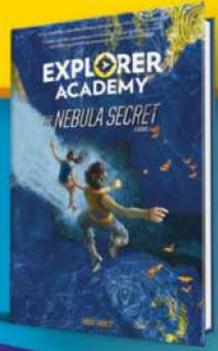


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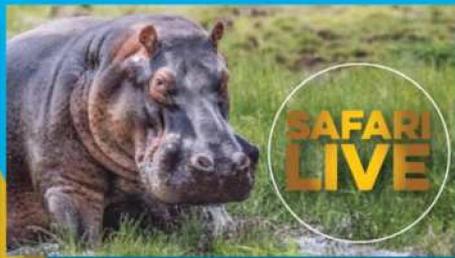

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NATIONAL GEOGRAPHIC KIDS (ISSN 1542-3042) is published ten times a year by National Geographic Partners, LLC, Washington, DC 20036. For more information contact natgeo.com/info.

Periodical postage paid at Washington, DC, and additional mailing offices. POSTMASTER: Send address changes to NATIONAL GEOGRAPHIC KIDS, P.O. Box 37545, Boone, IA 50037. Subscriptions: United States, \$25.00; Canada, \$29.95; elsewhere, \$34.95; all in U.S. funds. Single copy: United States, \$4.99; Canada, \$6.99 in Canadian funds or \$5.75 in U.S. funds; elsewhere, \$5.99 in U.S. funds or equivalent (includes postage). In Canada, Agreement number 1000010298, return undeliverable Canadian addresses to NATIONAL GEOGRAPHIC KIDS, P.O. Box 819 STN Main, Markham, Ontario L3P 9Z9.

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IN THIS SUPER SNEAKY ISSUE

This magazine is crammed with top-secret activities to inspire your undercover instincts. But first, take a fun quiz on **page 12** to find out which kind of explorer you're most like!



14

Photo Secrets Revealed

Find out how six sneaky wildlife photographers got their shots.



20

Undercover Tech

Discover the truth behind the gadgets in *Explorer Academy: The Nebula Secret*.



24

Code Breakers

Spy on a few ways people have sent secret messages.



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Sneak Peek!

Check out a chapter from *Explorer Academy: The Nebula Secret*.



BONUS:

Get details on the brand-new Nat Geo Kids book *Explorer Academy: The Nebula Secret*.

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Check out these outrageous facts.

BY JEFFREY WANDEL



CHECK OUT THE BOOK AND APP!

Snow leopards can't



ONLY FEMALE BEES STING.

Some **20,000 YEARS AGO**, massive icebergs floated off the coast of Florida.



A beefalo is part bison and part **COW.**

If you lived for **2.4 billion seconds**, you will be **75 years old.**

If you continued to **GROW** as fast as an average baby, you'd weigh about **413,300 pounds** by age 10.

A **zeptosecond** is one-billionth of a trillionth of a second.

You can see colorful autumn leaves from space.

Most spiders have 8 eyes.

The world's most expensive **TEA BAG** was decorated with **280 diamonds** and cost around **\$10,000!**

GUINNESS WORLD RECORDS

SUPER- STRONG FINGERS

How long can you do a handstand? How about a *finger*-stand? Wang Weibao of China holds the record for the longest time to balance on four fingers (that's two fingers on each hand), at 19.23 seconds. But Wang isn't always upside down on his fingers. Sometimes he uses his digits to push himself off the ground from a straight-legged sitting position—with a watermelon in his lap. Hey, we'd be impressed even without the fruit.

—Sally King

LARGE AND IN CHARGE

Cassius behaves the way you'd expect the largest crocodile in captivity to behave. The 18-foot salt-water croc's diet includes two or three whole chickens a week, plus he lunges at his keepers at Australia's Marineland Melanesia Zoo. But Cassius also has a soft side. He once "adopted" a young female croc named Zina. At mealtime, he'd grab food from the keepers, swim over to Zina, and give her the chow before he even had a nibble. Of course, he'd swim right back for more. Cassius may be big, but he's not stupid!

—Jen Rini

CAR ALMOST A TOY

At least the world's smallest car is bigger than most potholes. Austin Coulson built the miniature vehicle from scratch in his garage, giving it a license plate that reads: "IM BIG." Coulson scrunches up his body to drive the car—which measures two feet wide and four feet long—down the street at about 25 miles an hour. Hope it has a loud horn.

—Sally King



CHECK OUT THE BOOK!



Bet You Didn't Know!

6 priceless facts about treasure

BY ERIN WHITMER

1 The Queen of England has a crown studded with more than 3,000 precious gems.

2 Most pirates never buried their loot.

3 A gold nugget found in California weighed a whopping 160 pounds—about as much as 12 bowling balls.

4 Legend says that if you lose a tooth in Mexico, *el ratón* (the mouse) will leave a treasure under your pillow.

5 A 14-pound pearl was found inside a giant clam.

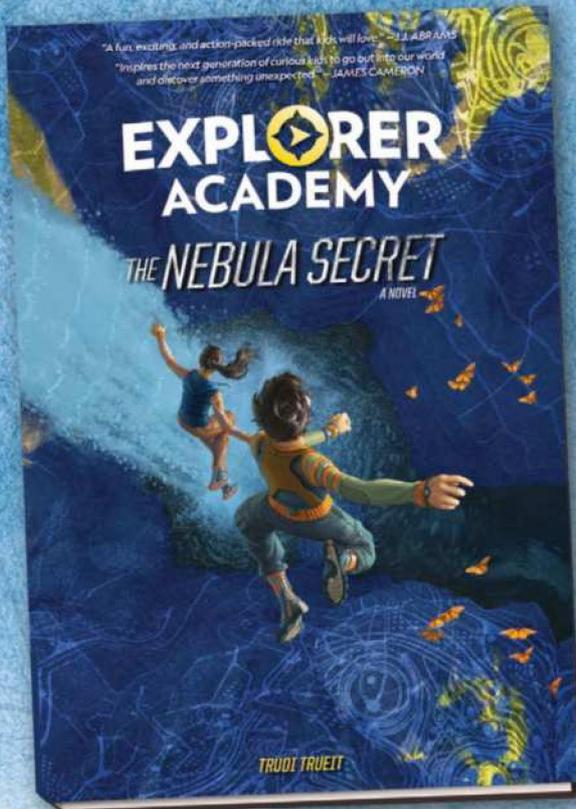
6 A cornflake shaped like the state of Illinois sold for \$1,350.



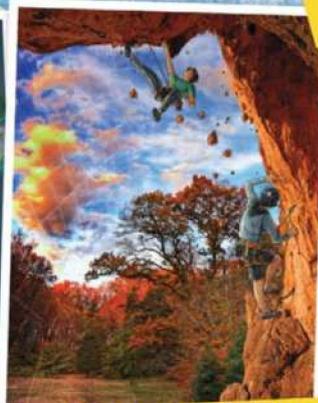
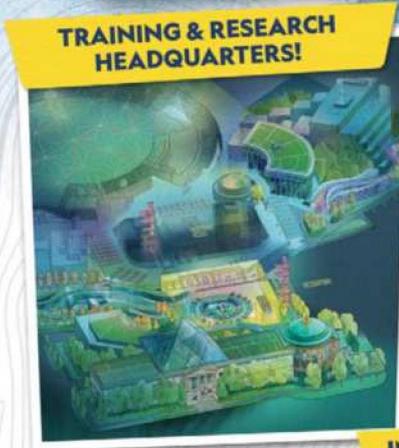
THE ROYAL COLLECTION © 2008. HER MAJESTY QUEEN ELIZABETH II

WELCOME TO EXPLORER ACADEMY

The COOLEST SCHOOL on the Planet!



ADVENTURE, DANGER, AND A THRILLING GLOBAL MISSION await 12-year-old Cruz Coronado at the Explorer Academy, where he and 23 other kids from around the globe will train to become the next generation of great explorers. But Cruz must also unlock clues to his family's mysterious past and tackle the biggest question of all: Who is out to get him ... and why?



UNDER THE Stars



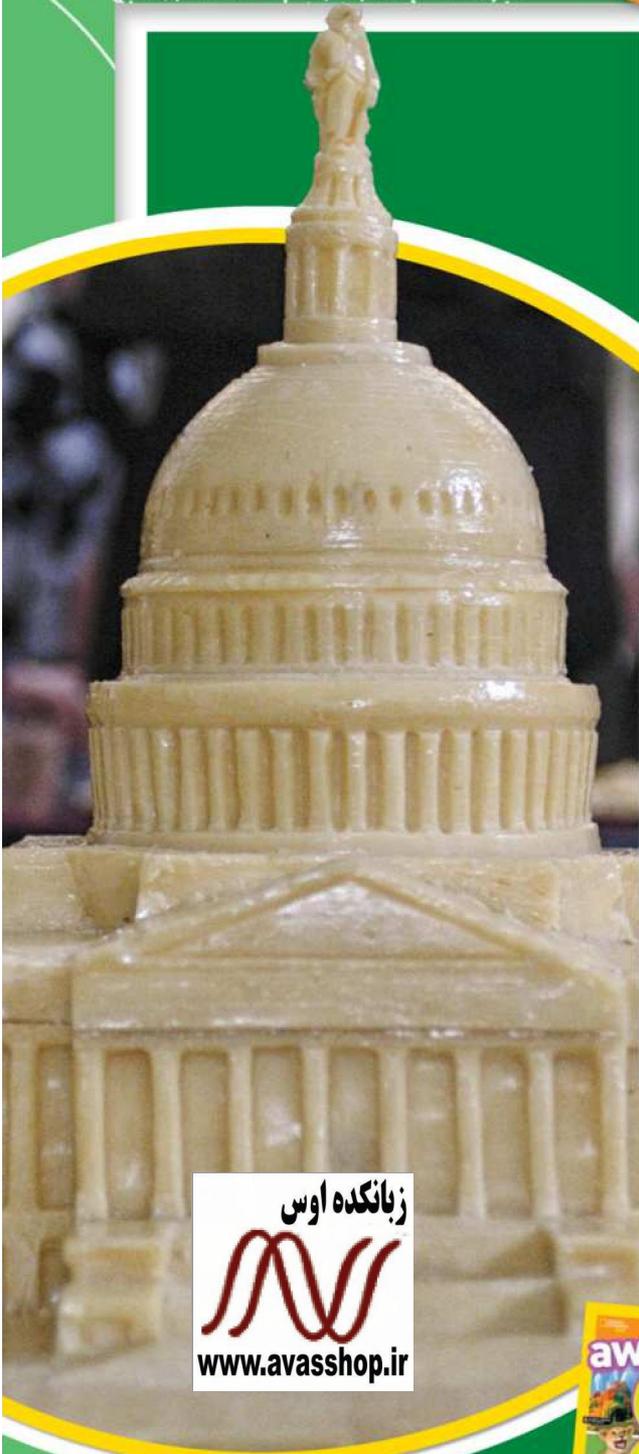
AVAILABLE WHEREVER BOOKS ARE SOLD SEPTEMBER 4
Pre-order now! Get a sneak peek at exploreraacademy.com

awesome

RAD REPLICAS

Even better than the real thing? These re-creations will make you do a double take.

BY JEN AGRESTA AND SARAH WASSNER FLYNN



1

ON POINT

A skilled sculptor carved these awesome **Darth Vaders** out of pencil points. The artist creates these and other cool copies by holding the pencil in one hand and a craft knife in the other.



2

THE BIG CHEESE

Say cheese! Cheddar, to be exact. A sculptor carved the likeness of the **U.S. Capitol** building out of a giant 400-pound block of the cheese—enough to make 50,000 sandwiches.

3

"CAN"-TASTIC

Talk about driving art to another level. This **cool car** was a sculpture built out of canned food as part of an exhibition to raise awareness of hunger issues and collect donations for food banks.



زبانگده اوس
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4

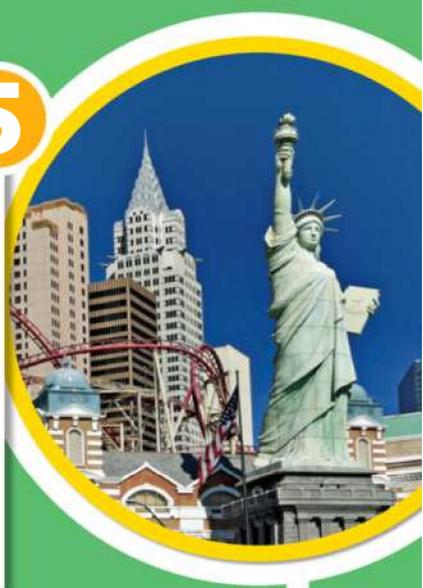
BRIDGE TWINS

Think this is a pic of London's **Tower Bridge**? Think again. It's actually a smaller-scale reproduction of the iconic landmark, rising above a river in Suzhou, China. The structure is a centerpiece for this unique town, which features more than 50 other replica bridges.

LITTLE LIBERTY

5

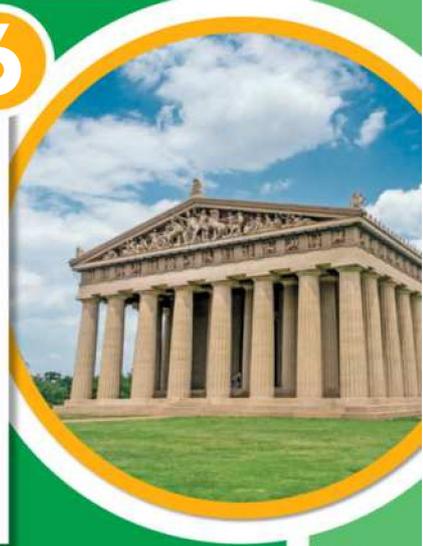
Lady Liberty doesn't welcome visitors only to the Big Apple. This famous green gal also raises her torch in front of the New York, New York hotel in Las Vegas, Nevada. The copycat statue is just 150 feet tall—only half the height of the real deal.



6

IT'S ALL GREEK

It might be the exact same size and show off similar columns, but this building is far from the original **Parthenon** in Athens, Greece. This monument in Nashville, Tennessee, was built to mark the state's hundredth anniversary in 1897.



7

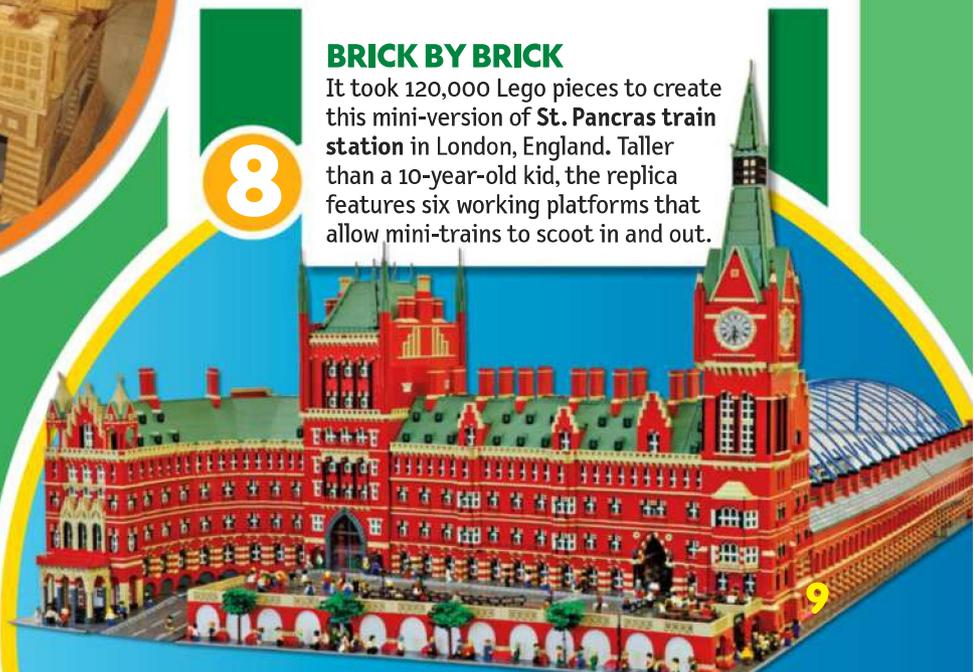
STICK TO IT

Four million matchsticks were used to create this copy of an **oil rig platform**. The artist spent some 30,000 hours over 15 years to piece together this half-ton model of a rig similar to one he once worked on.

8

BRICK BY BRICK

It took 120,000 Lego pieces to create this mini-version of **St. Pancras train station** in London, England. Taller than a 10-year-old kid, the replica features six working platforms that allow mini-trains to scoot in and out.



9

AMAZING ANIMALS

EAT MY BUBBLES.

Sea Turtles Work Out

Boca Raton, Florida

These baby sea turtles aren't hitting the treadmill for exercise—they're walking for science! In the wild, newly hatched sea turtles crawl from their beach nests to the flat, shiny horizon of the ocean. But bright lights from nearby cities can confuse the hatchlings, causing them to wander for hours.

Biologists Karen Pankaew and Sarah Milton wanted to know if these long crawls tire the little reptiles. So they placed wild loggerhead and green sea turtle hatchlings on a tiny, custom-built treadmill. Then the scientists shone a light on the turtles to get them to crawl—though a few of the hatchlings refused. "One turtle turned away

from the light and closed its eyes, like, 'I'm taking a nap!'" Pankaew says.

Next the turtles swam in a pool for two hours wearing a handmade swimsuit attached to fishing line so they wouldn't bump into the walls.

Turns out sea turtles are tough: The hatchlings that crawled for hours on a treadmill seemed to have as much

energy as their siblings that started swimming in the pool right away. But city lights are still dangerous: The longer the hatchlings stay on the beach, the more vulnerable they are to predators like birds.

After the experiment, the scientists released the sea turtles back into the wild—and now they're off to the races.

—Sara Schwartz

SEA TURTLES WALKED ON A TREADMILL CREATED FOR THE EXPERIMENT.



SWIMSUITS ATTACHED TO FISHING LINE KEPT THE SEA TURTLES FROM SWIMMING INTO THE POOL WALLS.



WATCH THE SEA TURTLE VIDEO!
natgeokids.com/september

Rabbit Joins Hospital Staff

Jerusalem, Israel

Calling Dr. Rabbit! When six-year-old Mussa, who had trouble walking, refused to wear his scary-looking leg braces, ALYN Hospital staff brought in Alyna the rabbit. The bunny, whose back legs didn't work, wore braces too. When Mussa saw a rabbit wearing braces, he wanted to as well. Soon Mussa and the rabbit were racing the hospital hallways together—leg braces and all.

Alyna was born with her back legs paralyzed. So owner Riki Yahalom Arbel, who worked at the hospital, fitted the rabbit with a miniature skateboard-like brace. The bunny pulled herself forward with her front legs while her back legs rolled along.

Arbel figured Alyna's disability might help encourage patients who were mobility-challenged. She was right. When kids like Mussa saw how the rabbit moved, they wanted to wear their braces. "The kids took turns strapping Alyna onto her 'skateboard,' and she loved it," says Cathy Lanyard, executive director of the American Friends of ALYN Hospital. "She was like part of the staff—but she got paid in unlimited snacks and plenty of hugs."

—Jamie Kiffel-Alcheh



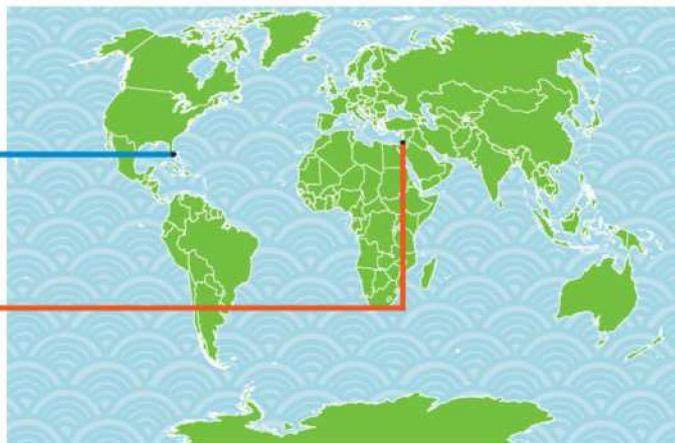
ALYNA SHOWS OFF HER SKATES TO MUSSA.

SEA TURTLES

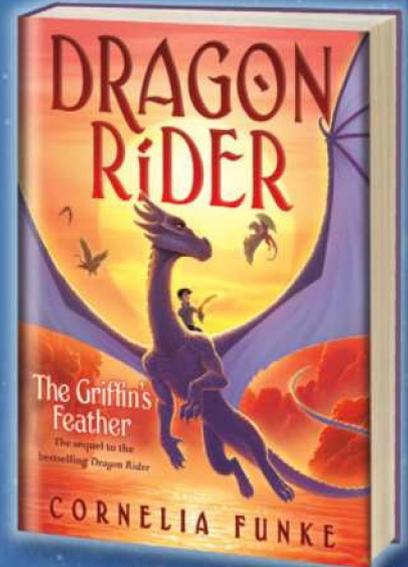
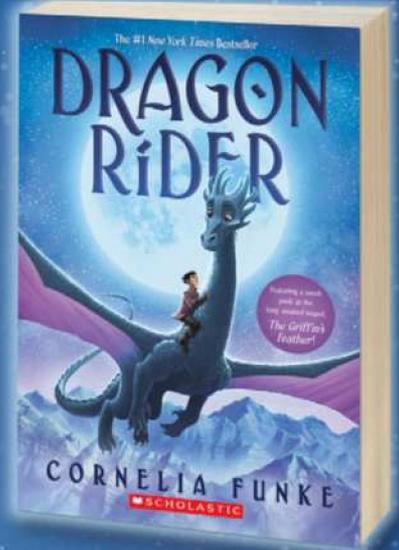
Boca Raton, Florida

RABBIT

Jerusalem, Israel



When your best friend is a dragon, ANYTHING IS POSSIBLE!



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Scholastic.com/DragonRider

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WELCOME TO THE SPECIAL

SUPER SNEAKY ISSUE

PERSONALITY QUIZ

Want to know a secret? You've come to the right place!

Welcome to the **Super Sneaky Issue**, crammed with top-secret activities to inspire your undercover instincts. Communicate in code, track hidden animals, discover real-life secret agents, and more. It's all related to the new book *Explorer Academy: The Nebula Secret*, in which 12-year-old Cruz Coronado attends a school to become a world-class explorer—unless dangerous people stop him.

But first: Several real-life Nat Geo explorers inspired the information in this issue, as well as the book. Take our quiz to see which type of explorer—and Explorer Academy character—you're most like. Just be careful who sneaks a peek at your results. This issue is for your eyes only!

START HERE

Are you more likely to be found at the top of a mountain, or do you prefer an ocean adventure?

MOUNTAIN

OR

OCEAN

Which classic science fair project is a winner in your book?

ERUPTING VOLCANO

THINK LIKE A CHIMP

BUILD-YOUR-OWN ROBOT

You won a free trip! What's your destination?

OOH, EGYPT!

PARIS, PLEASE.

MOUNTAIN

OCEAN

BIG-WAVE SURFING

SCALES

Which would you rather have on your pet: fur or scales?

Pick a water activity.

FUR

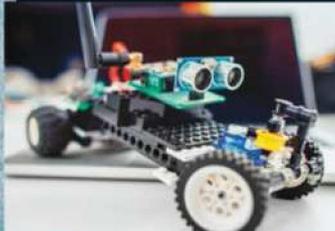
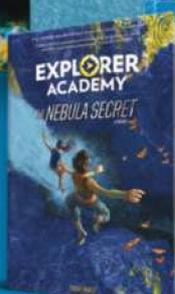
WHALE-WATCHING FROM THE SHORE

CHILLING ON AN INFLATABLE RAFT

What's your favorite thing to do at the beach?

SNORKELING

Get details on the brand-new Nat Geo Kids book *Explorer Academy: The Nebula Secret*! Look at the bottom-left corner of every feature to learn more about the book—and why it's so sneaky.



YOUR RESULTS

SLITHER LIKE A SNAKE



Pick a food you'd never eat: sushi or brussels sprouts?



SEE YA, SUSHI.

BYE, BRUSSELS SPROUTS!



YOU COULD BE AN **ARCHAEOLOGIST!**



Your curiosity about everything means you'd probably enjoy learning about the past. If rocks and minerals interest you, you might be happy as a geologist who studies the age of rock formations, an archaeologist who digs for ancient relics, or a historian who learns about people of the past.

EXPLORER ACADEMY CHARACTER MATCH: **CRUZ**

Cruz is on a global scavenger hunt, following clues to unlock his own family's history.



YOU COULD BE AN **INVENTOR!**



You're analytical and have great problem-solving skills, and you can't wait for the latest technology. Consider being an engineer in any field or a technician who specializes in submersibles or alternative energy devices.

EXPLORER ACADEMY CHARACTER MATCH: **EMMETT**

Emmett enjoys inventing gadgets like eyeglasses that adapt to his emotions.



YOU COULD BE AN **OCEANOGRAPHER!**



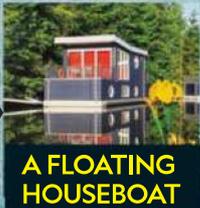
You get along with everyone thanks to your sunny personality. You're up for adventure and would do well in a water-related field, such as oceanography. If you enjoy searching for old relics, consider maritime archaeology. If aquatic animals are more your thing, try marine biology.

EXPLORER ACADEMY CHARACTER MATCH: **LANI**

Lani is always ready for a surf in her beautiful Hawaiian home.



A FLOATING HOUSEBOAT

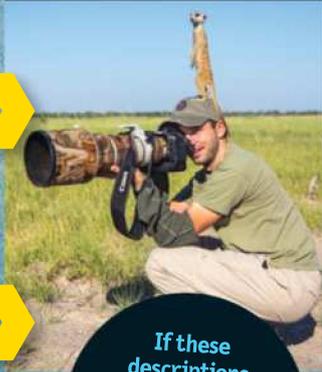


Pick your dream home.



A MULTILEVEL TREE HOUSE

YOU COULD BE A **WILDLIFE PHOTOGRAPHER!**



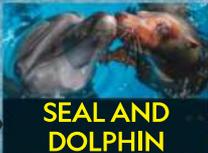
You're known for your big heart. Whether it's animals on the other side of the globe or critters in your own backyard, you're wild about saving wildlife. You'd be most happy working in fields such as zoology, wildlife conservation, and biology.

EXPLORER ACADEMY CHARACTER MATCH: **SAILOR**

Sailor loves animals. She's eager to protect fragile ecosystems and the animals that live in them.



SEAL AND DOLPHIN



Choose an animal pair.

DOG AND FOX



If these descriptions don't match your personality, don't worry. This quiz is just for fun!

CHECK OUT EXPLORER ACADEMY ONLINE!
ExplorerAcademy.com

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PHOTO SECRETS REVEALED

HOW SIX SNEAKY PHOTOGRAPHERS GOT THE SHOT

BY SCOTT ELDER

Wildlife photographers often must use some tricky tactics to get amazing shots. Check out six incredible pictures—and hear straight from the photographers how they used their own sneaky methods to get the pics.

SPOTTING JAGUARS

PHOTOGRAPHER: Steve Winter

ANIMAL: Jaguar

LOCATION: Brazil's Pantanal region

“Jaguars are big cats, the third largest in the world, behind lions and tigers. But they’re extremely good at hiding. Unless you’re lucky, you’d never see one in its tropical forest home. So I needed to set a trap—a camera trap—to get a photo of this juvenile.

“Camera traps take pictures when an animal steps into an invisible beam of light. The tricky part is figuring out where to put one. For help, I got advice from scientists who monitored jaguar movements with GPS collars. The tracking data showed that a female with cubs frequently visited the same clearing in this jungle. Since mothers teach their cubs to hide in trees until they’re big enough to take care of themselves, I set my camera trap on a large tree limb. Just three weeks later this 10-month-old jaguar tripped the beam... and even looked into the camera!”

In the book *Explorer Academy: The Nebula Secret*, Cruz and his friends can take pictures with their minds—sort of. Wildlife photographers can’t do that (yet!), but this article shows other sneaky ways they got these animal pictures.



SPLASHDOWN

PHOTOGRAPHER: Paul Nicklen

ANIMAL: Emperor penguins

LOCATION: Ross Sea, Antarctica

“Emperor penguins are not known for their climbing ability. They basically have to rocket out of the ocean to get back onto the sea ice. To do this, they dive deep and then swim upward at a sharp angle to accelerate. I really wanted to get a shot of a penguin launching out of the water.

“I spent six weeks with some penguins to figure out their favorite landing spots. Knowing that penguins can zoom up to six feet in the air and land beyond the edge of the ice, I spread myself out on the ice where I had seen these birds appear and waited for an explosion of penguins, making sure not to block their path from the water. But I didn’t get the picture I wanted. Finally, I figured out that I was too close to the water. I moved back and waited behind a block of ice. My new placement allowed me to capture this one as it landed, while another penguin catapulted into the air behind him.”

FISH FACE

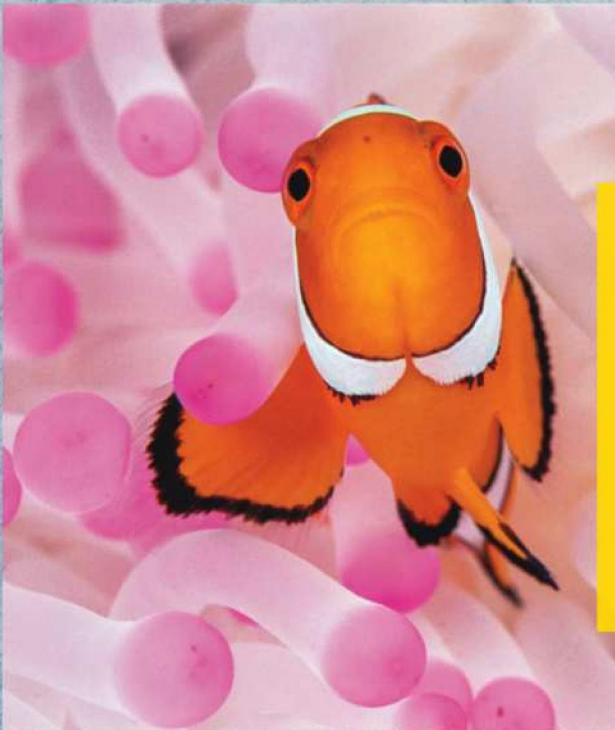
PHOTOGRAPHER: Birgitte Wilms

ANIMAL: Clownfish

LOCATION: Off the coast of Papua New Guinea

“Clownfish are quick. They constantly dart back and forth across their home, which is actually another animal called an anemone. In return for a safe place to live, clownfish defend the anemone from predatory fish by biting or aggressively swimming toward any intruders... including photographers like me.

“All the clownfish I tried to photograph before this one were too fast. My pictures were a split second too late, catching only a tail or no fish at all. So I had to use some tricks. I quietly steadied myself on the bottom so the ocean current wouldn’t push me away and patiently waited—clownfish get defensive if you approach their home. Then I focused my camera on where I thought the fish would appear and waited for it to come out in search of food. Getting a shot with eye contact was a moment of joy!”



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SAY AH!

PHOTOGRAPHER: Brian Skerry
ANIMAL: Shortfin mako shark
LOCATION: Off the coast of New Zealand

“Despite what all those shark movies show, it’s not easy to get sharks like this nine-foot predator to come near a human. But New Zealand is a hot spot for makos, and the fish snacks we tossed in the water attracted them.

“Five makos showed up, and I had to get out of the water and back on our boat. So how did I get this shot? With my pole cam! It’s a system I built that lets me dip my camera into the water, sort of like a heavy-duty selfie stick. Since sharks don’t have hands, they test things with their mouths. I wasn’t trying to portray the fish as a monster though. I wanted this close-up to show it as a magnificent predator that we should respect.”

MORE PHOTO SECRETS!
natgeokids.com/september

FIND THE HIDDEN ANIMALS

It’s not just photographers who can be sneaky! Animals often blend in with their environments for protection. Find each animal listed below in one of the pictures to the right. Write the letter of the correct picture next to each animal’s name. **ANSWERS ON PAGE 35**

- bighorn sheep
- goldenrod crab spider
- pika (*HINT: A pika looks like a rabbit.*)
- copperhead snake
- green frog



BIRD HERD

PHOTOGRAPHER: Jay Fleming

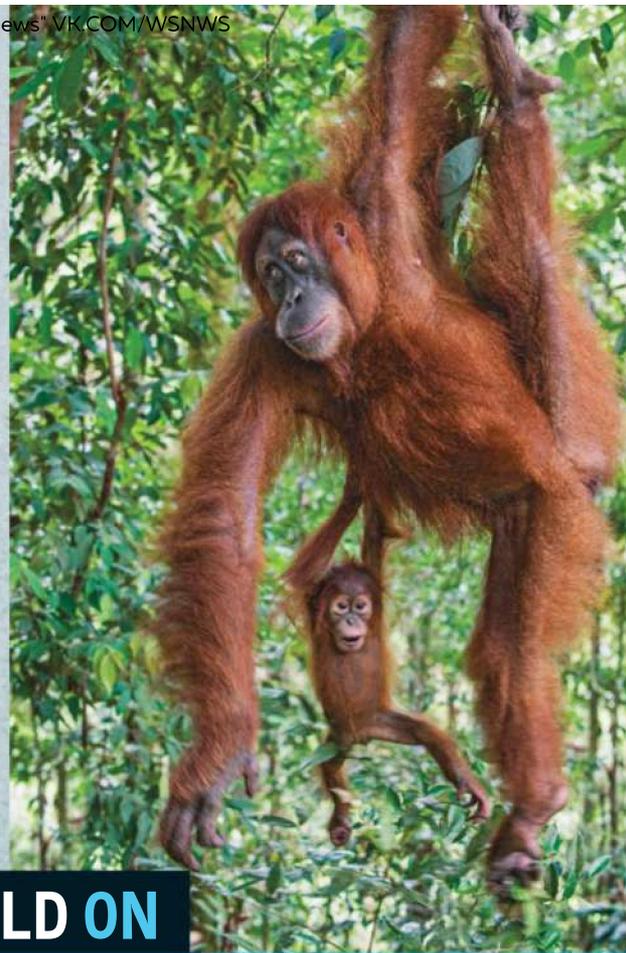
ANIMAL: Great egret chicks

LOCATION: Chesapeake Bay, Maryland

“Wading birds like egrets raise their chicks on small islands. The surrounding water works like a castle moat, keeping out predators like raccoons and foxes. I had to paddle about five miles in a kayak and search very carefully for these birds’ nest because the chicks’ green skin helps them blend in with the grasses.



“These two-week-old chicks were only about a foot tall, so to photograph them at their level, I was lying all the way back in my kayak. They weren’t able to walk or fly yet, but they were bobbing around constantly, so my first few shots were blurry. I had to plant my foot in the mud to keep the kayak steady and set up my camera to take multiple shots with just one click. That’s how I ended up getting this photo, which shows how fragile these birds can be when they’re this young.”



HOLD ON

PHOTOGRAPHER: Suzi Eszterhas

ANIMAL: Orangutans

LOCATION: Gunung Leuser National Park, Indonesia

“To get this shot, I had to know where to be and when. And so I needed to learn everything about my orangutan subjects. I followed this pair around the forest for a week. By spending time with them, I got to know their habits and personalities. It’s important to realize that animals are individuals—just like humans, they’re all different.

“Every day after eating fruit up in the trees, this mother carried her baby near the ground for playtime. But instead of dangling from branches this time, the 18-month-old hung from its mother’s fur! That probably didn’t feel good for Mom, but it made an adorable picture.”



C



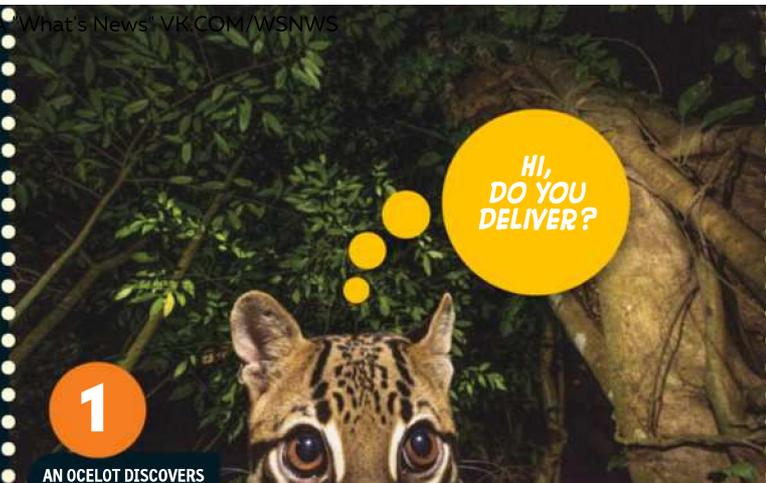
D



E

CAUGHT ON CAMERA

Camera traps automatically take pictures when an animal steps into an invisible beam of light. Why? By using remote cameras, scientists can count and monitor wild animals. Check out these critters caught by camera traps, along with some silly ideas about what the animals might be thinking.



Hi,
DO YOU DELIVER?

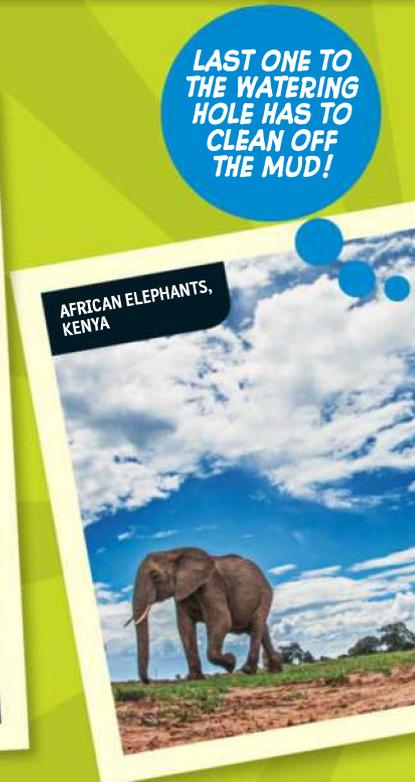
1

AN OCELOT DISCOVERS
A CAMERA TRAP IN
COSTA RICA.



SOME
DAYS
YOU JUST
NEED A NAP.
OR FIVE.

LION,
KENYA



LAST ONE TO
THE WATERING
HOLE HAS TO
CLEAN OFF
THE MUD!

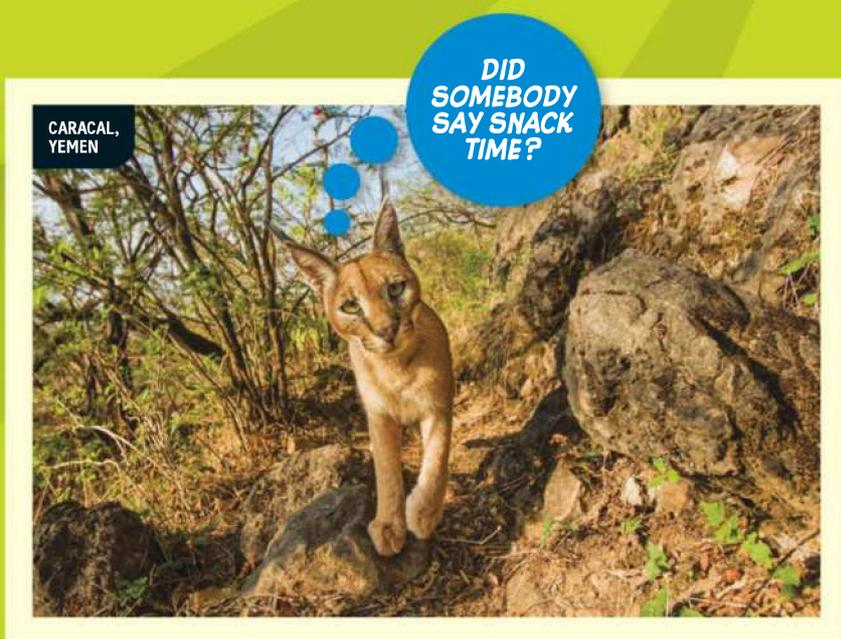
AFRICAN ELEPHANTS,
KENYA



UH,
YOU'VE GOT
SOMETHING
ON YOUR
FACE ...

زبانگده اوس
www.avasshop.ir

ALBATROSS,
SOUTH GEORGIA ISLAND,
NEAR ANTARCTICA



DID
SOMEBODY
SAY SNACK
TIME?

CARACAL,
YEMEN

© NICK HAWKINS / NATURE PICTURE LIBRARY (OCELOT); © ANUP SHAH / MINDEN PICTURES (LION); ELEPHANTS: PAUL NICKLEN / NATIONAL GEOGRAPHIC CREATIVE (ALBATROSS); POLAR BEAR: STEVE WINTER / NATIONAL GEOGRAPHIC CREATIVE (TIGERS); © SEBASTIAN KENNERKNECHT / MINDEN PICTURES (CARACAL); © WILL BURRARD-LUCAS / NATURE PICTURE LIBRARY (HYENAS)

2

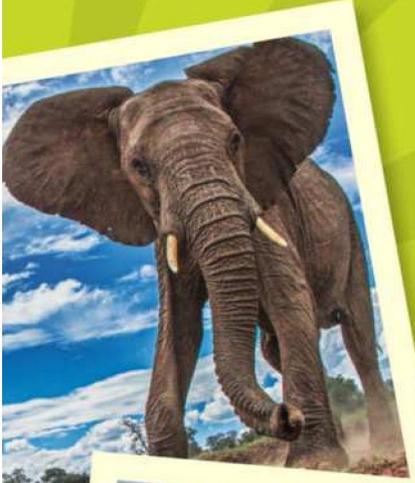
THE OCELOT PAUSES IN FRONT OF THE CAMERA.

I'D LIKE A LARGE FISH PIZZA.

3

AFTER GETTING CLOSER TO THE CAMERA, THE OCELOT BEGINS TO CLEAN ITS PAWS.

I'LL WASH UP FOR DINNER WHILE I WAIT.



#TIGER_BFFS
#NOFILTER

BENGAL TIGERS, INDIA



THIS IS MY GOOD SIDE.

POLAR BEAR, NORWAY



THIS PIC'S FOR OUR ALBUM COVER.

SPOTTED HYENAS, ZAMBIA



I'VE BEEN FRAMED!

RACCOON, CANADA

969
**SUPER
SNEAKY
ISSUE**

UNDERCOVER TECH

**THE TRUTH BEHIND THE GADGETS IN
*EXPLORER ACADEMY: THE NEBULA SECRET***

BY JAMIE KIFFEL-ALCHEH

Honeybee drones! Mood glasses! Classrooms that morph into far-flung destinations! In the book *Explorer Academy: The Nebula Secret*, 12-year-old Cruz Coronado and his friends experience this amazing technology at their school for explorers. Check out the real-life science that inspired the gadgets in the book.

In the book *Explorer Academy: The Nebula Secret*, Cruz and his friends attend an elite school equipped with supercool technology. In this article, see the real-life gadgets that inspired the ones in the book.





THE TECH: HEART-MONITORING WRISTBAND

HOW IT WORKS IN THE BOOK

The students at Explorer Academy wear skinny wristbands called Organic Synchronization (OS) bands that measure their vital signs, which are used as “passwords” to unlock doors.

HOW IT WORKS IN REAL LIFE

Heart-monitoring ID wristbands actually exist. The Nymi Band was made to use your electrocardiogram—that’s a heartbeat reading, also called an ECG—as your password to unlock computers and open doors. Just put the band on your wrist and press your finger on top, and the band measures bursts of electricity sent from your heart. Those bursts create a pattern that’s unique to you. The Nymi Band sends that info wirelessly to devices that have been paired with Nymi.

THE NYMI BAND USES YOUR UNIQUE HEARTBEAT READING AS A PASSWORD TO UNLOCK DOORS.



SAILOR—ONE OF CRUZ'S CLASSMATES AT EXPLORER ACADEMY—COMPETES IN A VIRTUAL REALITY OBSTACLE COURSE.



THE TECH: VIRTUAL REALITY

HOW IT WORKS IN THE BOOK

Explorer Academy’s students train in the CAVE, or Computer Animated Virtual Experience classroom. There, the kids are transported into a virtual world where a herd of wildebeests stampede by, butterflies land on the students’ shoulders, and a virtual ship takes them on an adventure.

HOW IT WORKS IN REAL LIFE

While gadget-free virtual reality classroom experiences like the CAVE don’t exist yet, VR headsets can take you out of your world and into a new one. The Oculus Rift virtual reality headset uses a face-mounted screen and surround-sound headphones to transport you anywhere.

You might have already played games using the Oculus Rift. But the military has used the VR system as well to train soldiers, and doctors may one day use the tech to examine patients remotely. You might even use the Oculus Rift someday to take a high-tech field trip to another country!

THE OCULUS RIFT VIRTUAL REALITY HEADSET ALLOWS YOU TO FEEL LIKE YOU’VE ENTERED A DIFFERENT WORLD.





MELL, CRUZ'S HONEYBEE MAV, OR MICRO AIR VEHICLE

THE TECH: ROBOBEES

HOW IT WORKS IN THE BOOK

When Cruz and his pals get locked inside a closet, Cruz's honeybee MAV, or micro air vehicle, flies to their rescue. "Mell" zips under a door and uses her stinger to unlock the closet.

HOW IT WORKS IN REAL LIFE

Mell was inspired by real drones built by Nat Geo explorer and electrical engineer Robert Wood. Though these RoboBees can't unlock doors, the insect-size bots might one day help with real-life rescue operations. Wood hopes the RoboBees will eventually be able to zoom places

that would be difficult or dangerous for humans to access. For instance, they could fly into collapsed buildings and help find injured people.

These drones won't use voice commands like Mell or even be controlled by a joystick. "They're much faster than a human mind and hand could control," Wood says. Instead they'll fly by themselves, with heat-seeking sensors to find survivors and pre-programmed commands to keep them from bumping into walls. When they find what they're after, they'll wirelessly send a message.

THE REAL DRONES THAT INSPIRED MELL, THE HONEYBEE DRONE



MEET THE INVENTOR BEHIND THE REAL ROBOBEES!
ExplorerAcademy.com



THE TECH: 4-D PRINTING

HOW IT WORKS IN THE BOOK

Cruz discovers a hidden slip of paper that assembles itself into an origami sphere with a secret message inside.

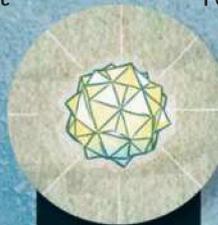
HOW IT WORKS IN REAL LIFE

Scientists like Nat Geo explorer Skylar Tibbits are engineering materials that can actually assemble themselves. A founder of the Self-Assembly Lab at the Massachusetts Institute of Technology, Tibbits

is also the inventor of 4-D printing. The fourth "D," or dimension, stands for time, because this technology will allow printed objects to reshape or transform themselves over time.

"People are trying to make things smarter by making them robotic," Tibbits says. "We're trying to do that with only the materials."

In other words, these materials can move on their own with no added electronic parts, like a cell phone



IN THE BOOK, A SLIP OF PAPER TRANSFORMS ALL BY ITSELF INTO THIS 4-D ORIGAMI SPHERE.



NAT GEO EXPLORER SKYLAR TIBBITS OBSERVES HOW WATER IN THIS TANK PROPELS SELF-ASSEMBLED BLOCKS TO BIND TOGETHER IN NEW SHAPES.



TIBBITS'S TEAM PRODUCED THE UPPER PART OF A SHOE BY PRINTING A PATTERN ONTO STRETCHED FABRIC. OVER TIME, THE FABRIC TRANSFORMED INTO THE SHAPE OF A SHOE.

that can assemble itself. Temperature, pressure, and even light can trigger the parts to start assembling. In the future, Tibbits's method could be used to create clothing that changes form to better fit the wearer, or even build replacement body parts like heart valves that can automatically adjust inside an individual's body.

THE TECH: SMART GLASSES

HOW IT WORKS IN THE BOOK

Cruz takes a class in mind-control photography, where a headpiece with a single lens uses electrodes to read his brain waves. To take a picture, he just thinks of the word "photo" and shuts his eyes for two seconds. *Snap!* The finished photo is uploaded straight to a computer.

HOW IT WORKS IN REAL LIFE

Smart glasses like Snap Spectacles are wearable computers that look like normal eyeglasses with a small extra

lens in one corner. They're wirelessly connected to the internet and have a camera built in on one side. Pressing the button on one side triggers a sensor to start recording the world from your perspective, completely hands-free.

Smart glasses aren't just for taking photos. Some factory workers wear them so they can read instructions while keeping their hands free to assemble products. They're also used by some doctors, who can wirelessly send



live video of their appointments to an assistant in a different location. The assistant takes notes so the doctor is free to focus on their patients.

THE TECH: THERMOCHROMIC MATERIAL

HOW IT WORKS IN THE BOOK

Cruz's classmate Emmett creates a pair of glasses that change color and shape depending on the wearer's mood. Bad mood? Glasses turn gray. Feeling good? They gradually turn yellow instead!

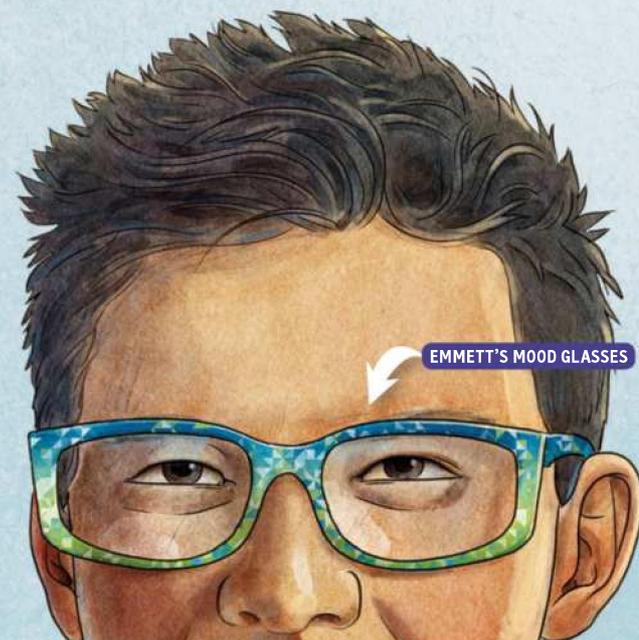
HOW IT WORKS IN REAL LIFE

Emmett's glasses connect to his brain waves. But real thermochromic materials can change

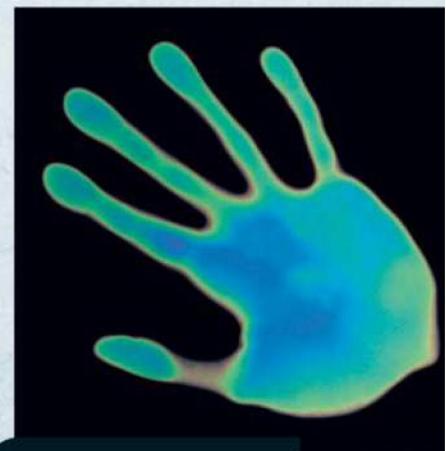
colors easier than that. Some contain billions of microscopic capsules, or super-tiny cases, that hold liquid crystals that become different colors at different temperatures. Other materials have chemical dyes that change color with light or heat.

So your glasses could appear one color when you're calm and turn a different color when your face heats up. Tibbits is

working on something similar to Emmett's glasses—his materials would change shapes too! "Imagine having a wild pair for a party... and suddenly they're normal-looking for school," Tibbits says.



EMMETT'S MOOD GLASSES



THERMOCHROMIC MATERIALS—LIKE THIS PIECE OF BLACK PAPER—ARE SENSITIVE TO HEAT. WHEN A WARM HAND IS PRESSED ONTO IT, THE PART OF THE PAPER UNDER THE HANDPRINT CHANGES COLOR.



**SUPER
SNEAKY
ISSUE**



SPIES ARE ENCOURAGED TO MAKE UP THEIR OWN CODES, SO THIS LACE PATTERN COULD MEAN "I HAVE INFORMATION!"

AND THIS LACE PATTERN COULD MEAN "FOLLOW ME."

Code Breakers

» CHECK OUT SNEAKY WAYS PEOPLE HAVE SENT MESSAGES.

BY ALLYSON SHAW

You need to tell your best friend a secret. But if anyone else reads your note, you're busted. Get the sneaky scoop on ways other people have delivered secret messages. You just might find a new way to get that info to your BFF!



THE HISTORIAN
HERODOTUS

THE METHOD: TATTOOED HEAD

THE MESSENGER: HISTIAEUS OF MILETUS

THE STORY: Around 513 B.C., Histiaeus was forced out as the ruler of an ancient city in what's now Turkey. So he wanted to send a message to his supporters: Revolt against the king who took away his power. According to the Greek historian Herodotus (who lived around the same time), Histiaeus summoned a slave, shaved his head, and tattooed the message onto the man's scalp. After the slave's hair grew back, he traveled to Greece with instructions to shave his head again. Message received!

In the book *Explorer Academy: The Nebula Secret*, Cruz receives postcards from his aunt that seem ordinary—until Cruz cracks a code that reveals a hidden message that could save his life. In this article, check out other ways people have sent secret information.

THE METHOD: SHOELACES

THE MESSENGER: UNITED STATES SPIES

THE STORY: Yeah, you learned how to tie your shoes years ago. But do you know how to send a message with your sneakers? In the 1950s, the U.S. Central Intelligence Agency created a book of tips to teach spies ways to communicate in public in case they were being watched. One tip: Lace up your sneakers. Tied one way, the laces might mean "I have information;" tied another, "Follow me." The spies could communicate while everyone else probably just thought: That guy can't tie his shoes correctly!



THE METHOD: SECRET SCARVES

THE MESSENGER: BELGIAN WORLD WAR I SPIES

THE STORY: "An old lady knitting doesn't look like a threat," says Vince Houghton, the historian and curator at the International Spy Museum in Washington, D.C. That's why during World War I (in the 1910s), Belgian resistance fighters asked women who lived near railways to keep track of the types of trains passing by, which gave the fighters information about the German invaders' movements. The women would knit a bumpy stitch for one type of train, and knit a small hole in the fabric for another. Then they'd pass the cozy scarf to a soldier so the cloth could be decoded.

THE METHOD: SONGS
THE MESSENGER: SLAVES
IN THE UNITED STATES

THE STORY: African-American slaves in the 1800s couldn't talk openly about their plans to escape to freedom—so they secretly sang about it. For instance, "Swing Low, Sweet Chariot" might sound like a religious song. But for slaves, the "sweet chariot" was code for the Underground Railroad, the network of people who helped slaves head to northern states and Canada, where slavery was illegal. The song "Wade in the Water" warned escaped slaves to get in the water so dogs would lose their scent trail. With these methods, hundreds of people escaped slavery.



Make Invisible Ink

You'll need:

- Baking soda
- Water
- Small cup
- Paper
- Paintbrush
- Sponge
- Grape juice

Step one

Mix equal amounts of baking soda and water in a small cup.

Step two

Write your message on paper using the mixture and the paintbrush.

Step three

Wait for the paper to dry, then pass the note to your friend.



Step four

To reveal the message, use a sponge or brush to paint the paper with grape juice.



The slight acidity of the juice reacts with the baking soda to reveal your message.

THE METHOD: ORANGE JUICE
THE MESSENGER: JOHN GERARD

THE STORY: In 1597, John Gerard was imprisoned in the Tower of London in England by Queen Elizabeth I. He asked the warden to let him send letters written in charcoal. But then he scrawled another message on top using the juice from an orange—which was only visible when the juice was dry and the page heated. With his invisible ink, he coordinated an escape out of a window and into a boat rowed by his supporters.



SPLINE_X / SHUTTERSTOCK (SHEET MUSIC), PHOTOS.COM / GETTY IMAGES (DRAWING), IMAGE DIGITALLY COMPOSED; IAKOV KALININ / SHUTTERSTOCK (TOWER OF LONDON); GTRANQUILITY / SHUTTERSTOCK (ORANGE); © YVDAVDY / DREAMSTIME (CANDLE); © MARGOULLAT / DREAMSTIME (JUICE AND GRAPES)

GET MORE SPY TRICKS!
natgeokids.com/september

SUPER SNEAKY ISSUE

EXPLORER ACADEMY

THE NEBULA SECRET

BY TRUDI TRUEIT

In this excerpt from Explorer Academy: The Nebula Secret, Cruz and his classmates are training in the CAVE, or the Computer Animated Virtual Experience. The ordinary-looking classroom has virtually morphed into Mexico's Monarch Butterfly Biosphere Reserve, and the assignment is to tag monarch butterflies to learn about migration patterns.

Things don't go exactly as planned, though, when Cruz and his friend Sailor encounter illegal loggers. Keep reading to find out what happens next ...

"I'm not sure it's a good idea to confront criminals," Sailor warned Cruz. "Who's confronting? Our textbook says conservationists are supposed to report things like poaching and illegal hunting and logging to the authorities," said Cruz. "I'll take a couple of pictures from a safe distance and turn them in to Professor Gabriel with our assignment."

Sailor's dark eyebrows went up. "We could use some bonus points after what happened last week," she said. "OK, we can check it out, but let's not go far."

"We won't."

They made their way through the brush in the direction of the chopping sound.

"Cruz, I think we should—"

Taking cover behind an oak tree, Cruz held up a hand to silence Sailor. About 30 yards away, two big men were using axes to chop down a fir tree. Cruz quietly lifted his phone and began taking photos.

"Hurry," hissed Sailor, her hands on his shoulders.

... Suddenly a noise alerts the loggers to Cruz and Sailor's whereabouts. The pair realize they're in deep trouble ...

"What should we do?" whispered Sailor.

"Go!" Cruz shouted.

They took off through the woods. As he ran, branches smacked Cruz's legs and grabbed at his clothes. He could hear the men



So now you know that the new book *Explorer Academy: The Nebula Secret* includes tons of cool technology and mind-boggling codes. On these pages, get a sneak peek of the book.

chasing them. Cruz could tell they were shouting, though it was hard to hear. The voices were getting louder. The men were gaining on them!

"Come on, Sailor, they're catching up!"

"Sorry!" she huffed. "If I'd known we were going to have to outrun some bad guys, I'd have worn my sneakers."

Cruz had lost the trail, but spotted an opening in the trees ahead of them. The clearing! If they could reach the group, maybe the men would give up the chase.

Was that mist? Cruz put on the brakes. He skidded to a stop inches from the edge of a cliff, then threw out an arm to keep Sailor from going over the side. She latched on to him and, for a moment, teetered on the edge before he could get his other arm around her to pull her back. Heaving, they watched the rocks she'd kicked disappear into the white spray of a raging waterfall.

"We're trapped!" cried Sailor.

Cruz looked back at the men, then into the canyon, then back at the men. "We've got to jump!" he shouted above the roar of the water.

"No." She vigorously shook her head. "No way am I—"

"We have no choice."

"Are you kidding? It's got to be a 300-foot drop. We'll die."

... The pair look cautiously over the edge together ...

"I can't believe this is happening," shouted Sailor.

Cruz gave her a wry grin. "It's not, you know."

Sailor scowled at Cruz as he extended his hand out to her.

"Ready?"

Sailor grabbed his hand. She held on so tight, Cruz thought she might snap his knuckles. "Ready?"

"We'll go on the count of three," he yelled. "One ... two ... three!"

They jumped.

Sailor closed her eyes. Cruz didn't.

***Will Cruz and Sailor
escape the clutches
of the illegal loggers?***

**Read
Explorer Academy:
The Nebula Secret
to find out!**

CHECK OUT EXPLORER ACADEMY ONLINE!
ExplorerAcademy.com

FUN

STUFF

GAMES, LAUGHS, AND LOTS TO DO!

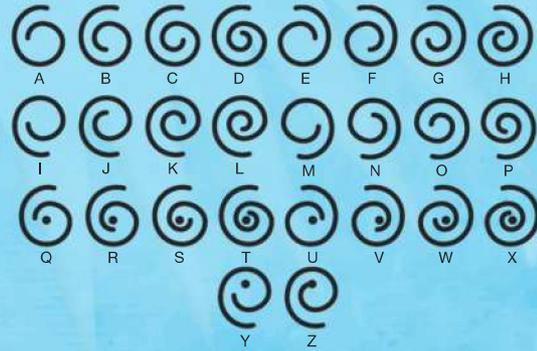
EXPLORER ACADEMY

TEXT AND CODE BY GARETH MOORE

THE CODE: SPIRAL CIPHERS

If you *really* want to create a super-secret code, you need to make it up yourself! In the new book *Explorer Academy: The Nebula Secret*, 12-year-old Cruz Coronado breaks codes in order to fight dangerous villains and solve mysteries. His mom, Petra Coronado, designed her own cipher based on spirals to communicate with him.

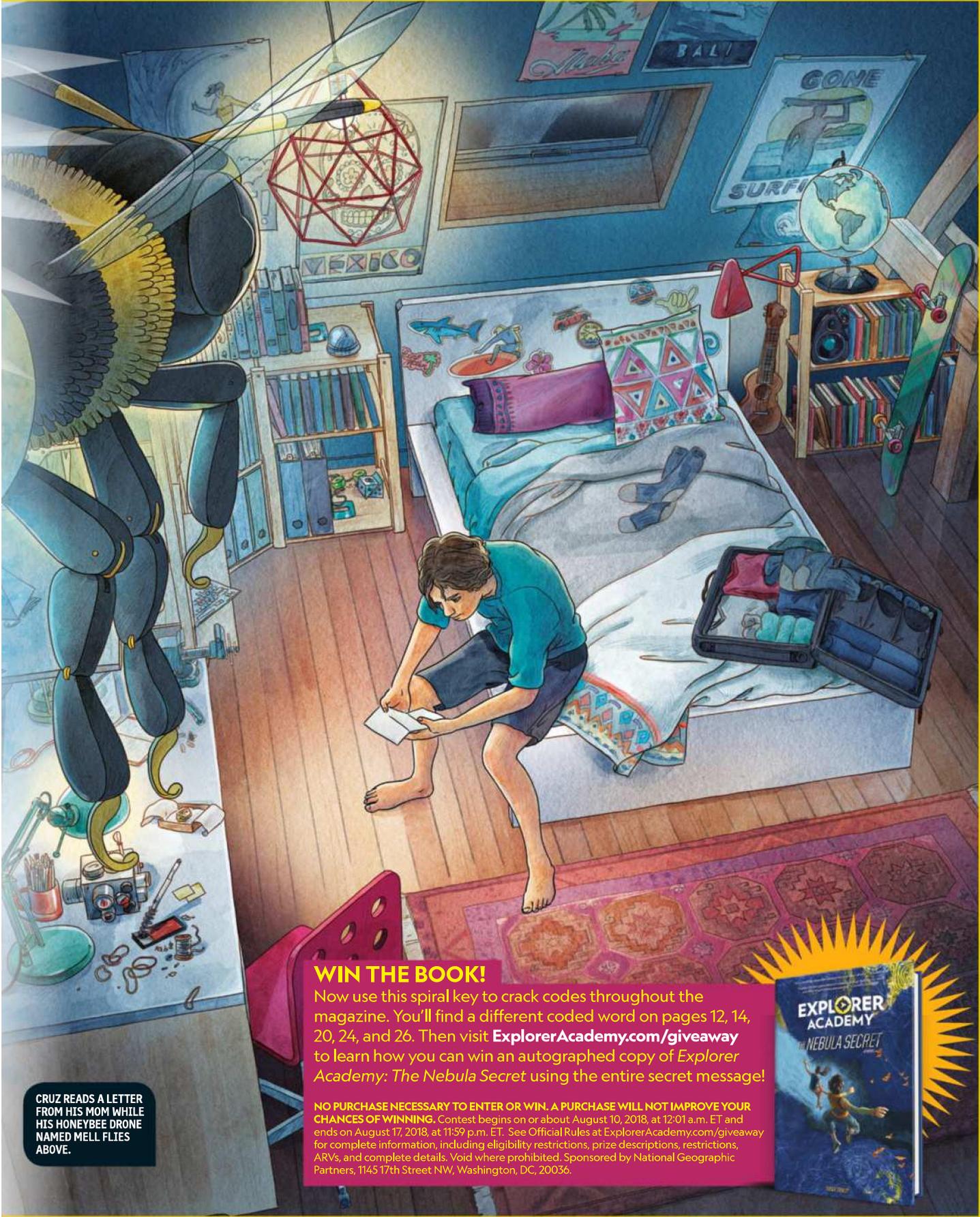
Check out the alphabet she created on the right. Look carefully! The differences between the spirals are small.



CRACK THIS CODE!

Using Petra's spiral alphabet, decode the message below. ANSWER ON PAGE 35



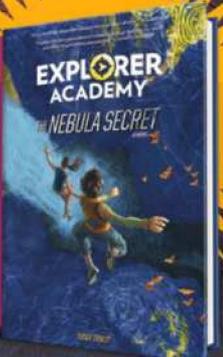


CRUZ READS A LETTER FROM HIS MOM WHILE HIS HONEYBEE DRONE NAMED MELL FLIES ABOVE.

WIN THE BOOK!

Now use this spiral key to crack codes throughout the magazine. You'll find a different coded word on pages 12, 14, 20, 24, and 26. Then visit ExplorerAcademy.com/giveaway to learn how you can win an autographed copy of *Explorer Academy: The Nebula Secret* using the entire secret message!

NO PURCHASE NECESSARY TO ENTER OR WIN. A PURCHASE WILL NOT IMPROVE YOUR CHANCES OF WINNING. Contest begins on or about August 10, 2018, at 12:01 a.m. ET and ends on August 17, 2018, at 11:59 p.m. ET. See Official Rules at ExplorerAcademy.com/giveaway for complete information, including eligibility restrictions, prize descriptions, restrictions, ARVs, and complete details. Void where prohibited. Sponsored by National Geographic Partners, 1145 17th Street NW, Washington, DC, 20036.



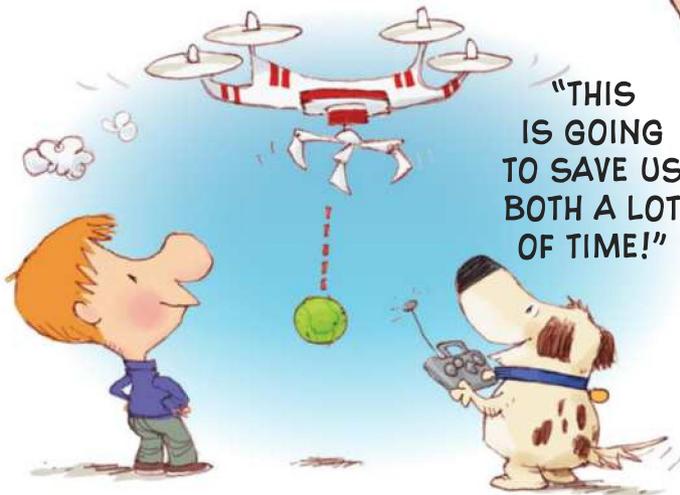
LAUGH **OUT LOUD**



"WELL ... THIS IS AWKWARD."



"I WANT YOU TO START USING A SOFTER PILLOW."



"THIS IS GOING TO SAVE US BOTH A LOT OF TIME!"



"I HOPE THAT'S PB&J ... I'M TIRED OF SEAFOOD!"

CHECK OUT THE BOOK!

WHAT IN THE WORLD

ALOHA SPIRIT

These photos show close-up and faraway views of things you could see in Hawaii. Unscramble the letters to identify what's in each picture. **ANSWERS ON PAGE 35**



ESA REUTLT



AIWAAHIN SIRHT



TOCNCOU



SELI



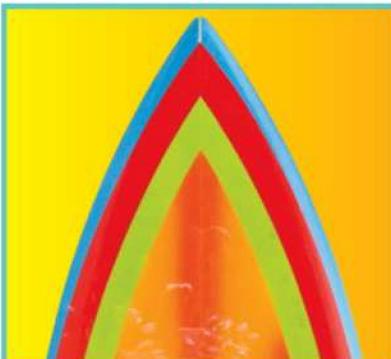
AHINIWAA LOLD



NVLAOOC



EKUULLE



DAUSRFOBR



EPPIEPLSNA

TOP ROW (LEFT TO RIGHT): © RICHARD CAREY / DREAMTIME; © BANANASTOCK / JUPITERIMAGES; © BANANASTOCK / JUPITERIMAGES. MIDDLE ROW (LEFT TO RIGHT): BUNGHAI CHOTIKASITIAN / SHUTTERSTOCK; © PHOTOOBJECTS.NET / JUPITERIMAGES; JAMES L. MACS / NATIONAL GEOGRAPHIC STOCK. BOTTOM ROW (LEFT TO RIGHT): SIEDE PREIS / GETTY IMAGES; STEVE COLLENDER / SHUTTERSTOCK; SHULEVSKYY VOLODYMYR / SHUTTERSTOCK.

FUNNY**FILL-IN****ROOFTOP CHASE**

Ask a friend to give you words to fill in the blanks in this story without showing it to him or her. Then read out loud for a laugh.

BY LINDSAY ANDERSON

PLAY MORE FUNNY FILL-IN!
natgeokids.com/ffi



My classmate from the Super Secret Spy Academy and I were walking on _____ Hill looking for our archenemy, _____. Suddenly we heard a(n) _____ noise. We were expecting to see a(n) _____, but it was our archenemy in a flying _____. “_____!” I shouted. He skidded _____ onto a roof. We couldn’t let him get away! We turned on our _____ and flew across the street, landing on another roof. It was _____, so we kept _____ down. We jumped to the next house and _____ the _____ so we didn’t fall off. Then a flock of _____ flew toward us and we had to duck. When the air cleared we saw the bad guy had gotten his _____ in the machine’s controls and couldn’t move. Busted!



SIGNS OF THE TIMES

Seeing isn't always believing. Two of these funny signs aren't real. Can you figure out which two are fake?

ANSWERS ON PAGE 35



DAVID ZAITZ / GETTY IMAGES (1); JENNIFER CHEN / ALAMY, IMAGE DIGITALLY COMPOSED (2); STEVE LEWIS / GETTY IMAGES (3); ANGELO CANVALLI / AGE FOTOSTOCK / SUPERSTOCK, IMAGE DIGITALLY COMPOSED (4); RS SMITH PHOTOGRAPHY / SHUTTERSTOCK (5); E.J. WEST / PHOTOGRAPHY / GETTY IMAGES (6); GARY BRAGAASCH / GETTY IMAGES (7)

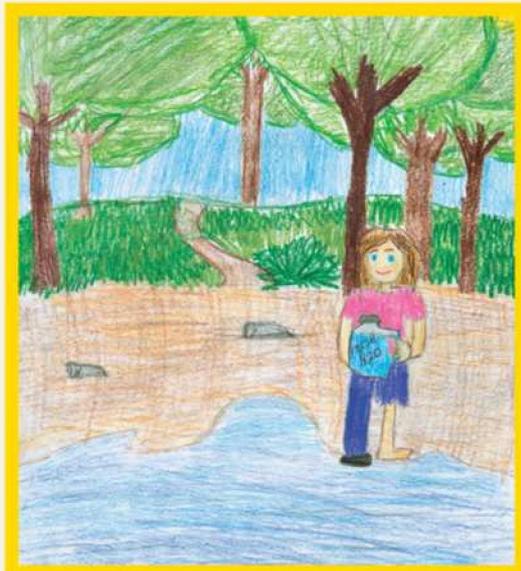
ART ZONE

DESERTED ISLAND

If *Nat Geo Kids* readers were stranded on an island, here's what they'd bring.



▲ **Food-Creator Computer** Sarina B., 11, Salem, Oregon



▲ **Water to Survive**
Alyssa W., 11, Olathe, Kansas



▲ **A Hammock**
Reagan S., 13, Kaysville, Utah



▲ **My Dog**
Cyrus A., 8, Washington, D.C.



▲ **Magazine, Paintbrush, Paper**
Marley H., 12, Corpus Christi, Texas

Draw

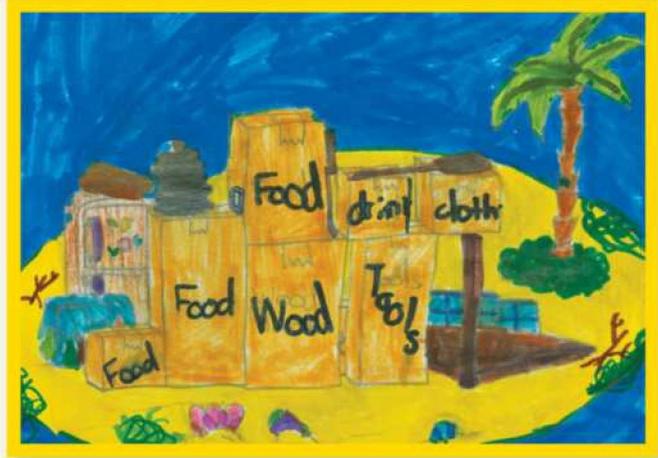
what pets do when they're home alone.

Send us your original drawings: **Nat Geo Kids— Pets Art Zone P.O. Box 98002 Washington, DC 20090-8002**

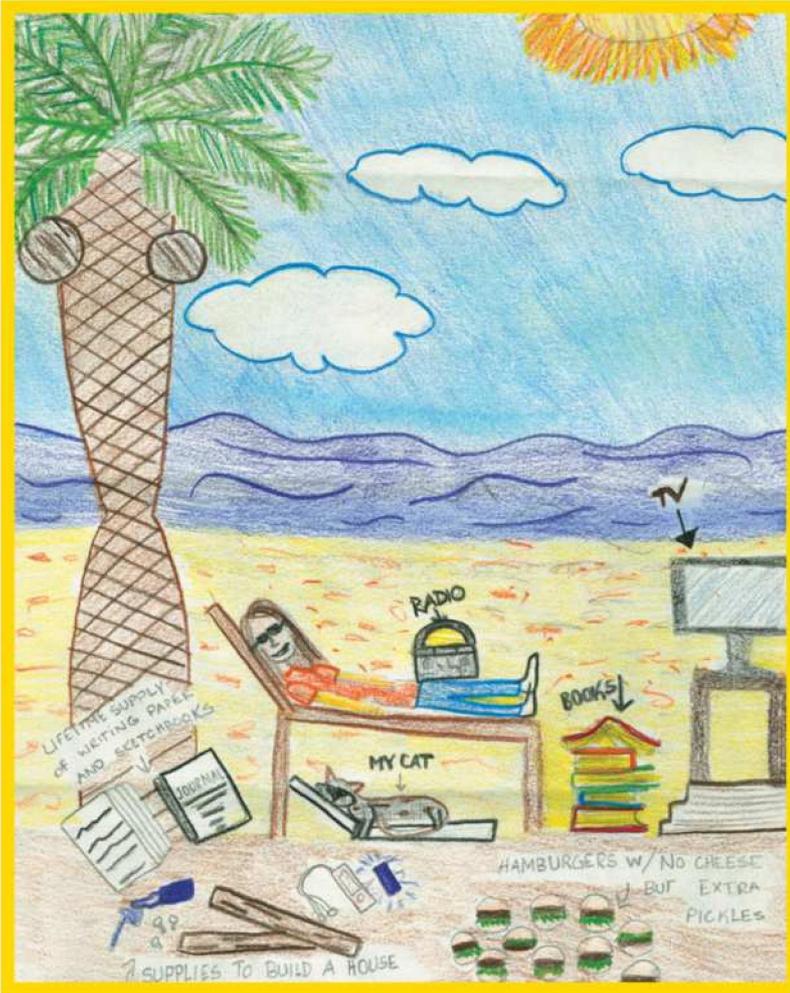
Include your name, address, phone number, date of birth, a title for your drawing, a statement that it is your own work, and the name of your parent or guardian. Your parent or guardian must sign a release for publication if your illustration is selected. Submissions become the property of National Geographic Partners, and all rights thereto are transferred to National Geographic Partners. Submissions cannot be acknowledged or returned. Selection will be at the discretion of *Nat Geo Kids*.



▲ **My Best Friend** Ashlynn F., 10, Stoneham, Massachusetts



▲ **I Came Prepared** Max T., 11, Fair Lawn, New Jersey



▲ **Deserted in Luxury** Katelyn M., 13, Glendora, California

BIG WINNER!



Congratulations to the 2018 National Geographic Bee champion, Venkat Ranjan, 13, from San Ramon, California. He won a \$50,000 college scholarship, a trip to the Galápagos Islands, and a lifetime membership to the National Geographic Society. Go online to learn more about the Nat Geo Bee.

natgeokids.com/geobee

Ask your teacher to register your school for the 2019 Bee by January 2019.

Answers

"Find the Hidden Animals" (pages 16-17): A. pika, B. copperhead snake, C. green frog, D. bighorn sheep, E. goldenrod crab spider; "Explorer Academy" (pages 28-29): Welcome to the Academy; "What in the World?" (page 31): Top row: sea turtle, Hawaiian shirt, coconut; Middle row: leis, Hawaiian doll, volcano; Bottom row: ukulele, surfboard, pineapples; "Signs of the Times" (page 33): Signs 2 and 4 are fake.