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## I'm a Scientist!

Goals: Inspire students to engage in the environment by exploring different fields of conservation science. Practice using scientific tools and recording observations in nature journals.

Science | Literacy | Writing | Art | Math

Grades K-5

**Created By:**  
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Curriculum Set: I'm a Scientist!  
Lesson 1: What is Science?

Goals: Describe scientific processes in our everyday lives and understand our role in science. Fine tune our observational and scientific recording skills on a nature walk.

Science | Writing

Grade K-5

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## Total lesson time: 1 hr 30 min

What is Science: 20 minutes

Classroom Activity: 20 minutes

Nature Walk: 30 minutes

Journaling and Debrief: 20 minutes

## Materials needed:

*What is Science* by Rebecca Kai Dotlich

Scientist Coloring Page

Science journal supplies

Science Questions Scavenger Hunt sheet

Clipboards

## Lesson Tips:

- The “I’m a Scientist!” series as a whole works best May-September. However, Lesson 1: What is Science could be done any time of year.

## What is Science: Pick one activity below (20 minutes)

1. Read *What is Science* by Rebecca Kai Dotlich (recommended for grades K-2)
  - a. What types of things did the scientists in the book study?
  - b. Have you ever investigated these things on your own or at school? With your friends or family?
  - c. Scientists ask how, what, and why questions. Give examples.
  - d. Explain that each day we will learn about a different field of science. We will do activities and experiments to learn what it would be like to be a scientist in real life.
2. Ask kids to each write an example on the board of something scientists study (recommended for grades 3-5)
  - a. Review answers and discuss other potential fields of science
  - b. Ask the kids:
    - i. Why is science important?
    - ii. Who is a scientist? (We are ALL scientists!)
      1. Describe scientific processes in our own lives such as cooking or gardening.
    - iii. What are some special tools that scientists use to make observations and discover new things about the world?
    - iv. Scientists ask how, what, and why questions. Give examples.
  - c. Explain that each day we will learn about a different field of science. We will do activities and experiments to learn what it would be like to be a scientist in real life.



**Classroom Activity: Pick one activity below (20 minutes)**

3. Scientist Coloring Books (recommended for grades K-2)
  - a. Review the different types of scientists in the book.
  - b. Point out that the students should draw themselves as their favorite type of scientist on the first page.
4. Science Journals (recommended for grades 3-5)
  - a. Explain that scientists record their observations in journals. We are also scientists and will keep track of what we learn and see.
  - b. Why keep a science journal? Helps to answer how, what, and why questions.
  - c. How should you record your findings? Lists, captioned drawings, prose or poetry, tables, etc.
  - d. Show students how to create and decorate their own nature journal. We used this [site's](#) design when we made science journals for middle school students. For younger students, we just stapled sheets of blank paper between cardstock covers and let them collage the front and back with nature magazines.

**Nature Walk: (30 minutes)**

5. Hand out “Science Questions” scavenger hunts and clipboards. Explore natural area. Discuss scavenger hunt answers throughout hike.
6. Remind students that they are viewing the world like a scientist and are asking how, what, and why questions about their surroundings.
7. Go over scavenger hunt answers. Note that some questions do not have only one correct answer.

**Journaling: (20 minutes)**

8. Science Journaling
  - a. Everyone writes the date, time, location, and weather.
  - b. Everyone takes time to write/draw what they learned about their surroundings, questions they have, or what they saw on their hike.
  - c. For grades K-2, use a larger group journal that everyone contributes towards. Hand out slips of paper for students to write their name and favorite thing they saw that day. Paste the slips in the book.
  - d. Model effective journaling by recording your own observations and sharing with the students.
  - e. If a student is unsure how to begin, ask them to pick a favorite animal and write the letters down the side of the page (e.g. ROBIN). Ask the student to find something they can see that starts with each letter of the word (e.g. R is for “red flowers”).



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**Curriculum Set: I'm a Scientist!**

**Lesson 2: Ornithology**

Goal: Learn how to use binoculars, identify birds by sight and sound, and use a field guide.

Science | Literacy | Writing

**Grade K-5**

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## Total lesson time: 1 hour 10 minutes

What is Ornithology: 20 minutes

Birding: 30 minutes

Journaling and Debrief: 20 minutes

### Materials needed:

*The Birdwatchers* by Simon James

[Trivia questions](#)

Binoculars (optional)

Bird field guide

Science journals

### Lesson Tips:

- The “I’m a Scientist!” series as a whole works best May-September. However, Lesson 2: Ornithology could be done any time of year.
- You can check out bird field guides at most libraries. You can also purchase *Madison Audubon Bird Guide for Kids* (donation of \$5/book) which includes 27 of the more common birds in south central Wisconsin. This book’s simpler format includes fun facts and large pictures.
- This program pairs well with Bird Call BINGO from the All About Birds curriculum, Lesson 1: Beginning Birding, and with the Bird Count from the All About Birds curriculum, Lesson 5: Citizen Science.

### What is Ornithology: Pick one activity below (20 minutes)

1. Read *The Birdwatchers* by Simon James (recommended for grade K-2)
  - a. Define ornithology
    - i. Why study birds?
      1. Determine the health of bird populations (and the populations of plant and animal species affected by bird numbers, like prey and predators).
      2. Understand ecosystem health. It can sometimes be determined with the help of bird health data.
    - ii. Why study birds?
      1. Determine the health of bird populations (and the populations of plant and animal species affected by bird numbers, like prey and predators).
      2. Understand ecosystem health. It can sometimes be determined with the help of bird health data.
  - b. What makes a bird a bird?
    - i. Covered in feathers (what are feathers used for?)
    - ii. Warm blooded (regulate their own body temperature, outside temperature doesn’t control their body temperature)
    - iii. Birds lay eggs
2. Ask kids to each write an example on the board of how they can tell different birds apart (recommended for grade 3-5)
  - a. Review answers and discuss other potential answers to identify different bird species.
  - b. Define ornithology?
    - i. Why study birds?

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3. Play bird trivia (recommended for grade 3-5)

### **Birding: (30 minutes)**

4. Binocular basics
  - a. Ask the kids what tools ornithologists use to study birds.
  - b. Show kids how to focus binoculars. Remind kids to look for the bird first with their naked eye (sans binoculars) and then, keeping their eyes on the bird, bring the binoculars up to their face.
  - c. Reinforce the two binocular rules: strap stays around their neck and never walk with binoculars up to their face.
5. Take a nature walk stopping periodically to look and listen for birds. Use the bird guide to identify bird sightings.
6. Lead the kids asking how, what, and why questions about birds:
  - a. What makes a bird a bird?
  - b. How do we identify the different birds?
    - i. Field marks, size, calls, color
  - c. Why do birds live where they live?

### **Journaling and Debrief: (20 minutes)**

7. Debrief
  - a. Discuss ways that we can all help birds.
8. Science Journaling
  - a. Everyone writes the date, time, location, and weather.
  - b. Everyone takes time to write/draw what they learned about their surroundings, questions they have, or what they saw on their hike.
  - c. For grade K-2, use a larger group journal that everyone contributes towards. Hand out slips of paper for students to write their name and favorite thing they saw that day. Paste the slips in the book.
  - d. Model effective journaling by recording your own observations and sharing with the students.
  - e. If a student is unsure how to begin, ask them to pick a favorite animal and write the letters down the side of the page (e.g. ROBIN). Ask the student to find something they can see that starts with each letter of the word (e.g. R is for “red flowers”).

### **RESOURCES:**

Bird Field Guides:

*Birds, Nests & Eggs (Take Along Guides)* by Mel Boring

*Birds of North America* by Kenn Kaufman

Bird Phone App:

[Merlin Bird ID App](#) from Cornell Lab





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Curriculum Set: I'm a Scientist!  
Lesson 3: Soil Science

Goal: Explain why soil is important, use soil cores, and compare soil types from different locations.

Science | Art | Writing

Grade K-5

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## **Total lesson time: 1 hr 30 min**

What is Soil Science: 10 minutes

Soil Sampling: 30 minutes

Soil Painting: 30 minutes

Journaling and Debrief: 20 minutes

### **Materials needed:**

Soil cores or garden trowel

Plastic baggies with permanent marker

Metal bowl and spoon

Jars or other containers for soil paint

Vegetable shortening

Stiff bristle paint brushes

Parchment paper

Crayons

Science journals

### **Lesson**


#### **Tips:**

- The “I’m a Scientist!” series as a whole works best May-September.

#### **What is Soil Science: (10 minutes)**

1. Ask kids to write something that they could find in the soil on the board.
  - a. Review answers and discuss other potential answers.
  - b. Why is soil important? (foundation for plant growth, provides shelter, retains water, holds up buildings)
  - c. What’s the difference between soil and dirt? (soil has living organisms in it and provides a home or for many species of plants and animals where dirt is made up of decomposed organic matter that isn’t being used by living things- soil is productive for life, dirt is not)
  - d. We’re going to learn how soil is different depending on what is in it (air, water, minerals, decomposed plants/animals, living animals, insects, etc.)

#### **Soil Sampling: (30 minutes)**

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2. Take a nature walk. Stop in places with different types of vegetation and have students take 1-2 soil samples with core or trowel. Place sample in a baggie. Label baggie with vegetation type (forest, prairie, shrubs, turfgrass, etc.).
  3. Let each kid take a soil sample from a different location.
  4. Lead kids in asking how, what, and why questions.
    - a. What is growing over the soil?
    - b. How does the soil look and feel different at each location?
      - i. Can you put them in order from lightest to darkest?
      - ii. Can you find the soil with the most rocks? Least rocks?
    - c. Why is the soil important?

### **Soil Painting: (30 minutes)**

5. One leader can explain the activity while the other one preps.
6. Since soils are different depending on where you find them, people have been using soils as paint for thousands of years. Our early ancestors used soils to paint pictures of things they saw, like bison, and Native Americans would illustrate stories using soil. We're going to use soil to paint just like them.
7. Prepare paint by mixing a baggie of soil with vegetable shortening in a metal bowl and then scooping into jars.
8. Hand out brushes and parchment paper. Encourage kids to paint their favorite scenes from nature using the soil paint. Kids can add color with crayons.
9. While students paint, help them notice that different soils are different colors. Help them draw the connection that the soils are from places with different vegetation. Vegetation affects soil and vice versa.

### **Journaling: (20 minutes)**

10. Science Journaling
  - a. Everyone writes the date, time, location, and weather.
  - b. Everyone takes time to write/draw what they learned about their surroundings, questions they have, or what they saw on their hike.
  - c. For grades K-2, use a larger group journal that everyone contributes towards. Hand out slips of paper for students to write their name and favorite thing they saw that day. Paste the slips in the book.
  - d. Model effective journaling by recording your own observations and sharing with the students.
  - e. If a student is unsure how to begin, ask them to pick a favorite animal and write the letters down the side of the page (e.g. ROBIN). Ask the student to find something they can see that starts with each letter of the word (e.g. R is for "red flowers").



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Curriculum Set: I'm a Scientist!  
Lesson 4: Botany

Goal: Learn why plants are important and gain familiarity with the concept of identifying different tree species.

Science | Literacy | Art | Writing

Grade K-5

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## Total lesson time: 1 hr 20 min

What is Botany: 10 minutes

Nature Walk: 30 minutes

Leaf Rubbings: 20 minutes

Journaling and Debrief: 20 minutes

## Materials needed:

*Sky Tree: Seeing Science through Art* by Thomas Locker

Plastic baggies with permanent marker

White paper

Crayons

Science journals

## Lesson Tips:


- The “I’m a Scientist!” series as a whole works best May-September.
- If you are in the Madison-area, we recommend visiting the Longnecker Garden at the UW-Arboretum. All of the trees are labeled so students can easily identify the leaves they select for their leaf rubbings.

## What is Botany: Pick one activity below (10 minutes)

1. Read *Sky Tree: Seeing Science through Art* by Thomas Locker (recommended for grades K-2)
  - a. Ask the kids:
    - i. What is botany?
    - ii. How can we tell different kinds of trees or plants apart?
    - iii. Why are trees and plants important?
2. Ask kids to each write an example on the board of why plants are important (recommended for grades 3-5)
  - a. Review answers and discuss other potential answers.
  - b. We’re going to explore how plants grow, why they look the way they do, and why different plants grow where they do.

## Nature Walk: (30 minutes)

3. Leaf collection:
  - a. Explain that the goal is for every student to find a different leaf.
  - b. Remind students that they can look at leaves in trees, but they should only pick up leaves off the ground.
  - c. When a student finds a leaf they like, put it in a baggy.
  - d. Lead kids in asking how, what, and why questions.

- 
- i. How are the leaves different?
  - ii. What do the leaves feel like?
  - iii. Why do trees or plants have leaves? (to collect sunlight and carry out photosynthesis!)

**Leaf Rubbings: (20 minutes)**

4. With paper and crayons, students will make leaf rubbings of each of the leaves they found. They can cut out and glue the leaves into their journals.
  - a. Talk with students about how the leaves look different from one another. E.g. color, size, pointy/rounded, lobed/entire, etc.

**Journaling: (20 minutes)**

5. Science Journaling
  - a. Everyone writes the date, time, location, and weather.
  - b. Everyone takes time to write/draw what they learned about their surroundings, questions they have, or what they saw on their hike.
  - c. For grades K-2, use a larger group journal that everyone contributes towards. Hand out slips of paper for students to write their name and favorite thing they saw that day. Paste the slips in the book.
  - d. Model effective journaling by recording your own observations and sharing with the students.
  - e. If a student is unsure how to begin, ask them to pick a favorite animal and write the letters down the side of the page (e.g. ROBIN). Ask the student to find something they can see that starts with each letter of the word (e.g. R is for “red flowers”).

**Adjust this lesson for different age groups:**

**More Challenging:**

- Provide students with tree and plant field guides. Ask them to identify the leaves they choose for the leaf rubbings.



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Curriculum Set: I'm a Scientist!

Lesson 5: Water Science


Goal: Learn the importance of good water quality. Practice using turbidity meters and thermometers to evaluate local water quality. Discover invertebrates with magnifying glasses and determine the biodiversity of the water by calculating the biotic index.

Science | Math | Literacy | Writing

Grade K-5

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## Total lesson time: 1 hr 30 min - 50 min

What is Water Science: 10 minutes

Water Quality Exploration: 1 hour

Reptile Meet and Greet (optional): 20 minutes

Journaling and Debrief: 20 minutes

### Materials needed:

*Pond Circle* by Betsy Franco

UW Extension water quality testing equipment (see Lesson Tips)

Turtle and shells (optional)

Science journals

### Lesson Tips:

- The “I’m a Scientist!” series as a whole works best May-September.
- To learn how to use and to borrow water quality testing kits, contact Mindy Habecker, Dane County UW-Extension Natural Resources/Community Development Educator at 608-224-3718.


### What is Water Science: Pick one activity below (20 minutes)

6. Read *Pond Circle* by Betsy Franco (recommended for grades K-2)
  - a. Ask the kids:
    - i. What is water quality? (health of the water which is measured by how clear it is- turbidity, temperature, what is living in it, nutrient levels, etc.)
    - ii. Why is clean water important?
7. Ask kids to each write an example on the board of why water is important (recommended for grades 3-5)
  - a. Review answers and discuss other potential answers.
  - b. We’re going to test if Madison’s water is clean.

### Water Quality Exploration: (1 hour)

8. While walking over to the waterbody, perform a preliminary assessment. Ask the group whether they think the water is clean and why.
9. Split the class into two groups so that each one starts at a different station. Spend 30 minutes at each station.
10. Throughout each of the stations’ activities, lead kids in asking how, what, and why questions.
  - a. Why does the water get polluted?
  - b. How can we help improve water quality?
  - c. What needs clean water to survive?



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11. Station 1: Temperature/Turbidity
    - a. Show the kids how to take the temperature of the water. Have the kids write the number in the correct place on the table.
    - b. Discuss with the kids why water temperature is important. (some aquatic species need cooler temperatures vs. warmer temperatures- they hold different levels of oxygen for life in water)
    - c. Let the other kids try measuring the temperature.
    - d. Repeat with turbidity.
  12. Station 2: Macroinvertebrate biotic index
    - a. Show the kids how to find and identify the macroinvertebrates in the water sample.
    - b. With the adult, fill out the biotic index sheet.
      - i. Calculate the biotic index score and write the number in the correct place on the table.
      - ii. Look at the chart to see if the biotic index is acceptable for good water quality.
      - iii. Discuss with the kids why measuring macroinvertebrate diversity is important.

### **Reptile Meet and Greet (optional): (20 minutes)**

13. Discuss water quality and quantity impact on wildlife and humans
14. Show turtle and shells
  - a. Answer questions about turtles, or water wildlife in general
  - b. Explain what an invasive species means
  - c. Allow kids to pet turtle and then follow with hand sanitizer

### **Journaling: (20 minutes)**

15. Science Journaling
  - a. Everyone writes the date, time, location, and weather.
  - b. Everyone takes time to write/draw what they learned about their surroundings, questions they have, or what they saw on their hike.
  - c. For grades K-2, use a larger group journal that everyone contributes towards. Hand out slips of paper for students to write their name and favorite thing they saw that day. Paste the slips in the book.
  - d. Model effective journaling by recording your own observations and sharing with the students.
  - e. If a student is unsure how to begin, ask them to pick a favorite animal and write the letters down the side of the page (e.g. ROBIN). Ask the student to find something they can see that starts with each letter of the word (e.g. R is for “red flowers”).



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Curriculum Set: I'm a Scientist!

Additional Resources: Trivia Packet

Grade 3-5

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## Insect Trivia

1. Butterflies use what body part to taste? (Feet)
1. Do boy or girl crickets chirp? (Boys)
2. Are centipedes insects? (No, they have 100 legs.)
3. What color is insect blood usually? (Yellow!)
4. Do insects have noses? (No, they “smell” using their antenna.)
5. How many “teeth” (stylets) do mosquitos have? (47)
6. How many ears do praying mantises have? (One – they are the ONLY animal with just one ear and it’s in their chest!)
7. Are ladybugs herbivores or carnivores? (Carnivores, they eat aphids.)
8. Can bugs feel pain? (No.)
9. How many brains does a leech have? (32)
10. Why do fireflies light up? (To attract a mate – each have a unique code like a song.)
11. Is a bug’s skeleton on the inside or outside? (Exoskeleton – like a set of armor.)
12. What do butterflies hatch out of? (A cocoon; ask students about metamorphosis.)


## Reptile and Amphibian Trivia

1. What is the difference between venomous and poisonous? (Venom is injected, poison is absorbed or ingested; snakes are venomous, some frogs are poisonous.)
2. Snakes have a special body part called the Jacobson’s Organ. What is this used for? Hint – it’s in their mouth. (Taste air particles to “smell” the air. Snakes have terrible vision (they can only see vague black and white shapes) so they use their sense of smell to know their surroundings. Snakes cannot smell through their nostrils. They use their nostrils for breathing.)
3. If you were a ball python, what is the biggest size fruit that you could swallow whole? (Watermelon. Pythons can stretch their jaw in four different places in order to swallow their food whole. Their lower jaw isn’t fused in the front (feel how your jaw is fused) so it can stretch much further.)

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4. What is the difference between a lizard and a snake? (Snakes do not have eyelids – this is why it always looks like they are staring at you even when they are sleeping! There are legless lizards that look like snakes except that they have eyelids.)
  5. Can reptiles and amphibians grow back body parts? (Both can regenerate.)
  6. How long can a crocodile go without eating? (Two years.)
  7. Which type of reptile doesn't have teeth? (Turtles.)
  8. Why do frogs close their eyes when they eat? (The eye muscle pushes their food down their throat.)
  9. What is it called when a tadpole becomes an adult frog? (Metamorphosis – review.)
  10. How often do frogs shed? (Once a week they shed their entire body's skin and then eat it! Snakes and turtles shed their skin or scutes much less frequently, usually only once a month or every few months.)
  11. A group of birds is called a flock. A group of frogs is called: a herd, a colony, an army, or a swarm? (An army.)
  12. What colors can frogs see: (a) black and white, (b) same as humans, (c) only red and green? (Black and white.)
  13. Which of the following have webbed feet: frogs, toads, water turtles, box turtles? (Frogs and water turtles.)
  14. Name at least one way that snakes are good.
  15. Which of these characteristics do amphibians NOT have: slimy skin, scales, gills, legs? (Scales – reptiles and fish have scales.)


### Mammal (Bat) Trivia

1. On average how many mosquitos do bats eat in one hour? (1200! Yay bats!)
2. How many babies does a bat mom have each year? (Only one.)
3. True or false: bats in Wisconsin drink blood. (False! Only three species of vampire bats drink animal blood and they do not even live in North America.)
4. True or false: bats are blind. (False, bats can see but they use echolocation to find food and avoid predators from far away distances.)
5. How many fingers do bats have on each wing? (Five.)
6. True or false: bats are the only mammals that fly. (True, sugar gliders and flying squirrels only glide, they cannot fly.)
7. Why do bats hang upside down? (They have weak legs, their tendons lock into place so it uses no energy to hang upside down.)
8. True or false: All bats eat insects. (False, lots of bats eat only pollen and fruit.)
9. True or false: bats have good hearing. (True, in fact they have the best hearing of all land mammals.)
10. Bats usually hunt for insects at night. What is this called? (Nocturnal.)

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11. True or false: All bats have rabies. (False! All mammals can get rabies, but very few bats actually have it. Bats are very clean and groom themselves like cats.)
  12. True or false: Bats can get tangled in my hair. (False! Remember bats use echolocation? This helps them avoid getting tangled in your hair or touching you at all. They see you as a predator and do NOT want to get anywhere near you.)

### Bird Trivia

13. What is the state bird of Wisconsin? (Robin)
14. What bird's call sounds like "Who cooks for you? Who cooks for all?" (Barred Owl)
15. Which of the five senses is strongest for a bird? (Sight. If we had eyes like a bird, they would be the size of baseballs.)
16. What makes a bird a bird (i.e., what do birds have or do that no other type of animal has or does)? (Feathers. Explain why it's not beaks (turtles), flight (insects, bats), eggs (platypus, reptiles, amphibians.))
17. What is the fastest bird in the world? (Peregrine Falcon)
18. How many bird species are there in the world? (10,000), the US? (900), WI? (about 400)
19. What are different ways that humans can help bird populations?
20. Hummingbird fun facts for true/false:
  - a. Can fly backwards
  - b. About the weight of a penny
  - c. Cannot smell at all
21. How many eyelids do birds have? (Three. The third is called a nictitating membrane. It's clear-ish and used to protect the eye while flying or swimming, like a goggle.)
22. What is unihemipheric sleep? (When we go to sleep, our entire brain enters sleep mode. Certain animals like ducks can keep half of their brain awake while the other half sleeps. You can see groups of mallard ducks where the ones on the inside of the circle are fully asleep (both eyes closed) because they feel safe from predators. The ducks on the outside of the circle only partially sleep. The eye on facing the inside of the circle is closed (asleep), but the eye facing outwards is open so they can keep alert and protect the group. Dolphins and whales also use unihemipheric sleep since they need to stay awake to remember to swim to the surface and breathe air.)
23. Are birds warm or cold blooded? (Warm blooded, like mammals.)
24. True or false – all bird species build nests. (False, some species like the kestrel are cavity nesters and look for holes in trees or for bird houses to nest in.)

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25. Why do woodpeckers peck on trees? Hint – it's not to drill holes to find insects. (Woodpeckers tap on trees to communicate. They can't sing like many other birds.)
  26. Can birds dream? (Scientists think that birds can dream, and that they dream about singing in order to improve their singing the next day.)
  27. Crows live in every state of the United States except one. Which one? (Hawaii)
  28. What bird needs to put its head upside down in order to eat? (Flamingo)
  29. True or False. All birds have hollow (pneumatic) bones? (False. Some diving birds – like loons or puffins – do not have hollow bones – that would make diving difficult)
  30. True or False. Most birds cannot move their eyes. (True. Birds with eyes on the sides of their heads have a wide visual field, while birds with eyes on the front of their heads, such as owls, have binocular vision and can estimate the depth of field.)