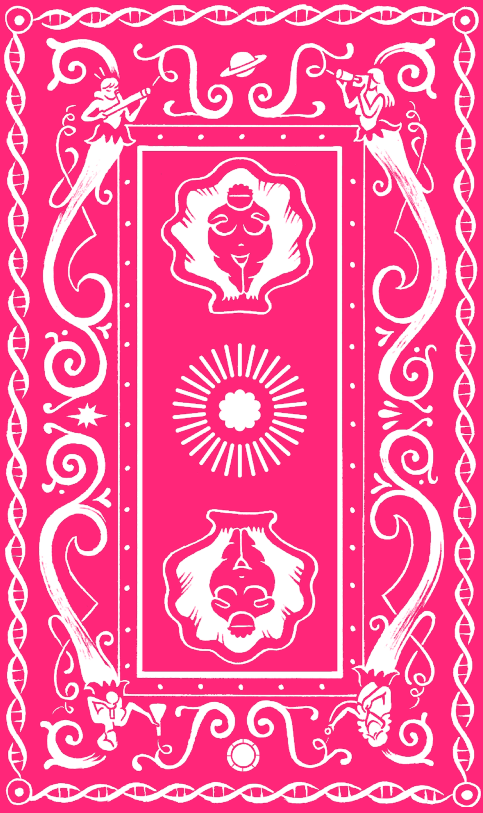
WOMEN OF SCIENCE TAROT



GUIDEBOOK

WOMEN OF SCIENCE
TAROT

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Introduction

Tarot cards have been used since the 15th century as a framework for communal storytelling, soothsaying, and prediction. We've updated this tarot deck to reflect our scientific, 21st century curiosity about how the world works.

Our cards are fashioned after traditional tarot decks, but instead of being illustrated with the usual esoteric symbols, they feature women who have shaped the way we see, create, and imagine the world. Ask the cards and the women a question and let their knowledge of the four spheres of inquiry—the Nano, the Micro, the Macro, and the Astro—guide you to new conclusions.

Marvel at discoveries and paradigms in math, engineering, physics, chemistry, microbiology, genetics, medicine, organismal biology, ecosystems, climate science, earth science, geology, astrophysics, cosmology, and let them inform how you think about life's big and small questions.

The most transformative ways of thinking are not magic: they are real, rooted in STEM, and they can help us imagine a better future.

How to Play

There are infinite ways to read any Tarot deck, including this one. You may find some ways of reading the tarot more-or-less helpful, depending on the questions you have and the story you want to tell.

Use the meaning of each card to narrate the plot points of a story you tell yourself or a friend. Cards can relate to each other or represent transformative moments, events, things, or people.

Here are two ways of playing:

5 Minute Reading

1. Limit your deck to only the Major Arcana cards.
2. Shuffle the cards and ask the deck a question.
3. Pick and lay down cards one at a time to tell a story until you feel it is complete and answers your question. You can lay them in a row or arrange the cards in a shape that corresponds with the question at hand.

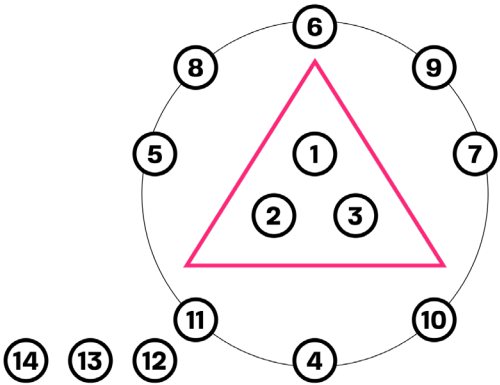
20 Minute Reading

For longer readings, we like to use the *Motherpeace* feminist Tarot deck layout, created by Karen Vogel and Vicki Noble.

I. Use the entire deck or only the Major Arcana.

II. Shuffle the cards and ask the deck a question.

III. The question asker picks 14 cards. As each card is revealed and placed in the layout, the story is guided by the contents of the card and the order in which it is seen:



1. Who are you? This card tells you where you are in your life.
2. This card sets the 'mood' of the reading/game play, for better or worse.
3. This card tells you what you're learning about.
4. This card tells you what drives you.
5. This card tells you how you behave in the world.
6. What happened recently that might have had an influence on you today?
7. What could happen in the near future?
8. This self-concept card tells you how you might see yourself.
9. This card illuminates your hopes and your fears (often, they are the same thing).
10. This card refers to the groups and individuals that are a part of your life.
11. This card suggests the outcome of your story and should be Major Arcana. If it isn't, draw up to three cards (12–14) until a Major Arcana appears. If none appears, the outcome is mixed or might follow a trajectory.

MAJOR ARCANA

The 22 Major Arcana cards represent a path (or cycle) of spiritual evolution from the naive Fool to the transcendent World and back again.

0. THE FOOL

I. THE MAGICIAN

II. THE HIGH PRIESTESS

III. THE EMPRESS

IV. THE EMPEROR

V. THE HIEROPHANT

VI. THE LOVERS

VII. THE CHARIOT

VIII. STRENGTH

IX. THE HERMIT

X. WHEEL OF FORTUNE

XI. JUSTICE

XII. THE HANGED MAN

XIII. DEATH

XIV. TEMPERANCE

XV. THE DEVIL

XVI. THE TOWER

XVII. THE STAR

XVIII. THE MOON

XIX. THE SUN

XX. JUDGEMENT

XXI. THE WORLD

THE FOOL

New beginnings, faith in the future, beginner's luck, and improvisation

UPRIGHT	REVERSED
beginnings, originality, innocence, leaps of faith	naivety, poor judgement, folly, lack of direction

The Fool represents a new beginning, full of promise, possibility, but also peril. Traditionally depicted as a vagabond gazing out on unknown territory, The Fool in our deck is the mythical first fish to venture out of the seas and walk on land. This evolutionary trailblazer serves as a symbol of life's resourcefulness, constantly reforming itself to adapt to the changing environment.

Venturing into a new world or discipline is risky and exposes us to failure, but it can also lead to great rewards. This card celebrates scientific pioneers and the leaps of imagination that are required to establish a new field or theory.

THE MAGICIAN

The scientific method, experiments, discovery, and the eureka moment

UPRIGHT	REVERSED
determination, resourcefulness, dexterity, skill, self-confidence, will	deceit, lack of energy, communication blocks, confusion, ill intentions, disgrace, disquiet

The Magician challenges our preconceptions. Traditionally depicted as an alchemist working with the tools of the four tarot (discs, wands, swords, and cups), this deck's Magician is a woman performing a scientific experiment, the creative phase common to all the sciences.

She reminds us that scientific knowledge is in continuous flux, as every new experiment asks new questions and forces us to reassess existing assumptions. This is one of science's most powerful lessons: you must learn to embrace uncertainty without turning to nihilism, and always be willing to change your mind.

THE HIGH PRIESTESS

Abstraction, reflection, and stillness

UPRIGHT	REVERSED
insight, hidden talents, intuition, things yet to be revealed, mystery, secrets	information withheld, lack of harmony, conceit, surface knowledge

The High Priestess of Science urges us to keep an eye on the nitty-gritty. A master of probability and statistics, her penchant for abstraction and stillness compliments the Magician's creative impulse. She reminds all scientists to retreat ever-so-often and reflect upon the data from their experiments.

Things around us are not always as they appear to be, and only the insight of repeated trial and error can lead us to comprehensive conclusions. We must trust the laws of probability, even when they go against our common sense.

THE EMPRESS

Tool use, agriculture, fertility, and the domain of living things

UPRIGHT	REVERSED
pregnancy, nurturing, abundance, maternal care, opportunity, stability, fruitfulness	financial issues, stagnation, domestic problems, revelations around difficult issues

The Empress represents the possibility of renewal. While traditionally she is depicted sitting on a royal throne amid a field of grain, symbolizing her dominion over the natural world, our deck's Empress is a female farmer harvesting a field of wheat.

This Empress stands for living within our means, and the abundant opportunities that can arise from stable, thoughtful planning. She reminds us how science and engineering helped us build prosperous civilizations, and that we now depend on that same ingenuity to help us ensure a sustainable future.

THE EMPEROR

Militarism and the misuse of power

UPRIGHT	REVERSED
Law and order, power, leadership, authority	Loss of authority, immaturity, control freak, lack of discipline, manipulative friends

The Emperor represents power and domination. Traditionally depicted as an old man sitting atop his mountain throne, our deck's Emperor is physicist Robert Oppenheimer, one of the fathers of the atomic bomb, still living in the shadow of the Trinity nuclear test. "Now I am become Death, the destroyer of worlds," he described the experience in the famous words of the Bhagavad Gita. This card serves as a reminder that scientific advancement isn't an unalloyed good. Combined with militarism, it can produce a dark and sterile form of control that is the opposite of the Empress's fertility.

THE HIEROPHANT

The structures of academia

UPRIGHT	REVERSED
Seeking counsel or advice, need for tradition, guidance, education	Breakdown, rejection of traditional values, abuse of position, poor counsel

The Hierophant urges you to conform to tradition and convention. He is usually depicted as a religious figure seated on a high throne between two pillars symbolizing obedience and disobedience, lecturing two disciples, with the keys to Heaven laying at his feet. In our deck, the Hierophant stands for academia and its almost religious conventions. Two young students stand in front of a stern professor, begging for qualifications and reference letters (the keys to tenure).

Universities are shrines of human knowledge, but they don't have a monopoly on intellectual rigor or scientific mastery. Science predates academia and can come in many shapes and forms, many of which do not require traditional qualifications.

THE LOVERS

VI

Gravity

UPRIGHT	REVERSED
Falling in love, commitment, choices, being at a crossroads, partnerships	Separation, infidelity, relationship issues, broken relationship

The Lovers represent relationships and pressing decisions. Traditionally, a man and woman are shown in the Garden of Eden, with The Tree of Life behind the man and The Tree of Knowledge behind the woman. Here, two men (Newton and Einstein) stand in front of an apple tree, contemplating a fallen fruit. These two Lovers of science have decisively chosen the tree of knowledge, and it has inspired one of them to discover gravity.

Science often requires us to make difficult decisions based on logic rather than emotion. Some scientists have to privilege their work over their relationships, while others have to give up on a long-held theory, or take on the risk of a new collaboration. Some of the most groundbreaking discoveries are not made by solitary geniuses, but by teams of scientists building on the insight of previous research.

THE CHARIOT

Space travel

UPRIGHT	REVERSED
Overcoming obstacles, willpower, drive, a journey, confidence, ambition	Scattered energy, lack of direction, self doubt

The Chariot is a symbol of determination, travel, and a heightened ability to overcome obstacles. While the card traditionally depicts a princely figure sitting on a chariot pulled by two sphinxes or horses, our Chariot shows a spaceship piloted by a female astronaut. Having worked twice as hard as her male counterparts to get where she is, her drive matches her jet propulsion.

Throughout history, science and technology has allowed humans to transcend natural barriers and thrive in new environments. The spaceship represents the pinnacle of this ambition, which has ultimately enabled us to leave the planet itself. Hopefully, returning home to planet earth will always remain the attractive option.

STRENGTH

The engineering of systems and use of energy like heat and electricity

UPRIGHT	REVERSED
Potency, vitality, confidence, self-belief, enjoying power	Hedonism, self-doubt, lacking courage, lack of self-control, vanity

The Strength card represents calm, deliberate power, and the gradual, patient triumph over circumstance. Traditionally depicted as a gentlewoman calmly taming a lion, our Strength shows a female worker resting after stoking the furnace of a steam engine. Mastering fire and other natural forces allowed us to amplify our strength, build increasingly complex tools, and set us on the path that eventually led to the industrial revolution. This didn't only have positive consequences, as we can see from the soot-covered sky. We are still learning how to use our newly-gained powers without harming ourselves in the process.

THE HERMIT

Self-awareness, metacognition, and brain imaging

UPRIGHT	REVERSED
Soul-searching, introspection, solitude, meditation, self-reflection	Misfit, withdrawing from loved ones, exile, sadness, loneliness

The Hermit is a symbol of introspection. While, traditionally, the card depicts an old man whose face is illuminated by a lantern, our Hermit is a neuroscientist whose face is brightened by photos of his patient's brain. Upside down, the Hermit card suggests loneliness, isolation, but upright it stands for the invaluable quest to find answers within ourselves.

Brain-imaging techniques are the final frontier of this inward voyage. For the first time in history, we can observe the workings of the brain in real time, asking questions about the nature of consciousness and metacognition itself. Meanwhile, increased rates of neurodegenerative diseases also lead to the ultimate form of isolation, where we are no longer able to recognize ourselves and our loved ones.

WHEEL OF FORTUNE

Entropy, chaos and indeterminism

UPRIGHT	REVERSED
Changes, opportunity, luck, destiny, winning, chance	Mishap, unforeseen setback, bad luck, misfortune, disappointment

Intuitively enough, the Wheel symbolizes changing circumstances, drastic reversals of Fortune. Traditionally, this card depicts a revolving wheel with four winged creatures (representing the four suits) sitting around it. Here, the Wheel is represented by the iconic shape of the Hadron collider, the world's largest machine and most powerful particle accelerator, which explores new and unpredictable features of reality.

The Wheel of Fortune reminds us of the temporary, unstable nature of our worldview. New scientific discoveries upend our view of the universe. The world's most stable regimes suddenly seem on the verge of collapse. Particles split and merge to form other particles. The counterintuitive discoveries of subatomic physics become a symbol for all unexpected results in science.

JUSTICE

The conservation of energy

UPRIGHT	REVERSED
Fairness, justice, cause and effect, balance, equilibrium, responsibility	Lack of accountability, unfair treatment, dishonesty, flaws, imbalance

The Justice card signals the restoration of balance and fairness. Usually depicted as scales or a sullen man passing judgment with a sword, our Justice card shows the law of conservation of energy. This fundamental concept of physics states that the total amount of energy in an isolated system remains constant. Stars and galaxies are continuously being formed from the remains of dead stars, atoms rearrange themselves in new forms, life often feeds on other life, but energy cannot be created or destroyed. The first law of thermodynamics is a symbol of the fundamental justice and balance of our universe.

THE HANGED MAN

XII

Paradox, surrender, and sacrifice

UPRIGHT	REVERSED
Letting go, breaking old patterns, circumspection, suspension	Missing an opportunity, inability to change, egotism

The Hanged Man represents surrender, sacrifice, or being suspended in time. Our card depicts the paradox devised by Austrian physicist Erwin Schrödinger in 1935 to illustrate the counterintuitive nature of quantum mechanics. In the famous thought experiment, a cat is simultaneously dead and alive, because his fate depends on a random subatomic event that may or may not trigger the release of poisonous gas. Schrödinger's cat stands for all the paradoxes that scientists have to accept when studying the fundamental nature of reality. It is also an homage to all the animals 'sacrificed' to scientific progress.

DEATH

Extinction and scientific paradigm shifts

UPRIGHT	REVERSED
Endings, severe illness, profound change, letting go of attachments, mortality	Living unaware, depression, long terminal illness, resistance to change

The Death card signals the end of a long process, and the opportunity for reinvention. Traditionally, Death is depicted as a skeleton surrounded by dying people of all classes, including kings, bishops, and commoners. Here, Death is represented by the great dinosaur extinction: a landscape covered in ashes, with dead trees, dead herbivores and, finally, dead carnivores. But every ending implies a new beginning. That sense of possibility is embodied here by a primitive mammal sitting among the bones of the giant reptiles that dominated earth for millions of years. Mass extinctions are an opportunity for the surviving species, who can reassess their position and expand into previously occupied niches. More broadly, Death reminds us that old scientific theories and ideas often need to die before a new paradigm can emerge.

TEMPERANCE

XIV

Geology and deep time

UPRIGHT	REVERSED
Balance, moderation, harmony	Disharmony, imbalance, onset of illness, lack of patience

The Temperance card is a call for patience, calmness. It has been traditionally illustrated as a person pouring liquid from one receptacle into another, usually standing with one foot submerged in water and the other on land. Here, Temperance is an allegorical figure who embodies the elements that shape the surface of our planet: tectonic forces, rain, rivers, and winds, which conspire over thousands of years to break rocks into sand and carve valleys into mountains. This card invites us to contemplate the deep time of geological processes, admire the balance and patience of this endless cycle, which transcends biological life. Like the river, we should sometimes take the path of least resistance, avoiding extremes and cultivating calm and balance.

THE DEVIL

Ownership, patents, and corporate greed

UPRIGHT	REVERSED
Temptation, enslavement, unhealthy relationships, materialism, bondage	Freedom from restraints, breaking from addictions, intellectual freedom

The Devil represents corruption. Traditionally, this card depicts two people willingly shackled to a classic vision of Satan. Our Devil, meanwhile, is the god of capitalism, sitting on the paywall of patents and proprietary journals, which prevent science from being freely shared for the benefit of society. Although science is a collective effort, built upon the efforts of many generations, a few scientists still fall victim to pride and try to preserve ownership of their research. These unhappy souls are represented as demons shackled to the wall and blinded by their greed, handing over the precious fruits of their work to the Devil in exchange for material rewards.

THE TOWER

Climate change

UPRIGHT

Unexpected change, renovation, catastrophe, destruction, accident or damage

REVERSED

Obstacles, volatile situations, losses, illness

The Tower card suggests the possibility of an impending crisis. In traditional decks, a Tower is struck by lightning and consumed by fire. On our card, however, the destruction is not sudden or unforeseen. This ivory Tower is a symbol of academic science, which has predicted the coming catastrophe but remained unmoved by it, and is now being swamped by the rising seas. This card should be a reminder that when science isolates itself from society it becomes powerless, and ultimately undermines its own foundations.

THE STAR

Astronomy and human navigation

UPRIGHT	REVERSED
Good health, opportunities, inspiration, hope	Despair, missed opportunities, disappointments

The Star represents inspiration and true understanding of both the material world and the self. Traditionally, The Star card depicts a naked woman kneeling by a river with one foot in the water and the other on land. In our deck, the woman becomes the Egyptian goddess Nut, who is arched over the world covered in stars.

Under the starry sky, we see ancient astronomers, arguably the first scientists, who often provided both a true understanding of planets and stars (useful for timekeeping and navigation) and a spiritual guide for their society. This card represents the potential for science to provide guidance without devolving into superstition.

THE MOON

Duality and competition

UPRIGHT	REVERSED
Difficulty, insecurity, confusion, deception, hidden things, fear	Unhappiness, release of fear, insomnia, mysteries unveiled

The Moon represents the subtle power of the unconscious mind. Traditionally, it has been illustrated as two dogs facing each other across a river, suggesting that two mutually exclusive ways of seeing something can coexist in time and space. Here, two astronauts from different places stare at each other with hidden faces, as they embark on the same mission. It is a reminder that insecurity is part of science, and there may be more than one way to reach the same goal. The path we choose is at times more of a personal, political or moral choice than a rational one.

THE SUN

Renewable energy and automation

UPRIGHT	REVERSED
Joy, enlightenment, material happiness	False impressions, lack of clarity, sadness

The Sun represents universal harmony, disparate forces coming together to unleash a burst of progress. Our Sun shines on an infant riding a mechanical horse, and its rays are powering a huge network of automated machines in the background. Here, The Sun represents a new utopia, in which humans will be freed from work and live in a perpetual state of harmony and play, energy will be free and cleanly produced, and machines will tend to our every need and desire.

JUDGEMENT

XX

Artificial intelligence and the singularity

UPRIGHT	REVERSED
Decision making, transition, renewal, redemption	Stagnation, self-doubt, poor logic, poor or hasty judgement

The Judgement card symbolizes a drastic transformation that is beyond our control. Traditionally, the card depicts an angel tooting a huge trumpet, resurrecting humans from their graves. Here, the card depicts Artificial Intelligence (inspired by the female automata from the film Metropolis), which will one day surpass human intelligence and propel us into an age of dynamic new beginnings. This day, commonly referred as the 'singularity,' will be the real-life equivalent of biblical Judgment. The new superintelligence will seem like a god to us, operating in inscrutable ways. Will it deliver prosperity and eternal life or judge us as useless beings not worthy of this brave new world?

THE WORLD

Humanity's ability to alter our own form and function

UPRIGHT	REVERSED
Successful conclusions, possibilities, fulfillment, achievement	Delayed success, lack of completion, stagnation, failed plans

The World represents the possibility of wholeness and completion. A woman in a purple suit crosses a circular wreath of DNA, looking behind her to the past, while her body moves forward to the future. She's holding two scientific tools, a futuristic version of the Magician's tools, which she uses to read and modify her own genome. The spirit of creation symbolized by the Magician has now come to fruition with The World.

Science started with answering simple questions about the world around us, but now it has the potential to shape our own evolution. The woman stepping through the wreath represents the ending to a cycle of life, a lull before the next big cycle.

THE FOOL

I
THE MAGICIAN

II
THE HIGH PRIESTESS

III
THE EMPRESS

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THE EMPEROR

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THE HIEROPHANT

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THE SUN

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JUDGEMENT

XXI
THE WORLD

MINOR ARCANA

For minor cards, examine the lesson of each card in relation to the suit and its associated realms, as well as the rank of the card and its meaning.

Suits

Nano is the suit of the invisible fields like math and physics. It corresponds to **Cups** in a traditional deck, symbolizing **emotions, intuition, and water**.

Micro is the suit of the molecular fields like chemistry and microbiology. It corresponds to **Wands** in a traditional deck, symbolizing **creativity, passion, and fire**.

Macro is the suit of the systemic fields like ecology and geology. It corresponds to **Discs** in a traditional deck, symbolizing **money, work, and earth**.

Astro is the suit of the cosmic fields like astronomy. It corresponds to **Swords** in a traditional deck, symbolizing the **intellectual/mental realms, truth, and air**.

Ranks

Ace: new beginnings, potential for change

Two: duality, balance

Three: group growth, creative growth

Four: stability, structures, birthing something new

Five: instability, change

Six: cooperation, communication

Seven: learning from the past, gaining knowledge

Eight: reflecting on lessons learned

Nine: feeling fulfilled, attaining a goal

Ten: completing a cycle, ready to start again

Page: excess of doubt or excess of carelessness

Knight: a blocked state or unrealized potential

Queen: pragmatism and experience, entrenching existing knowledge or perspectives

King: true mastery and foresight, at the risk of falling into complacency or despotism

NANO
emotions, intuition, and water

ACE
new beginnings, potential for change

Ada Lovelace

Your vision of the future could change the world, even if you don't implement it yourself.

Ada Lovelace was the first person to propose that a computer could do a lot more than just math—if it was programmed the right way. She went on to write the first computer program, although the machine she wrote it for was never built.

Today, she is regarded as a programming pioneer and a "prophet of the computer age," reminding us that women not only belong in computer science – the field was actually invented by a woman. The second Tuesday of every October is now marked Ada Lovelace Day, dedicated to honoring Lovelace's legacy and raising the profiles of women in STEM.

Gabrielle du Châtelet

Be independent-minded and take credit for your work.

Du Châtelet was a prodigious mathematical scholar. Women were not allowed to join scientific societies at the time, but that didn't stop du Châtelet from conducting experiments in secret and sharing her findings. In 1737, she participated in a contest by the French Academy of Sciences, submitting an essay on the nature of light, heat and fire. Her research proved the existence of a phenomenon that would later become known as infrared radiation. Châtelet went on to translate Isaac Newton's Principia, which she annotated with notes, clarifications, and experiments that supported his findings. Its publication would prove to be crucial for the establishment of modern science in France.

NANO
emotions, intuition, and water

THREE
group growth, creative growth

Emmy Noether

Approach your field in a revolutionary, big picture, conceptual way.

A brilliant and highly original mathematician, Emmy Noether fundamentally transformed our approach to math and physics from exhaustive bean-counting with figures and formulas to big picture, conceptual thinking. She burst onto the scene by resolving a sticky hang-up in Einstein's theory of general relativity. After a lifetime of being discouraged, excluded, and unpaid, Noether is now hailed as the author of "the most beautiful theorem in the world."

NANO
emotions, intuition, and water

FOUR
stability, structures, birthing something new

Maria Goeppert Mayer

When you love what you do, even nuclear physics can be as simple as a waltz.

Goeppert Mayer is most famous for her Nobel Prize-winning work on Magic Numbers, which explained why certain configurations of protons and neutrons in the nucleus of an atom are more stable than others. But Mayer made groundbreaking discoveries in multiple fields throughout her career. She was the first person to calculate how a complex organic molecule absorbs and emits energy, and predicted two-photon absorption of molecules thirty years before experiments confirmed its existence.

NANO
emotions, intuition, and water

FIVE
instability, change

Lise Meitner

Although it's rare that all scientists on a team get the recognition they deserve, science requires collaboration.

Born in 1878 in Austria-Hungary, Lise Meitner faced relentless discrimination due to her gender and Jewish heritage, but she didn't let that deter her. Forced into Swedish exile during the war, she discovered the process of nuclear fission, one of the most transformative scientific findings of the 20th century. Her work allowed for the development of the atomic bomb (which she strongly opposed) and nuclear energy.

Unable to co-publish research with her collaborator Otto Hahn, Meitner's role in the discovery was long overlooked. Hahn alone was awarded the Nobel Prize for chemistry in 1944. That injustice has never been rectified, but Meitner did have an element named after her (element 109, meitnerium).

NANO
emotions, intuition, and water

SIX
cooperation, communication

Hedy Lamarr

There is no "right" career path.

Inventor Hedy Lamarr is known as the "mother of WiFi," but the full breadth of her genius is only now receiving its rightful due. While working as an actress during World War II, Lamarr used her spare time to engineer inventions that could help the American war effort in Europe. She developed a method of making torpedo signals harder to detect by frequency-hopping between radio waves. After patenting the technology, she donated the information to the United States Navy. This spread-spectrum technology is the basis for all the essential communication devices we use every day.

NANO
emotions, intuition, and water

SEVEN
learning from the past, gaining knowledge

Jean Bartik

Open the door when opportunity knocks.

Jean Bartik programmed some of the first electronic and commercial computers, but her contribution to this age-defining innovation was woefully overlooked for most of her life.

At only 20 years old, in 1945, she become the youngest member of a team of women who were recruited to program the first general-purpose computer. This so-called Electronic Numerical Integrator and Calculator (ENIAC) was able to cut the calculation of complex equations for ballistic missile trajectories from 40 hours down to a matter of seconds.

In her old age, Bartik finally started to get some of the recognition she deserved. In 1986, a Harvard undergrad called Kathy Kleinman wrote her thesis on the women involved in ENIAC, drawing belated attention to these pioneers living in history's blind spot.

Olga Aleksandrovna Ladyzhenskaya

Break down barriers to achieve greatness.

Ladyzhenskaya learned her trade from her mathematician father, before he was executed for treason by Stalin's henchmen. But neither this experience nor the repressive machinations of the Soviet state could stop her from becoming one of the world's leading mathematicians.

Western counterparts marveled at the work of their Russian colleague, who was cut off from the international math community's latest research by the iron curtain. Ladyzhenskaya became best-known for her groundbreaking work on partial differential equations, though her research had implications for areas as diverse as weather forecasting, aerodynamics, and cardiovascular science.

NANO
emotions, intuition, and water

NINE
feeling fulfilled, attaining a goal

Mildred Dresselhaus

Don't let financial hardship stop you from pursuing what you love.

Mildred Dresselhaus — nicknamed the "Queen of Carbon" — is best known for her contributions to our understanding of carbon compounds, including graphite, buckyballs, and nanotubes. In 1968, she became the first woman to receive a tenured professorship at MIT.

Dresselhaus has co-authored over 1,500 papers, eight books and supervised over 60 PhD students. Her research accomplishments and advocacy for women in science and engineering have earned her countless accolades, including 28 honorary doctorates, the first solo award of the $1 million Kavli prize in 2012, and the Presidential Medal of Freedom in 2014.

Grace Hopper

Communicate clearly with everyone around you.

Computer programming pioneer Grace Hopper believed that anyone could be a programmer — if the computer spoke their language. Her invention of the first compiler made coding more accessible. She advocated creating programming languages that worked on any computer, regardless of the manufacturer, and this led to the development of one of the first high-level languages: COBOL.

Hopper received more than 40 honorary degrees and even had a Navy destroyer named in her honor, only the second navy ship to be named after a woman. Following her death in 1992, she was interred with full military honors at Arlington National Cemetery, and was posthumously awarded the Presidential Medal of Freedom.

NANO
emotions, intuition, and water

PAGE
excess of doubt or excess of carelessness

Maryam Mirzakhani

Solving complex problems sometimes requires a simple approach.

In 2014, at the age of 37, Maryam Mirzakhani became the first woman to receive the Fields Medal, widely known as the Nobel Prize for mathematics. The young mathematician devoted her life to her subject. It took her all around the world as a child, winning math competitions, and finally moved her from Tehran to Harvard.

The notes she scribbled in class may have been in Persian, but math is an international language, and Mirzakhani's professors soon realized they had a genius on their hands. Best-known for the work on the geometry of Riemann surfaces and their moduli spaces, the late Stanford professor liked to described herself as a "slow" mathematician: "you have to spend some time and energy to see the beauty of the numbers," she said, memorably.

NANO
emotions, intuition, and water

KNIGHT
a blocked state or unrealized potential

Marjorie Lee Browne

Life isn't only about making discoveries, but also about enabling others to make discoveries of their own.

Mathematics was the love of Marjorie Lee Browne's life. However, as a black woman in America in the 1940s, she faced a "'double whammy' of racism and sexism." Nevertheless, her passion for the subject and devotion to education propelled her to become the third black woman in America to earn a PhD in mathematics. She used her skills to open doors for under-represented students and created initiatives supporting their secondary school and higher education.

NANO
emotions, intuition, and water

QUEEN
pragmatism and experience, entrenching existing knowledge or perspectives

Chien-Shiung Wu

There is no one set way to explore an idea.

Experimental physicist Chien-Shiung Wu was the only Chinese scientist involved in the Manhattan Project. She is best known for the so-called Wu experiment, which proved that the law of conservation of parity does not apply to beta decay. Building on her research, Tsung-Dao Lee and Chen-Ning Yang won the Nobel Prize in Physics. Despite being snubbed herself, Wu is considered a trailblazer in physics, and is often referred to as the First Lady of Physics, or "the Chinese Marie Curie."

NANO
emotions, intuition, and water

KING
true mastery and foresight, at the risk of falling into complacency or despotism

Marie Curie

All enduring achievements require curiosity and persistence.

Widely considered the greatest female scientist ever, Marie Curie discovered two elements, polonium and radium, and developed the scientific theory of radiation. In recognition of that work, she became the first person to win two Nobel Prizes, and only one of two laureates with a Nobel Prize in two different fields (physics and chemistry). Not bad for someone who couldn't land a teaching job after grad school because she was a woman.

MICRO
creativity, passion, and fire

ACE
new beginnings, potential for change

Tapputi

History may not preserve the details of your life, but your example will endure.

Thanks to archeologists, we know that the first recorded chemist was a woman named Tapputi-Belatikallim, who lived in Babylonian Mesopotamia around 1200 BCE. Taputti made perfumes for the royal family with the help of her research sidekick (a woman who has only been known as "()-ninu," since the first part of the name has been lost to history). The techniques she developed, turning water, flowers, oil, and lemongrass into aromatic and long-lasting fragrances, are still employed by chemists today. Aside from their cosmetic benefits, her concoctions were also used for religious rituals and medical practices, making Tapputi an important leader with enduring authority.

Elisa Izaurralde

A fierce dedication to teaching always pays off.

Elisa Izaurralde contributed greatly to our knowledge of RNA, the molecule that translates DNA instructions into our cells and tissues. The Uruguayan biochemist and molecular biologist identified how RNA escapes the center of the cell to spread its molecular message. She also made huge strides in understanding how that message is regulated by the cells.

An active and supportive mentor, Izaurralde was adamant about STEM education for girls and women throughout her career. She led scientific meetings, where she eagerly discussed recent scientific findings, sometimes quite intensely. Despite her busy career, she is remembered most fondly for that extra time she took to support students and independent researchers, helping start many science careers in the process.

MICRO
creativity, passion, and fire

THREE
group growth, creative growth

Gertrude Elion

Don't look to traditional metrics of success: look within.

Biochemist Gertrude Elion shared the Nobel Prize in Medicine in 1988 for "discoveries of important principles for drug treatment." She helped revolutionize how medicines were developed in the lab, making the process much faster and more cost-effective. Her efforts led to a leukemia drug for children, which saved numerous lives, and a drug that delayed the effects of AIDS in HIV patients. She did all of this without ever earning a PhD, dropping out because it distracted her from the professional research she was already doing. Luckily, she was later awarded a multitude of honorary doctorate degrees.

MICRO
creativity, passion, and fire

FOUR
stability, structures, birthing something new

Alice Augusta Ball

Sometimes you must force oil to mix with water to create a solution.

Blessed with a surplus of dedication and diligence, Alice Augusta Ball was the first African American and the first woman to earn a graduate degree at the University of Hawaii. That perseverance drove the young chemist to develop the first effective treatment for leprosy, deriving it from the oil of the chaulmoogra seed. Her treatment would go on to be the standard care for leprosy for the next 30 years. Hall passed away before she could see the full impact of her discovery, but the world was a healthier place thanks to her efforts.

MICRO
creativity, passion, and fire

FIVE
instability, change

Mary Putnam Jacobi

Shine a light on injustice.

Mary Putnam Jacobi had to fight for her education, vigorously protesting until she was accepted as the first female student at the University of Paris. She became a physician in a time when women were expected to remain at home, and an opinionated writer when the intellectual sphere was considered the purview of men.

When a Harvard professor wrote a book arguing that women couldn't attend college because menstruation weakened them too greatly, the suffragette writer responded with a book-length scientific paper. Drawing on psychological data she'd collected from women, Jacobi proved handily that the gentleman's argument was dangerous nonsense. Thanks to her efforts, many future women had to fight a little less hard to get an education of their own.

MICRO
creativity, passion, and fire

SIX
cooperation, communication

Miriam Michael Stimson

Don't let other people's expectations prevent you from pursuing your goals.

Miriam Michael Stimson saw no contradiction between her scientific interests and her devotion to Christ, allowing her to become both a catholic nun and an influential chemist. Her scientific work laid the groundwork for one of the most important discoveries of our time — the structure of DNA. She was able to think outside the box and modify an existing technique, infrared spectroscopy, to give her a more accurate view of the structure of DNA nucleotides.

MICRO
creativity, passion, and fire

SEVEN
learning from the past, gaining knowledge

Rita Levi-Montalcini

Turn the obstacles you face into a training ground.

Rita Levi-Montalcini's conservative family opposed her choice to become a medical doctor. Growing up Jewish in fascist Italy, the academy was closed to her anyway. But that wasn't enough to discourage Levi-Montalcini. She set up a secret lab in her bedroom. The research that began there would eventually win her the Nobel Prize for her work on nerve development. She discovered the nerve growth factor, which continues to be studied for its potential to restore damaged neurons. Her discoveries may yet help us defeat dementia and Alzheimer's.

Rosalyn Sussman Yalow

Even the tiniest details are important.

Dr. Rosalyn Sussman Yalow won the Nobel prize in physiology/medicine for her development of the radioimmunoassay (RIA), an essential medical breakthrough that allowed the precise measurement of substances, such as hormones, in the blood. The medical physicist had been researching diabetes, which required the precise measurement of blood insulin levels. This inspired her and her collaborator Dr. Solomon Berson to invent the revolutionary RIA, which combines immunology and radioisotope tracing to easily quantify the concentration of specific molecules.

MICRO
creativity, passion, and fire

NINE
feeling fulfilled, attaining a goal

Jane Cooke Wright

Work to improve yourself from within. Don't overextend yourself.

Dr. Wright played an instrumental part in the development of chemotherapy in the 1940s and '50s. She was one of the first researchers to test the therapeutic effects of nitrogen mustards, the first available anti-cancer chemicals. She was also one of the first researchers to consider folic acid antagonists as a treatment for cancer, which continues to be used to this day. Dr. Wright was at the forefront of analyzing tumor biopsies to find the most effective cancer drugs.

Helen Rodríguez Trías

Fight for those who can't fight for themselves.

Helen Rodríguez Trías dedicated her life to fighting for the medical rights of marginalized people. After college, she founded the first center for neonatal care in her mother's native Puerto Rico. Back at home in New York, she worked to end the forced sterilization of women, a practice that disproportionally affected impoverished women of color, who were unaware of the procedure's outcome. In the 1980s, she advocated on behalf of poor people suffering from HIV aids. That lifetime of service earned her the Presidential Citizen's Medal.

MICRO
creativity, passion, and fire

PAGE
excess of doubt or excess of carelessness

Barbara McClintock

Let their doubts fuel your perseverance.

Barbara McClintock made major advances in the field of genetics by carefully observing her corn plants. Dismissed by other scientists, who said her results were impossible, she kept watching, researching and writing until her findings were finally vindicated. She was awarded the Nobel Prize in Physiology or Medicine for her discovery of transposons — or "jumping genes." Not only did her findings change the field of genetics, but her story inspires women to this day to fight for recognition of their scientific achievements.

Dorothy Crowfoot Hodgkin

Always remain open to the ways that new methods can help you solve old problems.

A pioneer of physical chemistry, Dorothy Hodgkin used x-ray imaging to understand the 3D structure of important molecules like insulin and vitamin B-12. The British biochemist's innovative approach to crystallography techniques made her the second woman to win the Nobel Prize.

Hodgkin toured the world giving lectures and building connections well into her 80s. In the meantime, she spearheaded and supported the development of many new techniques that chemists use today. Rather than be intimidated by the fast pace of technological advancements, she embraced their ability to help her see more clearly.

MICRO
creativity, passion, and fire

QUEEN
pragmatism and experience, entrenching existing knowledge or perspectives

Marie Maynard Daly

Your health comes first, no matter what.

The first African American woman to obtain a chemistry PhD in the United States, Maynard Daly performed crucial research in the fields of chemistry, molecular biology, and cardiology. Early in her career, she did groundbreaking research on the properties of the building blocks of DNA and protein metabolism. Her work was so transformative to the field that Watson and Crick cited it in their famous Nobel Prize address. Later in life, she conducted team research that provided the first evidence of a connection between high cholesterol, clogged arteries, high blood pressure and heart attacks, which saved an inestimable number of lives.

MICRO
creativity, passion, and fire

KING
true mastery and foresight, at the risk of falling into complacency or despotism

Rosalind Franklin

Even if your work is underappreciated, that doesn't undermine its significance.

Rosalind Franklin used x-ray crystallography to capture Photograph 51 — an image that was critical to deciphering DNA's double-stranded structure. This key contribution was not cited when Watson and Crick proposed a theoretical model of DNA's structure, or later when the 1962 Nobel Prize was awarded to only Watson, Crick and Maurice Wilkins, Franklin's supervisor, for their work on DNA.

MACRO
money, work, and earth

ACE
new beginnings, potential for change

Merit-Ptah

Spend time on issues that will matter for years to come.

A chief physician working in the Pharaoh's court during ancient Egypt's early Dynastic period, Merit-Ptah is believed to be the first woman known by name in the field of medicine. At the time, there were all-women medical schools, and its graduates regularly became physicians and midwives. Aside from her name and job title, little is known about Merit-Ptah, including the name of the Pharaoh she served.

Alice Wilson

If you're feeling overwhelmed, spend some time outside.

Alice Wilson was an outdoorsy child, spending her summers fossil-hunting with her family. As the first female geologist hired by the Geological Survey of Canada, Alice had to fight for the right to pursue a PhD and do fieldwork. She was forbidden from working at remote field sites with her male colleagues, so she made the case that she could work alone in the nearby St. Lawrence Valley. In the next 50 years, she became the leading authority on local fossils and rocks. When she retired, five people had to be hired to replace her.

MACRO
money, work, and earth

THREE
group growth, creative growth

Bertha Parker

Universities don't have a monopoly on intellectual achievement. Sometimes, the most important contributions come from outsiders with boundless curiosity.

Bertha Parker was the first Indigenous North American archaeologist. As a self-taught researcher, she made important contributions to our understanding of early North American civilizations. Her research and work also amplified the voice of overlooked indigenous tribes, documenting and sharing their culture with others.

Her most notable discovery, the skull of an ancient ground sloth (*Nothrotherium shastense*) in Gypsum Cave, dated early humans in North America to the Pleistocene — nearly 10,000 years ago. It was lauded as "the most outstanding anthropological find ever made in the United States."

MACRO
money, work, and earth

FOUR
stability, structures, birthing something new

Frances Hamerstrom

Don't let anyone make you feel unwelcome. Instead, beat them at their own game.

Frances Hamerstrom paved the way for women in wildlife biology. Even though her parents raised her to become a socialite, Frances was always drawn to nature and spent her childhood partaking in "unladylike" activities, like teaching herself how to hunt. She went on to become one of the first female conservation biologists. The research she conducted alongside her husband is credited with saving the Wisconsin prairie chicken and many other species in the region. Hamerstrom was an accomplished researcher, conservation advocate, and public educator. She published several books recounting her experiences breaking into a male-dominated field, inviting others to follow her lead.

MACRO
money, work, and earth

FIVE
instability, change

Mamie Phipps Clark

Science and social justice should go hand in hand.

Mamie Clark grew up in depression-era Arkansas attending segregated schools, and much of her professional life would be dedicated to analyzing the effects of that experience.

She attended Howard University in Washington, D.C. where she earned a Master's degree in psychology and wrote her thesis on the effects of racial segregation on black children's sense of self. The results of Clark's study were later used as scientific evidence in the 1954 Supreme Court case, Brown v. Board of Education of Topeka, and were said to be highly influential on its outcome.

Margaret Mead

Live fearlessly and do not shy away from controversial ideas.

Margaret Mead was a fearless researcher, unafraid of challenging societal ideas and breaking down barriers. She pioneered anthropological and ethnological research techniques and laid the foundation for modern ideas of feminism, gender, and cultural identities. Mead strove to make her research accessible to the public, and in so doing, popularized the field of anthropology.

MACRO
money, work, and earth

SEVEN
learning from the past, gaining knowledge

Marie Tharp

A focused mind can do a lot with a little.

Oceans cover over 70% of Earth's surface. What lies beneath them was long considered an absolute mystery, until Marie Tharp mapped it out — by hand! Due to her gender, she was not allowed on research vessels conducting sonar surveys for the first 17 years of her career. She had to content herself with processing the data collected by her male colleagues, an unglamorous desk job. But that's how she discovered the mid-Atlantic ridge, a finding that revolutionized the whole field of geology, proving Alfred Wegener's theory of continental drift.

Mary Leakey

Put your world in perspective by walking in our ancestors' footsteps.

Mary Leakey led the charge in advancing our understanding of human evolution. She was the first to discover fossilized remains from the Australopithecus boisei and Homo habilis species. Thanks to her discovery of fossilized footprints in Tanzania, we have a far better understanding of how and when our ancestors began to walk upright. Her legacy lives on with the creation of the Leakey Foundation that continues to support young anthropologists.

9

MACRO
money, work, and earth

NINE
feeling fulfilled, attaining a goal

Rachel Carson

Don't be afraid to take on big problems.

Marine biologist Rachel Carson started the modern environmental movement. Her wildly influential book Silent Spring criticized the wholesale and unregulated use of pesticides, ultimately prompting the formation of the Environmental Protection Agency. Going up against established industries is never easy, especially if you're a woman in 1960s America, but Carson's work was unassailable. She stuck to the facts and let them speak for themselves.

Ynes Mexia

There is more than one way to be successful.

Ynes Mexia followed an untraditional career path. The botanist and explorer decided to follow her interest in biology and enroll in college courses at the age of 51. Despite being more than twice the age of her classmates, Ynes' experience and fearlessness made her a formidable field biologist. She didn't complete her degree, but her expeditions and collection trips to remote areas of the Americas were invaluable. The specimens Ynes collected are still being studied today and have led to the discovery of an estimated 500 new plant species.

MACRO
money, work, and earth

PAGE
excess of doubt or excess of carelessness

Katsuko Saruhashi

Promote peace where you can, even if others question your motives.

Katsuko Saruhashi was a fierce advocate for women's equality in science. The first woman to receive a PhD in Chemistry from the University of Tokyo, she went on to conduct revolutionary research in her field, developing novel methods to measure carbon dioxide and, later, nuclear fallout from atomic bomb tests in the ocean. Saruhashi endured criticism due to both her nationality and gender but she persevered, and her research and advocacy led to the eventual ban on nuclear weapon testing. She used her experiences to help fellow female scientists, founding societies to unite and support them.

Janaki Ammal

Devoting your life to a single passion can be liberating rather than limiting.

Janaki Ammal's dedicated her whole life to studying botany. During the 87 years of her life, she did research at institutions all over India, the US, and the UK. In the meantime, she discovered a new variety of eggplant, developed a sweeter sugarcane cross-breed, performed chromosome studies on various flowering plants, deepening our understanding of their evolution, and reorganized the Botanical Survey of India (BSI) upon request of the Prime Minister, eventually becoming the nation's Director-General.

MACRO
money, work, and earth

QUEEN
pragmatism and experience, entrenching existing knowledge or perspectives

Mary Anning

Surround yourself with objects of importance.

Mary Anning spent her entire life in the small seaside village of Lyme Regis, but she knew how to amuse herself. She unearthed incredible fossils of ancient marine vertebrates and invertebrates, including plesiosaur specimens, which had previously been unknown to science. Though often passed over in scientific circles due to her gender, she was a tireless collector who had a large impact on the field of paleontology. Despite being poor, and having no way to attend scientific conferences or publish the results of her work, Anning had an enormous impact on the newly emerging field of paleontology. From her small seaside village, she helped change people's perceptions of extinction and evolution.

Maria Sibylla Merian

Nature's tiniest details contain some of her biggest secrets.

Working as a scientific illustrator in the 17th century, Maria Sibylla Merian became so fascinated with insects and plants that she effectively transformed herself into an entomologist. Even the ultimate authority on everything, Sir David Attenborough, regards her illustrated books as significant milestones in the field. She travelled the world for forty years, publishing on specimens local and global. Her six books, several depicting insects in detail and describing their life cycle and the food source, set the gold standard for scientific illustration.

ASTRO
intellectual/mental realms, truth, and air

ACE
new beginnings, potential for change

Hypatia

The pursuit of truth is noble, even if it's not appreciated at the time.

She is remembered mostly for her martyrdom, but the life of Hellenistic intellectual Hypatia was quite something, as well. Living in 4th century Alexandria, she became the first female mathematician to share her knowledge with broader audiences, making her both an influential philosopher and a kind of public intellectual.

Heralded as one of the "last great thinkers," she was violently murdered around 415 A.D. by a mob of Christian zealots during a time when Alexandria—a prominent cultural center of scholarly and academic pursuits for Western civilization—was rife with religious conflicts.

ASTRO
intellectual/mental realms, truth, and air

TWO
duality, balance

Annie Jump Cannon

Overcoming personal tragedy is never easy, but it can be a transcendent experience.

In 1893, Cannon contracted Scarlet Fever, which left her almost entirely deaf. The next year, her mother died. Bereft and at a crossroads, she began to work at the Harvard College Observatory. It was there she began her collaboration with Edward Pickering, Williamina Fleming, and Antonia Maury, who were hard at work cataloging the heavens. Cannon began grouping stars into 7 spectral classes based on their color, from blue to red: O, B, A, F, G, K, M. Using this system, Cannon catalogued almost 230,000 stars and discovered an additional 300. The current Morgan-Keenan system of star classification is still based on Cannon's stellar classes, with a few derivations to account for a star's luminosity.

ASTRO
intellectual/mental realms, truth, and air

THREE
group growth, creative growth

Henrietta Swan Leavitt

Even the humdrum can lead to incredible discovery.

Leavitt was an incredibly meticulous astronomer, who analyzed nearly 2000 photographs to establish the relation between a Cepheid variable star's brightness and the duration of its brightening-dimming cycle. This seemingly humdrum research turned out to be pivotal for a better understanding of our universe. Edwin Hubble relied on Leavitt's observations to determine that the universe is expanding. The 2011 winners of the Nobel Prize in Physics built upon both Leavitt's and Hubble's research to show that the universe is not only expanding, but that the rate of expansion is accelerating.

ASTRO
intellectual/mental realms, truth, and air

FOUR
stability, structures, birthing something new

Cecilia Payne-Gaposchkin

A healthy sense of wonder can sustain you for a lifetime.

Payne-Gaposchkin decided to become a scientist at age 8. She settled on astronomy in college, after attending a transformative lecture. Although she completed her studies at Cambridge, as a woman she was not entitled to a degree. Cecilia moved to the US, and in 1925 she earned her PhD from Harvard, with a thesis described by a colleague as "the most brilliant ever written in astronomy." She demonstrated that hydrogen is by far the most common element in stars, and went on to become the first female tenured professor and department chair at Harvard.

ASTRO
intellectual/mental realms, truth, and air

FIVE
instability, change

Caroline Lucretia Herschel

You can outgrow the limitations placed on you.

Growing up in Germany in the mid-19th century, Caroline Herschel never enjoyed the privilege of a formal education. Fortunately, her brother William took her on as an assistant in his work as court astronomer to King George III. There she learned the tools of her trade, crafting telescopes by accurately grinding and polishing mirrors, scanning the night skies with them, discovering stars, comets, and nebulae. Later in life, Caroline was the first woman to be named an Honorary Member of the Royal Astronomical Society.

ASTRO
intellectual/mental realms, truth, and air

SIX
cooperation, communication

Antonia Maury

Always stand up for yourself and your work.

Antonia Maury worked as one of the so-called Harvard Computers, a group of women who processed astronomical data. Maury devised a new stellar classification system. Her ambition irritated her supervisor, and Antonia thus decided to leave the observatory. She was asked to return and complete her work or hand it over to a colleague but remained firm until she was sure she would receive full credit for it. Her stellar catalogue became the first observatory publication to bare a woman's name on the title page. Notwithstanding a few updates, it is still in use today.

ASTRO
intellectual/mental realms, truth, and air

SEVEN
learning from the past, gaining knowledge

Maria Margaretha Kirch

Don't let anyone discourage you from pursuing your dreams.

18th century Astronomer Maria Margaretha Kirch made essential contributions to her field, discovering a new comet and publishing accurate calendars based on astronomical observations. She was well-respected by the community, though, being a woman, she rarely received public acknowledgment. Her achievements helped pave the way for future women to take their rightful place in scientific fields.

Maria published her research in popular little pamphlets, including a description of the Aurora Borealis. She even predicted an upcoming conjunction of the sun, Saturn and Venus three years prior to its occurrence in 1712. She was the second female in the Holy Roman Empire to publish research under her own name.

Maria Mitchell

It's okay to leave the party and go outside. The night sky will do you good.

Maria Mitchell was one of the first American astronomers, and the first woman to track the path of a comet. She became the first professor hired by Vassar College. Among her many contributions to science, Maria Mitchell took some of the first photographs of space, including pictures of sunspots.

She often took on young women as students and advocated on their behalf. For example, she lobbied for her all-female class of astronomy students to be allowed out past curfew to make use of the College's observatory at night. Needless to say, she got her way.

ASTRO
intellectual/mental realms, truth, and air

NINE
feeling fulfilled, attaining a goal

Mary Golda Ross

Most acts of heroism
are performed in secret.

Mary Golda Ross, of the Cherokee tribe, was one of the first Native American female engineers. At the height of World War II, she was recruited as the first and only female engineer at a top-secret think tank. Much of her work there remains classified to this day. She contributed to the foundation of space exploration, turning theory into reality, by co-writing the NASA Planetary Flight Handbook, working on satellite orbits, and building the Aegis space rocket.

ASTRO
intellectual/mental realms, truth, and air

TEN
completing a cycle, ready to start again

Vera Rubin

Some mysteries are too great to solve in one lifetime.

Vera Rubin proved the existence of dark matter, a mysterious phenomenon we are still trying to understand today. She was determined to succeed in a scientific discipline dominated by men. That unique focus allowed her to lead the charge on the discovery of something long theorized but never observed. In her free time, Rubin championed the role of women in science and continued to campaign for the increased inclusion of women in astronomy.

ASTRO
intellectual/mental realms, truth, and air

PAGE
excess of doubt or excess of carelessness

Ursula Le Guin

The road to success is paved with rejections.

Author Ursula Le Guin elevated science-fiction and fantasy novels to the realm of high literature, influencing several generations of writers along the way. Born Ursula Kroeber in 1929, the youngest child and only daughter of two anthropologists, she grew up in Berkeley, California, surrounded by academic conversations, books, and a fantastic imagination. In her father's library, Le Guin discovered the Tao Te Ching. Its themes of balance would reappear throughout her work — she would even undertake the text as a translation project later in her career.

ASTRO
intellectual/mental realms, truth, and air

KNIGHT
a blocked state or unrealized potential

Williamina Fleming

If you succeed, leave the door open for those coming after.

Williamina Fleming developed a catalog system for stars and other astronomical features. She discovered 10 novae, 52 nebulae, and 310 new stars, most famously discovering the Horsehead Nebula in 1888. In 1906, she became the first American woman to be elected to the Royal Astronomical Society. Fleming also helped open the field of astronomy to women by hiring and supervising a team of women to help catalog stellar spectra, as well as publishing a paper focused on research completed by other female astronomers at the observatory.

ASTRO
intellectual/mental realms, truth, and air

QUEEN
pragmatism and experience, entrenching existing knowledge or perspectives

Annie Easley

Small, consistent contributions can be just as powerful as a single great one.

Annie Easley dedicated her life to learning and sharing her knowledge with others for the greater good. As valedictorian of her graduating class, she was primed for great things, starting with a university education from Xavier University. Easley went on to spend 34 years working at NASA, first as a human computer, then as a programmer and software developer. She contributed to the development of alternative energy, the batteries used in hybrid cars today. She did crucial work on the Centaur rocket, which has been used to launch weather and communications satellites, and exploration spacecrafts such as Viking, the first spacecraft to land on Mars.

ASTRO
intellectual/mental realms, truth, and air

KING
true mastery and foresight, at the risk of falling into complacency or despotism

Wang Zhenyi

Being a scientist is one of the most creative occupations.

Wang Zhenyi was born in 1768 during the early years of the Qing dynasty, an intensely patriarchal era that confined women to domestic roles. In a time when women's education was restricted to cooking, sewing, and child-rearing, Zhenyi accumulated unparalleled scientific knowledge through disciplined self-education. She passed away at the young age of 29, but by then she had undermined common societal assumptions about women, and demonstrated how science, rather than divine interventions, could explain lunar eclipses and gravity.

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Rose Harmon
RoseRed Robisnon
Ross Jackson
Roylin Downs
Salmaan Craig
Sandee Kastrul
Sandy Fernandez & Keith Tapper
Sarah Bisceglie
Sarah Ginsburg
Sarah Jessop
Sarah Smaga
Shakeer Rahman
Shane M Hanlon
Shawn Poiley
shondra leigh
Silvia Irahola
Silvina Ferradal
smash the patriarchy
Sonia Shechet Epstein
Sophie Clayton
Stacy Psaros
Stephany Mazon
Stuart Vyse
Tasha Campbell

Tasha Turner

Tegan Usagi

The Johansen Hurwitt Family

The Oh Family

The Squirrels

Theodora Sarah Abigail

Theory Gang

Timotheus Gmeiner

Torry Crass

Tree Raine

Uschi Symmons

Veronica I. Arreola

Vickie Curtis

Vik Wqz

Will Canine

Win Mixter

Wythe Marschall

Yosef B

Zane Wolf

and 79 others.

Thank you.