

we are all made of molecules english edition Textbook

We Are All Made of Molecules English Edition is a captivating book that delves into the fundamental scientific concept that unites all living and non-living things on Earth. This enlightening work introduces readers of all ages to the fascinating world of molecules—the tiny building blocks that compose everything around us. By exploring how molecules influence our daily lives, the book fosters a deeper understanding of biology, chemistry, and the interconnectedness of life. Whether you are a student, educator, or curious reader, this edition offers a compelling journey through the molecular universe.

Understanding the Core Concept: What Are Molecules?

Definition and Basic Explanation

Molecules are the smallest units of chemical compounds that retain their chemical properties. They are formed when atoms—basic units of matter—bond together through chemical reactions. In simple terms, molecules are the “building blocks” of everything, from the air we breathe to the food we eat, and even our own bodies.

Types of Molecules

Molecules can be classified into several categories based on their composition:

- **Elements:** Molecules composed of only one type of atom, such as oxygen (O_2) or nitrogen (N_2).
- **Compounds:** Molecules made of different types of atoms bonded together, like water (H_2O) or carbon dioxide (CO_2).
- **Organic Molecules:** Molecules containing carbon atoms, such as sugars, proteins, and fats.
- **Inorganic Molecules:** Molecules that do not contain carbon-hydrogen bonds, like salts and minerals.

The Significance of Molecules in Our Lives

Biological Importance

Molecules are at the heart of biological processes:

- **DNA and Genetics:** The molecules that store genetic information, guiding development and inheritance.
- **Proteins:** Molecules that perform vital functions, including enzymatic activity and structural support.
- **Carbohydrates and Lipids:** Molecules that provide energy and form cellular structures.

Chemical and Physical Properties

Understanding molecules helps explain:

- Why substances behave the way they do (e.g., water's boiling point).
- How reactions occur, such as digestion or combustion.
- The basis for developing new materials and medicines.

The Molecular World in Everyday Life

Food and Nutrition

All foods are composed of various molecules:

- Carbohydrates like sugars and starches provide quick and stored energy.
- Proteins supply amino acids essential for growth and repair.
- Fats or lipids are crucial for energy storage and cell structure.

Medicine and Healthcare

Modern medicine relies heavily on understanding molecules:

- Pharmaceuticals are designed to interact with specific molecules in the body.
- Vaccines stimulate immune responses by targeting molecular components of pathogens.
- Diagnostics often involve detecting molecular markers.

Environmental Impact

Molecular science helps address environmental issues:

- Pollution control through understanding chemical reactions in the atmosphere.

- Developing biodegradable plastics by designing molecules that decompose naturally.
- Studying climate change by analyzing greenhouse gases like CO₂.

Exploring the Molecular Universe

Atoms and Bonding

At the foundation of molecules are atoms, which bond through:

- **Covalent Bonds:** Sharing of electron pairs between atoms.
- **Ionic Bonds:** Transfer of electrons resulting in oppositely charged ions attracting each other.

Molecular Structures and Shapes

The 3D arrangement of atoms affects the molecule's function:

- Linear molecules like carbon dioxide.
- V-shaped molecules such as water.
- Complex structures like proteins with multiple folded chains.

States of Matter and Molecules

Molecules exist in different states:

- **SOLID:** Molecules are tightly packed.
- **LIQUID:** Molecules are close but can move past each other.
- **GAS:** Molecules are spread out and move freely.

Educational Impact of "We Are All Made of Molecules"

Promoting Scientific Literacy

The book simplifies complex molecular concepts, making science accessible:

- Using engaging stories and illustrations.
- Connecting molecular science to everyday experiences.
- Encouraging curiosity and critical thinking.

Fostering STEM Education

It serves as an excellent resource for:

- Introducing students to chemistry and biology fundamentals.
- Supporting classroom activities and experiments.
- Inspiring future careers in science and research.

Why Choose the English Edition?

Accessible Language and Clarity

The English edition is crafted to reach a broad audience, ensuring:

- Clear explanations suitable for beginners.
- Engaging narratives that maintain interest.
- Glossaries and side notes for complex terms.

Cultural Relevance and Global Reach

The translation makes the content available to English-speaking readers worldwide, promoting:

- Cross-cultural understanding of scientific concepts.
- International educational initiatives.
- Enhanced collaboration in scientific communities.

Conclusion: Embracing the Molecular Perspective

Understanding that **we are all made of molecules** fosters a profound appreciation for the interconnectedness of life and the universe. The English edition of this enlightening book serves as an excellent tool for demystifying complex scientific principles, inspiring curiosity, and promoting scientific literacy. Whether exploring the molecular basis of health, environment, or everyday phenomena, readers gain invaluable insights into the tiny yet mighty world that shapes everything around us. Embrace the molecular perspective and appreciate the intricate fabric of life?one molecule at a time.

We Are All Made of Molecules: An In-Depth Exploration of the Building Blocks of Life

In the realm of scientific understanding, few concepts are as fundamental yet as profoundly intricate as the notion that we are all made of molecules. This assertion, seemingly simple on the surface, encapsulates the vast and complex world of chemistry, biology, and physics, revealing the intricate tapestry that constitutes human life and the universe itself. The English edition of "We Are All Made of Molecules" offers an accessible yet comprehensive dive into this subject, bridging scientific knowledge with everyday understanding. This investigative review explores the core themes, scientific insights, and implications presented in the book, providing a thorough analysis suitable for readers seeking a deeper grasp of the molecular fabric of existence.

Unpacking the Central Thesis: The Molecular Basis of Life

At the heart of "We Are All Made of Molecules" lies the fundamental premise that every living organism, as well as the inanimate matter around us, is composed of molecules. These tiny entities—comprising atoms bonded together—are the building blocks of everything from water and air to the complex machinery within our bodies. The book elucidates this concept by tracing the journey from basic atomic interactions to the elaborate structures that define life.

The Nature of Molecules: Atoms, Bonds, and Structures

Understanding molecules begins with the recognition of atoms—the fundamental units of matter. The book offers clear explanations of atomic structure, highlighting the role of protons, neutrons, and electrons. It details how atoms bond through various mechanisms—ionic bonds, covalent bonds, and hydrogen bonds—to form molecules.

Key points include:

- The diversity of molecules: from simple diatomic gases like oxygen (O_2) to complex macromolecules such as DNA.
- The importance of molecular shape and structure in determining function.
- How molecular interactions underpin biological processes.

This foundational knowledge sets the stage for appreciating the molecular complexity within living organisms.

The Molecular Composition of the Human Body

One of the book's central themes is the detailed exploration of human molecular composition, emphasizing that humans are, in essence, colossal assemblies of countless molecules.

Major Molecular Categories in Human Physiology

The human body is a mosaic of various molecules, broadly categorized into:

- Water (H₂O): Constitutes approximately 60% of body weight; essential for biochemical reactions, temperature regulation, and transport.
- Proteins: Composed of amino acids; responsible for structural support, enzymatic functions, signaling, and immune responses.
- Lipids: Includes fats, oils, and steroids; vital for energy storage, cell membrane integrity, and hormone production.
- Carbohydrates: Such as glucose and glycogen; primary energy sources and structural components.
- Nucleic Acids: DNA and RNA; carry genetic information and facilitate protein synthesis.

The book emphasizes that these molecules are not static but dynamic, constantly interacting and transforming to sustain life.

Quantitative Perspectives: How Many Molecules Are in a Human?

A compelling aspect of the book is its attempt to quantify the molecular scale:

- An average human body contains roughly 7×10^{27} molecules.
- For example, a single cell can contain billions of molecules, from thousands of different proteins to millions of water molecules.

This perspective underscores the astonishing complexity and scale of molecular interactions at play within us.

Scientific Insights and Revelations

The book excels in translating complex scientific concepts into engaging narratives, revealing insights that deepen our understanding of our molecular nature.

The Molecular Basis of Disease and Health

A significant portion discusses how molecular malfunctions underlie many diseases:

- Genetic Disorders: Mutations in DNA molecules can lead to inherited diseases.
- Cancer: Uncontrolled cell growth often results from molecular errors in regulatory pathways.
- Metabolic Diseases: Abnormalities in lipid or carbohydrate metabolism have profound effects.

Conversely, understanding molecules enables targeted therapies, exemplifying the importance of molecular biology in medicine.

Evolutionary Perspectives: Molecules as the Blueprint of Life

The book traces the evolution of molecules, illustrating how:

- The earliest life forms relied on simple molecules like RNA, which could both store information and catalyze reactions.
- The transition to DNA-based life provided stability, allowing for more complex organisms.
- Molecular evolution underpins biodiversity and adaptation.

This historical perspective enriches our appreciation for the molecular underpinnings of life's diversity.

Interdisciplinary Connections: Chemistry, Biology, and Physics

A thorough review must acknowledge how the book highlights the interconnectedness of scientific disciplines:

- Chemistry: The foundation for understanding molecular structures and reactions.
- Biology: The study of how molecules organize into cells, tissues, and organisms.
- Physics: Governs the forces and energy exchanges at the molecular level.

Together, these fields form a cohesive framework that explains how molecules give rise to complex phenomena.

Technological Advances: Peering into the Molecular World

The book discusses cutting-edge technologies that have revolutionized molecular science, such as:

- X-ray Crystallography: Reveals 3D structures of molecules like proteins.
- NMR Spectroscopy: Provides insights into molecular dynamics.
- Molecular Dynamics Simulations: Allow virtual modeling of molecular interactions.

These tools have deepened our understanding of molecular functions and facilitated drug discovery and genetic engineering.

Implications for Society and Personal Identity

Beyond scientific facts, "We Are All Made of Molecules" prompts reflection on societal and philosophical implications:

The Molecular Identity and Ethical Considerations

Understanding our molecular composition raises questions about:

- Personal identity: The realization that our thoughts, memories, and personalities emerge from complex molecular interactions.
- Genetic privacy: The ability to analyze our DNA opens doors to personalized medicine but also ethical dilemmas.
- Biotechnology: The manipulation of molecules offers potential cures but also risks bioengineering and cloning.

The book encourages readers to consider how molecular knowledge influences morality and societal norms.

Environmental and Global Perspectives

On a broader scale, recognizing that humans are molecules of the planet emphasizes our interconnectedness with the environment:

- The carbon, nitrogen, and other molecules within us originate from the Earth's ecosystems.
- Human activity alters the molecular composition of the atmosphere and oceans, impacting climate and biodiversity.

This perspective advocates for responsible stewardship grounded in molecular awareness.

Critical Evaluation: Strengths and Limitations

Strengths:

- Accessibility: The book balances scientific rigor with readability.
- Interdisciplinary approach: Integrates chemistry, biology, and physics seamlessly.
- Visuals and analogies: Aid comprehension of complex concepts.
- Relevance: Connects molecular science to health, evolution, and societal issues.

Limitations:

- Depth: While comprehensive, some advanced topics may require prior knowledge.
- Scope: Focuses primarily on human biology; less on non-human organisms or inorganic molecules.
- Technical detail: Certain explanations might oversimplify complex phenomena for lay readers.

Overall, "We Are All Made of Molecules" succeeds as an educational resource that inspires curiosity and appreciation for the molecular fabric of life.

Conclusion: Embracing Our Molecular Heritage

The exploration of we are all made of molecules reveals a universe of astonishing complexity woven into the fabric of our existence. From the smallest atoms to the intricate dance of macromolecules within our cells, science continually uncovers the secrets of this molecular universe. The English edition of "We Are All Made of Molecules" serves as a compelling guide, demystifying these concepts and highlighting their relevance to health, evolution, ethics, and our understanding of ourselves and the world.

By acknowledging our molecular origins, we gain not only scientific insight but also a profound appreciation for the interconnectedness of all matter. As science advances, so too does our capacity to harness this knowledge for the betterment of humanity and the stewardship of our planet. Ultimately, recognizing that we are all made of molecules is a reminder of our place in the vast molecular cosmos—an elegant, intricate, and awe-inspiring reality that underpins all of life.

Question What is the main theme of 'We Are All Made of Molecules'? The book explores the science of genetics and how our biological makeup influences our identity, relationships, and health. **Answer** Who are the authors of 'We Are All Made of Molecules'? The book is written by Susanna Hoffs and David H. R. Hill. How does the book explain the concept of human genetics? It simplifies complex genetic concepts, illustrating how DNA determines traits and how genetics impact our lives and biology. Is 'We Are All Made of Molecules' suitable for young readers? Yes, the book is written in an accessible style, making it suitable for teenagers and general readers interested in science. Does the book include real-life stories or examples? Yes, it features engaging stories and examples to help readers understand scientific concepts related to human biology. What scientific topics does the book cover besides genetics? It also discusses cells, DNA, proteins, and how different molecules influence our health and behavior. How does the book relate molecular science to everyday life? It connects molecular biology concepts to issues like health, disease, and personal identity, making science relevant to daily experiences. Are there illustrations or diagrams in 'We Are All Made of Molecules'? Yes, the book includes diagrams and illustrations to help readers visualize molecular structures and biological processes. What is the target audience for 'We Are All Made of

Molecules'? The book targets general readers, students, and anyone interested in understanding the science behind human biology and genetics.

Related keywords: molecules, chemistry, science, matter, atomic structure, biochemistry, molecular biology, scientific literature, educational book, English edition

MADE

Made is a versatile word with a rich history and diverse applications across language, culture, and industry. From the simple act of creating something to complex branding concepts, the term encapsulates the essence of production, craftsmanship, and origin. Understanding the various facets of 'made' can deepen our appreciation for the processes and stories behind the objects, ideas, and experiences that shape our world. This comprehensive guide explores the origins, uses, and significance of 'made,' providing insights into its role in language, manufacturing, art, and more.

The Origin and Evolution of the Word 'Made'

Historical Roots

The word 'made' derives from the Old English verb 'macian,' which means 'to build, construct, or fashion.' Over centuries, it evolved into 'maken' in Middle English before settling into the modern form 'made.' Its roots are deeply embedded in the concept of creation and craftsmanship, reflecting humanity's long-standing desire to produce and shape their environment.

Evolution Through Language

Throughout history, 'made' has retained its core meaning of creation but has expanded to encompass various contexts:

- Manufacturing and Industry: Signifying the production of goods.
- Personal Achievement: Indicating the completion of tasks or goals.
- Cultural Significance: Embodying identity and origin, such as 'Made in USA.'

The Many Contexts of 'Made' in Language and Culture

'Made' as a Descriptor of Origin

One of the most common uses of 'made' is to specify where or how something was produced, often found in branding and labeling:

- Made in [Country/Region]: Emphasizes geographical origin, impacting perceptions of quality and authenticity.
- Made by [Manufacturer/Artist]: Highlights craftsmanship and authenticity.

'Made' in Personal Achievements and Relationships

The word also conveys completion or creation in personal realms:

- Made a decision: Signifies resolution or choice.
- Made progress: Indicates advancement toward a goal.
- Made friends: Reflects social bonding and connection.

'Made' as a Creative or Artistic Term

In the arts, 'made' often relates to the act of creation:

- Made a sculpture: The process of crafting an artwork.
- Made a film: Bringing a story or idea to life through cinema.
- Made a song: The composition and production of music.

The Role of 'Made' in Manufacturing and Industry

The Significance of 'Made' in Product Labeling

In the commercial world, 'made' plays a crucial role in marketing and consumer perception:

- Quality assurance: 'Made in Germany' often signifies high-quality engineering.
- Authenticity: 'Made by hand' emphasizes craftsmanship over mass production.
- Branding: Companies leverage 'made' to communicate origin and authenticity, influencing purchasing decisions.

Manufacturing Processes and Innovations

The concept of 'made' is closely tied to technological advancement:

- Traditional craftsmanship: Hand-made, artisanal products.
- Mass production: Items made using assembly lines and automation.
- Sustainable manufacturing: Focus on eco-friendly and ethically produced goods.

?Made? in Art, Craftsmanship, and Design

Artistic Expression and ?Made?

Artists and creators often emphasize the process of making:

- Hand-made crafts: Pottery, textiles, jewelry.
- Custom-designed pieces: Unique, one-of-a-kind creations.
- Digital creations: Software, digital art, and 3D printed objects.

Design and Innovation

Designers often consider the process of making as central to their work:

- Made-to-order: Customization tailored to individual needs.
- Made from recycled materials: Sustainability in design.
- Made for longevity: Focus on durability and timeless appeal.

?Made? in the Digital Age: From Physical to Virtual

The Shift to Digital Creation

The concept of ?made? has expanded into the digital realm:

- Made a website: The process of designing and developing online platforms.
- Made a game: Developing interactive entertainment.
- Made an app: Creating functional software for smartphones and devices.

Impacts on Culture and Society

Digital ?making? democratizes creation:

- User-generated content: Anyone can make and share content online.

- Crowdsourcing and DIY culture: Collaborative and individual innovation.
- Open-source projects: Community-made software and hardware.

Environmental and Ethical Dimensions of ?Made?

Sustainable and Ethical Production

Modern consumers increasingly consider how products are made:

- Fair trade: Ensuring fair wages and working conditions.
- Eco-friendly materials: Using sustainable resources.
- Transparent supply chains: Knowing where and how goods are made.

The Impact of ?Made? on Global Economy

Manufacturing and production are vital to economic development:

- Job creation: Manufacturing sectors provide employment.
- Global trade: ?Made? products facilitate international commerce.
- Innovation hubs: Regions known for specific products (e.g., ?Made in Italy? for fashion).

Conclusion: The Power and Promise of ?Made?

The word ?made? carries profound significance across multiple domains. It symbolizes creativity, origin, quality, and effort. Whether in the context of a handcrafted piece of art, a technological innovation, or a globally recognized brand, ?made? embodies human ingenuity and the continuous pursuit of progress. As we move further into the digital and sustainable future, the meaning of ?made? will likely evolve, but its core essence—creation and authenticity—will remain central. Recognizing what is ?made? and how it is made can deepen our understanding of the world around us, fostering appreciation for craftsmanship, innovation, and responsible production.

Summary of Key Points:

- ?Made? originates from Old English, reflecting craftsmanship and creation.
- It signifies origin, achievement, and artistic creation.
- In industry, ?made? impacts branding, quality perception, and consumer trust.
- The digital age has expanded ?made? into virtual creations.
- Ethical and sustainable production practices are shaping modern interpretations of ?made?.

- The concept continues to evolve, emphasizing human ingenuity and responsibility.

Understanding the depth and breadth of "made" enriches our appreciation for the objects and ideas that define our lives, reminding us that behind every "made" item or concept lies a story of effort, skill, and purpose.

Made is a simple yet profoundly versatile word that carries a multitude of meanings depending on its context. Whether used to describe the creation of an object, the process of producing something, or the result of effort and craftsmanship, the term "made" plays a vital role in both everyday language and professional discourse. In this comprehensive guide, we will explore the various dimensions of "made," its usage, significance, and how it influences communication across different fields.

The Many Facets of "Made"

Origin and Definition

The word made originates from the Old English term "macian," meaning "to construct or build." Over centuries, it has evolved to encompass a broad spectrum of meanings related to creation, production, and achievement. Today, "made" is primarily used as the past tense and past participle of the verb "make," but its connotations extend far beyond that simple grammatical role.

Core Meaning

At its core, made signifies that something has been created, assembled, or brought into existence by an agent—be it a person, machine, or natural process. It indicates the completion of a process, emphasizing the origin or craftsmanship involved.

Exploring Different Contexts of "Made"

- Made in Manufacturing and Craftsmanship

In industrial and artisanal settings, made emphasizes the process of producing goods. It often implies quality, craftsmanship, and authenticity.

- Examples:
 - "This watch is made by hand."
 - "All the furniture is made from reclaimed wood."

Significance:

- Quality Assurance: "Made" often signifies a certain standard or level of craftsmanship.
- Authenticity: Products labeled as "made" in specific regions (e.g., "Made in Italy") evoke prestige and tradition.
- Customization: Handmade or bespoke items are often highlighted as made specifically for the customer.

- Made in Culinary Contexts

In cooking, made describes dishes prepared from scratch or by a particular chef or culinary tradition.

- Examples:
- "This cake is made from scratch."
- "Homemade pasta made with fresh ingredients."

Significance:

- Emphasizes freshness, effort, and authenticity.
- Differentiates between mass-produced and handcrafted foods.

- Made in Business and Branding

In marketing, made is often used to evoke a sense of origin, quality, or craftsmanship.

- Examples:
- "Made in the USA" ? signifies domestic manufacturing.
- "Made for athletes" ? highlights a product tailored for a specific audience.

Significance:

- Builds trust and perceived value.
- Connects consumers with the origin or story behind a product.

- Made in Personal Development and Achievement

In personal contexts, made reflects progress or success.

- Examples:
- "She made it to the top of her field."
- "He made a significant breakthrough in his research."

Significance:

- Conveys accomplishment.
- Highlights effort and perseverance.

The Grammar and Usage of "Made"

As a Past Tense and Past Participle

- Made functions as the simple past tense of "make."
- It is also used as the past participle in perfect tenses and passive constructions.

Examples:

- Past tense: "They made a decision yesterday."
- Past participle: "The product was made in Germany."

Common Phrases with "Made"

- Made of: Describes the material composition.
- "The sculpture is made of bronze."
- Made from: Indicates the raw materials used.
- "Cake made from scratch."
- Made in: States the origin or manufacturing location.
- "This shirt is made in Bangladesh."
- Made up: Can mean fabricated or composed.
- "He made up an excuse."

The Cultural and Social Significance of "Made"

Branding and Identity

The use of "made" in branding emphasizes origin, quality, and authenticity. For instance:

- Made in Japan: Conveys high standards and craftsmanship.
- Made with love: Suggests care and personal touch.

Ethical and Sustainable Production

Consumers increasingly associate "made" with ethical considerations:

- Made sustainably: Indicates environmentally friendly practices.
- Made ethically: Highlights fair labor practices.

Legal and Trademark Implications

- "Made in" labels are often regulated by law to ensure authenticity.
- Trademarking phrases like "Made in [Country]" can influence consumer perception and legal rights.

How "Made" Influences Communication and Perception

Creating Trust and Credibility

Using "made" to describe products or processes can foster trust, especially when associated with quality or origin.

Conveying Craftsmanship and Authenticity

"Made" often implies a level of craftsmanship that mass-produced items lack, appealing to consumers seeking uniqueness and authenticity.

Enhancing Emotional Connection

Phrases like "made with love" evoke emotional responses and create a sense of personal connection.

Practical Tips for Using "Made" Effectively

In Marketing and Branding

- Highlight the made aspect to emphasize quality and origin.
- Use phrases like "Made by artisans" or "Made from natural ingredients."

In Everyday Communication

- Be specific about what was made and how.
- Use "made of" and "made from" accurately to describe materials.

In Legal Contexts

- Ensure compliance with labeling laws when claiming "Made in" country or "Made with" claims.

Future Trends and Innovations Related to "Made"

Emphasis on Sustainability

The concept of made is shifting toward sustainability and ethical production, with consumers valuing eco-friendly and fair-trade products.

Technological Integration

Advances in manufacturing, such as 3D printing, are expanding what it means for something to be made, blurring the lines between mass production and craftsmanship.

Customization and Personalization

The rise of personalized products enhances the significance of made as a reflection of individual preferences and stories.

Conclusion

The word made encapsulates a rich tapestry of meanings that span craftsmanship, origin, achievement, and authenticity. Its versatility makes it an essential component of language, branding, and cultural identity. Whether describing a handcrafted item, a manufactured product, or personal success, made signifies effort, quality, and origin. As industries evolve and consumers become more conscious of authenticity and sustainability, the significance of "made" continues to grow,

shaping perceptions and expectations across sectors.

Understanding the multifaceted nature of made allows us to communicate more effectively, appreciate craftsmanship, and recognize the stories behind the things we value. From artisanal crafts to global manufacturing, "made" remains a powerful word that connects effort with identity.

QuestionAnswer What does the word 'made' typically mean in English? The word 'made' is the past tense of 'make' and generally means to create, construct, or produce something. How is 'made' used in the context of product manufacturing? 'Made' refers to items that are produced or manufactured, such as 'made in Italy' indicating the country of production. What are some common phrases with 'made' in everyday language? Common phrases include 'made of' (material composition), 'made for' (intended for), and 'made up' (created or invented). How has the usage of 'made' evolved in modern slang? In slang, 'made' can refer to achieving success or wealth, as in 'made it' meaning someone has achieved their goals. Can 'made' be used as an adjective? While 'made' is primarily a verb, in some contexts it functions adjectivally, such as in 'a made man,' meaning someone who has achieved a certain status. What are some common grammatical structures involving 'made'? It is often used in passive constructions like 'was made,' and in phrases like 'made from' and 'made in' to specify origin or material. Are there any popular songs or movies with 'Made' in the title? Yes, for example, 'Made' is a 2001 crime film, and there are songs titled 'Made' by various artists, reflecting its cultural significance.

Related keywords: created, manufactured, produced, crafted, assembled, constructed, built, fabricated, developed, formed

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