Hey Smart Girl

Book of Earth Science

SAMPLE CHAPTER

Ages 8 - 12

Sharon McLean

WELCOME, SMART GIRL!

WELCOME TO YOUR SNEAK PEEK OF HEY SMART GIRL: BOOK OF EARTH SCIENCE!

EARTH SCIENCE IS ALL ABOUT UNDERSTANDING OUR AMAZING PLANET—FROM THE GROUND BENEATH YOUR FEET TO THE WEATHER ABOVE YOUR HEAD, AND EVERYTHING IN BETWEEN.

THINK VOLCANOES, EARTHQUAKES, WEATHER PATTERNS, OCEANS, AND THE ROCKS YOU'RE STANDING ON RIGHT NOW!

NOW LET'S GET OUTSIDE AND SEE EROSION IN ACTION!

PS. WANT TO SEE MORE EXPERIMENTS LIKE THIS?

ASK YOUR PARENTS TO SCAN THE QR CODE AT THE END OF THIS PREVIEW
TO EXPLORE THE FULL HEY SMART GIRL: BOOK OF EARTH SCIENCE.

EROSION: ON THE MOVE!

ONCE WEATHERING SMASHES ROCKS INTO TINY PIECES (KNOWN AS SEDIMENT), EROSION TAKES OVER AS EARTH'S DELIVERY SERVICE. EROSION IS THE PROCESS OF MOVING SEDIMENT FROM ONE PLACE TO ANOTHER—AND IT WORKS VERY (VERY!) SLOWLY, UNLESS IT DOESN'T!

THE MAIN MOVERS? WATER, ICE, AND WIND.

WATER — THE MASTER SCULPTOR

RIVERS DON'T JUST FLOW; THEY CARVE. THE FASTER THE WATER, THE BIGGER THE CHUNKS IT CAN CARRY. OVER MILLIONS OF YEARS, THIS CUTS DEEP VALLEYS AND EVEN MASSIVE CANYONS LIKE THE GRAND CANYON. MEANWHILE, OCEAN WAVES BATTER COASTLINES RELENTLESSLY, WEARING CLIFFS BACK CENTIMETRE BY CENTIMETRE. BUT HERE'S WHERE IT GETS WILD: FLASH FLOODS IN DESERTS CAN ERODE INCREDIBLY FAST, TEARING NARROW SLOT CANYONS IN JUST HOURS. WHY? THE GROUND IS SO HARD AND DRY IT CAN'T ABSORB THE RAIN, SO ALL THAT WATER RUSHES OVER THE SURFACE LIKE A LIQUID BULLDOZER.

THINK LIKE A SCIENTIST: WHY ARE FLASH FLOODS MORE COMMON IN DESERTS THAN FORESTS?

ICE — THE SLOW GIANT

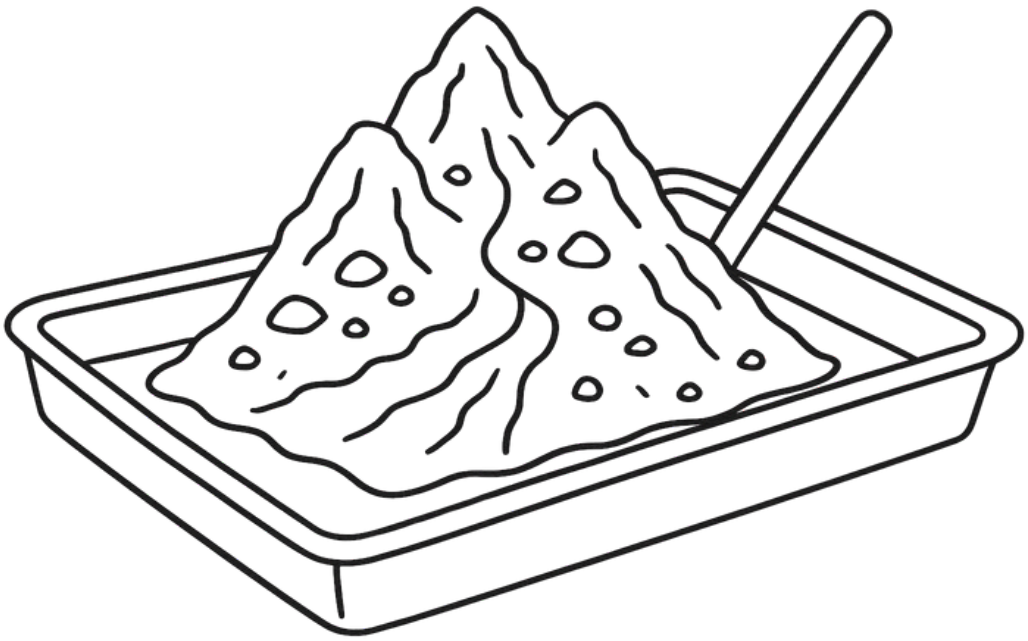
GLACIERS ARE MASSIVE RIVERS OF ICE THAT GRIND ROCKS AS THEY SLOWLY SLIDE DOWNHILL, CARVING WIDE U-SHAPED VALLEYS. WHEN THEY FINALLY MELT, THEY LEAVE BEHIND MORAINES (RIDGES OF ROCK AND GRAVEL) AND DEEP LAKES. MUCH OF NORTHERN EUROPE AND NORTH AMERICA WAS SHAPED THIS WAY DURING THE LAST ICE AGE —SO IF YOU LIVE THERE, THANK A GLACIER FOR YOUR LANDSCAPE!

WIND — THE DESERT ARTIST

WHERE WATER IS SCARCE, WIND BECOMES THE SCULPTOR. IT PICKS UP SAND GRAINS AND BLASTS THEM AGAINST ROCK FACES IN A PROCESS CALLED ABRASION—LIKE NATURE'S SANDPAPER. SOFTER ROCK LAYERS WEAR AWAY FIRST, LEAVING BEHIND STRANGE ROUNDED SHAPES, NATURAL ARCHES, AND BOULDERS THAT LOOK LIKE THEY'RE BALANCING ON TOOTHPICKS.

THINK LIKE A SCIENTIST: WHY IS WIND EROSION STRONGER IN DESERTS THAN FORESTS?

TEST IT LIKE A SCIENTIST: BUILD YOUR OWN ERODING MOUNTAIN



YOU'LL NEED

- SOIL OR MUD
- A SHALLOW TRAY OR OLD BAKING TIN
- WATER
- A STICK (OR YOUR HANDS)
- A FEW PEBBLES
- CAMERA OR PAPER + PENCIL (TO RECORD CHANGES)

STEPS

1. MIX SOIL WITH A LITTLE WATER UNTIL IT'S MOLDABLE (LIKE THICK PLAYDOUGH).
2. BUILD A MINI MOUNTAIN IN YOUR TRAY. ADD PEAKS, VALLEYS, SLOPES, PEBBLES, AND RIDGES.
3. USE A STICK TO CARVE CHANNELS DOWN THE SIDES (FUTURE RIVERBEDS!).
4. PLACE YOUR MOUNTAIN OUTSIDE WHERE WEATHER CAN REACH IT, BUT WHERE IT WON'T BE KICKED OR BUMPED.
5. CHECK IT EVERY DAY. NOTE THE WEATHER (RAINY / SUNNY / FROSTY / WINDY) AND TAKE A PHOTO OR SKETCH WHAT CHANGED.

WHAT TO OBSERVE

- AFTER RAIN: WHERE DID WATER CARVE CHANNELS? ANY MINI "LANDSLIDES"? SEDIMENT WASHED TO THE BOTTOM?
- AFTER SUN: DID CRACKS FORM AS THE MUD DRIED? DID THE SURFACE HARDEN?
- AFTER FROST (WINTER): DID CRACKS GROW? DID CHUNKS POP OFF?
- AFTER WIND: DID THE PEAK WEAR DOWN? DID FINE DUST BLOW AWAY?

WHAT'S HAPPENING? YOU'RE WATCHING WEATHERING (CRACKING, DRYING, BREAKING) AND EROSION (PIECES BEING MOVED) IN REAL TIME. IN NATURE, THESE FORCES RESHAPE LANDSCAPES OVER MILLIONS OF YEARS—YOUR MOUNTAIN SHOWS THE SAME PROCESSES IN DAYS OR WEEKS.

Science Hero: Wangari Maathai – The woman who planted hope

When Wangari Maathai was growing up in rural Kenya in the 1940s, her world was green. Thick forests covered the hills, crystal-clear streams ran year-round, and the soil was rich and dark.

But when she returned home after studying biology in the United States, everything had changed. The trees were gone. The streams had dried up or turned to muddy trickles. Farmland was washing away.

Wangari realised the connection: no trees meant no roots to hold the soil. Without forests, rainwater rushed straight off the land instead of soaking in. Women had to walk for hours to find firewood and clean water. The land was literally slipping away.

So in 1977, Wangari did something simple but revolutionary: she planted seven trees in her backyard. Then she encouraged other women to do the same. This tiny act grew into the Green Belt Movement, which helped communities across Kenya plant over 50 million trees.

The government didn't like Wangari speaking up for the environment and people's rights. She was arrested multiple times and even beaten. But she never stopped. In 2004, she became the first African woman to win the Nobel Peace Prize.

Wangari showed that knowing the science is just the beginning. Real change happens when you put that knowledge into action. Scientists had understood for centuries that tree roots prevent erosion, but Wangari turned that fact into a movement that transformed her country. She proved that you don't need a fancy laboratory or expensive equipment to make a difference—sometimes the most powerful scientific solution starts in your own backyard with your hands in the soil and a seedling in your palm.

Try This: Give Your Mountain Roots!

Remember your erosion mountain from earlier? Now it's time to test Wangari's solution and see roots in action!

What you need:

- Your erosion mountain (or rebuild a new one if it's totally washed away!)
- Grass sod, seeds, or a small potted plant
- Water
- A measuring jug
- Your observation skills

What to do:

  - Choose your root method:Fast option: Press a hand-sized piece of grass sod (that's grass with roots and soil attached) onto one slope of your mountain.
  - Quick-sprout option (3–5 days): Sprinkle cress, alfalfa, or chia seeds on one slope and mist with water daily until roots appear.
  - Mini lawn option (10–14 days): Plant grass seed on one side, keep it moist, and wait until you've got a proper little lawn growing.

1. Compare the slopes: Once your roots are established, pour the same amount of water from the same height over both the rooted side and the bare side.
2. Observe: Which side erodes less? Can you see how the roots are holding the soil together?

What's happening? The roots act like tiny ropes, grabbing onto soil particles and holding them in place. They also slow down the water so it has time to soak in instead of rushing away with all your topsoil. That's exactly what Wangari knew 50 million trees could do for Kenya—but you've just proved it works with your very own hands!

Smart Girl Status: Levelled Up!

Look at you! You've just:

- Discovered how erosion reshapes our planet - from the Grand Canyon carved over millions of years to flash floods that tear through deserts in hours
- Built your own eroding mountain and watched weathering and erosion happen in real time (what would take millions of years in nature, you saw in days!)
- Learned how roots prevent erosion - and tested it yourself, just like Wangari Maathai knew 50 million trees could save Kenya's soil
- Understood that science isn't just about knowing facts - it's about putting knowledge into action to change the world

You're thinking like an earth scientist now—observing, experimenting, and understanding how our amazing planet works!

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Ready for More Earth Science Adventures?

Good news — there's a LOT more where that came from. Hey Smart Girl: Book of Earth Science is packed with 30+ hands-on experiments, mind-blowing facts, inspiring scientist stories, and everything you need to understand the wild, wonderful planet you're standing on. Perfect for girls age 8-12.

Volcanoes. Oceans. Earthquakes. Rocks. Weather. Climate. It's all in there.

Scan the QR code to explore the book! 👇

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