# Birds and Mammals

**Includes:**

### Reproducible Student Pages

#### ASSESSMENT
- ✔ Chapter Tests
- ✔ Chapter Review

#### HANDS-ON ACTIVITIES
- ✔ Lab Worksheets for each Student Edition Activity
- ✔ Laboratory Activities
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#### MEETING INDIVIDUAL NEEDS
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- ✔ Enrichment
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Reproducible Student Pages

Reproducible Student Pages

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Hands-On Activities
Mini LAB

Modeling Feather Function

Procedure
1. Wrap polyester fiber or cotton around the bulb of an alcohol thermometer. Place it into a plastic bag. Record its temperature in the table under Data and Observations.

2. Place a second alcohol thermometer into a plastic bag and record its temperature.

3. Simultaneously submerge the thermometers into a container of cold water, keeping the top of each bag above the water’s surface.

4. After 2 min, record the temperature of each thermometer.

Data and Observations

<table>
<thead>
<tr>
<th></th>
<th>Thermometer Wrapped in Fiber or Cotton</th>
<th>Thermometer Without Fiber or Cotton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature after 2 min in cold water</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analysis
1. Which thermometer had the greater change in temperature?

2. Infer the type of feather the fiber or cotton models.
**Inferring How Blubber Insulates**

**Procedure**

1. Fill a self-sealing plastic bag about one-third full with vegetable shortening.
2. Turn another self-sealing plastic bag inside out. Carefully place it inside the bag with the shortening so that you are able to seal one bag to the other. This a blubber mitten.
3. Put your hand in the blubber mitten and place it in ice water for 5 s. Remove the blubber mitten when finished.
4. Put your bare hand in the same bowl of ice water for 5 s.

**Analysis**

1. Which hand seemed colder?

2. Infer how a layer of blubber provides protection against cold water.
Lab Preview

Directions: Answer these questions before you begin the Lab.

1. What do the tracks of mammals with webbed feet look like in the snow or soil?

2. Which items will you match in this lab?

Have you ever seen an animal footprint in the snow or soft soil? In this lab, you will observe pictures of mammal footprints and identify the mammal that made the footprint.

Real-World Question

How do mammal footprints differ?

Materials

diagram of footprints

Goals

- Identify mammal footprints.
- Predict where mammals live based on their footprints.

Procedure

1. Compare and contrast the different mammal footprints in Figure 1.
2. Based on your observations, match each footprint to an animal listed in the first column of the table in the Data and Observations section.
3. Write your answers in the column labeled Letter of Footprint. Complete the data table.
**Hands-On Activities**

**Data and Observations**

### Identifying Mammal Footprints

<table>
<thead>
<tr>
<th>Animal</th>
<th>Letter of Footprint</th>
<th>Traits of Footprint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bear</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beaver</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cougar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coyote</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raccoon</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Conclude and Apply**

1. Which mammals have hoofed feet?

2. Which mammals have clawed toes?

3. Which mammals have webbed feet?

4. **Explain** how the different feet are adapted to the areas in which these different mammals live.

5. What are the differences between track B and track E? How does that help you identify the track?

**Communicating Your Data**

Compare your conclusions with those of other students in your class. For more help, refer to the Science Skill Handbook.
Think about the types of birds that you observe around your neighborhood. What types of food do they eat? Do all birds come to a bird feeder? Form a hypothesis about the type of bird that you think you will see most often at your bird feeder.

Real-World Question
What is the most common bird in your neighborhood?

Goals
- **Research** how to build a bird feeder and attract birds to it.
- **Observe** the types of birds that visit your feeder.
- **Identify** the types of birds that you observe at your bird feeder.
- **Graph** your results and then communicate them to other students.

Data Source
Visit msscience.com for Web links to more information about how to build a bird feeder, hints on bird-watching, and data from other students who do this lab.

Safety Precautions

Make a Plan
1. **Research** general information about how to attract and identify birds. Determine where you will make your observations.
2. **Search** reference sources to find out how to build a bird feeder. Do all birds eat the same types of seeds?
3. **Select** the type of feeder you will build and the seed you will use based on your research.
4. What variables can you control in this lab? Do seasonal changes, length of time, or weather conditions affect your observations?
5. What will you do to identify the birds that you do not know?

Follow Your Plan
1. Make sure your teacher approves your plan before you start.
2. **Record** your data in your Science Journal each time you make an observation of the birds at your bird feeder.
Activity (continued)

Analyze Your Data
1. Write a description of where you placed your feeder and when you made your bird observations.

2. Record the total number of birds you observed each day.
3. Record the total number of each type of bird species you observed each day.
4. Graph your data using a line graph, a circle graph, or a bar graph.

Conclude and Apply
1. Interpret Data What type of bird was most common to your feeder?

2. Explain if all of your classmates’ data agree with yours. Why or why not?

3. Review your classmates’ data and determine if the location of bird observations affected the number of birds observed.

4. Infer if the time of day affected the number of birds observed. Explain.

5. Infer Many birds eat great numbers of insects. What might humans do to maintain a healthy environment for birds?

Communicating Your Data

Find this lab using the link below. Post your data in the table provided. Compare your data to those of other students. Combine your data with those of other students and plot the combined data on a map to recognize patterns in bird populations.

mssciences.com
Owl Pellets

The barn owl usually feeds on small mammals such as rodents, moles, and shrews. These mammals are swallowed whole. Some parts of the mammals dissolve in the owl’s stomach. The indigestible parts, such as bones, hair, and feathers, are regurgitated in an owl pellet. You can find out what an owl eats by examining the owl pellet in this Laboratory Activity.

Strategy
You will dissect an owl pellet and identify animal skulls found in the owl pellet. You will complete a table of the numbers and kinds of prey eaten by owls.

Materials
- plastic gloves
- white sheet of paper
- forceps
- dissecting needle
- owl pellet
- field guide to small mammals (that shows skeletons)

Procedure
1. Put on the plastic gloves. Use the forceps to place the owl pellet on the white paper.
2. Break the owl pellet apart. Carefully separate the bones of the animals from the feathers and fur.
3. Use the forceps and dissecting needle to clean skull bones. **WARNING:** Use care when handling sharp objects.
4. Identify the skulls of the animals that the owl has eaten, using a field guide to small mammals. You can also refer to the mouse skeleton below to help you determine which are leg bones, which are ribs, and so on. Record the number of skulls of different animals in Table 1.
5. Make a class record of the kinds and numbers of animals found in the owl pellets.
Laboratory Activity 1 (continued)

Data and Observations

Table 1

<table>
<thead>
<tr>
<th>Animal</th>
<th>Number—individual</th>
<th>Number—class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shrew</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mole sparrow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deer mouse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Questions and Conclusions

1. What was the outside covering of the owl pellet?

2. An owl regurgitates one pellet a day. How many animals did your owl eat in one day?

3. What animals did you find in the owl pellet?

4. What do you think is the owl’s role in the environment?

5. Is the owl a herbivore or a carnivore?

6. Poisons found in the environment often accumulate in the bodies of small mammals. How would this affect the owl which preys on these animals?

Strategy Check

Can you dissect an owl pellet and identify some animals the owl has eaten?
Can you record in a table the number and kinds of prey eaten by the owl?
Observing Hair and Feathers

Every mammal has hair at some point in its development. Hair and fur can serve many purposes, including protection, camouflage, body temperature regulation, attracting a mate, and sensing the surrounding environment. Birds use feathers for flight, camouflage, attracting a mate, and body temperature regulation. In this activity you will use a microscope and chemical tests to examine and compare the structure of various types of hair and feathers.

Strategy
You will examine various types of hair from different mammals using a microscope. You will examine and compare down and contour feathers using a microscope. You will compare and contrast the functions and structure of hair and feathers.

Materials
- various hair and fur samples, including human hair and dog or cat whiskers
- magnifying lens
- microscope slides and coverslips
- methylene blue solution
- microscope
- various feathers, including both down and contour feathers
- test tubes (3)
- glass marking pen
- biuret reagent
- warm water bath
- glass stirring rods

Procedure

Part A—Observing Hair
1. Examine the mammal hair samples using your unaided eyes. Compare the properties of the different types of hair. Record your observations in the data table in the Data and Observations section.
2. Using the magnifying lens, examine the hair samples. Be sure to include human hair, hairs used for sensing the environment (for example, cat’s and dog’s whiskers) and hairs used for insulation (for example, dog and cat fur). Record your observations in the data table.
3. Prepare a wet mount of the different types of hair using methylene blue solution. This solution allows cells to be more clearly visualized. **WARNING:** Methylene blue can stain skin and clothing.
4. Observe the hair under the microscope. What observations can you make about the different types of hair? Record your observations in the data table.
Laboratory Activity 2 (continued)

Part B—Observing Feathers
1. Examine the various feathers with your unaided eyes. Compare the different types of feathers. Record your observations in the data table.
2. Using the magnifying lens, carefully examine the feathers. Record the structure of the two types of feathers in the data table.
3. Observe the feathers under the microscope. Use a methylene blue wet mount to more clearly visualize the cells.
4. Record your observations in the data table.

Part C—Testing Hair and Feathers for Protein
1. Prepare a labeled test tube of biuret reagent for each type of hair and feathers to be tested. Prepare an additional control tube. **WARNING:** Biuret reagent can burn your skin. Tell your teacher immediately if biuret reagent comes in contact with your skin. Ask your teacher for help cleaning spills. Make sure you use protective gloves and goggles.
2. Place samples of hair and feathers into the labeled tubes. Add nothing to the biuret reagent in the control tube.
3. Place the test tubes in the warm water bath, and stir each tube with a separate glass stirring rod. Leave the stirring rods in the test tubes throughout the test.
4. Biuret reagent changes from blue to purple in the presence of protein. Record your observations about the presence or absence of protein in hair, fur and feathers in the data table.

Data and Observations

<table>
<thead>
<tr>
<th>Observations</th>
<th>Structure</th>
<th>Protein Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hair</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fur</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feathers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Questions and Conclusions
1. What are some functions served by both fur and feathers?

2. What similarities and differences did you find among the various types of hair you examined?

3. What similarities and differences did you see in the structure of contour and down feathers?

4. What differences between hair and feathers did you observe using the microscope? Similarities?

5. How do the similarities you noted between hair and feathers relate to their functions?

6. What conclusions can you make about the presence or absence of protein in hair and feathers?

Strategy Check
_____ Can you compare and contrast the functions of hair and feathers?
_____ Can you describe the appearance of hair and feathers?
_____ Can you compare the presence of protein in hair and feathers?
Birds and Mammals

Directions: Use this page to label your Foldable at the beginning of the chapter.

Birds

Mammals

Diet

Movement

Body Systems

Young

can walk, climb, swim, fly, or hop

can walk, fly, or swim

hatched from shells

herbivores, only plants;
carnivores, only other animals;
oncivores, plants and other animals

large amounts of high energy foods like insects, nectar, seeds, and meat

most are born live

made of bones that are almost hollow
Meeting Individual Needs
Overview

Birds and Mammals

Directions: Complete the concept map using the terms or phrases in the list below.

hollow bones  feathers  hair
endothermic  specialized teeth  4-chambered heart
mammary glands  care for young  wings

Birds

have these characteristics

1. and

2. and

3. and

Mammals

have these characteristics

4. and

5. and

6. and

7. and

8. and

9. and

Meeting Individual Needs

Birds

1. lay eggs

and

2.

and

3.

Mammals

4.

5.

6.

7.

8.

9.

produce milk

Directed Reading for Content Mastery

Birds and Mammals
Section 1 - Birds

Directions: Write T if the statement is true; write F if the statement is false.

1. Birds are the only animals that have feathers.  
2. Long contour feathers on the wings and tail help birds steer.  
3. Down feathers give birds their coloring.  
4. The oldest birdlike fossil was an Archaeopteryx.  
5. Each lung of a bird has four different chambers.  
6. Food passes from a bird’s stomach into its gizzard.  
7. Birds eat meat, fish, insects, fruit, seeds, and nectar.  
8. Penguins use their wings to swim under water.  
9. Flight requires good eyesight but poor hearing so that birds are not bothered by loud noises while they watch for prey.  
10. Flightless birds cannot fly because they have no wings.  
11. Most bones of birds that fly are almost hollow.  
12. Some birds can digest food in less than an hour.  
13. Bird eggs are usually incubated by a parent until they hatch.  
14. A bird’s oil glands are located under its wings.
Section 2 • Mammals

Directions: Complete the following sentences by writing the letter of the correct term in the blank at the left.

1. A kangaroo is an example of a ______.
   a. monotreme  b. placental  c. marsupial

2. The specialized teeth that bite and cut are the ______.
   a. molars  b. incisors  c. canine teeth

3. The ______ connects the placenta to the embryo.
   a. umbilical cord  b. mammary gland  c. uterus

4. The time during which the embryo develops in the mammal’s uterus is called the ______ period.
   a. preening  b. gestation  c. incubation

5. Mammals are endothermic animals that have ______ on their bodies.
   a. feathers  b. scales  c. hair

6. The milk that female mammals feed their young is produced in the ______ glands.
   a. oil  b. placental  c. mammary

7. A duck-billed platypus is an example of a ______.
   a. marsupial  b. bird  c. monotreme

8. Deer, which eat only plants, are called ______.
   a. herbivores  b. omnivores  c. carnivores

9. Animals that eat only meat are called ______.
   a. herbivores  b. carnivores  c. omnivores

10. Porcupine quills and hedgehog spines are modified ______.
    a. skin  b. hairs  c. teeth

11. The saclike organ that absorbs oxygen and food from the mammal mother’s blood is a ______.
    a. mammary gland  b. lung  c. placenta
Key Terms
Birds and Mammals

Directions: Unscramble the terms in italics to complete the sentences below. Write the correct terms on the lines provided.

1. Mammals that eat both plants and animals are vrimoones.
2. The 650 days that an embryo develops inside an elephant’s uterus is called the tagenisot period.
3. nowd feathers are soft and fluffy.
4. Opossums are the only plamusiras that live in North America.
5. A mammal that lays eggs with tough, leathery shells is a(n) torenomem.
6. maymarm glands are found in all mammals.
7. Mammals that eat only plants are shobrevrie.
8. A bird rubbing oil from its oil gland over its feathers is in the process of grinenep.
9. The blicumia cord connects the embryo to the placenta.
10. Birds use their trocuno feathers to fly.
11. Tigers with their large canine teeth, are nircorasev.
12. In scalletanp, embryos develop inside the female’s uterus.
13. Both birds and mammals are shedotnemr, meaning they keep a constant body temperature.
14. Vertebrates that have hair and produce milk are called smamlam.
15. The nealpact is an organ that develops from tissues of the embryo and the uterus.
Sinopsis
Aves y mamíferos

Instrucciones: Completa el mapa de conceptos usando los siguientes términos o frases.

- huesos huecos
- plumas
- pelo
- de sangre caliente
- dientes especializados
- glándulas mamarias
- cuidan las crías
- alas
- corazón de cuatro cavidades

Aves

- poseen estas características
- ponen huevos

Mamíferos

- poseen estas características

1. y
2. y
3. y
4. y
5. y
6. y
7. y
8. y
9. y
10. y

produce leche

Satisface las necesidades individuales
Sección 1 - Las aves

Instrucciones: Escribe V si el enunciado es verdadero; escribe F si el enunciado es falso.

1. Las aves son los únicos animales con plumas.
2. Las largas plumas de contorno de las alas y la cola ayudan a las aves a cambiar de dirección.
3. El plumón le da a las aves su colorido.
4. El fósil parecido a un ave más antiguo fue un Archaeopteryx.
5. Cada pulmón de las aves tiene cuatro cavidades diferentes.
6. El alimento pasa del estómago del ave a su molleja.
7. Las aves comen carne, pescado, insectos, frutos, semillas y néctar.
8. Los pingüinos usan las alas para nadar bajo el agua.
9. El vuelo requiere de buena vista pero no buen oído para que las aves no se distraigan por los ruidos fuertes cuando buscan presas.
10. Las aves que no vuelan no pueden hacerlo porque no tienen alas.
11. La mayoría de los huesos de las aves que vuelan son casi huecos.
12. Algunas aves pueden digerir el alimento en menos de una hora.
13. Entre las aves, los padres generalmente incuban los huevos hasta que se abren.
14. Las glándulas sebáceas de las aves están situadas bajo las alas.
### Sección 2 - Los mamíferos

**Instrucciones:** Completa las siguientes oraciones escribiendo la letra del término correcto en el espacio a la izquierda.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. El canguro es un ejemplo de un ______.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. monotrema</td>
<td>b. placentario</td>
</tr>
<tr>
<td>2. Los dientes especializados que muerden y cortan son los ______.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. molares</td>
<td>b. incisivos</td>
</tr>
<tr>
<td>3. El(La) ______ conecta la placenta al embrión.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. cordón umbilical</td>
<td>b. glándula mamaria</td>
</tr>
<tr>
<td>4. El tiempo durante el cual el embrión se desarrolla en el útero de los mamíferos se llama el período de ______.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. cuidar las plumas</td>
<td>b. gestación</td>
</tr>
<tr>
<td>5. Los mamíferos son animales de sangre caliente que tienen ______ sobre el cuerpo.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. plumas</td>
<td>b. escamas</td>
</tr>
<tr>
<td>6. Los mamíferos hembras alimentan a las crías con leche que producen en las glándulas ______.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. sebáceas</td>
<td>b. placentarias</td>
</tr>
<tr>
<td>7. El ornitorrinco de pico de pato es un ejemplo de un ______.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. marsupial</td>
<td>b. carnívoro</td>
</tr>
<tr>
<td>8. El venado, el cual consume solamente plantas, es un ______.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. herbívoro</td>
<td>b. omnívoro</td>
</tr>
<tr>
<td>9. Los animales que solamente consumen carne se llaman ______.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. herbívoros</td>
<td>b. carnívoros</td>
</tr>
<tr>
<td>10. Las espinas del puerco espín y del erizo son ______ modificado(a)(s).</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. piel</td>
<td>b. pelo</td>
</tr>
<tr>
<td>11. En los mamíferos, el órgano con forma de saco que absorbe oxígeno y alimento de la sangre de la madre es el(la) ______.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. glándula mamaria</td>
<td>b. pulmón</td>
</tr>
<tr>
<td>Términos claves</td>
<td>Aves y mamíferos</td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------</td>
<td></td>
</tr>
</tbody>
</table>

**Instrucciones:** Descifra las letras de los términos en bastardilla para completar las siguientes oraciones. Escribe cada término correcto en la línea de la izquierda.

1. Los mamíferos que consumen tanto plantas como animales son **ivonomosor**.
2. Los 650 días durante los cuales el embrión del elefante se desarrolla en el útero se llama el período de **naetsgóic**.
3. El(La) **mólopnn** es suave y mullido(a).
4. Las zarigüeyes son los únicos **plamusiraes** que viven en América del Norte.
5. Los mamíferos que ponen huevos con cascarón grueso y correoso son los **torenomams**.
6. Todos los mamíferos tienen glándulas **maaismar**.
7. Los mamíferos que sólo comen plantas son **shobreívor**.
8. Un ave que esparce aceite de las glándulas de aceite sobre sus plumas está **ddoanuci** de las plumas.
9. El cordón **muilibcla** conecta al embrión a la placenta.
10. Las aves usan las plumas de **trocnono** para volar.
11. Los tigres con grandes dientes caninos son **nírcorasvo**.
12. En los **scaletanprio**, la cría se desarrolla dentro del útero de la madre.
13. Tanto las aves como los mamíferos son **trédoencimos**, que significa mantener una temperatura corporal constante.
14. Los vertebrados que tienen pelo y producen leche se llaman **ifammreso**.
15. El(La) **nealpact** es un órgano que se desarrolla a partir de tejidos del embrión y del útero.
Birds

Directions: List three characteristics of birds.

1. 
2. 
3. 

Directions: Study the following diagram of a contour feather. Identify each part by filling in the labels.

4. 
5. 
6. 

Directions: Write the name of the organ used in each step of a bird’s digestive system in the blanks at the left.

7. where food is moistened and stored
8. where food is partially digested
9. where small stones and grit grind and crush the food
10. where the last stage of digestion occurs

Directions: Answer the following questions on the lines provided.

11. What is an amniotic egg?

12. Compare and contrast contour feathers and down feathers.

13. Why do birds preen?

14. What is the purpose of a bird’s air sacs?
Mammals

Directions: List three characteristics of mammals.
1. 
2. 
3. 

Directions: Name three glands that most mammals have.
4. 
5. 
6. 

Directions: Identify each mammal listed below by writing an H for herbivore, C for carnivore, or O for omnivore in the blanks provided.

7. lion ______ 12. bear ______
8. human ______ 13. beaver ______
9. wolf ______ 14. giraffe ______
10. zebra ______ 15. monkey ______
11. panther ______

Directions: Answer the following questions on the lines provided.
16. Which kind of teeth would a carnivore use most often? 

17. Which kind of teeth would a herbivore use most often? 

Directions: Describe the three groups of mammals based on how their young develop, and give one example from each group on the lines provided.
18. placentals: 

19. marsupials: 

20. monotremes: 

Meeting Individual Needs
Many animals, particularly birds, have a remarkable ability to migrate over thousands of miles of land and sea. Yet we know very little about how they do this. Clearly these animals must have special mechanisms of navigation and orientation.

**Vast Distances and Tiny Landing Sites**

The Atlantic golden plover flies over 12,800 kilometers from the northernmost part of Canada, its arctic breeding ground, to an area of the southeastern part of South America. Perhaps it is even more extraordinary that the Pacific golden plover finds its way from the western region of Alaska to the Hawaiian and Marquesas islands—relatively small pieces of land in the vast Pacific Ocean.

After much research, scientists determined that these birds migrate by the Sun and stars. They came to this conclusion because some species of birds cannot migrate successfully in cloudy weather. However, scientists were perplexed by the fact that many other species continue to migrate under clouds and through fog.

**Internal Clocks**

After many experiments, it was confirmed that birds use information from two sources to fly in a particular compass direction. These sources are the Sun or a constellation of stars, and their “internal clocks,” which are related in some way to 24-hour periods. But even this does not fully explain why birds are able to migrate on a cloudy day or starless night.

There is much evidence that birds can detect Earth’s magnetic field and orient themselves with it. Very little is known about how birds detect magnetism. However, bits of magnetite, a magnetic iron ore, have been found in the heads of pigeons. It is assumed that the magnetite is involved in the pigeon’s “magnetic sense.” Indeed, scientists have upset a pigeon’s flight pattern by attaching a small magnet to the bird.

**Rest Stops a Key?**

Scientists have recently found that at least some species reset their internal magnetic compasses against the positions of the stars during rest stops. These birds get lost if they don’t take enough time at each stop.

Much has been learned about navigation and orientation of birds and other animals. Yet scientists are far from understanding how birds can migrate with such accuracy for great distances year after year.

1. Initially, how were birds thought to orient themselves on a long, migratory flight?

2. How might birds navigate on cloudy days or starless nights?

3. How do you think a homing (messenger) pigeon finds its way from the coast of France to its cage on the roof of a London apartment house?
Directions: Observe the characteristics of a mammal in the following activity.

Procedure
Choose a family pet or some pet you know well in the neighborhood. Pets might include a dog, a cat, a rabbit, a gerbil, a horse, or a mouse. Make sure the pet is a mammal. Observe the mammal, keeping in mind the characteristics that you learned about in your textbook. Add to your observations by looking in an encyclopedia or some other reference book that might include information about the mammal. Complete the table below with your observations and the information you gained by reading about this mammal.

Data and Observations

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Observation/Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal type</td>
<td></td>
</tr>
<tr>
<td>Scientific classification (kingdom, class, order)</td>
<td></td>
</tr>
<tr>
<td>Outer covering</td>
<td></td>
</tr>
<tr>
<td>Teeth</td>
<td></td>
</tr>
<tr>
<td>Food</td>
<td></td>
</tr>
<tr>
<td>Reproduction (type, mammal classification, gestation period)</td>
<td></td>
</tr>
<tr>
<td>Other characteristics</td>
<td></td>
</tr>
</tbody>
</table>

Conclude and Apply
1. After observing the mammal’s teeth and food choices, would you classify it as a herbivore, a carnivore, or an omnivore?

2. What characteristics of the mammal you observed make it well suited to living in your home or neighborhood?
Birds and Mammals

Section 1  Birds

A. Bird Characteristics—all birds have ___________ and ___________ and lay eggs.

1. Amniotic eggs with hard shells made of _____________ provide a moist, protective environment for the embryo.
   a. A parent may _____________ the eggs in the clutch, or keep them warm, until they hatch.
   b. Length of incubation varies by _____________.

2. Flight adaptations include lightweight, but strong _____________, wings, _____________ strong flight muscles, efficient _____________ system, and well-developed senses.

3. Most birds’ bones are almost _____________; some are _____________ together, giving birds extra strength and more stability during flight.

4. Birds are the only animals with _____________.
   a. _____________ give birds their coloring and smooth shape and are used for flight.
   b. Down feathers provide birds with an _____________ layer to keep them warm.
   c. Feathers help birds, which are endotherms, maintain their body _____________.
   d. The shaft of a feather has many branches called _____________; each barb has branches called barbules that give the feather strength.
   e. Preening is a process in which the bird rubs _____________ over its feathers, which conditions them.

5. Wings move up and down and back and forth.
   a. Curved on top and flat or slightly curved on the bottom
   b. Shape provides upward push called _____________ for flight.
   c. Wings are also used for _____________ and balance.

B. Body systems

1. Digestive system
   a. High _____________ foods are quickly digested.
   b. System parts include _____________, stomach, _____________, and intestine.
2. Respiratory system
   a. Two lungs are connected to balloonlike ________________ which reach into many body
      parts, including some bones.
   b. Oxygen is received when birds both inhale and ________________.

3. Circulatory system
   a. Heart is large and beats rapidly
   b. ________________-chambered heart, arteries, capillaries, and veins circulate blood.

C. Importance of birds
   1. Role in nature
      a. ________________ source, pets, pest control, flower pollinators or ________________
         dispersers
      b. Can be considered ________________ when their populations grow too large
   2. Human uses
      a. Meat and ________________ are used as food.
      b. ________________ are used in clothing and mattresses.
      c. Droppings called ________________ are used as fertilizer.
      d. Kept as pets
   3. Origin
      a. Birds may have developed from ________________.
      b. Archaeopteryx—oldest birdlike ________________
      c. Protoavis—possible ancestor of birds

Section 2 Mammals
A. Mammal characteristics—have ________________ and produce ________________ for young
   1. Skin and glands
      a. ________________ produces hair or fur, horns, claws, nails, or hooves.
      b. Mammary glands make ________________ for feeding young.
      c. Other glands include oil, sweat, and ________________ glands.
   2. Teeth—incisors, canines, premolars, and molars
      a. Eating plants and animals, omnivores have all ________________ kinds of teeth.
      b. Carnivores have large ________________ teeth for eating meat.
      c. Premolar and molar teeth used by herbivores to eat ________________.
3. Hair
   a. Fur traps air to keep mammals ________________.
   b. Whiskers help mammals ________________ their environment.
   c. Whales have almost no hair; they rely on a layer of fat called ________________ to stay warm.
   d. Quills and spines are modified hairs that ________________ mammals from predators.

B. Body systems
1. Circulatory system has a ________________-chambered heart, blood vessels throughout the body, and lungs with millions of microscopic ________________.
2. Nervous system is composed of brain, spinal cord, and nerves.
3. Digestive system varies according to the mammal’s ________________.
4. Reproductive system
   a. All mammals reproduce ________________.
   b. Most mammals give birth to ________________ young.
   c. Young mammals feed on their mother’s ________________ while learning survival skills.
   d. Many mammals are helpless at birth. Young of mammals such as antelope, elephants, and whales are well-developed at birth and able to ________________ with their parents.

C. Types of mammals—based on how young ________________
1. Monotremes lay eggs and have no ________________ on the mammary glands.
2. Marsupials give birth to immature young that usually feed and develop in their mother’s ________________.
3. Placentals develop embryos inside the mother’s ________________.
   a. Amount of time ________________ develops in the uterus is the gestation period.
   b. A placenta, an organ inside the uterus, absorbs oxygen and food from the ________________ blood.
   c. Embryo is connected to the ________________ by the umbilical cord

D. Importance of mammals
1. Role in nature
   a. Carnivores control ________________ of grazing animals.
   b. Mammals pollinate ________________ and distribute seeds.
2. Origin—about 65 million years ago when ________________ became extinct
Assessment
Part A. Vocabulary Review

Directions: Unscramble the terms to form the correct word for each definition. Write the terms on the lines provided.

1. anuibtce—keep eggs warm until they hatch
2. rutonc stafeehr—strong and lightweight, help birds fly
3. nodw shatfere—soft and fluffy, insulate birds
4. grinneep—process of using beak to rub oil over its feathers
5. myarmma slnadg—glands that produce milk for feeding young
6. revebihro—animal that eats only plants
7. nivecaror—animal that eats only other animals
8. minroove—animal that eats both plants and animals
9. clespnlata—mammals in which embryos develop inside the females uterus
10. staitegno dropie—time during which an embryo develops in the uterus
11. nalpecat—saclike organ developed from tissues of the embryo and uterus
12. clubimila droc—attaches the embryo to the placenta
13. slamuprisa—pouched mammals that bear immature offspring
14. stemormoen—mammals that lay eggs with tough, leathery shells
15. lamsmam—endothermic vertebrates that have hair and produce milk to feed their young
### Chapter Review (continued)

**Directions:** Place each of the following animals into one of the three groups of mammals.

<table>
<thead>
<tr>
<th>16. kangaroo</th>
<th>19. koala</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. platypus</td>
<td>20. porpoise</td>
</tr>
<tr>
<td>18. cow</td>
<td>21. elephant</td>
</tr>
</tbody>
</table>

### Part B. Concept Review

**Directions:** Explain how the following adaptations help birds fly.

1. wings curved on top: ____________________________
2. fused hollow bones: ____________________________
3. contour feathers: ____________________________
4. air sacs: ____________________________

**Directions:** List three uses of wings.

5. ____________________________
6. ____________________________
7. ____________________________

**Directions:** Answer the following questions using complete sentences.

8. Compare and contrast the way birds and mammals reproduce.

9. Explain how a bird’s digestive system works and discuss the organs involved.
# Chapter Test

## Birds and Mammals

### I. Testing Concepts

**Directions:** Match the description in Column I with the item in Column II by writing the correct letter in the space provided. Some items in the second column may not be used.

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. animal that eats both plants and animals</td>
<td>a. carnivore</td>
</tr>
<tr>
<td>2. time during which an embryo develops in the uterus</td>
<td>b. contour feather</td>
</tr>
<tr>
<td>3. strong and lightweight, helps birds fly</td>
<td>c. down feather</td>
</tr>
<tr>
<td>4. process of rubbing oil over feathers with a beak</td>
<td>d. gestation period</td>
</tr>
<tr>
<td>5. meat-eating animal</td>
<td>e. herbivore</td>
</tr>
<tr>
<td>6. attaches the embryo to the placenta</td>
<td>f. incubate</td>
</tr>
<tr>
<td>7. mammal whose embryos develop in the uterus</td>
<td>g. marsupial</td>
</tr>
<tr>
<td>8. mammal that lays eggs with a tough leathery shell</td>
<td>h. monotreme</td>
</tr>
<tr>
<td>9. keep eggs warm until they hatch</td>
<td>i. omnivore</td>
</tr>
<tr>
<td>10. soft and fluffy, provides insulation for birds</td>
<td>j. placental</td>
</tr>
<tr>
<td></td>
<td>k. preening</td>
</tr>
<tr>
<td></td>
<td>l. umbilical cord</td>
</tr>
</tbody>
</table>

### Directions: For each of the following, write the letter of the term or phrase that best completes the sentence.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. Two ways in which a bird’s body is adapted for flight are ______.</td>
<td>a. oil glands and crop</td>
</tr>
<tr>
<td></td>
<td>b. chest muscles and gizzard</td>
</tr>
<tr>
<td></td>
<td>c. wings and feathers</td>
</tr>
<tr>
<td></td>
<td>d. amniotic eggs and air sacs</td>
</tr>
<tr>
<td>12. The bones of birds are ______.</td>
<td>a. solid and fused together</td>
</tr>
<tr>
<td></td>
<td>b. hollow and filled with air spaces</td>
</tr>
<tr>
<td></td>
<td>c. solid and filled with marrow</td>
</tr>
<tr>
<td></td>
<td>d. fused and filled with marrow</td>
</tr>
<tr>
<td>13. The digestive system of a bird ______.</td>
<td>a. works quickly and efficiently</td>
</tr>
<tr>
<td></td>
<td>b. plays no role in obtaining energy</td>
</tr>
<tr>
<td></td>
<td>c. functions slowly and inefficiently</td>
</tr>
<tr>
<td></td>
<td>d. digests food in 7 to 10 days</td>
</tr>
<tr>
<td>14. The organ a bird uses to grind its food is called the ______.</td>
<td>a. crop</td>
</tr>
<tr>
<td></td>
<td>b. stomach</td>
</tr>
<tr>
<td></td>
<td>c. gizzard</td>
</tr>
<tr>
<td></td>
<td>d. intestine</td>
</tr>
<tr>
<td>15. Because of its air sacs, a bird receives oxygen when it ______.</td>
<td>a. lifts and thrusts</td>
</tr>
<tr>
<td></td>
<td>b. steers and lands</td>
</tr>
<tr>
<td></td>
<td>c. protects and nourishes the embryo</td>
</tr>
<tr>
<td></td>
<td>d. inhales and exhales</td>
</tr>
<tr>
<td>16. The time during which the embryo develops in the uterus is called the ______.</td>
<td>a. incubation period</td>
</tr>
<tr>
<td></td>
<td>b. gestation period</td>
</tr>
<tr>
<td></td>
<td>c. amniotic period</td>
</tr>
<tr>
<td></td>
<td>d. umbilical cord</td>
</tr>
</tbody>
</table>
17. The primary role of mammary glands in mammals is to produce ______.
   a. milk   b. oil   c. scent   d. sweat

18. Teeth that are made for biting and cutting are the ______.
   a. canines   b. incisors   c. molars   d. premolars

19. Herbivores eat all of the following EXCEPT ______.
   a. carrots   b. steak   c. grass   d. lettuce

20. Most ______ are pouched mammals that give birth to tiny, immature offspring.
   a. carnivores   b. marsupials   c. monotremes   d. placentals

21. Teeth that can grip and tear away the flesh of animals are the ______.
   a. incisors   b. molars   c. premolars   d. canine teeth

22. Whales, humans, and elephants are examples of ______.
   a. monotremes   b. marsupials   c. placentals   d. insectivores

23. Mammals that eat both plants and other animals are called ______.
   a. carnivores   b. omnivores   c. embryos   d. marsupials

24. Mammals have all of the following EXCEPT ______.
   a. a four-chambered heart   c. well-developed lungs
   b. hollow bones   d. a nervous system

25. Monotremes, such as the duck-billed platypus, ______.
   a. incubate eggs   c. have mammary glands with nipples
   b. give birth to live young   d. have feathers instead of hair

II. Understanding Concepts
Skill: Comparing and Contrasting
Directions: Complete the following table using information from the chapter.

<table>
<thead>
<tr>
<th>Type of mammal</th>
<th>1 or 2 examples</th>
<th>How their young develop</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Marsupial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Monotreme</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Placental</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chapter Test (continued)

Directions: List three adaptations of birds’ bodies that help them fly.

4. ______________________________________________________
5. ______________________________________________________
6. ______________________________________________________

Directions: Explain how the following teeth are used, then name a mammal that uses them often.

7. Molars and premolars: ______________________________________
   Mammal: _________________________________________________
8. Canine: _________________________________________________
   Mammal: _________________________________________________
9. Incisors: _________________________________________________
   Mammal: _________________________________________________

Directions: Complete the following paragraphs by filling in the blanks.

Birds lay eggs with 10. ________________________ shells made of 11. _________________________. This is the same chemical that makes up 12. ________________________, limestone, and marble. Bird eggs have membranes that protect and nourish the 13. ________________________ in a moist environment. This type of egg is called 14. _______________________. Bird eggs are fertilized 15. ________________________.

The female lays eggs in a nest. The bird parents sit on their eggs to 16. ________________________ them, or keep them warm until they hatch. The young may be cared for by one or both parents.

III. Applying Concepts

Directions: List three uses of wings on birds, and name a bird that uses wings in that way.

1. Use: _________________________________________________
   Bird: _________________________________________________
2. Use: _________________________________________________
   Bird: _________________________________________________
3. Use: _________________________________________________
   Bird: _________________________________________________
Chapter Test (continued)

Directions: List three main characteristics of mammals.

4. ____________________________________________

5. ____________________________________________

6. ____________________________________________

Directions: Answer the following questions on the lines provided.

7. What enables herbivores to digest plants? ____________________________________________

8. How do koalas protect their young? ____________________________________________

9. What is located near a cat’s mouth that helps it sense its environment? ____________________________________________

10. What protects a porcupine from enemies? ____________________________________________

11. How do whales keep warm with so little body hair? ____________________________________________

12. Compare and contrast down feathers and contour feathers. ____________________________________________

IV. Writing Skills

Directions: Answer the following questions using complete sentences.

1. Explain a bird’s respiratory system and why it functions as it does. ____________________________________________

2. What are some similarities between birds and mammals? ____________________________________________
Transparency Activities
A Long Flight

Albatrosses are among the largest flying birds. They are able to ride the ocean winds in such a way that they can stay aloft for hours without flapping their wings. Albatrosses spend between five and ten years at sea before returning to shore to mate for the first time.

1. Describe the albatross pictured. How is it similar to other birds?
2. What might albatrosses eat?
3. What adaptations enable birds to fly?
Sea otters are playful marine mammals. One of the few nonprimates to use tools, sea otters often balance rocks on their stomachs to crack open shellfish. This once endangered species is now protected and increasing in numbers.

1. What other mammals live in the ocean?
2. How are otters and fish similar? How are they different?
3. How do otters and humans compare physically?
Hollow Bones of Birds

- **Sternum**: The sternum has a structure called a keel, which is where flight muscles attach.
- **Tail**: A bird does not have a bony tail.
- **Hollow leg bone**: Hollow leg bone
- **Leg bone**: Leg bone

**Teaching Transparency Activity**

Birds and Mammals
1. Name three bird characteristics that allow it to fly.

2. What is the sternum?

3. Where is the keel located?

4. Why is the keel important?

5. Does a bird have a bony tail?
**Birds and Mammals**

**Assessment Transparency Activity**

**Directions:** Carefully review the table and answer the following questions.

<table>
<thead>
<tr>
<th>Species</th>
<th>Length (m)</th>
<th>Weight (t)</th>
<th>Present population x 1,000</th>
<th>Endangered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>23–24</td>
<td>110–150</td>
<td>14</td>
<td>yes</td>
</tr>
<tr>
<td>Bowhead</td>
<td>15–18</td>
<td>60–80</td>
<td>7.8</td>
<td>yes</td>
</tr>
<tr>
<td>Gray</td>
<td>13–14</td>
<td>30–40</td>
<td>21</td>
<td>yes</td>
</tr>
<tr>
<td>Minke</td>
<td>9–11</td>
<td>20–30</td>
<td>N/A</td>
<td>no</td>
</tr>
<tr>
<td>Killer</td>
<td>7–9</td>
<td>4–6</td>
<td>N/A</td>
<td>no</td>
</tr>
<tr>
<td>Sei</td>
<td>12–17</td>
<td>20–30</td>
<td>54</td>
<td>yes</td>
</tr>
<tr>
<td>Sperm</td>
<td>16–18</td>
<td>15–20</td>
<td>1,950</td>
<td>yes</td>
</tr>
</tbody>
</table>

1. According to the information in the table, which whale is the longest?
   A. Minke       B. Bowhead
   C. Sperm       D. Blue

2. Based on this information, which is a reasonable conclusion to make about killer whales?
   F. They don’t swim as quickly as the bowhead.
   G. They must be short and heavy.
   H. They only eat sea plants.
   J. They must be sleek and thin.

3. The two whales listed in the table that are the most different in size are the ___.
   A. blue and minke       C. killer and minke
   B. blue and killer       D. blue and bowhead