

## What the experts are saying about *101 Things Everyone Should Know About Science*

"In *101 Things Everyone Should Know about Science*, Dia Michels and Nathan Levy capture the essence of science with pithy engaging explanations. Their book challenges our understanding, intrigues us, and leads us on a voyage of discovery. This is essential reading for anyone who wants to know how things work—from lizards to light bulbs."

—April Holladay, author, USA Today's online science column *Wonderquest*

★★★★ "Nathan Levy and Dia Michels employ a completely 'user friendly' Q & A format to introduce readers to key concepts in biology, chemistry, physics, geology, and the general sciences. A compendium of diverse fun science facts suitable for inquiring minds from 8 to 80, *101 Things Everyone Should Know About Science* is as entertaining and engaging as it is informed and informative. *101 Things Everyone Should Know About Science* is particularly recommended for school and community libraries, and would be an ideal addition to home schooling curriculums as supplemental reading in preparation for instilling a drive to learn what the various sciences are all about."

—Midwest Book Review

Science affects everything—yet so many of us wish we understood it better. Using an accessible question-and-answer format, *101 Things Everyone Should Know About Science* expands every reader's knowledge. Key concepts in biology, chemistry, physics, earth, and general science are explored and demystified by an award-winning science writer and a seasoned educational trainer. Endorsed by science organizations and educators, this book is perfect for kids, grown-ups, and anyone interested in gaining a better understanding of how science impacts everyday life.



Teaching the science of everyday life

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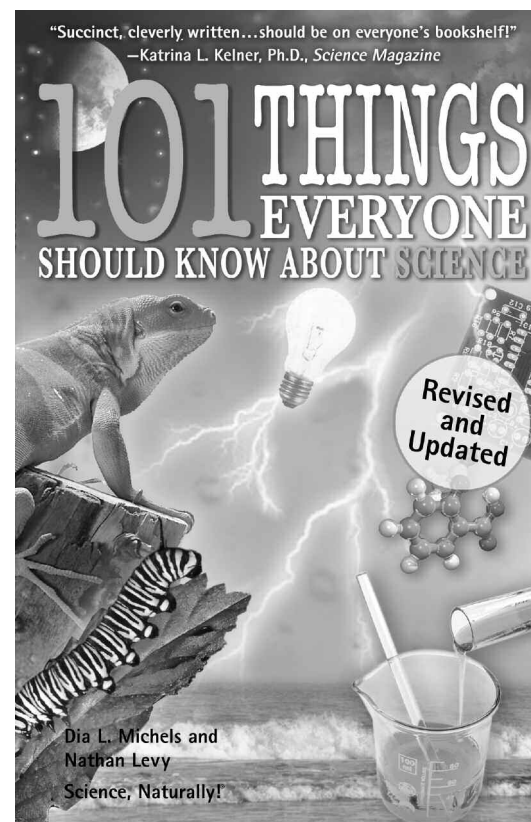
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# EXCERPTS FROM 101 Things Everyone Should Know About Science



"Michels and Levy have created a book that could be called *How to Learn Science without Really Trying!* With over 100 questions on things we've all wondered about, they provide answers in a succinct, cleverly written and understandable format. An authoritative overview of science, this book fills an empty niche and should be on everyone's book shelf!"

—Katrina L. Kelner, Ph.D., Deputy Editor, Life Sciences, *Science Magazine*

“Fun, accurate, and understandable, *101 Things Everyone Should Know About Science* is as engaging as it is educational. Readers will devour the book and be left eager for the 102nd thing to know! With expert text and clear illustrations, Michels and Levy appeal straight to our natural curiosity about how the physical world works.”

—Margaret Kenda, Ph.D., author of *Science Wizardry for Kids*

In *101 Things Everyone Should Know About Science*, children and adults alike find clear and engaging explanations of complex phenomena. Michels and Levy's book not only provides us with answers, but more importantly, also gives us the tools to ask the next question, and the next, and the next... *101 Things Everyone Should Know About Science* encourages a lifetime of curiosity about the world around us!

—Julie Edmonds, Ph.D., Associate Director, Carnegie Academy for Science Education

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### About Science, Naturally!®



Teaching the science of everyday life

Science, Naturally! is committed to increasing science literacy by exploring and demystifying key scientific concepts. Our mission is to produce products—for both children and adults—that are filled with interesting facts, important insights and key connections in science. Our materials are designed to make potentially intimidating topics accessible and intriguing. They are perfect for kids, parents, educators and anyone interested in gaining a better understanding of how science affects everyday life.

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# Earth Science

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## 4. What type of scale do seismologists use to measure the strength of an earthquake?

Richter scale.

For almost three-quarters of a century, seismologists, or scientists who study earthquakes and seismic waves, have used the Richter scale to measure an earthquake's strength or magnitude. Dr. Charles Richter developed the scale in 1935 when he recognized that the seismic waves radiated by all earthquakes can provide good estimates of their magnitudes. The earthquake itself occurs when adjacent rock layers suddenly slip and slide along each other.

The Richter scale provides a calibrated magnitude rating of seismic waves and their resulting earthquakes, ranging from less than 2 (not felt by humans) to 8 or greater (capable of causing mass destruction). Scientists measure these waves using seismographs, which record a zigzag trace on a seismogram showing the varying degree of ground motions beneath its sensor. Sensitive seismographs placed in strategic locations around the planet can now register earthquakes of 4.5 or higher anywhere in the world. Annually, there are eighteen major earthquakes (7 or higher) around the world; compare this to some 1.4 million combined minor and very minor earthquakes (3.9 or less).

Because the magnitude scale is based on powers of 10, an earthquake with a magnitude of 6.5 has ten times the wave amplitude (or height) on a seismogram. This relates to a 6.5 earthquake having about 30 times the energy of a 5.3 earthquake. Earthquake damage is not entirely dependent on the strength of the quake; building codes of that area, population density, underlying ground structures, and the distance of places from the earthquake itself also have an effect.


# Sample Questions

\*\*\*For formatting purposes, we are including the questions and the answers on the same page. In the book, all the questions precede the answers in separate sections.\*\*\*

## Biology

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### 1. Chicken pox, AIDS, and the common cold are caused by:

- a) bacteria.    c) viruses.   
b) fungi.        d) venom.

Viruses are much smaller than bacteria, and they infect almost all life forms, including plants, animals, and even bacteria. They are made of genetic material (DNA or RNA) surrounded by a protein coat. DNA is deoxyribonucleic acid, a nucleic acid that contains the genetic instructions specifying the biological development of all cellular forms of life (and most viruses). RNA (ribonucleic acid) is like DNA except that it is almost always a single-stranded molecule with shorter chemical compound chains.

Viruses invade and infect living cells, often damaging or killing them. They can also cause disease. Some viral diseases include chicken pox (caused by the varicella-zoster virus), AIDS (caused by HIV, the human immunodeficiency virus), and the common cold. Viruses require a host. The host provides them with all the chemicals and molecules they need to survive and reproduce.

There are no cures for viral diseases. Our most effective treatments work to eliminate symptoms. Prevention of infection through the use of vaccines is currently the best medical option.


Bacteria are one-celled organisms that exist in virtually every environment on Earth, including the human body. Some are beneficial and do things such as aid in digestion. Others are harmful and can cause sickness or disease.

Fungi are organisms that obtain energy from an outside source such as soil, rotting material, or living plants. Some fungi are beneficial and can be used as food or to produce medicines and antibiotics (such as penicillin); other fungi can be poisonous.

Venoms are poisons that come from animals and are used to damage an enemy or to catch prey through a sting or bite.

# Chemistry

## 2. Diamonds come from:

-  a) carbon.      c) iron.  
b) water.      d) oxalates.

Diamonds are a form of carbon valued for their beauty in jewelry and for their hardness in industrial use. They are transparent crystals of super-bonded carbon atoms. Most diamonds are mined from volcanic pipes (part of a deep volcano structure). Here, intense pressure and heat are suitable for diamond formation. Diamonds may be ejected from their formation region within lava flows and other volcanic activity.

Diamonds are famous for being the hardest known natural substance because they are made of sturdy, interlocking pyramids of carbon atoms. The pyramid is among the strongest structures in nature, which is what gives the diamond its hardness and indestructibility. Their structure (especially once cut into a multifaceted stone) is ideally suited for dispersing visible white light into its component colors. The sparkle or brilliance of diamonds makes them prized jewelry. Diamonds are also commonly used to make blades for cutting and drilling.

Water is made up of hydrogen and oxygen atoms and contains no carbon.

Iron is a heavy metallic element used in construction, tools, and armament.

Oxalates are organic (or carbon-containing) chemicals found in certain plant foods that can combine with calcium to form calcium oxalate, a mildly toxic chemical that the body does not use.



# Physics

## 3. Why does it hurt so much when you hit the water belly-flopping into a swimming pool?

Because you are breaking the surface tension.

In a liquid, the molecules have a strong enough attraction to one another to keep them from flying apart. At a boundary between the liquid and air, the molecules crowd closer together than inside the liquid, and so the attraction creates a kind of skin over the water, called surface tension. This is why it can be painful when you hit the water, especially from high up. Your body is hitting that skin, and it has to break through the clinging molecules. Belly-flopping hurts because you are breaking the surface tension over a large region of water all at once. In a dive, you break the surface tension with a small, sharp surface made by your hands. As a result, the force is small. (The amount of force is surface tension times the horizontal area of your body hitting the water.) The height from which you jump makes a difference as well; the higher the diving board, the faster you will be going when you hit the water, and therefore the harder you will hit it.

A way to see the clinging power of water molecules is to use an eyedropper to drip water slowly onto a penny. After a number of drops, the water will begin to bulge over the edges of the penny, but it won't drip off because surface tension holds it together. Eventually, if you keep adding drops, the water will run off. How many drops of water do you think can remain on the surface of a penny before the water runs off?

Water striders, a kind of insect, use surface tension to stand on and move across the surface of ponds and lakes. They are light enough that, while their legs make little dents in the surface tension, they don't break through.