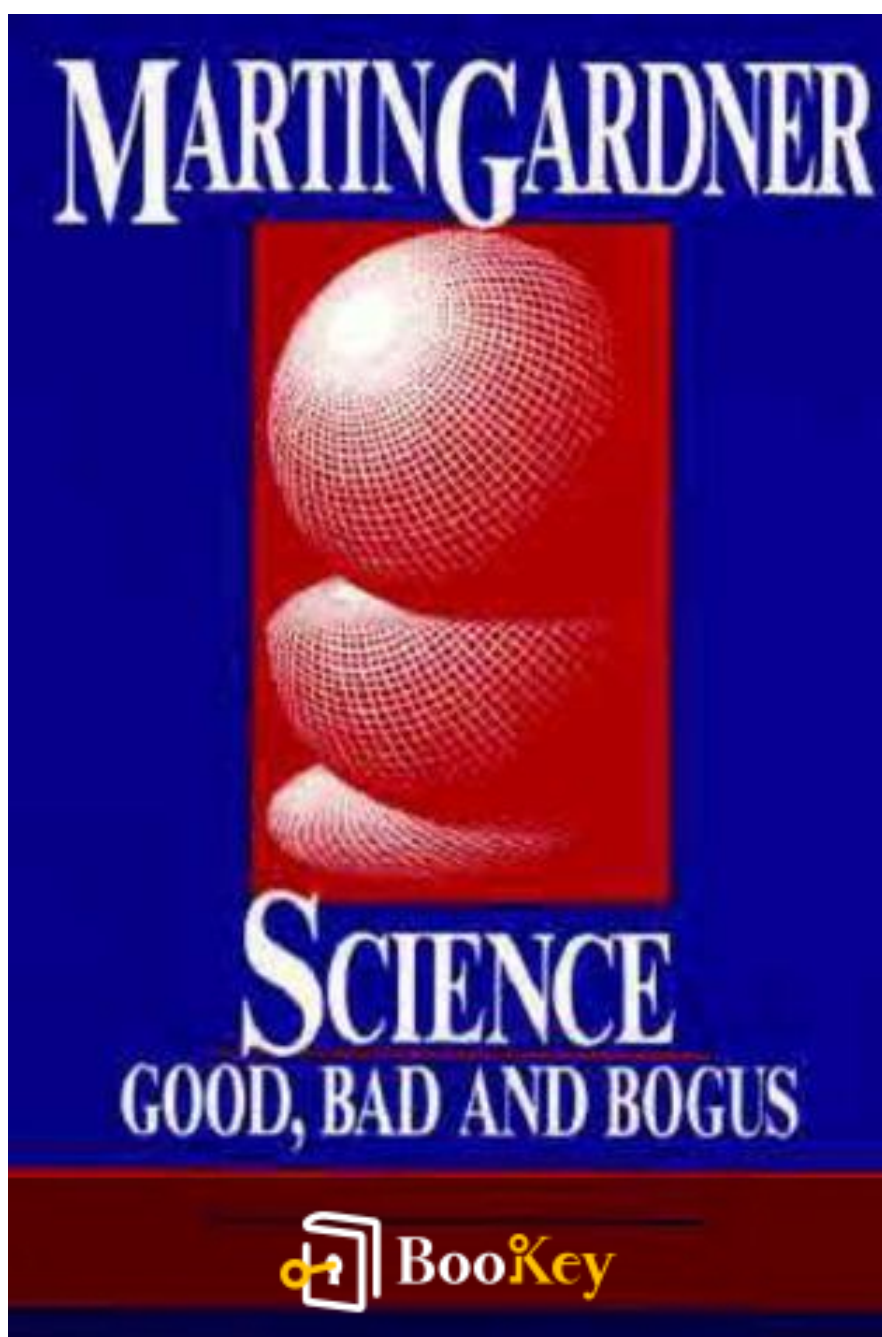


Science By Martin Gardner PDF (Limited Copy)

Martin Gardner



More Free Book



Scan to Download

Science By Martin Gardner Summary

"Exploring the Wonders and Mysteries of the Universe."

Written by Books1

More Free Book



Scan to Download

About the book

****Introduction to Martin Gardner's *Science: A Guided Journey Through the Wonders of the Natural World*****

Step into the fascinating realm of Martin Gardner's **Science**, a masterpiece that deftly weaves together the tangible and the whimsical threads of the natural world for both inquisitive minds and seasoned scholars. With his signature wit and clarity, Gardner unveils the foundational principles that govern our universe while infusing each concept with a sense of wonder and curiosity. This book isn't just a deep dive into scientific phenomena, but a celebration of science's ability to inspire awe and ignite imagination. As you turn the pages, you'll traverse the intricate path of discovery, from the microscopic wonders of biology to the cosmic choreography of astronomical phenomena, all enhanced by Gardner's flair for illuminating the elegance inherent in nature's mysteries. Whether you're a budding scientist eager to explore the vast landscapes of science or a casual reader seeking intellectual nourishment, Gardner's text promises a compelling journey that will strengthen your understanding and appreciation of the world around you.

More Free Book



Scan to Download

About the author

Martin Gardner (October 21, 1914 – May 22, 2010) was an ingenious American writer known prominently for his exploration of mathematics and puzzles, his critical approach to pseudoscience, and his long-running "Mathematical Games" column in Scientific American. Garnered respect as one of the most influential pop-mathematics and popular science writers, his work conveyed complicated subjects with clarity and charm, elucidating curiosities that bridged the gap between professional mathematicians and inquisitive novices. In addition to his mathematical endeavors, Gardner was a prodigious author and skeptic who penned dozens of books spanning topics from philosophy and logic to religion and literature. His distinctive style, characterized by a blend of humor, wit, and a deep understanding of the subjects he engaged in, resonated with readers across generations, reinforcing his status as a revered figure in scientific thought and literary circles alike.

More Free Book



Scan to Download



Try Bookey App to read 1000+ summary of world best books

Unlock **1000+** Titles, **80+** Topics

New titles added every week

Brand

 Leadership & Collaboration

 Time Management

 Relationship & Communication



Business Strategy

 Creativity

 Public

 Money & Investing

 Know Yourself

 Positive Psychology

 Entrepreneurship

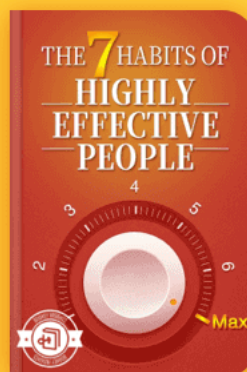
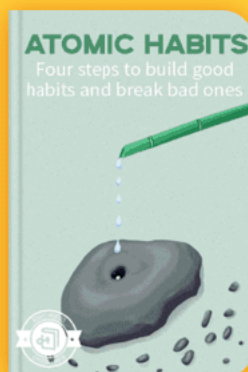
 World History

 Parent-Child Communication

 Self-care

 Mind & Spirituality

Insights of world best books



Free Trial with Bookey



Summary Content List

Chapter 1: ASTRONOMY

Chapter 2: CHEMISTRY

Chapter 3: PHYSIOLOGY

Chapter 4: PSYCHOLOGY

Chapter 5: GENERAL MATHEMATICS

Chapter 6: PROBABILITY

Chapter 7: GEOMETRY

Chapter 8: NUMBERS

Chapter 9: LIGHT

Chapter 10: GRAVITY

Chapter 11: STATIC ELECTRICITY

Chapter 12: MECHANICS

Chapter 13: AIR

Chapter 14: HYDRAULICS

Chapter 15: HEAT

Chapter 16: SOUND

More Free Book



Scan to Download

Chapter 17: INERTIA

More Free Book



Scan to Download

Chapter 1 Summary: ASTRONOMY

Certainly! Here's a summarized version of the chapters with additional context and logical flow:

Watch Becomes Compass

In any situation where the sun is visible, a traditional analog watch can serve as a makeshift compass. To utilize this method, hold the watch flat and point the hour hand toward the sun. Then, imagine a line from the center of the watch through a midpoint between the hour hand and the number twelve. This imagined line will indicate the southward direction.

The principle hinges on the position of the sun concerning local time. In the northern hemisphere, the sun is directly south at noon. Before noon, the sun lies to the left (or counterclockwise) of the twelve on the watch, and after noon, it's to the right (or clockwise). This makes it crucial to bisect the angle correctly depending on whether it's before or after midday. Since the hour hand completes two full rotations in a day and the sun makes one, the movement of the sun appears slower, requiring the halving of the angle for accurate direction. South of the equator, the technique is inverted, with the number twelve being pointed at the sun, and the angle then revealing the

More Free Book



Scan to Download

direction of north.

Oatmeal-Box Planetarium

For astronomy enthusiasts, constructing a simple planetarium using an oatmeal box provides a creative and educational tool for studying star constellations. Start by copying a star chart constellation onto a piece of paper and placing it face down on the bottom of an oatmeal box. Punch through the dots of the constellation with a nail to create a mirrored pattern.

To project the constellation, take the box into a dark room and insert a flashlight into the box's open end. By angling the flashlight's beam against the box's interior, you can project an enlarged image of the constellation onto a wall or ceiling. Rotating the box allows you to view different positions of the constellation, simulating the star's movement across the night sky.

Penny Paradox

The Penny Paradox offers insight into why the Earth appears to rotate an extra time compared to a fixed star during its annual orbit around the sun. From a solar system perspective, Earth completes $365\frac{1}{4}$ rotations, but from a stellar vantage point, it appears to rotate $366\frac{1}{4}$ times, defining a "sidereal day" as slightly shorter than a "solar day."

More Free Book



Scan to Download

This phenomenon can be visualized with an experiment involving two pennies. Place them edge-to-edge on a table. While holding one penny steady, rotate the other around it until it returns to its starting position. Observers might expect the penny to make one rotation, but it actually completes two. This illustrates the additional rotation phenomenon, a fascinating example of relative motion in celestial mechanics.

These descriptions collectively convey practical uses of everyday items for scientific exploration while also capturing the conundrum of Earth's rotational movements, making the science accessible and engaging to readers interested in these topics.

More Free Book



Scan to Download

Chapter 2 Summary: CHEMISTRY

Chapter Summary: Chemistry and Physics Experiments

1. Combustible Cube:

This chapter introduces the concept of a catalyst in chemistry. A catalyst is a substance that accelerates a chemical reaction without undergoing any change itself. To demonstrate this, we use a simple experiment with a sugar cube, some ash from a cigar or cigarette, and matches. Initially, you find that a sugar cube placed on a dish cannot be ignited simply with a match.

However, when a bit of ash is rubbed onto one side of the cube, it catches fire and burns steadily when you try again. Here, the ash acts as a catalyst, triggering the sugar to ignite without itself burning. This illustrates how catalysts can facilitate reactions without being consumed in the process.

2. Lift That Cube:

Described as a puzzle suitable for a dinner table scenario, this experiment teaches about the properties of salt and ice. You have an ice cube floating in a glass of water and a piece of string about four inches long, and the



challenge is to lift the cube with the string without touching the ice directly. The solution involves using salt to exploit the melting and freezing properties of ice. By laying the string over the cube and sprinkling salt on top, the ice begins to melt slightly at the point of contact. This melting absorbs heat, causing the surrounding water to freeze, and when the string is lifted after a minute or two, the ice cube adheres to it. This experiment highlights that unless sufficient salt is used to melt all the ice, any melted water on a cold surface will refreeze—a useful lesson for de-icing sidewalks.

3. Copying Fluid:

This section provides a method to transfer images from newspaper to blank paper, using a specially prepared fluid. To create this copying fluid, mix four parts water with one part turpentine, adding a small amount of soap. The soap enables the formation of an emulsion, preventing the turpentine and water from separating due to their different specific gravities. To copy an image, the newspaper print is moistened with this fluid and a blank paper is placed over it. Rubbing the paper firmly with the bowl of a spoon dissolves enough ink for a reverse impression to transfer onto the blank sheet. This technique exploits the dissolving properties of turpentine to achieve the desired result.

Note: Each described experiment uses simple materials and



demonstrates basic scientific principles in an engaging and practical manner, allowing for easy understanding of chemistry and physics concepts.

More Free Book



Scan to Download

Chapter 3 Summary: PHYSIOLOGY

The chapters provided delve into various intriguing experiments that explore concepts related to psychology and human physiology. Here's a summarized rendition that weaves in necessary context for better understanding:

Split Personality:

Fifty years ago, a group of German psychologists introduced a simple yet fascinating experiment to unveil the dual aspects of an individual's personality. The test involves using an unframed pocket mirror and a front-view photograph of a person. By positioning the mirror vertically along the center of the face in the photograph, an interesting visual illusion is created, producing two composite images—one of the left side mirrored and the other of the right. This method, while dismissed today by reputable psychologists, was believed to reveal the optimistic and pessimistic sides of a person. What remains from this playful experiment is the insight into asymmetry in human facial features, suggesting that no two sides of a person's face are identical.

Catch the Bill:

A simple, yet deceiving challenge involving a dollar bill explores the

More Free Book



Scan to Download

nuances of human reaction times. If you hold a bill in your left hand and position your right hand below it, catching it when released is easy due to simultaneous signals sent by the brain to both hands. However, if you attempt the same trick with someone else, they will find it difficult to catch the bill. This is because their brain requires time to process the visual cue, then send a signal to the fingers, which ultimately results in a delay long enough to miss catching the bill. This exercise subtly introduces the concept of reaction time and the delay between sensory perception and motor response.

Pulse Detector:

Traditionally, detecting a pulse visually required expensive equipment. However, this chapter introduces a cost-effective trick using a simple thumbtack and a large wooden kitchen match stick. By balancing the match stick on the wrist where the pulse is felt, one can observe the match head vibrating with each heartbeat—a cleverly simple yet effective way to witness the pulse without complex tools.

The Crooked Path:

This experiment provides insight into the development of motor skills and eye-hand coordination. By attempting to trace a path on a page seen only through its reflection in a mirror, one can experience the initial struggles



young children face when learning to draw or write. This difficulty arises from the brain's pre-conditioned reflexes for coordinating hand movements being challenged by the reversal of the mirrored image, thus simulating a child's learning curve.

One or Two Points?:

Using a bent hairpin, this chapter demonstrates the varying sensitivity of different body parts to pressure points. When touching the forearm, most people cannot differentiate between one or both points of an inch-apart hairpin, whereas the fingertips can easily distinguish the two points when they are closer together. This highlights the significant variation in tactile sensitivity across the human body and can be further explored by creating a chart of body sensitivity.

Overall, these chapters weave together a series of engaging and illustrative exercises that provide insight into the complex workings of human perception, reaction, and coordination, offering both an entertaining and educational exploration of physiology and psychology.

More Free Book



Scan to Download

Chapter 4: PSYCHOLOGY

The chapters presented explore various optical illusions and perceptual phenomena that reveal how our senses can be deceived. These illusions are fascinating both for their simplicity and for what they tell us about human perception.

1. **Floating Frankfurter:** This illusion involves placing your index fingers close together and focusing on a distant point. Your brain does not properly combine the images from each eye, creating the appearance of a floating "wienie"-shaped finger, demonstrating the limitations of binocular vision.

2. **Circles on the Card:** By drawing lines on a card and spinning it around a pin, you can create the illusion of concentric circles. This occurs because certain spots on the lines create a darker impression as they rotate, highlighting how motion can alter our perception of static patterns.

3. **Missing Slice:** This illusion shows an apparent missing slice from a cake by flipping an image upside down. Our brains interpret it differently due to unfamiliar viewing angles, exemplifying how context influences perception.

4. **The Penetrating Match:** This trick uses a rubber band and matches to



create the illusion of one match passing through another. Quick movements deceive the eye, showcasing how motion can mask reality.

5. **Moon Illusion:** This discusses how the moon appears larger on the horizon than when overhead, a long-debated illusion with theories focusing on contextual size comparisons being non-universal since the illusion appears at sea too.

6. **Penny Illusion:** Attempting to place a penny on a drawn table seems possible but fails due to perspective distortions in the drawing, revealing how visual cues trick spatial reasoning.

7. **See Through Your Hand** By looking through a paper tube while holding your hand beside it, you can see a "hole" in your hand, demonstrating binocular vision's quirks and brain's integration of separate images.

8. **Ghost Penny:** Rapid movement of two held pennies creates a phantom third coin, highlighting retinal image retention and illustrating persistence in perception.

9. **Spooky Spiral:** A seemingly twisting spiral is actually concentric circles. Such illusions occur due to color and pattern interactions confusing the brain's interpretation of simple geometric shapes.



10. **Paper Movies:** By flipping a paper with alternating images, a motion effect is created, akin to early animation. This feat showcases how perception of motion emerges from rapid sequential images.

11. **Twirl a Thaumatrope:** A simple device demonstrates retinal persistence, blending two separate images into one when spun rapidly, illustrating early principles of animation and perception.

12. **Pencil Illusions:** With rapid shaking, a pencil appears to bend like rubber. This illusion results from rapid motion blurring perception, manipulating visual expectations of solidity.

13. **The Illusory Pendulum:** A pendulum viewed through dark glasses over one eye seems to change direction, highlighting differences in image processing speed based on light intensity.

14. **Hot or Cold?:** Submerging fingers in differing water temperatures then transitioning to room temperature water highlights subjective perception, illustrating unreliability in sensory-based judgments.

15. **Take Another Look!:** A simple reading puzzle shows people often miss repeated words due to Gestalt reading—recognizing whole shapes rather than individual components—revealing limits of rapid visual



processing.

16. Mnemonic Aids: Discusses mnemonic techniques to improve memory recall by creating associations, illustrating principles of cognitive organization in remembering complex information.

These chapters collectively delve into the fascinating world of human perception and the brain's interpretation of visual stimuli, offering engaging insights into the quirks of how we see and understand our environment.

Install Bookey App to Unlock Full Text and Audio

Free Trial with Bookey





Why Bookey is must have App for Book Lovers



30min Content

The deeper and clearer interpretation we provide, the better grasp of each title you have.



Text and Audio format

Absorb knowledge even in fragmented time.



Quiz

Check whether you have mastered what you just learned.



And more

Multiple Voices & fonts, Mind Map, Quotes, IdeaClips...

Free Trial with Bookey



Chapter 5 Summary: GENERAL MATHEMATICS

General Mathematics – Topsy-Turvy Tumblers and Reverse Ticktacktoe

This segment delves into the intriguing world of mathematical puzzles, beginning with the "Topsy-Turvy Tumblers" trick. Imagine a simple setting: three empty drinking glasses aligned in a row, with the middle glass upright and the end glasses inverted. The challenge is to turn two glasses at a time and, within three moves, have all three glasses standing right side up. The solution involves flipping the first two glasses, then the first and the last, and finally, the first two again. The clever twist is when you secretly alter the setup by flipping the middle glass upside down. From this altered starting point, the puzzle becomes unsolvable, leaving your friends baffled until they notice your sly adjustment.

Transitioning into "Reverse Ticktacktoe," this section explores a twist on a familiar game where the objective is reversed: the first player to align three marks in a row loses. This variation introduces a more complex mathematical strategy, as the second player, with careful play, can usually secure a win—unless the first player begins in the center. To force a draw, the first player must consistently mirror the opponent's moves directly opposite, maintaining symmetrical play. Engaging in this reversed strategy creates an entertaining challenge, prompting players to leave their opponent



with as many winning paths as possible, thus turning a traditionally simple game into a strategic exercise.

Chapter Segment	Content Overview
General Mathematics – Topsy-Turvy Tumblers	This part of the chapter explains a fascinating puzzle involving three glasses. The puzzle asks participants to use three moves to turn all glasses upright by flipping two at a time. However, secretly flipping the middle glass downside renders the puzzle unsolvable, adding an amusing trick element.
Reverse Ticktacktoe	This section introduces a reversed version of the ticktacktoe game, where the player who lines up three marks first loses. The strategic variation encourages players to think ahead, with the second player often favored unless the first starts in the center. A successful strategy involves mirroring the opponent's moves, thereby complicating a usually simple game.



Critical Thinking

Key Point: Transforming challenges enhances strategic thinking

Critical Interpretation: One of the most impactful insights from this chapter is your newfound appreciation for transforming familiar challenges into complex problems, such as when engaging with 'Reverse Ticktacktoe.' By altering the common rules and flipping expectations, you learn to approach situations with creativity and innovative thinking. This shift in mindset not only sharpens your analytical skills but also encourages you to assess life's challenges with a fresh perspective, potentially revealing more strategic pathways than originally perceived. Embracing such puzzles can inspire you to see obstacles as opportunities to cultivate flexibility, strategic foresight, and problem-solving prowess in everyday situations.

More Free Book



Scan to Download

Chapter 6 Summary: PROBABILITY

The chapter delves into the concept of probability through two intriguing scenarios: determining the likelihood of various gender combinations in a family of four children and evaluating the odds in a three-card game.

In the first scenario, the question is posed: if you have four children, how many of them will likely be boys, and how many will be girls? It outlines three potential outcomes: all children being of one gender, a 3-1 split of genders, or an even 2-2 split. Contrary to popular belief that a balanced gender combination is most likely, the odds actually favor a 3-1 split. This is demonstrated by listing all 16 possible gender permutations for four children. Eight permutations result in three children of one gender and one of the other, giving it a probability of 1:2. Conversely, only six permutations result in an equal number of boys and girls, equating to a probability of 3:8. The least likely outcome, where all children are of the same gender, occurs in only two permutations, with a probability of 1:8.

The second part of the chapter explores probability through a three-card game. The game involves three cards: one black on both sides (BB), one white on both sides (WW), and one black and white (BW). After shaking them in a hat, you draw a card and place it on the table. The challenge is to determine the odds that the underside matches the upper side. If the upper side is black, logic might suggest a 50-50 chance between the BB and BW



cards. However, there are three possible scenarios: the visible black side could be the BW card's black side or either side of the BB card. Of these, two scenarios result in the underside matching the top, while only one does not, thereby making the odds 2:1 in favor of a match.

Both scenarios illuminate the often counterintuitive nature of probability, challenging common assumptions and illustrating how probability can be calculated to reveal less obvious truths.

Scenario	Description	Possible Outcomes	Probabilities
Gender Combination in a Family of Four	Determining the likely distribution of boys and girls.	4 children of the same gender 3 children of one gender, 1 of the other 2 boys and 2 girls	1:8 likelihood for all children of one gender 1:2 likelihood for a 3-1 gender split 3:8 likelihood for a balanced split
Three-Card Game	Determining the odds that the underside of a drawn card matches the upper side.	Visible black side could be from the BB card's black sides Visible black side could be from the BW card's black	2:1 odds in favor of a match (two matching scenarios, one non-matching scenario)

Scenario	Description	Possible Outcomes	Probabilities
		side	

More Free Book



undefined

Critical Thinking

Key Point: Probability often defies intuition.

Critical Interpretation: In exploring the concept of probability, you unveil an unexpected truth: what appears obvious is not always what is most probable. In life, just like in Martin Gardner's scenarios of gender combinations and card games, your assumptions can often lead you astray. By understanding and applying the principles of probability, you can navigate decisions more effectively, weigh the chances with a clear head, and embrace outcomes with wisdom. This insight encourages you to challenge your instincts, look beyond surface-level perceptions, and approach life's unpredictabilities with analytical curiosity, equipping you with a richer, more informed perspective.

More Free Book



Scan to Download

Chapter 7 Summary: GEOMETRY

The chapters presented explore intriguing concepts and clever mathematical curiosities from classical geometry and beyond, offering practical solutions and mind-bending paradoxes that engage both enthusiasts and those new to the subject.

Trisecting an Angle: The age-old problem of trisecting an angle using only a compass and straightedge, deemed impossible by modern mathematics, is tackled with a unique approach involving a cleverly designed cardboard device. By positioning this tool at the appropriate points of the angle, one can achieve an accurate trisection. Even when faced with acute angles, the method allows for doubling and subsequent trisecting, followed by bisecting to derive the original angle's trisections.

Spinning a Hypocycloid: Introducing the concept of hypocycloids, these chapters explore curves traced by a point on the rim of one circle rolling inside another. For instance, a "deltoid" shape emerges when the rolling circle's diameter is one-third that of the larger circle. With a curious twist, readers are encouraged to hypothesize the shape formed when the diameter is half, leading to hands-on experimentation with paper circles and pie pans—a delightful blend of prediction and discovery.

Geometrical Shortcut: Moving from theory to practical application, a

More Free Book



Scan to Download

shortcut technique for finding a circle's center is unveiled, favored by commercial artists for its simplicity. By leveraging a sheet of paper and deploying specific intersections along the circle's edge, this method replaces a complicated compass process, making the task accessible to those less mathematically inclined.

Drawing a Perfect Ellipse: While a compass easily draws circles, crafting a perfect ellipse involves a clever use of two pins and a looped string. As the string is stretched and traced with a pencil, an ellipse emerges, illustrating the geometric property of a constant sum of distances from two fixed points, known as foci. This hands-on technique visually exemplifies the principles underpinning elliptical shapes.

Paper-Fold Proof: A whimsical yet surprisingly effective method presents a "paper-fold" proof that the triangle's angles sum to 180 degrees. By cutting a paper triangle and folding its corners to converge at the base, the angles collectively form a straight line—an intuitive and engaging proof accessible to anyone with paper and scissors.

Through the Hole: Engaging the curiosity, readers learn the surprising feat of passing a larger coin through a smaller hole, utilizing strategic paper folding. This paradoxical trick relies on geometry, illustrating a fascinating principle where the hole's circumference slightly exceeds twice the coin's diameter, sufficing the requirements for a seemingly impossible puzzle.



Paradox for Squares: An entertaining paradox is introduced, showing a zigzag path across a square, leading to the erroneous conclusion that a square's diagonal equals twice its side length. This playful exploration demonstrates the fallacy, as the zigzag never truly becomes a straight line, maintaining a path length that is always 200 units, regardless of step size.

Pythagorean Plesantry: The Pythagorean theorem, a cornerstone of geometry, is approached with an innovative and tactile proof. By cutting squares from a right-angled triangle and creatively arranging them, the theorem's truth—that the square on the hypotenuse equals the sum of the squares on the other two sides—becomes visually expressible. This unorthodox yet convincing proof invites a deeper mathematical exploration and understanding of the renowned Euclidean proposition.

These chapters combine traditional geometry with delightful insights, encouraging exploration and engagement with both classic and unexpected mathematical exercises.



Critical Thinking

Key Point: Emerging from impossible - Trisecting an Angle

Critical Interpretation: You might have encountered challenges that seem insurmountable, much like the centuries-old problem of trisecting an angle using just a compass and straightedge, historically doomed to failure. Yet this chapter offers a powerful metaphor for your life: the art of approaching the impossible differently. With a cleverly crafted cardboard device, an obstacle once considered unconquerable is navigated with ease. This idea inspires you to tackle your seemingly insurmountable problems with innovative solutions and ingenuity. It assures you that, often, the key is shifting your perspective and employing creativity to transform a 'can't' into a 'can,' igniting your potential to reshape the limitations you once accepted as absolute.



Chapter 8: NUMBERS

The chapter you provided contains a series of intriguing mathematical tricks and concepts, each offering its own unique sleight of hand or logical twist.

Here's a coherent summary that integrates some background for clarity:

Chapter Summary: Mathematical Mysteries and Mind-Bending Tricks

This chapter delves into the world of number tricks and mathematical curiosities, illustrating how simple mathematical principles can create seemingly magical results.

Matches in the Fist: This trick revolves around a peculiar property of numbers: if you subtract the sum of a number's digits from the original number, the result is always a multiple of nine. Using this principle, one can seemingly read minds. The trick involves a participant secretly taking matches out of a box, using calculations based on the sum of remaining matches. By knowing this underlying principle, the performer can quickly deduce how many matches the participant holds, leading to an impressive reveal.



Magic with Dice: Here, a trick showcases the property of dice where opposite faces add up to seven. Instructing a participant to perform a series of rolls and additions, the performer then guesses the total. By secretly summing the top faces before rolling and adding seven, the performer can confidently announce the total without knowing which die was manipulated. It demonstrates the reliability of arithmetic patterns.

The Magic Window: In this elegant illusion, a participant engages in simple arithmetic with a three-digit number, leading to a surprising and invariant result: 1089. Predetermined though it seems, the performer anticipates this result by subtly preparing a window to reveal the answer through condensation. The invisibly prepared surface writes 1089, linking physical phenomena with numerical certainty.

Lightning Addition: This stunt transforms anyone into a rapid calculator. It relies on complementing digits to nine. After a series of number writing by both the performer and participant, the performer executes a quick mental transformation, enabling them to write the total sum in seconds, seemingly without calculation.

Digital Computer: This highlights a finger-multiplication method used historically in Russia, focused on multiplying numbers between 6 and 10 using fingers as proxies for tens and units. It's a delightful blend of digital sobriety with archaic charm, underscoring traditional methods of calculation.



Crazy Multiplication: An introduction to using binary principles in practical multiplication, this method teaches an unconventional approach where division and doubling are used to find products mathematically. Surprisingly intuitive once grasped, it provides a lesson in the utility of

Install Bookey App to Unlock Full Text and Audio

Free Trial with Bookey





App Store
Editors' Choice



22k 5 star review

Positive feedback

Sara Scholz

tes after each book summary
understanding but also make the
and engaging. Bookey has
ding for me.

Fantastic!!!



I'm amazed by the variety of books and languages
Bookey supports. It's not just an app, it's a gateway
to global knowledge. Plus, earning points for charity
is a big plus!

Masood El Toure

Fi



Ab
bo
to
my

José Botín

ding habit
o's design
ual growth

Love it!



Bookey offers me time to go through the
important parts of a book. It also gives me enough
idea whether or not I should purchase the whole
book version or not! It is easy to use!

Wonnie Tappkx

Time saver!



Bookey is my go-to app for
summaries are concise, ins
curated. It's like having acc
right at my fingertips!

Awesome app!



I love audiobooks but don't always have time to listen
to the entire book! bookey allows me to get a summary
of the highlights of the book I'm interested in!!! What a
great concept !!!highly recommended!

Rahul Malviya

Beautiful App



This app is a lifesaver for book lovers with
busy schedules. The summaries are spot
on, and the mind maps help reinforce wh
I've learned. Highly recommend!

Alex Walk

Free Trial with Bookey



Chapter 9 Summary: LIGHT

This set of chapters delves into fascinating number tricks, optical illusions, and simple experiments, revealing the surprising interplay between mathematics and physics, and providing readers with intriguing facts and tricks. Each section holds a unique concept that blends entertainment with education, inviting readers to explore and experiment.

Lightning Addition introduces a clever trick for performing rapid calculations. By asking someone to write a five-figure number and then systematically choosing numbers to write beneath it that total nine with the original digits, you can magically deduce the total by subtracting 2 from the last number and appending 2 in front of the result. This method illustrates quick mental math that can dazzle an audience due to its simplicity and speed.

Digital Computer presents a traditional Russian method for multiplying the numbers 6 through 10 using only one's fingers. This approach involves assigning numbers to fingers and sets the stage for a manual computation that extends to intuitive arithmetic, rooted in a physical, tangible process akin to the binary counting system.

Crazy Multiplication describes an unconventional method of multiplication based on the binary number system. By repeatedly halving



one number and doubling the other, ignoring fractions, and strategically eliminating even rows, this method demonstrates a way to compute products that are grounded in binary operations, even though the detailed reason for its success is complex and linked to more advanced mathematics.

Magic Multiplication captivates the audience with a number trick involving a unique sequence, 12,345,679. By multiplying this sequence by a number derived from the favorite digit of a participant (multiplied by 9), you create a product composed entirely of their chosen digit. This trick is a fascinating application of pattern recognition and multiplication, showing how numbers can create predictable results.

Magic Picture explains how a glass with a hidden image becomes visible when filled with water, showcasing principles of refraction and focusing. This concept is rooted in optics, where a glass marble acts as a lens that brings the concealed picture into view by altering light paths.

Unreversed Image involves using two mirrors to present a true front-facing reflection, reversing the typical mirror reversal. This setup enables viewers to see themselves as others do, offering an intuitive understanding of light reflection principles.

Color That Isn't There highlights the appearance of colors when black and white patterns spin quickly, known as "subjective color." This



phenomenon, first investigated by the physicist Gustav Fechner, is partly understood as an interaction between visual processing and optical illusions.

Swizzle-Stick Code uses refractive properties of rods to decode messages by reversing and inverting letters, adding an element of discovery and curiosity to written communication.

In **Stroboscope**, light interruption creates illusions of motion alteration.

By looking through a cardboard circle with cut slots, objects like spinning fans appear to slow or reverse, illustrating an interplay of vision and time perception often used in motion picture technology.

Watermark Writing offers a secretive messaging method via watermarks, where writing appears only when the paper is wet, leveraging the transformative impact of pressure and moisture on paper fibers.

Vanishing Postage Stamp shows a compelling illusion where light refraction through a glass of water makes a stamp seemingly disappear, a phenomenon based on the bending of light rays.

Spectrum on the Ceiling replicates Newton's prism experiment, revealing the spectrum of light using simple tools like a mirror and water, illustrating fundamental properties of light.

More Free Book



Scan to Download

Far or Near? engages readers with optical diagnosis similar to Sherlock Holmes' investigation, explaining how lenses correct visual impairments and how to test them for accuracy in prescriptions.

Picture Copier teaches how a pane of glass can reflect images for drawing copy purposes, utilizing the reflective and transparent properties of glass to overlap images for manual tracing.

Lastly, **Color Complements** explores the concept of complementary colors in an optical experiment, demonstrating how placement of colored materials affects perception, linking back to artistic techniques and psychological principles.

These captivating chapters intertwine everyday materials and simple steps with deeper scientific principles, encouraging readers to explore the magic and logic hidden within mathematics and physics.

More Free Book



Scan to Download

Chapter 10 Summary: GRAVITY

This passage explores several intriguing experiments and demonstrations related to concepts of physics, specifically focusing on gravity, equilibrium, buoyancy, and related phenomena.

The Precarious Forks: This section introduces a perplexing arrangement involving two forks and a coin. By overlapping the prongs of two forks and securing a coin between them, the entire structure can be balanced on a glass rim. Despite appearances, this balance is achieved because the heavy fork handles shift the center of gravity directly beneath the contact point of the coin on the glass, creating a stable equilibrium.

Gravity Machine: A demonstration mimics perpetual motion, although such a machine is impossible according to the laws of physics. Using a candle balanced on a needle between two glasses, the melting wax causes an imbalance. As one side drips more tallow, gravity causes it to tilt downward, shifting the balance back and forth, similar to a seesaw effect, powered purely by gravity and the redistribution of mass.

Finger in the Bowl: Examines the debate around weight displacement. It explains that a bowl with a goldfish weighs more than one without, corresponding to the fish's weight. Similarly, inserting a finger displaces water, adding its displaced weight to the bowl. This is visually demonstrated



with a simple balance scale, tipping when a finger is inserted into the water.

Galileo vs. Aristotle: Revisits Galileo's experiment from the Leaning Tower of Pisa, refuting Aristotle's claim that heavier objects fall faster than lighter ones. By dropping a coin with a paper on top, air resistance is minimized, and both fall together. However, dropping faster than gravity speed shows the paper's separation, highlighting motion laws.

Balancing Point: Method for locating an object's center of gravity is demonstrated using a cardboard piece. By hanging the cardboard and using a plumb line, intersecting lines mark the center of gravity, the spot where it balances when supported.

The Floating Balloon: Describes how a gas-filled balloon can be made to float in midair by precisely adjusting its weight with a piece of cardboard. The balloon stabilizes between cooler (dense) and warmer (less dense) air layers, exploiting the buoyancy difference.

Anti-Gravity Cone: Presents a double cone toy that seemingly defies gravity by moving uphill when placed on a sloped track. The arrangement of the slopes and the cone's design lowers its center of gravity as it "ascends," creating the illusion of anti-gravity motion.

Each demonstration cleverly uses basic physics principles to challenge

More Free Book



Scan to Download

perceptions, making complex ideas accessible through simple, hands-on experiments.

More Free Book



Scan to Download

Chapter 11 Summary: STATIC ELECTRICITY

The chapters explore a series of simple yet fascinating experiments that demonstrate the principles of static electricity, intended to delight and educate. These activities, often using everyday household items, cleverly reveal the invisible forces at play in our everyday environment.

The Hindu Thread Trick

The first experiment introduces a miniature version of the legendary Hindu rope trick. To perform this, you need a short piece of thread and a pocket comb. Rubbing the comb on your clothing generates static electricity, allowing you to make the thread stand upright and even move in circles. This entertaining trick utilizes the concept of static electricity, where friction causes electrons to transfer to the comb, giving it a negative charge. The thread, losing electrons, becomes positively charged and is attracted to the comb due to the principle that opposite charges attract. This demonstration effectively shows how static electricity can be harnessed in everyday objects.

Unpepper the Salt

Positioned as an amusing dinner-table stunt, this experiment utilizes static electricity to separate a mixture of salt and pepper. By placing a static charge



on a comb and hovering it over the seasoned pile, the lighter pepper grains jump to the comb, effectively separating them from the salt. This activity is not only entertaining but also demonstrates how static electricity can influence particles in unexpected ways, highlighting the different properties of materials affected by static charge.

The Invisible Leg

In this intriguing experiment, static electricity is used to create the illusion of an "invisible leg" inside a nylon stocking. Rubbing the stocking with a polyethylene bag induces a strong static charge on the nylon, causing the stocking to fill out as though a leg were inside because like charges repel each other, and the material tries to spread out as much as possible. This experiment is particularly effective on cold, dry winter days when static electricity is more prevalent due to low humidity. It provides a vivid illustration of how static forces can cause objects to behave in unexpected, almost magical, ways.

Overall, through these playful experiments, readers are invited to explore the principles of static electricity with simple tools and relatable situations, enhancing their understanding of this fascinating natural phenomenon.



Chapter 12: MECHANICS

The chapters provide engaging, hands-on demonstrations of various physics and mechanical principles through simple experiments and tricks that can be performed with everyday objects. These activities not only captivate with their surprising outcomes but also illustrate fundamental concepts like feedback, gyroscopic motion, levers, friction, and momentum.

Feedback by the Yard begins with the concept of feedback, a mechanism common in electronic devices, exemplified by a thermostat adjusting heat. A practical demonstration involves balancing a yardstick on two fingers. Attempting to bring the fingers together at a point other than the center proves impossible due to the feedback mechanism created by varying friction, illustrating how natural feedback ensures equilibrium.

Paradox on Wheels explores the seemingly contradictory behavior of a rolling wheel's speed. The chapter explains that the top of a rolling wheel actually travels faster than the bottom. This paradox occurs because, as the wheel turns, the upper half covers more distance than the lower half in the same time, accounting for the uneven visibility of wheel spokes in motion.

Make a Boomerang describes creating a boomerang from cardboard and launching it such that it returns. The chapter explains that the boomerang's flight is governed by gyroscopic principles; as it spins, it



maintains its plane of rotation. The rotational forces interact with air resistance to guide its path back to the thrower.

The Unbreakable Match uses the mechanics of levers to explain why holding a match at its tips prevents it from breaking. When fingers act as a third-class lever, the mechanical advantage decreases with distance from the fulcrum, making it resilient. Reducing the distance from match to fulcrum increases force concentration, making it breakable.

Suspended Rice details a traditional trick where a dagger lifts an entire bowl of rice. Replicating this involves packing rice tightly in a jar before stabbing it repeatedly with a knife. The rice compacts around the blade, allowing the entire jar to lift—a demonstration of pressure and friction.

Penny Poser presents a coin trick that challenges physics understanding. By using one penny to transmit force without movement, it solves the puzzle of repositioning a coin without touching another, utilizing the concept of force transmission within solid bodies.

Matchbox Stabilizer is a challenge to drop a matchbox to land on its end, harnessing momentum for stabilization. Expanding on principles, the adjustment of the drawer aligns momentum with gyroscopic stabilization, a technique paralleling those in advanced mechanics like aviation.



Super-Strength reveals a method to break a strong cord using one's hands. Demonstrating how concentrating force into a small area increases pressure, this chapter reflects the power of mechanical advantage.

Potato Puncture challenges perceptions with a soda straw penetrating an unpeeled potato. By trapping air within the straw as it strikes, rigidity is maintained, allowing the straw to puncture the potato with sufficient force.

Throughout these chapters, readers learn how tangible phenomena relate to theoretical physics, illustrating abstract concepts through memorable, interactive experiments.

Install Bookey App to Unlock Full Text and Audio

Free Trial with Bookey





Read, Share, Empower

Finish Your Reading Challenge, Donate Books to African Children.

The Concept



This book donation activity is rolling out together with Books For Africa. We release this project because we share the same belief as BFA: For many children in Africa, the gift of books truly is a gift of hope.

The Rule



Earn 100 points



Redeem a book



Donate to Africa

Your learning not only brings knowledge but also allows you to earn points for charitable causes! For every 100 points you earn, a book will be donated to Africa.

Free Trial with Bookey



Chapter 13 Summary: AIR

The chapters presented are fascinating explorations of simple science experiments and phenomena that illustrate fundamental principles of physics. They cover a range of topics, offering insights into air pressure, static electricity, mechanics, and hydrodynamics, often with a touch of historical context or practical trick that can be tried at home.

1. Air Pressure Experiments:

- **Egg in the Bottle:** This classic demonstration shows air pressure's dramatic effects by using a burning match to create a vacuum, allowing a hard-boiled egg to be sucked into a bottle. Getting the egg out involves using breath pressure.
- **Dancing Dime:** By warming the air with your hands around a cold bottle, it expands and causes a dime on the opening to flutter, a simple display of air expansion.
- **The Magdeburg Tumblers:** Drawing from historical experiments, this presents how creating a vacuum between two inverted glasses can lift one when their rims are sealed with a wet paper.
- **Blowing Out a Candle:** Utilizing compressed air and partial vacuums, this proposes several novelty ways to extinguish a flame using a soda bottle.
- **The Floating Ball:** Demonstrating Bernoulli's principle, a



table-tennis ball can be suspended in the air above a blowing straw due to the pressure difference created by fast-moving air.

2. Static Electricity:

- **Hindu Thread Trick:** By charging a comb with static electricity, a thread can be made to stand and move, illustrating electrostatic attraction.
- **Unpeppering the Salt:** Using static to separate lighter pepper from heavier salt relies on charged combs, showing the effect of static on lightweight particles.
- **The Invisible Leg:** A nylon stocking, when charged with static using a polyethylene bag, inflates as if filled, a result of like charges repelling each other.

3. Mechanics and Dynamics:

- **Feedback by the Yard:** This experiment with a yardstick between two fingers exemplifies the feedback mechanism in systems by highlighting how friction adjusts movement.
- **Paradox on Wheels:** Exploring the intriguing concept where a rolling wheel's top half moves faster than its bottom provides insight into relative motion.
- **Make a Boomerang:** The effect of gyroscopic forces is demonstrated with a cardboard boomerang that maintains its course back to the thrower.



- **The Unbreakable Match:** Examining lever principles, holds a match so that human muscles' third-class lever configuration cannot easily break it.
- **Suspended Rice:** By tightly packing rice grains in a jar, one can lift the jar with a knife due to friction locking the rice together.
- **Penny Poser & Matchbox Stabilizer:** These puzzles use mechanical principles like force transmission and momentum to create surprising stability or motion.

4. Hydrodynamic Principles:

- **Potato Puncture:** Demonstrates that even a simple soda straw can pierce a potato when the air inside is compressed, exhibiting strength due to air pressure.
- **Boiling Without Heat:** Creating a vacuum inside a glass, simulates boiling with air pressure pulling air bubbles through the water.
- **Smoke Rings:** Cards configured into a box can release perfect smoke rings, visualizing air dynamics.
- **Bernoulli's Principle:** Illustrated with a card and spool, this principle underpins the lift in flight, showing how pressure differences keep objects afloat.

These chapters blend fun with learning, providing interactive ways to understand the physics behind everyday phenomena with the added delight of historical experiments and practical tricks.



Chapter 14 Summary: HYDRAULICS

The content presented explores various principles of physics and everyday science through engaging demonstrations and simple experiments. Each section describes a phenomenon or principle and then explains a method to observe or replicate it with everyday items, lending a touch of magic and wonder to scientific concepts.

1. Obedient Button: This section involves an engaging trick where a magician drops a small object, like a button, into a carbonated beverage. The object sinks and rises seemingly at command. This illusion leverages the properties of carbonation, where carbon dioxide bubbles attach to the object, reducing its density enough to make it float to the surface. Upon reaching the surface, the bubbles pop, and the object sinks back down to repeat the cycle, creating a visually appealing demonstration of buoyancy and surface tension.

2. Self-Starting Siphon: This demonstration introduces the concept of siphoning using a bent glass tube. When the tube's submerged end fills with water, the water's inertia carries it over the bend to start the siphon effect. The principle relies on gravity and continuity of liquid, showing how water naturally seeks its own level. Variations might include using flexible straws for a more accessible setup, suitable for casual experimenters interested in the laws of fluid dynamics.



3. **Mysterious Match Heads:** This experiment vividifies Pascal's Law, which states that pressure applied to a confined fluid is transmitted equally throughout. By pressing on a balloon-covered soda bottle filled with water and match heads, you exert pressure that causes the match heads to sink as water enters the porous material. Releasing the pressure allows them to rise again, offering a hands-on illustration of hydraulic principles.

4. **Brim to Brim:** This trick demonstrates air pressure and surface tension by arranging two water-filled glasses brim to brim. A small gap is created, and a soda straw is used to blow air into the top glass, forcing water into a bowl below. It showcases the interaction between air pressure and liquid dynamics, and can be performed without physically touching the glasses.

5. **Capillary Siphon:** Employing a handkerchief as a conduit, this section illustrates capillary action—the process by which liquid moves through a porous medium. Water in a higher placed glass transfers to a lower placed one overnight, demonstrating capillary attraction found in fabrics and nature, like water moving up plant stems.

6. **Two-Tone Corsage** This experiment demonstrates capillary action in plants. By splitting the stem of a white flower and placing each half in differently colored water, each side of the flower absorbs the colors through



the flower's capillary tubes, resulting in a bi-colored bloom. This visual effect not only highlights plant biology but also serves as a curious decorative element.

7. Center the Cork: By filling a glass slightly above the rim, surface tension creates a convex water surface, ensuring a cork placed in the glass centers itself. This experiment visualizes the effects of surface tension and the natural tendency of a floating object to find equilibrium, converting fluid mechanics into a social challenge and solution.

Each section not only explains simple scientific principles using everyday materials but also ignites curiosity and encourages readers to experiment and understand the science behind the world around them. Through these easy-to-execute experiments, fundamental concepts of physics such as buoyancy, capillarity, air pressure, and hydraulic pressure are brought to life, creating a bridge between scientific theory and entertaining practice.

More Free Book



Scan to Download

Chapter 15 Summary: HEAT

Heat and Illusions of Magic:

Some years back, a mystical display by a gypsy demonstrated an intriguing contrast between perception and reality. By filling a glass with water and covering it with a damp handkerchief, she created a visual trick. As she inverted the glass on her palm and touched it with her finger, bubbles appeared, making it seem as though the water was boiling. In reality, this was due to the vacuum formed when her touch allowed the glass to slide, drawing air through the fabric and creating the illusion of boiling.

Understanding Bernoulli's Principle:

To explore an essential principle of physics, you can engage in an experiment with a thumbtack, a playing card, and a spool. By blowing air rapidly through the spool, you can witness Bernoulli's principle in action. This principle, named after the Swiss scientist Daniel Bernoulli, explains that the faster a fluid moves, the lower its pressure. This principle is key to aerodynamic lift, the force that allows airplanes to fly as faster-moving air over the wings reduces pressure and creates lift.



Magical Hydraulics and Everyday Physics:

Engage in magical experiments such as the obedient button, where a button in a carbonated drink appears to obey commands to rise and sink. This illusion is driven by carbon dioxide bubbles forming around the button, affecting its buoyancy.

Further exploring hydraulic principles, create a self-starting siphon from glass tubes, illustrating how water finds its level and the inertia of moving water initiates flow. Additionally, Pascal's law, concerning pressure in liquids, is demonstrated with match heads and a toy balloon, where applied pressure causes match heads to sink and rise.

Surface Tension Experiments:

Challenge yourself with feats like the brim-to-brim water transfer, using air pressure and surface tension. Through strategic air bubbles, water moves from one glass to another without directly touching them. Surface tension also plays a role in the "center the cork" challenge, where surface tension forms a convex surface, guiding the cork to the center of a glass full of water.

More Free Book



Scan to Download

Capillary Action in Nature and Art:

In an experiment demonstrating capillary action, water colored with dye travels up the split stem of a white carnation, producing a striking two-tone blossom. This reveals how plants draw water from the soil. Such natural processes are mirrored in amusing tricks like using a woman's handkerchief to transfer water between glasses overnight.

Unexpected Properties of Materials:

The mysterious properties of rubber are showcased in an experiment involving a rubber band and a cardboard arrow. When heated, the rubber contracts, causing the arrow to rotate—a counterintuitive property unlike most materials that expand with heat.

In these engaging activities, science reveals itself as a realm where natural laws create wondrous effects, capable of both scientific insights and delightful mystification. Through hands-on exploration, these chapters provide a dynamic investigation into principles like Bernoulli's, hydraulics, surface tension, and capillary action, merging scientific learning with magical intrigue.



Chapter 16: SOUND

In these chapters, we explore the fascinating world of sound and its unique properties through various hands-on experiments and intriguing historical inventions.

The first experiment, dubbed "Coat-Hanger Chimes," is a simple yet surprising illustration of how sound travels and changes. By tying a wire coat hanger to a string and positioning it near your ears, you can create an unexpected sound resembling the chimes of an old clock or a distant church bell. Here, the vibrations of the hanger travel through the string to your fingers, then to your eardrums, showcasing how sound waves can traverse through solid mediums.

Next, we delve into the inventive mind of Benjamin Franklin with his creation, the "armónica." This unusual musical instrument consists of rotating glass bowls of varying sizes, which produce clear tones when touched. To grasp its concept, a similar phenomenon can be observed with a glass of water. Running a moist finger around the rim of the glass creates vibrations that emit a sound, highlighting the delicate balance of friction and movement—much like a violin's bow on strings.

The third experiment, known as "Musical Fork," involves a trick of perception and sound transmission. By plucking a fork with a knife and then



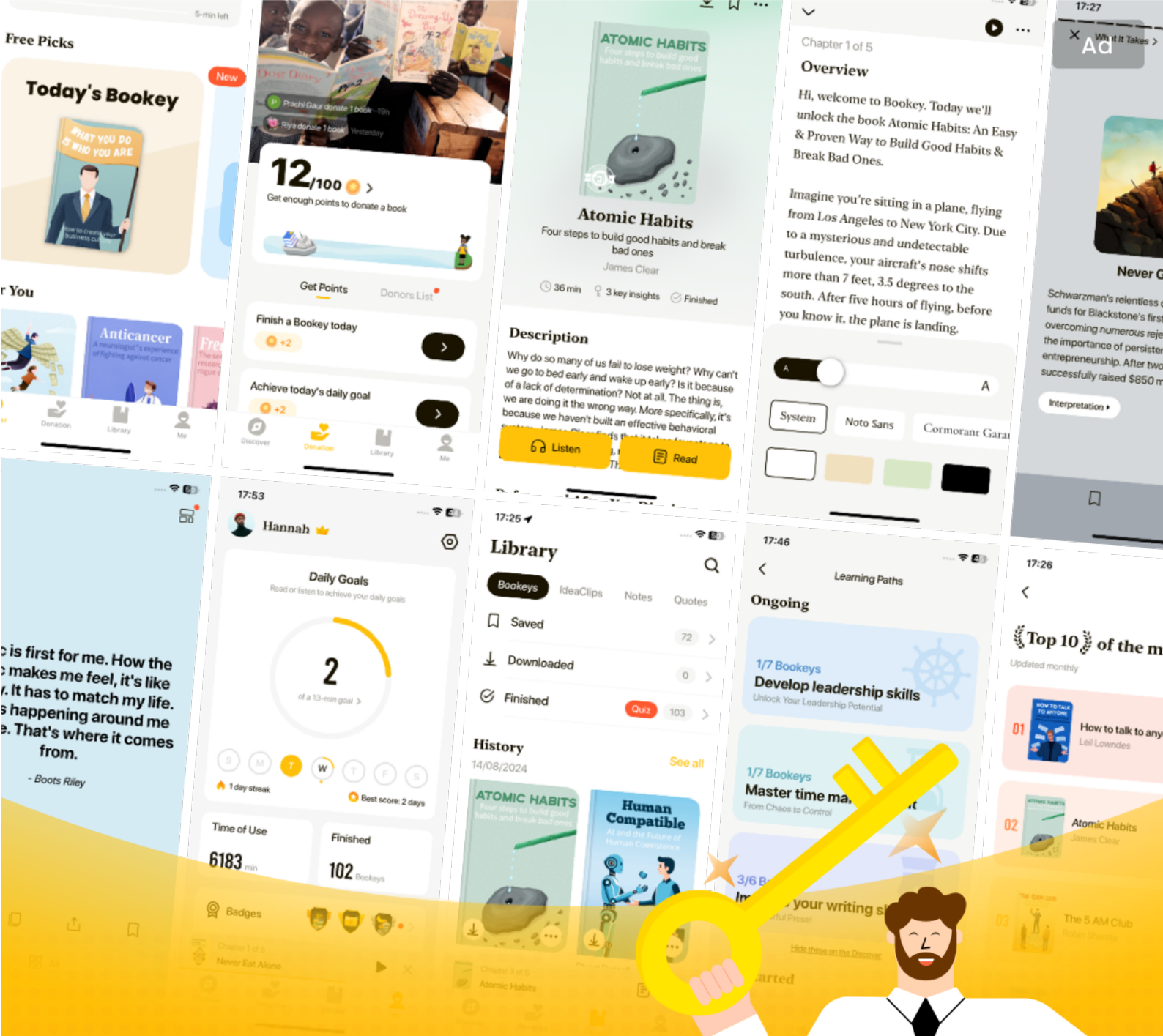
pressing it onto a table, a tone is produced, not from the fork directly, but from the table amplifying the fork's vibrations through "sympathetic vibration." This phenomenon, which is part physics and part illusion, can serve as a charming after-dinner trick.

Collectively, these chapters articulate the intriguing intersections of physics, perception, and creativity in understanding sound. They invite readers to explore and experiment, unveiling the invisible yet omnipresent waves that shape our auditory experiences.

Install Bookey App to Unlock Full Text and Audio

Free Trial with Bookey





World' best ideas unlock your potencial

Free Trial with Bookey



Scan to download



Chapter 17 Summary: INERTIA

The chapter explores the concept of inertia through a series of engaging experiments. Inertia, a fundamental principle in physics, refers to the tendency of an object to resist changes to its state of motion unless acted upon by an external force. The experiments in the chapter illustrate this concept clearly.

The first experiment involves a simple setup with checkers. A tower is formed using black checkers with a single red checker positioned second from the bottom. By propelling a separate checker towards the tower, the red checker is displaced while the black checkers remain in place, demonstrating how the inertia of the black checkers keeps them stable.

In the second experiment, the challenge is to identify a hard-boiled egg among a dozen. When spun, the hard-boiled egg remains stable due to its solid internal structure, whereas the raw eggs, affected by the inertia of their liquid interiors, fail to spin effectively. This illustrates how inertia can affect motion differently based on the composition of an object's interior.

The final experiment focuses on dividing an apple using the force of a table knife. By embedding the knife slightly and then striking it sharply with another knife's back, the inertia of the apple keeps it relatively still, allowing the blade to slice through cleanly. This experiment highlights how inertia



can be used to facilitate precision in motion and cutting.

Together, these experiments provide practical and visual demonstrations of how inertia operates in everyday situations, enhancing our understanding of this critical physical law.

More Free Book



Scan to Download