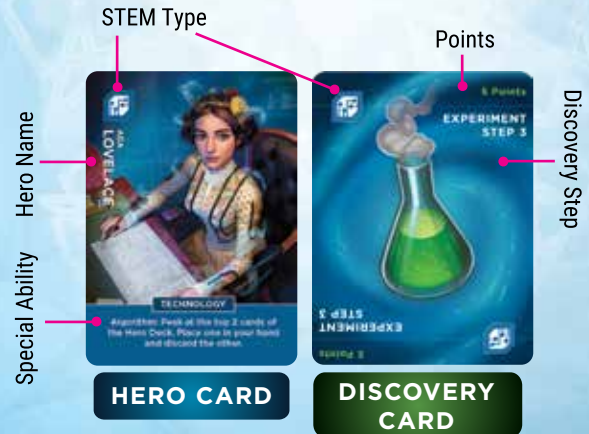
The Polymath type is like a wild card and can be used to play all STEM types.

TECHNOLOGY

SCIENCE

POLYMATH

MATHEMATICS

ENGINEERING
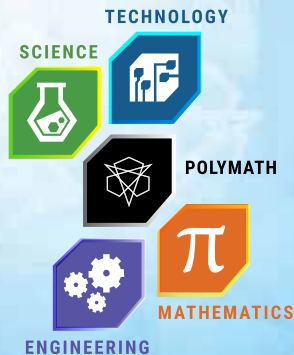
Players acquire the face up Discovery Cards from the Field using **matching type** Hero or Polymath Cards from their hand. Players take turns collecting Discoveries and drawing cards to enhance their score. The game's end is triggered when at least one player acquires every step of the Scientific Method.

The player with the highest final score wins. If there is a tie, the player with the fewest played cards wins.

STEM Type

Points

Hero Name

Special Ability

Discovery Step

HERO CARD

DISCOVERY CARD

THE FIELD

Discovery Cards

Hero Deck

**Challenge Cards
(optional)**

Discovery Deck

THE DECKS

HERO DECK

Hero Cards, Enhancement Cards, and Inspiration Cards. Players draw and play cards from this deck.

DISCOVERY DECK

Each Discovery Card has a STEM classification and a designated point value. These cards are acquired by players from the Field.

DISCOVERY DECK | 44 CARDS

20 cards of each unique STEM type and Step (**5 points each**).

20 split cards balanced across all STEM types (**3 points**)

4 Wild Step Cards, one of each STEM type (**3 points**)

HERO DECK | 64 CARDS

30 Hero Cards (6 of each STEM type)

14 Inspiration Cards

20 Enhancement Cards
- **12** Item Cards (various points)
- **8** Locations (various points)

Discovery Cards depict the Scientific Method, broken into 5 steps.

STEP 1: OBSERVATION   **STEP 2:** HYPOTHESIS

STEP 3: EXPERIMENT   **STEP 4:** ANALYZE DATA

STEP 5: PUBLISH RESULTS

Players compete to acquire all five steps in order to score points and end the game.

Rules applying to Discovery Cards:

Only one of each step may be acquired.

Discovery cards may be acquired in any order, i.e., Step 1 can be acquired first, last or any turn.

Players may only acquire one Discovery Card per turn.

Discovery Cards are worth the point amount displayed in the top right corner of the card.

Only a Hero of a matching type (i.e., Science, Technology, Engineering, Mathematics) may acquire a Discovery Card of that same type. **Polymath Heroes can acquire any Discovery Card.**

Split Type Discovery Cards:
Some Discovery Cards have split types (i.e. Science AND Technology). These cards may be scored by Heroes of both listed types.

"Wild Step" Cards:
Wild Cards may be used for any Step in the Scientific Method, but must be scored by a Hero of a matching type. The player must declare what step the Wild Step Card will be used for at the time of use and it cannot be changed later.

Hero Cards are used to acquire Discovery Cards.

Each Hero has a STEM type. They also have a Special Ability that makes them unique.

STEM Type
STEM types are depicted by color and icon. In order for a Hero to be played, there must be a matching Discovery Card face up in the Field.

Special Ability
When a Hero is played, their Special Ability is used immediately unless it directly affects score calculation. In instances where a Hero's Special Ability affects the final score, the Ability results will be calculated at the end of the game.

Polymaths
Polymaths are special Heroes that may acquire any Discovery and use any Enhancements, regardless of type. Think of them as a "Wild Hero."

STEM TYPE

Hero Name

Special Ability

Item

Location

ENHANCEMENT CARDS

Enhancement Cards are used to add points to Discoveries. There are two types of Enhancements: ITEMS and LOCATIONS.

When a Hero Card has been played to acquire a Discovery Card, the player has an option to add an Item and a Location to the Hero. These cards increase the point value of that particular Discovery.

Enhancement Cards are **limited to one Item and one Location per Hero**, unless otherwise stated. Heroes may only use Enhancement Cards that match their type. Enhancements are based on the Hero type, so when scoring a split type Discovery Card, the **Enhancements must match the Hero type**.

When an Enhancement is taken from an opponent, it must be placed on either a Polymath Hero or a Hero of matching STEM type — otherwise it is discarded.

Enhancements are played face up below the Hero.

*** NOTE: For a different style of play, try playing Enhancement Cards face down. ***

Inspiration Cards are very powerful and are used to disrupt your opponents.

⚠️ **WARNING** | Use of these cards may induce an *evil grin* and *affect friendships*.

Inspiration Cards may be used at any time (even when it is not the player's turn) and are **effective immediately**.

When an Inspiration Card is revealed and played all other gameplay is paused until the inspiration card is resolved.

During play of an Inspiration Card, only other Inspiration Cards or Hero Cards with relevant Special Abilities may be used.

For example, a Lost Results card can be used to defend against the same card. Or, in the case of Hero Cards such as Alexander Fleming or Sophie Germain, the text on the card affects the outcome of the Inspiration Card.

Once an Inspiration Card is played, it must be resolved before any other Inspiration Cards are played, unless it is the same card.

For example, If Lost Results is played, the affected player can play another Lost Results to block the first. However, if a Fund Transfer is played, the affected player cannot play any Inspiration Cards until the Fund Transfer is resolved.

OPTIONAL ADVANCED PLAY:

10 Challenge Cards are included in the core game.

Challenge Cards are an optional layer of gameplay that can be added to the game's core experience.

These cards are worth bonus points and are awarded to the first player to complete the challenge on the card.

Before the game begins, shuffle the Challenge Cards and then deal 4 face up on the table. The first player to complete the challenge on each card may take the card and place it on their side of the table to be added to their total score at the end of the game. These cards are not lost if the challenge condition becomes unmet by an Inspiration Card.

TO BEGIN

Shuffle both decks.

Deal each player a starting hand of **6 cards** from the Hero Deck (**BLUE cards**) face down.

Allow players to discard and redraw up to 6 cards from their starting hand before the game begins. After the starting hand, players are allowed to discard up to 3 cards per turn. (See page 16-17, Player Turns)

Reshuffle discarded cards into the Hero Deck.

Deal the top 5 cards from the Discovery Deck (**GREEN cards**) face up in the middle of the table. This area is called the **Field**. Place both decks on either side of the face up Discovery Cards. (*Optional*: include Challenge Cards under the Discovery Cards. See page 14.)

Begin gameplay with the person who can recite Pi to the furthest decimal. Otherwise, simply choose someone. This person takes the first turn and gameplay moves clockwise from that player.

2-PLAYER NOTE:

For a 2-player game, remove the 5 point Discovery Cards (solid color) from play.

OPTIONAL

PLAYER TURNS

Each player turn consists of the following phases:

• Choosing a card from your hand to play.

• Choosing a Discovery Card from the Field (to acquire or to discard).

• Discarding and/or drawing more cards.

Each player begins their turn by taking ONE of the following three ACTIONS with their hand of cards:

1| **Play a Hero to acquire a new Discovery Card.** Hero Cards must match the same type of Discovery Cards, i.e., a Science Hero can score a Science Discovery Card. The player moves the Discovery Card to their side of the table and places the Hero on top of the Discovery Card. The player then has the option to play up to one Item and one Location on the Discovery Step that is being acquired. Only one Discovery Card may be acquired per player's turn.

2| **Play an Enhancement Card.** Instead of acquiring a new Discovery Card, the player may add one Enhancement to an existing Discovery. Only one card may be played and the amount of Enhancements may not exceed one Item and one Location for that particular Discovery Step.

3| **Choose not to play a card.** The player has the option to not play any cards from their hand. (They must still choose a Discovery card from the Field to discard. See below.)

After Action
After the player's action is taken, the player replaces the empty spot in the Field with a new Discovery Card from the top of the Discovery Deck. If the player did not acquire a NEW Discovery Card from the Field on their turn, they must discard one face up Discovery Card of their choice from the Field and replace it with the top card of the Discovery Deck.

DRAWING CARDS

The player ends their turn by discarding up to 3 cards from their hand and then drawing until they have 6 cards. A player may not have more than 6 cards at the end of their turn. If this happens, discard down to 6. If either deck runs out, reshuffle the discard pile.

NOTE: Any Inspiration Cards that are drawn and played immediately may NOT be replaced by additional card draws until the next turn.

TO END GAME

• When at least one player has acquired all 5 steps of the Scientific Method, the game's end is triggered.

• Play continues until it reaches the player who went first.

• Players then calculate their points and resolve any Hero Special Abilities that directly affect scoring. The player with the highest score is the winner!

Example of a completed set at game end.

DISPUTES: If there is ever a dispute between the rules in the rule book and the text on a card, the text on the card takes precedence.

HEROES OF SCIENCE

JAMES CLERK MAXWELL

James Clerk Maxwell was a 19th Century Scottish scientist and mathematician who formulated the classical theory of electromagnetic radiation. Considered one of the most influential physicists of all time, Maxwell's equations formed the foundations of what would later become special relativity and quantum mechanics.

SPECIAL ABILITY

Electromagnetism: Take 1 enhancement from an opponent's discovery and add it to yours.

MARIE CURIE

Marie Sklodowska Curie, a physicist and chemist, conducted pioneering research on radioactivity. Curie was the first woman to win a Nobel Prize and the first person and only woman to win it twice.

SPECIAL ABILITY

Radioactivity: Deduct 3 points from the opponent with the highest score.

ALICE BALL

Alice Ball, an African-American chemist, developed one of the first effective treatments for leprosy. She was the first woman and first African-American to graduate from the University of Hawaii with a master's degree.

Develop the cure: The Science Lab is worth 6 points when played with Ball.

GEORGE WASHINGTON CARVER

George Washington Carver was an African-American botanist, inventor, and educator. He is best known for his promotion of alternative crops to cotton, such as peanuts and sweet potatoes.

Alternative Crops: Carver may use any Science Discovery Card for any Discovery Step.

CHIEN SHIUNG WU

Chien Shiung Wu was a Chinese-American physicist who made significant contributions in the field of nuclear physics. Wu is most famous for her work on the Manhattan Project during World War II.

Gaseous Diffusion: "Split type" Discovery Cards played with Wu are worth 6 points.

ALEXANDER FLEMING

Alexander Fleming was a Scottish physician and scientist best known for discovering the world's first antibiotic substance (Penicillin G). He later shared the Nobel Prize in Physiology and Medicine in 1945.
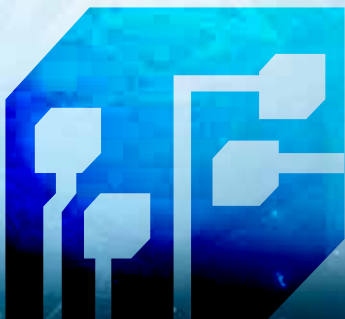
Antibiotics: This player is now immune from having enhancements stolen.

HEROES OF TECHNOLOGY

CHARLES BABBAGE

Charles Babbage is considered to be a father of the computer. He was a mathematician, philosopher, inventor, mechanical engineer, who originated the concept of a digital programmable computer.

SPECIAL ABILITY

Analytical Engine: IF played with 2 technology enhancements, THEN double enhancement points.

ALAN TURING

Alan Turing, an English computer scientist, is considered by many to be the father of artificial intelligence. His work as a codebreaker during World War II contributed to shortening the war and saving millions of lives.

SPECIAL ABILITY

Artificial Intelligence: The Assistant Robot is worth 7 points when played with Turing.

ADA LOVELACE

Ada Lovelace was an English mathematician and writer who published the first known computer algorithm. She was a close colleague of renowned computer inventor Charles Babbage and, in 1843, was the first to document and understand the full potential of computers beyond just calculations.
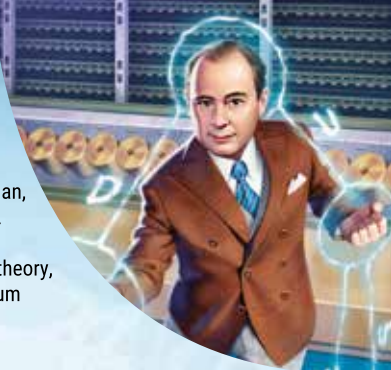
SPECIAL ABILITY

Algorithm: Peek at the top 2 cards of the Hero Deck. Place one in your hand and discard the other.

JOHN VON NEUMANN

John von Neumann was a Hungarian-American mathematician, physicist, and computer scientist. He is most noted for his major contributions to statistics, game theory, stochastic computing, and quantum mechanics.

SPECIAL ABILITY

Self-Replicating Machine: Discovery Cards are worth double when played with Neumann.

GRACE HOPPER

Grace Hopper was an American computer scientist and United States Navy rear admiral. Hopper was a pioneer of computer programming who popularized the idea of machine-independent programming languages.

SPECIAL ABILITY

Compiler: Peek at the top 4 cards of the Discovery Deck. Place one in your hand to be played later.

MARY KENNETH KELLER

Mary Kenneth Keller was one of the first people to obtain a doctorate in the field of computer science. A religious sister and educator, she contributed to the development of BASIC, an early computer programming language.

SPECIAL ABILITY

Inductive Inference: Peek at a chosen opponent's hand.

HEROES OF ENGINEERING

EDITH CLARKE

Edith Clarke was the first female electrical engineer and the first female professor of electrical engineering at the University of Texas at Austin.
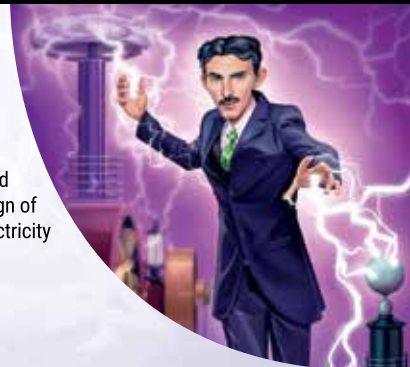
SPECIAL ABILITY

Power Distribution: All your Engineering discoveries are each worth 1 additional point.

NIKOLA TESLA

Nikola Tesla, an inventor and electrical engineer, is most noted for his contributions to the design of the modern alternating (AC) electricity supply system.

SPECIAL ABILITY

Alternating Current: Deduct Tesla's enhancement score from the opponent with the highest score.

THOMAS EDISON

Thomas Edison, an American inventor and businessman, is well known for his work on the development of early electric light bulbs and the invention of the phonograph and motion picture camera.

Mass Production: Edison may use unlimited Items.

ALEXANDER GRAHAM BELL

Alexander Graham Bell was a Scottish-born scientist, inventor, engineer, and innovator who is credited with patenting the first practical telephone and founding the American Telephone and Telegraph Company in 1885.

Telephone: May use two Locations of any type.

HERTHA AYRTON

Hertha Ayrton was a British engineer, mathematician, physicist, and inventor. Ayrton was awarded the Hughes Medal by the Royal Society for her work on electric arcs and ripples in sand and water.

Electric Arc: Discard 1 card from an opponent's hand.

THE WRIGHT BROTHERS

The Wright brothers were aviation pioneers who are known for inventing, building, and flying the world's first successful airplane.

Flight: Any Discovery Card scored by the Wright brothers is worth 6 points, regardless of point value.

HEROES OF MATHEMATICS

SOPHIE GERMAIN

Sophie Germain was a French mathematician, physicist, and philosopher, who made significant and fundamental contributions to the field of elasticity theory.

Elasticity Theory: Sophie is returned to the original player's hand if discarded by an opponent.

GOTTFRIED WILHELM LEIBNIZ

Gottfried Wilhelm Leibniz was a German mathematician and philosopher of the 17th century. Leibniz is credited, along with Isaac Newton, with the discovery of calculus. Leibniz's notation has been widely used ever since it was published. He was also one of the most prolific inventors in the field of mechanical calculators.
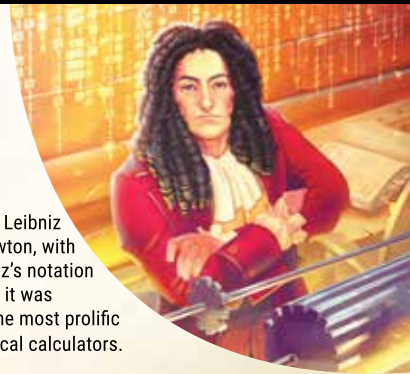
Pinwheel Calculator: The Calculator is worth 7 points when played with Leibniz.

SOFIA KOVALEVSKAYA

Sofia Kovalevskaya was a Russian mathematician and a pioneer for women in mathematics around the world. Kovalevskaya made noteworthy contributions to analysis, partial differential equations, and mechanics.

SPECIAL ABILITY

Professorship: The Classroom is worth 6 points when played with Kovalevskaya.

EMMY NOETHER

Emmy Noether, a German mathematician, is known for her landmark contributions to abstract algebra and theoretical physics. Albert Einstein and other notable experts described Noether as the most important woman in the history of mathematics.

SPECIAL ABILITY

Algebraic Structure: All your Mathematics discoveries are each worth 1 additional point.

MUHAMMAD IBN MŪSĀ AL-KHWĀRIZMĪ

Muhammad ibn Mūsā al-Khwārizmī, a Persian mathematician and astronomer, was the first to treat algebra as an independent discipline. He introduced the methods of reduction and balancing and is often called the father or founder of algebra.
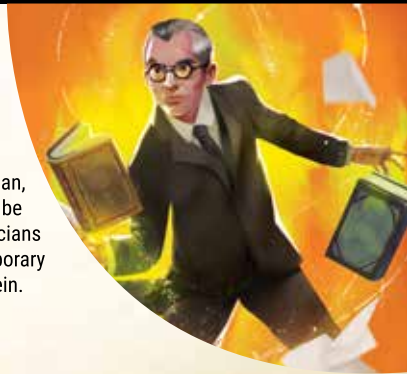
SPECIAL ABILITY

Quadratic Equation: Choose up to 2 players who must discard 2 cards of their choosing.

KURT GÖDEL

Kurt Gödel was an Austrian-American logician, mathematician, and philosopher. Considered to be one of the most significant logicians in history, Gödel was a contemporary and good friend of Albert Einstein.

SPECIAL ABILITY

Incompleteness Theorem: Gödel gains an additional 5 points when played with no enhancements.

POLYMATHS

All Polymaths have the same Special Ability.

pol·y·math
/ˈpälēˌmaTH/
noun
a person of wide-ranging knowledge or learning.

HYPATIA

Hypatia was a Greek mathematician, astronomer, inventor, and philosopher in Egypt, then a part of the Eastern Roman Empire. Hypatia was the head of the Neoplatonic school at Alexandria where she taught philosophy and astronomy.

SPECIAL ABILITY

Polymath: Can acquire any discovery and use any enhancements regardless of type.

GALILEO GALILEI

Galileo Galilei, an Italian polymath, is considered one of the founders of modern science. He contributed groundbreaking work in astronomy, telescopic observations, and heliocentrism.

SPECIAL ABILITY

Polymath: Can acquire any discovery and use any enhancements regardless of type.

BLAISE PASCAL

Blaise Pascal was a French mathematician, physicist, inventor, writer, and philosopher. Pascal is famous for contributions in the fields of hydrology (Pascal's Law), mathematics (Pascal's Triangle) , and probability theory. He also invented one of the first mechanical calculators.

SPECIAL ABILITY

Polymath: Can acquire any discovery and use any enhancements regardless of type.

ZHANG HENG

Zhang Heng was a greatly celebrated Chinese polymath who achieved success as an astronomer, mathematician, scientist, engineer, inventor, geographer, cartographer, artist, poet, statesman, and literary scholar.

SPECIAL ABILITY

Polymath: Can acquire any discovery and use any enhancements regardless of type.

ISAAC NEWTON

Isaac Newton was an English mathematician, astronomer, and physicist who is widely recognized as one of the most influential scientists of all time and a key figure in the scientific revolution of the 17th century.

SPECIAL ABILITY

Polymath: Can acquire any discovery and use any enhancements regardless of type.

MARY FAIRFAX SOMERVILLE

Mary Fairfax Somerville, a Scottish science writer and polymath, studied mathematics and astronomy. Translating and expanding Pierre Laplace's book on current astronomical knowledge, *Celestial Mechanics*, is considered one of her greatest achievements.

SPECIAL ABILITY

Polymath: Can acquire any discovery and use any enhancements regardless of type.

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UNLOCK HERO

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