

Grown-Up Guide

For 120 Big Questions Kids Ask by Evan Larkwell

24 conversation starters and the sources behind all 120 answers.



How to use this guide

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Let the child choose a question. Ask what they notice in the picture before you explain more. Listen for the reason behind an answer. You can come back to a page together.

Nothing needs to be written down. The conversation starters are invitations, not quizzes.

The answers in the book were written with the help of AI tools and checked against the published sources listed here: science agencies, museums, universities, and journals. They have not been reviewed by an independent scientist. Science keeps moving, so if a source has been updated since September 2026, the newer information wins.

Everyday Science

G01 / Everyday Science, Q001/Q004

Compare the floating ship and the floating ice. What is shared, and what needs a different explanation?

G02 / Everyday Science, Q005/Q006

Explain the difference between melting and dissolving using the pictures, without using the word disappear.

G03 / Everyday Science, Q010/Q011

Trace a sound on its way to a wall and back. Which part of the route creates the delay?

Follow the child's reasoning. Go back to the picture when a detail needs checking.

Space and the Universe

G04 / Space, Q016/Q026

Use the two diagrams to explain why an ordinary Moon phase is not the same as an eclipse.

G05 / Space, Q017/Q023

Compare the changes that make a day with those that make a year of seasons.

G06 / Space, Q029/Q030

Find one scientific question with an uncertain answer and one classification with written rules. How do they differ?

Follow the child's reasoning. Go back to the picture when a detail needs checking.

Earth, Weather and Oceans

G07 / Earth, Q031/Q032

Follow water through two routes and explain why a cloud is more than invisible water vapor.

G08 / Earth, Q037/Q038

Compare the evidence for an earthquake with the explanation of an eruption. Which processes are connected?

G09 / Earth, Q036/Q045

Explain why one rainy day does not tell you whether a place usually has a desert climate.

Follow the child's reasoning. Go back to the picture when a detail needs checking.

Animals and Nature

G10 / Nature, Q046/Q048

Follow the job of a leaf and the job of a flower. How do both support the plant differently?

G11 / Nature, Q050/Q051

Remove a decomposer from the pictured system. Name a possible consequence and something you would need to investigate.

G12 / Nature, Q053/Q054

Compare where a fish and a whale get oxygen. Explain why sharing an ocean does not make them the same kind of animal.

Follow the child's reasoning. Go back to the picture when a detail needs checking.

The Human Body and Brain

G13 / Body, Q062/Q069

Follow nutrients from a meal toward the body's transport system. Where do the two diagrams connect?

G14 / Body, Q063/Q067

Choose one body diagram and explain which arrows show matter moving and which show information moving.

G15 / Body, Q073/Q074

Recall a time when new information changed your interpretation. Share only what each person feels comfortable discussing.

Follow the child's reasoning. Go back to the picture when a detail needs checking.

Technology and Inventions

G16 / Technology, Q076/Q078

Compare two devices powered by a circuit. How do their useful outputs differ?

G17 / Technology, Q081/Q082

Follow a message through a network and compare that journey with a program following its instructions.

G18 / Technology, Q084/Q090

Compare a useful technology with one of its limitations. What would you check before making a big claim about it?

Follow the child's reasoning. Go back to the picture when a detail needs checking.

Dinosaurs and Deep Time

G19 / Deep Time, Q091/Q092

Explain the difference between preserving a fossil and finding evidence for its age.

G20 / Deep Time, Q096/Q104

Compare the time bar and the mammal examples. What evidence shows that some mammals lived alongside dinosaurs?

G21 / Deep Time, Q100/Q101

Separate what is observed, what is inferred, and what is still unknown in one reconstruction.

Follow the child's reasoning. Go back to the picture when a detail needs checking.

People, History and Our World

G22 / People, Q110/Q114

Compare a rule and a tradition. How might people discuss changing each one?

G23 / People, Q111/Q117

Imagine making a museum label for an object. Include what you know, how you know it, and what you do not know.

G24 / People, Q119/Q120

Compare two accounts of a harmless event. Identify an outside source that could help check a specific claim.

Follow the child's reasoning. Go back to the picture when a detail needs checking.

Sources

Click a number to open the source. Full list online: evanlarkwell.netlify.app/120-questions



Q001 Why can a heavy ship float?

1. ACS

Q002 Why do things fall when we let go?

1. NASA Goddard Space Flig... / 2. NASA / 3. NASA Glenn Research Center

Q003 Why does a sliding toy eventually stop?

1. OpenStax, Rice University / 2. NASA Goddard Space Flig...

Q004 Why does ice float on water?

1. ACS / 2. OpenStax, Rice University

Q005 Why does an ice cube melt?

1. ACS / 2. ACS

Q006 Where does sugar go when it dissolves?

1. ACS

Q007 Why are soap bubbles usually round?

1. Exploratorium / 2. Exploratorium / 3. Exploratorium

Q008 How does a rainbow appear in the sky?

1. OpenStax, Rice University

Q009 Why can we see ourselves in a mirror?

1. OpenStax, Rice University

Q010 How does sound travel from one place to another?

1. OpenStax, Rice University

Sources

Click a number to open the source. Full list online: evanlarkwell.netlify.app/120-questions

Q011 Why do we sometimes hear an echo?

1. [OpenStax, Rice University](#)

Q012 Why do magnets stick to some things but not others?

1. [OpenStax, Rice University](#)

Q013 Why can a rubbed balloon make hair stand up?

1. [ACS](#)

Q014 Why do some metal objects rust?

1. [OpenStax, Rice University](#)

Q015 Why does popcorn pop?

1. [ACS](#)

Q016 Why does the Moon seem to change shape?

1. [NASA Science](#) / 2. [NASA Science](#)

Q017 Why do day and night happen?

1. [NASA](#) / 2. [NASA, Basics of Space F...](#)

Q018 Why does the Sun shine?

1. [NASA Science](#) / 2. [NASA Goddard Space Flig...](#)

Q019 Why do stars look like tiny dots?

1. [OpenStax, Rice University](#) / 2. [NASA Science](#) / 3. [OpenStax, Rice University](#)

Q020 Why are the planets so different from one another?

1. [OpenStax, Rice University](#) / 2. [OpenStax, Rice University](#) / 3. [NASA Science](#)

Sources

Click a number to open the source. Full list online: evanlarkwell.netlify.app/120-questions

Q021 Why does Saturn have rings?

1. [NASA Science](#) / 2. [NASA Goddard Space Flig...](#) / 3. [NASA Ames](#) / 4. [arXiv \(research paper\)](#)

Q022 Why do people see patterns in the stars?

1. [International Astronomi...](#) / 2. [NASA Space Place](#)

Q023 Why do we have different seasons?

1. [NASA Space Place](#) / 2. [NASA Earth Observatory](#) / 3. [Met Office, National Me...](#) / 4. [Met Office](#) / 5. [NASA Science](#)

Q024 Why do astronauts float inside a space station?

1. [NASA](#) / 2. [NASA](#)

Q025 How can a rocket move through space?

1. [NASA, Basics of Space F...](#) / 2. [NASA Glenn Research Center](#) / 3. [NASA Goddard Space Flig...](#)

Q026 Why do eclipses happen only sometimes?

1. [NASA Science](#) / 2. [NASA Science](#)

Q027 What makes a black hole different from other objects in space?

1. [NASA Science](#)

Q028 How can looking into space show us the past?

1. [NASA Space Place](#) / 2. [OpenStax, Rice University](#)

Q029 Could living things exist somewhere beyond Earth?

1. [NASA Science](#) / 2. [NASA Science](#)

Q030 Why is Pluto called a dwarf planet?

1. [International Astronomi...](#) / 2. [International Astronomi...](#)

Sources

Click a number to open the source. Full list online: evanlarkwell.netlify.app/120-questions

Q031 How does water travel around our planet?

1. USGS, Water Science School / 2. USGS / 3. Met Office

Q032 How can a cloud stay in the sky?

1. Plymouth State Universi... / 2. University of Alaska Fa... / 3. Met Office / 4. Met Office

Q033 What makes the wind blow?

1. Met Office / 2. National Weather Service / 3. NOAA NSSL

Q034 Why do we see lightning before we hear thunder?

1. National Weather Servic... / 2. National Weather Service / 3. NOAA JetStream

Q035 Why do snowflakes have such intricate shapes?

1. Kenneth G. Libbrecht, C... / 2. Kenneth G. Libbrecht, C...

Q036 How is climate different from today's weather?

1. NOAA Climate.gov / 2. NOAA Physical Sciences ... / 3. NOAA

Q037 Why does the ground shake during an earthquake?

1. USGS / 2. USGS

Q038 Why do volcanoes erupt?

1. USGS / 2. USGS, Hawaiian Volcano ... / 3. USGS / 4. USGS

Q039 How can mountains grow and wear away?

1. NPS / 2. NPS / 3. NPS / 4. USGS

Q040 Why do rivers often bend instead of running straight?

1. NPS / 2. NPS

Sources

Click a number to open the source. Full list online: evanlarkwell.netlify.app/120-questions



Q041 Why is the ocean salty?

1. [USGS](#) / 2. [NOAA Ocean Today](#) / 3. [NOAA National Ocean Ser...](#)

Q042 Why does the sea rise and fall with the tides?

1. [NASA Science](#) / 2. [NOAA National Ocean Ser...](#)

Q043 How do waves move across the ocean?

1. [NOAA Ocean Exploration](#) / 2. [Woods Hole Oceanographi...](#) / 3. [NOAA Ocean Exploration](#)

Q044 Why is the pressure so great deep in the ocean?

1. [OpenStax](#) / 2. [OpenStax](#) / 3. [NOAA National Ocean Ser...](#) / 4. [Woods Hole Oceanographi...](#) / 5. [NOAA Ocean Exploration](#)

Q045 Why do some places become deserts?

1. [USGS](#) / 2. [British Antarctic Survey](#)

Q046 How do plants make their own food?

1. [OpenStax](#) / 2. [University of Minnesota...](#) / 3. [North Carolina State Un...](#)

Q047 How does a seed grow into a plant?

1. [University of Minnesota...](#) / 2. [OpenStax](#) / 3. [OpenStax](#)

Q048 Why do so many flowers attract bees?

1. [OpenStax](#)

Q049 Why do some leaves change color in fall?

1. [Royal Botanic Gardens Kew](#) / 2. [US Forest Service](#) / 3. [Penn State Extension](#) / 4. [Clemson University Coop...](#)

Q050 Why are fungi important even when we barely notice them?

1. [Royal Botanic Gardens Kew](#)

Sources

Click a number to open the source. Full list online: evanlarkwell.netlify.app/120-questions



Q051 What happens when one part of a food web changes?

1. OpenStax / 2. OpenStax / 3. Cornell Lab of Ornithology / 4. Nebraska Academy of Sci...

Q052 How do birds stay in the air?

1. NASA Glenn Research Center / 2. Cornell Lab of Ornithology / 3. Smithsonian National Zoo / 4. Smithsonian Gardens

Q053 How do fish breathe underwater?

1. OpenStax / 2. Washington State Univer... / 3. Smithsonian Ocean / 4. Research article / 5. Trevisan et al.

Q054 Why is a whale a mammal instead of a fish?

1. Smithsonian Ocean

Q055 How does camouflage help an animal survive?

1. NHM, London / 2. NHM, London / 3. Matchette et al. / 4. M. J. Morgan, A. Adam, ...

Q056 Why do some animals migrate?

1. US Fish and Wildlife Se... / 2. NPS / 3. USDA Forest Service

Q057 How can some animals get through winter by hibernating?

1. NPS, Denali / 2. University of Alaska An... / 3. Physiological and Bioch... / 4. Science (Barnes, 1989) / 5. University of Alaska Fa...

Q058 How does a caterpillar become a butterfly?

1. University of Maryland ... / 2. Smithsonian Gardens / 3. Marine Biological Labor... / 4. Smithsonian Institution

Q059 How can an ant colony work together?

1. Deborah M. Gordon / 2. University of Florida I...

Q060 Why does having many different living things matter?

1. American Museum of Natu... / 2. Kühsel & Blüthgen / 3. OpenStax

Sources

Click a number to open the source. Full list online: evanlarkwell.netlify.app/120-questions

Q061 Why do we have a skeleton inside our bodies?

1. NIAMS

Q062 What happens to food after we swallow it?

1. NIDDK

Q063 Why do we need to breathe?

1. NHLBI / 2. OpenStax / 3. OpenStax / 4. University of Hawai'i OER

Q064 How do muscles move our bodies?

1. OpenStax / 2. OpenStax / 3. OpenStax / 4. OpenStax / 5. RockEDU

Q065 Why do we sweat when we get hot?

1. OpenStax / 2. NOAA National Weather S...

Q066 How do our eyes turn light into what we see?

1. National Eye Institute / 2. OpenStax / 3. OpenStax

Q067 How do our ears turn vibrations into hearing?

1. NIDCD / 2. NIDCD / 3. OpenStax

Q068 Why do children lose their baby teeth?

1. NIDCR / 2. American Dental Associa... / 3. Nobuo Motegi

Q069 Why does the heart keep beating?

1. NHLBI / 2. NHLBI / 3. OpenStax

Q070 How does skin repair a small cut?

1. NIAMS / 2. MedlinePlus / 3. Journal of Biomedical O...

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Q071 How does the body defend itself against germs?

1. NIGMS / 2. OpenStax / 3. NIEHS

Q072 Why do we need sleep?

1. NHLBI / 2. NHLBI / 3. NHLBI / 4. NINDS / 5. OpenStax / 6. Moctezuma, Molinas & Abe

Q073 How does practice help us remember something?

1. OpenStax / 2. Brain and Behavior / 3. PNAS / 4. NHLBI / 5. OpenStax / 6. OpenStax

Q074 Why can feelings change so quickly?

1. OpenStax

Q075 Why do family members sometimes look alike?

1. MedlinePlus Genetics / 2. NHGRI / 3. MedlinePlus Genetics

Q076 How does a light bulb turn electricity into light?

1. US Department of Energy / 2. NIST / 3. US Department of Energy / 4. US Department of Energy / 5. US Department of Energy / 6. University of Wisconsin... / 7. OpenStax

Q077 How can a battery power a toy?

1. US Department of Energy

Q078 How does an electric motor make something spin?

1. OpenStax / 2. Northwestern University...

Q079 Why does pedaling a bicycle turn its back wheel?

1. Exploratorium / 2. OpenStax

Q080 How can an airplane stay in the air?

1. NASA Glenn Research Center / 2. NASA Glenn Research Center / 3. NASA Glenn Research Center / 4. Federal Aviation Admini...

Sources

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Q081 What happens when we send a message over the internet?

1. Internet Society / 2. Internet Engineering Ta... / 3. Cisco / 4. Apple Support

Q082 How does a computer follow instructions?

1. Computer Science Educat...

Q083 How does a touchscreen know where we touch?

1. Microchip

Q084 Why can an AI give a confident answer that is wrong?

1. NIST / 2. Australian Antarctic Pr...

Q085 How can a phone work out where it is?

1. GPS.gov / 2. NOAA National Ocean Ser... / 3. GPS.gov / 4. Google, Android Help / 5. Apple

Q086 How can a bridge hold so much weight?

1. PBS NOVA / 2. PBS

Q087 How does a refrigerator keep food cold?

1. OpenStax, Rice University / 2. Australian Government, ...

Q088 How does clean water reach a faucet?

1. US Centers for Disease ... / 2. US Environmental Protec... / 3. DC Water / 4. Centers for Disease Con... / 5. American Water Works As...

Q089 What happens to a plastic bottle put out for recycling?

1. US Environmental Protec... / 2. NAPCOR (PET industry as... / 3. NAPCOR (PET industry as...

Q090 How do solar panels turn sunlight into electricity?

1. US Department of Energy / 2. U.S. Department of Energy / 3. U.S. Department of Energy

Sources

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Q091 How can a living thing become a fossil?

1. NHM, London

Q092 How do scientists work out how old a fossil is?

1. US NPS / 2. US NPS / 3. US NPS

Q093 Why can rock layers tell a story about the past?

1. US NPS / 2. US NPS / 3. US NPS

Q094 What makes an animal a dinosaur?

1. American Museum of Natu... / 2. NHM, London

Q095 How do we know that birds are living dinosaurs?

1. American Museum of Natu... / 2. NHM, London / 3. American Museum of Natu...

Q096 Did all dinosaurs live at the same time?

1. NHM, London / 2. NHM, London / 3. NHM, London

Q097 How could some dinosaurs grow so enormous?

1. NHM, London / 2. NHM

Q098 How can fossil teeth reveal what an animal ate?

1. NHM

Q099 What can dinosaur footprints tell us?

1. US NPS, Zion / 2. US NPS, Zion / 3. NHM / 4. NHM, London

Q100 Can fossils tell us what colors dinosaurs were?

1. NHM, London / 2. University of Bristol / 3. University of Bristol

Sources

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Q101 Can we know what dinosaurs sounded like?

1. Sandia National Laborat... / 2. NHM, London

Q102 Why are similar fossils found on continents far apart?

1. Earth Experience Museum / 2. OpenGeology

Q103 Why did the non-bird dinosaurs disappear?

1. NHM, London / 2. NHM, London

Q104 Were mammals already around when dinosaurs ruled the land?

1. American Museum of Natu... / 2. NHM, London / 3. NHM, London / 4. Nature (Hu et al., 2005)

Q105 How can living things change over many generations?

1. UC Museum of Paleontolo... / 2. OpenStax, Rice University

Q106 Why are there so many different languages?

1. OpenStax, Rice University / 2. University of Pennsylvania / 3. UNESCO / 4. UNESCO Bangkok

Q107 Why did people invent writing?

1. British Museum / 2. OpenStax, Rice University / 3. British Museum / 4. National Institutes of ... / 5. UNESCO, Intangible Cult... / 6. Mesoweb (Kettunen and H...

Q108 Why do we need a symbol for zero?

1. MacTutor History of Mat...

Q109 Why do people use money?

1. Federal Reserve Bank of... / 2. Bank of England

Q110 Why do communities make rules?

1. UNICEF MENA

Sources

Click a number to open the source. Full list online: evanlarkwell.netlify.app/120-questions

Q111 How do archaeologists learn about people who lived long ago?

1. Roman Inscriptions of B... / 2. British Museum / 3. NHM, London / 4. Society for American Ar...

Q112 How were the ancient Egyptian pyramids built?

1. Institut français d'arc... / 2. Ancient Egypt Research ... / 3. Ancient Egypt Research ... / 4. Ancient Egypt Research ...

Q113 Why do cities grow in some places?

1. London Museum / 2. UNESCO World Heritage C...

Q114 Why do people celebrate in different ways?

1. UNESCO Intangible Cultu... / 2. Smithsonian American Ar... / 3. UNESCO

Q115 Why isn't it the same time everywhere on Earth?

1. NIST

Q116 Why can a flat map make places look different from a globe?

1. NASA Goddard Institute ... / 2. Esri / 3. Esri / 4. Nature Index

Q117 How do museums decide what to show us?

1. Smithsonian National Mu... / 2. Smithsonian National Mu... / 3. Smithsonian National Mu...

Q118 Why do people carry ideas and foods from place to place?

1. International Potato Ce... / 2. Europeana, mostra Edibl... / 3. International Potato Ce... / 4. Food and Agriculture Or... / 5. Smithsonian National Mu...

Q119 How can people tell different stories about the same event?

1. OpenStax, Rice University / 2. UC Museum of Paleontolo...

Q120 How can we decide whether an amazing claim is true?

1. UC Museum of Paleontolo... / 2. UC Museum of Paleontolo... / 3. OpenStax, Rice University / 4. OpenStax, Rice University

About the sources

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The answers in the book were written with the help of AI tools and checked against the published sources listed here: science agencies, museums, universities, and journals. They have not been reviewed by an independent scientist. Science keeps moving, so if a source has been updated since September 2026, the newer information wins.

Links were checked in September 2026; websites can move or change. Some sites block automatic checks, so a few links may need to be opened by hand.

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