Science Grade Three

Topics D and E
Topic D

Hearing and Sound
About the Lessons

_Hearing and Sound_ is a unit that should be enjoyable for all students. If you have one or more students with a hearing impairment in your class, this would be a great opportunity for them to share the strategies they use to cope with this disability.

Part I of the unit is designed to introduce students to some of concept related to hearing and sound and some of the vocabulary associated with those concepts. There are some activities directed specifically to younger students whose vocabulary may be relatively limited.

Part II of the unit applies the knowledge students learned in Part I. Part II is much more activity oriented.

Mini Textbook

The Mini Textbook is an important part of the unit. If you prefer, however, the unit can be implemented without the use of the Mini Textbook. It requires that you share your knowledge of the basic concepts in other ways.

Materials

Generally, the lesson activities rely on materials that are readily available at school, from home, or from local retail outlets.
Tuning forks, available from a Science education supplies company, would be great to have if your budget allows. However, they are certainly not essential, especially given that this unit is the only one in the elementary-junior high school curriculum that uses them.

- **Elastic bands.** Start collecting all different sizes.
- **Small boxes.** Be on the lookout for these. They should be at the largest, a third of the size of a shoebox.
- **Bottles.** You will need sets of five or six identical narrow-mouthed bottles (like pop bottles)
Science Grade Three

Topic D: Hearing and Sound

Contents

Part I: What is Sound?

Lesson One
Lesson Two
Lesson Three
Lesson Four
Lesson Five
Lesson Six
Lesson Seven
Lesson Eight
Lesson Nine
Lesson Ten
Lesson Eleven

Introduction
Familiar Sounds
Words That Make Sounds
Sounds Animals Make
What Causes Sound?
Describing Sound: Volume
Describing Sound: Pitch
Describing Sound: Quality
How We Hear Sounds
What Animals Can Hear
Hearing and Sound, Part I Test

5
6
7
8
9
10
11
12
13
14
15
Part II: Making Sound

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twelve</td>
<td>Making Sounds by Striking Objects – Part I</td>
<td>16</td>
</tr>
<tr>
<td>Thirteen</td>
<td>Making Sounds by Striking Objects – Part II</td>
<td>17</td>
</tr>
<tr>
<td>Fourteen</td>
<td>Producing Sounds with Strings</td>
<td>18</td>
</tr>
<tr>
<td>Fifteen</td>
<td>Making a Stringed Instrument</td>
<td>19</td>
</tr>
<tr>
<td>Sixteen</td>
<td>Making Sounds by Blowing</td>
<td>20</td>
</tr>
<tr>
<td>Seventeen</td>
<td>Making a Blowing Instrument</td>
<td>21</td>
</tr>
<tr>
<td>Eighteen</td>
<td>Changes in Hearing</td>
<td>22</td>
</tr>
<tr>
<td>Nineteen</td>
<td>Soundproofing</td>
<td>23</td>
</tr>
<tr>
<td>Twenty</td>
<td>Making Sounds Louder</td>
<td>24</td>
</tr>
<tr>
<td>Twenty-one</td>
<td>Sign Language</td>
<td>25</td>
</tr>
<tr>
<td>Twenty-two</td>
<td>Hearing and Sound, Part II Test</td>
<td>26</td>
</tr>
</tbody>
</table>
Lesson One

Concept: Introduction

Resources/Materials: Mini Textbook, pages 4 – 6
Worksheets #3D.1a and #3D.1b (student copies)

Introduction: Explain that you are going to conduct the class for three minutes (or so) without talking or making any sounds. That is, you will not be talking and students are not allowed to talk either. However, people must still try to communicate. During the “silent time” try to communicate such things as:
- Take out your pencils and erasers.
- Talk a little about the weather conditions outside.
- Congratulate students for doing well on…….

Once the silent period is over, discuss ways that people communicated. Discuss also that fact that the world is very quiet when people do not make sounds.

Explain that the next unit of study involves taking a closer look at sounds and how we hear them.

Procedure:

1. Quickly review the five senses (sight, hearing, touch, smell, taste).

2. Review also that the senses are the way we get information about what is happening in our surroundings – our environment. So, hearing is our way of knowing what sounds are being produced.

3. Have students turn to Mini Textbook, page 4 and guide the reading of pages 4 – 6.

4. Distribute Worksheets #3D.1a and #3D.1b. Go over the directions.

Assignments:

1. Read Mini Textbook, pages 4 – 6
2. Do Worksheets #3D.1a and #3D.1b.
Sounds

1. Listen carefully. Tell about five sounds you can hear in your school right now. Tell who or what is making the sound and what sound the person or thing is making. (Example: Mary is talking to David.)
   a. 
   b. 
   c. 
   d. 
   e. 

2. Tell whether each of the following tells about a loud sound or a soft sound.

   ______ a dish falling to the floor and breaking
   ______ a student erasing a word
   ______ the bell calling everyone to church
   ______ a tractor running
   ______ a student turning the page of a book
   ______ a door slamming
   ______ a baby crying
   ______ singing in church
   ______ someone whispering
3. Sometimes we use our sense of hearing together with other senses. Tell what other senses we use for each of the following.

a. a crackling fire

b. munching on popcorn

c. meat sizzling in a hot pan

d. the carpenter cutting wood with a saw

e. children playing a game
Lesson Two

Concept: Familiar Sounds

Resources/Materials: Mini Textbook, pages 7 – 10
Worksheet #3D.2a and #3D.2b (optional, student copies)

Introduction: Review that hearing is one of the five senses that we use to get information about what is going on around us.

Procedure:

1. Have students think about the sounds that are commonly heard around school – both the louder and the softer ones. Write the students ideas on the board. Once the list is complete, have students read them aloud as a group.

2. Explain that sounds are all around us. Have them turn to Mini Textbook, page 7. Guide the reading of pages 7 – 10.

3. If you have the time, have students come up with sounds they commonly hear at different locations around the colony. Write their ideas on the board in categories:

   At Home       In the Kitchen       At Church
   At School     In the Barns          In the Shops
   Outside

4. Distribute Worksheets #3D.2a and #3D.2b. Go over the directions. **Note:** You may want older students to do this in their notebooks instead. If you wrote the lists in #2 above, you may want to leave them on the board so that younger students can refer to them.

Assignments:

2. Do Worksheets #3D.2a and #3D.2b.
Familiar Sounds

Directions: Think of the sounds you can hear around your community. Write them in the boxes below.

Sounds in the School

________________________

________________________

________________________

________________________

Sounds at Home

________________________

________________________

________________________

________________________

Sounds Outside

________________________

________________________

________________________

________________________
Sounds at Church

Sounds in the Kitchen

Sounds in the Barns

Sounds in the Shops
Lesson Three (Optional)

Concept: Words That Make Sounds

Resources/Materials: Mini Textbook, pages 8 – 10
Worksheet #3D.3 (younger students)

Introduction: Write the words crash, boom, and ding on the board in large letters. Read them to students in such a way that the words resemble sounds.

Explain that many words in the English language sound like particular sounds. (The literary term for these words is onomatopoeia. Introduce the term to students, if you like, just as a matter of interest.)

Procedure:

1. Have students turn to Mini Textbook, page 8. With students reread pages 8 – 10. As the pages are being read, challenge students to find other words that resemble sounds. (put-punt, clang, sizzle, moo, quack, chirp, hum, buzz, thud) Write them on the board.

2. As a class try to come up with more words. Add them to the list and read them as a class, once the list is finished. Examples:
   
   click       crinkle       whoosh      plop
   ah-choo    whack         pitter-patter  swish
   snap       creak         tinkle       squish
   hoot       slurp         tick-tack     hiss

3. Older Students. Write seven sentences that using words from the list on the board. (Do in notebooks. Example: I could hear the crinkle of the fire in the burning barrel.)
   Younger Students. Distribute Worksheet #3D.3. Go over the directions.

Assignments:

Older Students. Write seven sentences that use words that resemble sounds.
Younger Students. Do Worksheet #3C.3.
Words That Are Sounds

Directions: In each box, write a word that is a sound. Then draw a picture.
Lesson Four (Optional)

Concept: Sounds Animals Make

Resources/Materials: Mini Textbook, pages 8 – 10
Worksheet #3D.4a (optional, teacher copy, cut up, folded, and put in a container)
Worksheet #3D.4a (older students)
Worksheet #3D.4b (younger students)

Introduction: Review that some words sound like sounds. Then write these words on the board.

buzz  gobble  moo

Explain that these are also words that sound like sounds. Challenge students to tell you what is the same about them (all made by animals or birds).

Procedure:

1. Explain that almost all the words we use to tell about animal sounds sound like the sounds the animals make.

2. If you have the time, have students come up and draw out a paper from the container (Worksheet #3D.4a). They are to read the name of the animal/bird; then the class should tell you the sound it makes. Then write the name of the animal and the sound on the board.

If you feel it is necessary, have the class read the names of the animals and their sounds.

3. Distribute Worksheets #3D.4b (older students) OR Worksheets #3D.4c and #4D.4d (younger students). Go over the directions.

4. OPTIONAL. Have students write ten sentences in their notebooks, using a sentence frame, such as:

Younger Students. A __________ (name of animal) __________ (sound of animal).

Example: A horse neighs.

Older Students.

________ (when) __________ (name of animal) __________ (sound of animal) __________ (where)

Example: Last Friday I heard a pig oink in the barn.

Assignments:

1. Do Worksheet #3D.4b (older) OR Worksheets #3D.4c and #3D.4d (younger).
2. Write sentences using the name of the animal and the sound it makes.
# Animals and Birds

<table>
<thead>
<tr>
<th>cow</th>
<th>horse</th>
</tr>
</thead>
<tbody>
<tr>
<td>snake</td>
<td>rooster</td>
</tr>
<tr>
<td>pig</td>
<td>sheep</td>
</tr>
<tr>
<td>mosquito</td>
<td>robin</td>
</tr>
<tr>
<td>goat</td>
<td>frog</td>
</tr>
<tr>
<td>owl</td>
<td>cat</td>
</tr>
</tbody>
</table>
**Animal and Bird Sounds**

**Directions:** Match the animals and birds with the sounds they make.

<table>
<thead>
<tr>
<th>sound 1</th>
<th>sound 2</th>
<th>sound 3</th>
<th>sound 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>neigh</td>
<td>moo</td>
<td>oink</td>
<td>croak</td>
</tr>
<tr>
<td>baa</td>
<td>hee haw</td>
<td>hoot</td>
<td>gobble</td>
</tr>
<tr>
<td>cock-a-doodle-doo</td>
<td>buzz</td>
<td>meow</td>
<td>cheep</td>
</tr>
<tr>
<td>cluck</td>
<td>caw</td>
<td>bark</td>
<td>quack</td>
</tr>
<tr>
<td>bleat</td>
<td>hiss</td>
<td>chirp</td>
<td>honk</td>
</tr>
</tbody>
</table>

rooster ____________________________  cat ____________________________
dog ______________________________  goat ____________________________
robin ____________________________  horse __________________________
cow ______________________________  bee ____________________________
hen ______________________________  duck __________________________
frog ______________________________  goose __________________________
crow ______________________________  owl __________________________
donkey ____________________________  pig __________________________
sheep ____________________________  turkey _________________________
chick ____________________________  snake _________________________
Directions: Match the pictures to the names of the animals and to their sounds. Colour the pictures.

- sheep
- pig
- horse
- cow
- frog
- croak
- moo
- oink
- baa
- neigh
Lesson Five

Concept: What Causes Sound?

Resources/Materials: Mini Textbook, pages 11 – 13
Worksheets #3D.5a and #3D.5b (student copies)
wooden ruler or plastic ruler
rope or cord

Introduction: Write the question “What causes sound?” on the board.
Have students offer their answers to the question. Then explain that today students will find out.

Procedure:

1. Place the ruler so that one-third is on a desk or table and two-thirds is sticking out. Then while firmly holding onto the part of the ruler that is one the desk, press down on the part that is sticking out and then let it go. **Point out how the ruler goes up and down.**

2. Explain that this up and down or back and forth movement is called a **vibration.**

3. Explain that sound is created when something vibrates. You cannot see sound, but you can sometimes see the vibrations that create sound. Explain also that some vibrations are so small that we’ve can’t really see or feel them. For example, if you pick up a piece of paper, you can probably hear the rustle of the paper; yet you do not see the paper vibrating.

4. Write one the board the question “**How does sound travel?**” Explain that sound travels in waves. To illustrate grasp one end of the rope, allowing the rest of the rope to lie on the floor. Wiggle the end of the rope back and forth. Explain that sound travels in waves that go back and forth, just like the rope. Sound waves are **invisible.**

5. Explain also that sound waves not only travel through the air, but they travel through solids and liquids.


7. Distribute Worksheets #3D.5a and #3D.5b. Go over the directions. Have older students work with younger students.

Assignments:

2. Do Worksheets #3D.5a and #3D.5b.
**What Causes Sound?**

**Directions:** Use Mini Textbook, page 11 to help you answer the questions.

1. The following sentences are taken from the Mini Textbook. Fill in the missing words.
   
   Sound happens when something _________________.
   
   Vibrate means to _____________ back and _____________.
   
   A thing does not have to vibrate ________________ to make a sound.

2. For each of the following tell what is vibrating and what caused the vibrations.

<table>
<thead>
<tr>
<th></th>
<th>What is vibrating?</th>
<th>What caused it to vibrate?</th>
</tr>
</thead>
<tbody>
<tr>
<td>someone talking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>footsteps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dish breaking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>book closing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>leaves rustling</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Directions: Use Mini Textbook, pages 12 and 13 to help you with the questions.

1. Answer true or false.

_______ Sound travels in waves.

_______ You can see sound waves.

_______ The farther sound travels, the larger the waves become.

_______ The farther sound travels, the weaker it gets.

_______ Sound travels in all directions.

_______ Sound only travels in the air.

_______ Sound can travel through liquids and solids.

2. In the box below draw waves to show how sound travels.

3. Pretend that you were swimming and had your whole body under water. If someone slapped the surface of the water, would you be able to hear the slap? Tell why.
Lesson Six

Concept: Describing Sound: Volume

Resources/Materials: Mini Textbook, pages 14 and 15  
Worksheets #3D.6a and #3D.6b (student copies)  
Worksheet #3D.6c (optional, teacher copy)

Introduction: Review that sound is created with something causes an object to vibrate. Also review that sound travels from one place to another in waves.

Explain that today we will begin the first of several lessons about how we describe sound.

Procedure:

1. To begin the discussion on volume, take something that won’t easily break like a metre stick, a workbook, or a textbook. Without giving students any advance warning, slam it relatively hard on your desk. Then tap it slightly on your desk so that it just makes a tiny noise.

2. Have children describe the two different sounds the object made as it hit the desk.

3. Conclude that the major difference is that the first was loud and the second was softer. Explain that one way we can describe sound is by the volume – that is, the loudness or softness.

4. Explain that the sound waves for loud sounds are much bigger than those for soft sounds. (Draw diagrams on the board to show the difference.)


6. Discuss:
   - Why we can’t hear things that are far away. (volume decreases with distance)
   - Why older people can talk louder than small babies (Lungs are bigger in adults than in babies so they are able to force more air over their voice boxes.)

7. Finally, some students may have difficulty with the idea of measuring volume in decibels. You may have to clarify that humans have invented ways to measure many things. We measure distance in cm, m, km and so on. We measure weight in g and kg. In the same way we measure volume in decibels. If you like, refer to the information on Worksheet #3D.6c to give students idea of the volume of some familiar sounds.

8. Distribute Worksheets #3D.6a and #3D.6b. Go over the directions. Have older students help younger students.

Assignments:

1. Read Mini Textbook, pages 14 and 15.
2. Do Worksheets #3D.6a and #3D.6b.
Directions: Use Mini Textbook, pages 14 and 15 to help you answer the questions.

1. What is volume?

2. On what two things does volume depend?
   a. 
   b. 

3. Tell whether each of the following would usually have low volume or high volume.

   ________ a dish breaking
   ________ a tractor starting up
   ________ telling a secret to your friend
   ________ drawing a line with a pencil
   ________ brushing your hari
   ________ dropping a big book on the floor
   ________ eating a raw carrot
   ________ thunder
   ________ turning a page of a book
4. Draw sound waves pictures for loud and soft sounds.

<table>
<thead>
<tr>
<th>loud sound</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>soft sound</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Look at the table below. Then answer the questions.

<table>
<thead>
<tr>
<th>Sound</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal breathing</td>
<td>10 decibels</td>
</tr>
<tr>
<td>Rustling leaves</td>
<td>20 decibels</td>
</tr>
<tr>
<td>Soft whisper</td>
<td>30 decibels</td>
</tr>
<tr>
<td>Quiet talking</td>
<td>50 decibels</td>
</tr>
<tr>
<td>Normal talking</td>
<td>60 decibels</td>
</tr>
<tr>
<td>Shouting in ear</td>
<td>110 decibels</td>
</tr>
<tr>
<td>Thunder</td>
<td>120 decibels</td>
</tr>
</tbody>
</table>

If you were whispering to someone, how many decibels of sound would you be making? ________

Which has a higher volume, rustling leaves or quiet talking?

________

Sounds that are louder than 90 decibels can be dangerous to your hearing. Why is it a bad idea to shout in someone's ear?

________
## COMPARISON OF SOUND PRESSURE LEVELS AND LOUDEDNESS SENSATIONS

<table>
<thead>
<tr>
<th>Sound Pressure Level (dBA)</th>
<th>Source</th>
<th>Sensation</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>Jet Aircraft at 100’</td>
<td>Physical Pain</td>
</tr>
<tr>
<td></td>
<td>Bass Drum at 3’</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Auto Horn at 3’</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>Thunder, Artillery</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nearby Riveter</td>
<td></td>
</tr>
<tr>
<td>110</td>
<td>Elevated Train</td>
<td>Deafening</td>
</tr>
<tr>
<td></td>
<td>Discotheque</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>Loud Street Noise</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Noisy Factory</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>Truck Unmuffled</td>
<td>Very Loud</td>
</tr>
<tr>
<td></td>
<td>Police Whistle</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>Cocktail Party</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Noisy Office</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average Street Noise</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>Average Radio</td>
<td>Loud</td>
</tr>
<tr>
<td></td>
<td>Average Factory</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>Noisy Home</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inside General Office</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>Conversation</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Quiet Radio</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Quiet Home</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Private Office</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Empty Auditorium</td>
<td>Faint</td>
</tr>
<tr>
<td></td>
<td>Quiet Conversation</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Rustle of Leaves</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Whisper</td>
<td>Very Faint</td>
</tr>
<tr>
<td></td>
<td>Soundproof Room</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Threshold of Audibility</td>
<td></td>
</tr>
</tbody>
</table>
Lesson Seven

Concept: Describing Sound: Pitch

Resources/Materials: Mini Textbook, pages 16 – 18
Worksheets #3D.7a and #3D.7b (older students)
Worksheet #3D.7c (younger students)
- thick elastic band
- thin elastic band
- two identical small containers
- metal spoon
- variety of objects (some that will produce high-pitched and some that will produce low-pitched sounds when hit by the spoon)

Introduction: Review that one way to describe sound is by volume, and that volume increased when the amount of vibration increased. Explain that today students will learn about another way to describe sound.

Procedure:

1. Stretch a thick, wide elastic band over an open container, like a tuna fish can, a small box, a small sturdy plastic, or a small cup. Pluck the elastic band and have students listen to the sound.

2. Do the same for a thin elastic band.

3. With students contrast the sounds made by the two elastic bands. Explain that we can describe the sound of the thin elastic as high and the sound of the thick elastic band as low. When we talk about how high or low a sound is, we are referring to the sound’s pitch.

4. Use a metal spoon to tap various objects, like glass, a piece of Plasticine, a book, and a metal pot. Have students decide on the pitch of each sound. (Note: Some pitches are medium – neither distinctly high nor distinctly low.) Explain also that we can compare pitches as one being higher or lower than another.


6. If you have the time, have students come up with sounds that are high-pitched and low-pitched.

7. Distribute Worksheets #3D.7a and #3D.7b (older) OR Worksheet #3D.7c (younger). Go over the directions.

8. OPTIONAL. Have students write sentences telling about sounds that are high- or low-pitched.

A ___________________________ has a ___________________________.
(baby crying) (high pitch)

Assignments:

1. Read Mini Textbook, pages 16 – 18.
2. Do Worksheets #3D.7a and #3D.7b OR #3D.7c (younger).
Directions: Use Mini Textbook, pages 16 – 18 to help you with the questions.

1. What is pitch?

2. Write each of the sounds under the correct column. Then add two more sounds for each.

<table>
<thead>
<tr>
<th>High-Pitched Sounds</th>
<th>Low-Pitched Sounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>squeak</td>
<td>growl</td>
</tr>
<tr>
<td>glass breaking</td>
<td>big dog’s bark</td>
</tr>
<tr>
<td>big book falling on the floor</td>
<td>thunder</td>
</tr>
</tbody>
</table>

• • • • • • • • • •
3. What is frequency?

4. Draw high-pitched and a low-pitched sound wave.

<table>
<thead>
<tr>
<th>high-pitched</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>low-pitched</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

5. For each sound, circle high frequency or low frequency.
   a. tiny bell ringing (high frequency, low frequency)
   b. older man’s voice (high frequency, low frequency)
   c. robin chirping (high frequency, low frequency)
   d. truck engine (high frequency, low frequency)
   e. pig oinking (high frequency, low frequency)

6. If an elephant made a sound that was 10 Hertz, could you hear it? Explain why.

__________________________________________________________________________

Worksheet #3D.7b
**Pitch**

**Directions:** Tell whether you think each animal makes a **high-pitched**, a **medium-pitched**, or a **low-pitched** sound.

<table>
<thead>
<tr>
<th>cow</th>
<th>goat</th>
<th>pig</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Cow" /></td>
<td><img src="image" alt="Goat" /></td>
<td><img src="image" alt="Pig" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>horse</th>
<th>frog</th>
<th>duck</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Horse" /></td>
<td><img src="image" alt="Frog" /></td>
<td><img src="image" alt="Duck" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>puppy</th>
<th>donkey</th>
<th>sheep</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Puppy" /></td>
<td><img src="image" alt="Donkey" /></td>
<td><img src="image" alt="Sheep" /></td>
</tr>
</tbody>
</table>
Lesson Eight

Concept: Describing Sound: Quality

Worksheet #3D.8 (student copies)
sheet of paper
tuning fork and rubber mallet (optional)
Any number of items that you can use to make pleasant and unpleasant sounds.

Introduction: Briefly review that volume and pitch are two ways to describe sounds. Review that volume refers to loudness or softness, and that pitch refers to high or low sounds.

Explain that a third way to describe sound is quality. Quality refers to how pleasant or unpleasant a sound is. Write the word “quality” on the board along with “pleasant” and “unpleasant”.

Procedure:

1. Sit in a student’s desk and move it by sliding it along the floor. (It usually makes an irritating scraping sound.) If your classroom floor is carpeted, do something equally annoying, like sharpening a pencil.

2. Discuss with students if the sound is pleasant or unpleasant.

3. If you have a tuning fork, strike it with the mallet. Ask students if the sound is pleasant or unpleasant. (A metal spoon striking the rim of a better quality glass or piece of crystal also produces quite a pleasant sound.)

4. Discuss what makes some sounds pleasant and others unpleasant. (Usually pleasant sounds are more pure and clear with a continuous pitch. Unpleasant sounds seem to have uneven pitches with more jarring sounds.)

5. On the board write the headings **Pleasant** and **Unpleasant**. Have students come up with sounds that are pleasant and those that are unpleasant.

6. Acknowledge that what is pleasant to some may not be pleasant to others.

7. Explain that some combinations of sounds are pleasant and some are not as well. A good example is harmonized singing. If done well, it is pleasant.


9. OPTIONAL. As a class make a bulletin board display about “Sound Quality”. Divide the bulletin board in two. On one section have illustrations of pleasant sounds; on the other, unpleasant sounds. Have students write captions for each of their illustrations.

Assignments:
1. Read Mini Textbook, page 19
2. Do Worksheet #3D.8.
3. OPTIONAL. Make a bulletin board display about Sound Quality.
Directions: Use Mini Textbook, page 19 to help you with the questions.

1. What is sound quality?

2. What is another word for sound quality?

3. Tell whether you think each of the following sounds is pleasant or unpleasant.

- desk scraping along the floor
- a dish breaking on the floor
- a robin chirping
- a crow cawing
- a hammer hammering
- a mother singing to baby
- someone breaking a piece of wood in half
- a loud, high-pitched whistle
- someone whistling a tune
- singing in church
- motorcycle engine

Worksheet #3D.8
Lesson Nine

Concept: How We Hear Sounds

Resources/Materials: Mini Textbook, pages 20 – 25
Worksheet #3D.9a (transparency or enlarged teacher copy)
Worksheets #3D.9b, #3D.9c, and #3D.9d (student copies)

Introduction: Ask students what their favourite food is. Then use one of those foods as an example. If it is chocolate cake, then discuss how we don’t know that it is good until we actually taste it.

The cooks make the cake by putting certain ingredients together and baking them. However, we do not know what it tastes like until we actually put it in our mouths.

In the same way, sound is made by vibrations and travels to our ears in waves, but we don’t know what the sound is like until it actually reaches our ears. Explain that today’s lesson is about how our ears and brain take in sound waves and tell us about the sound.

Procedure:

1. Review that vibrations cause sound waves to form. The sound waves travel from where the vibrations started to our ears. Once the waves get into our ears, the waves make tiny parts in our ear vibrate. Our brain takes those vibrations and tells us about the sound.

2. Have students turn to Mini Textbook, page 20. Guide the reading of pages 20 – 25. This will take some time.

3. Distribute Worksheet #3D.9b and put up the transparency or enlarged copy of Worksheet #3D.9a. Help students label the diagram of the ear. Clarify that many parts of the ear have different names.

4. Then distribute Worksheets #3D.9c and #3D.9d. Go over the directions. Younger students will need assistance.

Assignments:

2. Do Worksheets #9D.9b, #3D.9c, and #3D.9d.
Science Grade Three Topic D: Hearing and Sound, Part 1
Worksheets

Parts of the Ear

Outer Ear
Ear Canal
Eardrum
Hammer
Anvil
Stirrup
Cochlea
Auditory Nerve

Worksheet #3D 9a
- From Edmonton Public Schools
Directions: Label the diagram of the ear. Write the names of the parts on the lines at the bottom of the page. Use the words in the box.

ear canal
ear drum
cochlea

hammer
pinna
auditory nerve

anvil
stirrup

1. ____________________  5. ____________________
2. ____________________  6. ____________________
3. ____________________  7. ____________________
4. ____________________  8. ____________________

Worksheet #3D.9b
How We Hear Sounds

Directions: Use Mini Textbook, pages 20 – 25 to help you with the questions.

1. Where would you find each of these parts of the ear? Write outer ear, middle ear, or inner ear. You will have to look carefully.

____________________ nerve to the brain (auditory nerve)
____________________ pinna (auricle)
____________________ stirrup (stapes)
____________________ cochlea
____________________ ear drum (tympanic membrane)
____________________ Eustachian tube
____________________ incus (anvil)
____________________ ear canal
____________________ semicircular canals
____________________ malleus (hammer)

2. Which part of the inner ear has little to do with hearing and more to do with keeping balance?

__________________________________
3. Match each parts of the ear to their descriptions.

<table>
<thead>
<tr>
<th>pinna</th>
<th>ear canal</th>
<th>ear drum</th>
</tr>
</thead>
<tbody>
<tr>
<td>hammer, anvil, stirrup</td>
<td>cochlea</td>
<td>auditory nerve</td>
</tr>
</tbody>
</table>

_________ They are the three smallest bones in your body. The vibrating ear drum makes them vibrate.

_________ This part takes the sound waves from the pinna and carries them along to the ear drum.

_________ Messages are sent to the brain through it.

_________ This begins to vibrate as sound waves from the ear canal touch it.

_________ This fold of skins stick out from your head. It catches sound waves and funnels them into the ear canal.

_________ The tiny middle ear bones make it vibrate.

4. Number these sentences in the order they would happen.

_____ The vibrating of the tiny bones makes the cochlea vibrate.

_____ The sound waves make the ear drum and three tiny bones vibrate.

_____ The outer ear catches the sound waves as they pass through the air and funnels them into the middle ear.

_____ The cochlea sends messages about the vibrations through the auditory nerve to the brain.
Lesson Ten

Concept: What Animals Can Hear

Worksheets #3D.10a and #3D.10b (older students)
Worksheets #3D.10c and #3D.10d (younger students)
dog whistle (optional)

Introduction: Recall with students that pitch refers to how high or low a sound is. Pitch is measured in Hertz. Higher pitched sound waves have higher frequencies; that is, they travel quickly in smaller sized waves. Lower pitched sound waves have lower frequencies. They travel more slowly in large sized waves.

Review also that our ears catch sound waves, which makes parts of our middle and inner ears vibrate. These vibrations are what tell our brain about the sounds.

Explain that only certain frequencies of sounds are recognized by our brain. We cannot hear sounds whose frequencies are not recognized by the brain.

Procedure:

1. Explain that people can hear sounds with frequencies between 20 and 20 000 Hertz. Any sounds with frequencies below 20 Hertz and above 20 000 Hertz cannot be heard.
2. Explain that many animals can hear sounds human cannot. If the colony has a dog, the students might identify with instances where the dog has heard noises that humans cannot. If you have dog whistle, blow into it to show that it is inaudible to humans.
4. Distribute Worksheets #3D.10a and #3D.10b (older students) OR Worksheets #3D.10c and #3E.10d (younger students). Go over the directions.
5. OPTIONAL. Have students use the information on Mini Textbook, page 28 to write riddles about the hearing of particular animals. They can then be read to the class. The class tries to determine the animals the riddles are about.

Assignments:

2. Do Worksheets #3D.10a and #3D.10b (older) OR Worksheets #3D.10c and #3D.10d (younger).
3. OPTIONAL. Write riddles about the hearing of certain animals.
What Animals Can Hear

Directions: Use Mini Textbook, pages 26 – 28 to help you with the questions.

1. Answer yes or no.

   ____ Humans can hear sounds with pitches between 20 and 20,000 Hertz.

   ____ Dogs can hear sounds that are lower in pitch than sounds that humans can hear.

   ____ Bats can hear sounds that are higher in pitch than sounds that humans can hear.

   ____ Elephants can hear sounds that are lower in pitch than sounds that humans can hear.

   ____ A human can hear a sound whose pitch is 10 Hertz.

   ____ A turtle and a mouse can hear the same sounds.

   ____ A mouse can hear sounds with pitches of 900 Hertz.

   ____ A frog would be able to hear a sound with a pitch of 200 Hertz.

   ____ A bat can hear a wider range of sounds than a human.
2. Look at the graph below. It shows the range of hearing of some animals. Answer the questions.

![Graph showing the range of hearing for different animals in Hertz](image)

**Range of hearing in Hertz**

- a. Can elephants hear sounds with pitches of greater than 100,000 Hertz? _____________

- b. Can all the animals in the graph hear sounds with pitches that are 1,000 Hertz? ____________

- c. Which animals can hear sounds with pitches of less than 100 Hertz?

- d. Which animals can hear sounds with pitches of greater than 10,000 Hertz?

- e. Which animals can hear sounds with pitches between 10,000 and 100,000 Hertz?
Directions: Read the information. Then answer the question on the next page.

These animals can hear **lower-pitched** sounds than humans:

- hippopotamus
- rhinoceros
- alligator
- tiger
- elephant

These animals can hear **higher-pitched** sounds than humans:

- bat
- dog
- mouse
- grasshopper
- cat
- whale
What Animals Can Hear

Directions: Tell if the animal can hear higher-pitched or lower-pitched sounds than humans.

<table>
<thead>
<tr>
<th>Tiger</th>
<th>Whale</th>
<th>Grasshopper</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Tiger" /></td>
<td><img src="image" alt="Whale" /></td>
<td><img src="image" alt="Grasshopper" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hippopotamus</th>
<th>Bat</th>
<th>Elephant</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Hippopotamus" /></td>
<td><img src="image" alt="Bat" /></td>
<td><img src="image" alt="Elephant" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mouse</th>
<th>Alligator</th>
<th>Giraffe</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Mouse" /></td>
<td><img src="image" alt="Alligator" /></td>
<td><img src="image" alt="Giraffe" /></td>
</tr>
</tbody>
</table>
**Lesson Eleven**

**Concept:** Hearing and Sound, Part I Test

**Resources/Materials:** Hearing and Sound, Part I Test (student copies)

**Introduction:** Explain that the first half of the unit on *Hearing and Sound* is almost finished. All that is left is the test.

**Procedure:**

1. Distribute the test.

2. If you have students in the group who cannot read the test independently, consider going through the test with students, question by question.
Hearing and Sound, Part I

Test

1. Tell about one sound you can hear at each place.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>school</td>
</tr>
<tr>
<td>b</td>
<td>home</td>
</tr>
<tr>
<td>c</td>
<td>outside</td>
</tr>
<tr>
<td>d</td>
<td>church</td>
</tr>
<tr>
<td>e</td>
<td>kitchen</td>
</tr>
<tr>
<td>f</td>
<td>in a barn</td>
</tr>
<tr>
<td>g</td>
<td>in a shop</td>
</tr>
</tbody>
</table>
2. Circle the better answer for each question.

<table>
<thead>
<tr>
<th>a</th>
<th><strong>What causes sound?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Something vibrates.</td>
</tr>
<tr>
<td></td>
<td>• Something rings.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>b</th>
<th><strong>What does vibrate mean?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• move back and forth</td>
</tr>
<tr>
<td></td>
<td>• get bigger and smaller</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c</th>
<th><strong>How does sound travel?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• in circles</td>
</tr>
<tr>
<td></td>
<td>• in waves</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>d</th>
<th><strong>Which word better tells about sound waves?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• visible</td>
</tr>
<tr>
<td></td>
<td>• invisible</td>
</tr>
</tbody>
</table>
e. **What does volume mean?**

- how loud or soft a sound is
- how high or low a sound is

g. **Which wave shows the lower volume?**

- [Diagram of waves A and B]

h. **How is volume measured?**

- in Hertz
- in decibels
What does *pitch* mean?

- how loud or soft a sound is
- how high or low a sound is

Which wave shows the higher pitch?

- 
- 

How is pitch measured?

- in Hertz
- in decibels
### k What is frequency?
- how long a sound wave is
- the number of times a sound wave vibrates every second

### l What is meant by sound quality?
- how high or low a sound is
- how pleasant or unpleasant a sound is

### m Which wave shows good sound quality?
- ![Waveform Image]
- ![Waveform Image]

### n Why can some animals hear sounds that humans cannot?
- They have smaller ears than humans.
- They can hear sounds that are lower- or higher-pitched.
3. Give a heading for each list of parts of the ear.

<table>
<thead>
<tr>
<th>Outer Ear</th>
<th>Middle Ear</th>
<th>Inner Ear</th>
</tr>
</thead>
<tbody>
<tr>
<td>• cochlea</td>
<td>• Eustachian tube</td>
<td>• semicircular canals</td>
</tr>
<tr>
<td>• hammer</td>
<td>• anvil</td>
<td>• ear drum</td>
</tr>
<tr>
<td>• ear canal</td>
<td>• pinna</td>
<td></td>
</tr>
</tbody>
</table>
4. Match the parts of the ear to their descriptions.

<table>
<thead>
<tr>
<th>outer ear</th>
<th>middle ear</th>
<th>inner ear</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The sound waves cause the ear drum and the three tiny bones of vibrate.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sound waves are caught and sent into the rest of the ear.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The auditory nerve send messages about the vibrations to the brain.</td>
<td></td>
</tr>
</tbody>
</table>
NOTE: This half of the unit often refers to musical instruments. Most colonies prefer that musical instrument not be brought into the classroom. You may want to let your German teacher know that you will be referring to some musical instruments as a way of teaching students how various sounds can be made. Let your German teacher know that in some cases, students will be making structures that resemble musical instruments. They will be used to help students learn more about sound. Students will not be “playing” them.

Lesson Twelve

Concept: Making Sounds By Striking Objects – Part I

Resources/Materials: Mini Textbook, pages 29 – 32
Worksheets #3D.12a and #3D.12b (student copies)
water glass metal pot cardboard box
pencil metal spoon

Introduction: Once the class has come to order, do the following while the students listen:
- Clap your hands.
- Say “This is science class.”
- Whistle a short little tune. (If you prefer not to whistle, just blow out of your mouth so that you more or less resemble the sound of the wind.)

Explain that you have just demonstrated the three main ways in which we make sound: by striking, strings, and blowing. Tell students they will learn all about them in the second half of the unit.

Explain that the next few classes will involve understanding how sounds are made by striking.

Procedure:

1. With the metal spoon, gently strike the objects you have brought into the room. Tell students that the most common way that sound is made is by one thing striking or hitting another.

2. Then note that some sounds made by striking have better quality than others. They also have different pitches.

3. Ask students how you can control volume. (The harder you strike, the louder the sound.)


5. Distribute Worksheets #3D.12a and #3D.12b. Go over the directions.

Assignments:

1. Read Mini Textbook, pages 29 – 32.
2. Do Worksheets #3D.12a and #3D.12b.
Making Sounds by Striking Objects

Directions: Use Mini Textbook, pages 29 – 32 to help you with the questions.

1. Tell why an object makes a sound when you strike it.
   
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________

2. What are two things that affect the volume of something you strike?
   a. __________________________________________________________
   b. __________________________________________________________

3. Pretend you hit the following objects with a pencil with the same amount of force. Place a 1 in front of the loudest sound that would be made and a 5 in front of the softest sound.

   _____ glass cup
   _____ feather
   _____ cardboard box
   _____ metal cup
   _____ rubber tire

Worksheet #3D.12a
4. Pretend you hit the following objects with a metal spoon to make sounds. Number the sounds that would be made from highest pitch to lowest pitch.

___ eraser
___ bell
___ wooden box
___ your shoe
___ glass cup

5. In each pair, circle the name of the object that will have the higher pitch.

a. large cooking pot   small cooking pot
b. thick rubber       thin rubber
c. short metal tube   long metal tube
d. small metal wheel  large metal wheel
e. thick pane of glass thin pane of glass
Lesson Thirteen

Concept: Making Sounds By Striking Objects – Part II

Resources/Materials: Worksheet #3D.13a and #3D.13b, (student copies)
balloons (if possible of varying sizes and thicknesses)
elastic bands
various open, round containers, such as small cans, small plastic margarine tubs,
mugs (straight sides), Pringles cans

Introduction: Explain that the class will be making some drums. After the drums are made. We will work with them to compare volume, pitch, and quality.

Procedure:

1. Give each student a balloon, a container, and an elastic band. **Note: You will have to ensure that the balloon can be stretched over the container you give the student. In the same way, the elastic you give the student must be long enough to hold the balloon in place.**

2. Distribute Worksheet #3D.13a. Go over the directions. **Note: You may want the students to work in pairs. If you have a small group, have each pair make two objects.**

3. Once the objects have been completed, distribute Worksheet #3D.13b. Go over the directions. Have older students help younger students.

4. ADDITIONALLY. Help students construct their own set of bells, modeled after the one on Mini Textbook, page 32. Instead of using tubes, use varying sizes of nails. (Get them from the carpenter or the hardware store.) Hang the nail using thread or fishing line from a dowel or wooden ruler supported by two tabletops.

Assignments:

1. Make a drum using the instructions on Worksheet #3D.13a.
2. Do Worksheet #3D.13b.
**Making a Drum**

**Challenge:** Make a drum.

**Materials:** balloon  
small open container  
elastic band

**Procedure:**

1. Cut the neck off the balloon.

2. Stretch the balloon over the opening of the container.

3. Put an elastic band over the balloon, so that it stays in place over the container.

4. Hold the elastic in place, and pull the edges of the balloon down so the balloon forms a nice tight **membrane**.

5. Tap the membrane lightly with different objects, like your pencil, your scissors handle, or your finger.
Comparing Drums

1. Draw picture of each of the drums that the students in the class made. Write the students’ names under their drums.

2. Have your teacher strike each drum with the end of a pencil crayon. Listen to the pitch of each drum. Then number the drums from highest-pitched to lowest-pitched.
Lesson Fourteen

Concept: Producing Sounds with Strings

Resources/Materials: Mini Textbook, pages 33 – 36
Worksheets #3D.14a and #3D.14b (student copies)
1 m string

Introduction: Review that some sounds are made by striking objects or surfaces. The next set of lessons has to do with making sound by making strings vibrate.

Explain that our voice works when air from our lungs passes over some cords in our throat. These cords are in a part of the throat called the voice box or larynx. We can talk because these cords vibrate.

Have student place their middle and index fingers together gently on the front of their throat and speak in a firm voice. They should be able to feel their voice boxes vibrate. (Some may have to feel around a little to find the voice box.

Procedure:

1. Tie the string to the legs of two desks or tables. (The higher up, the better so that students can see.)

2. Pull the tables apart so the string is relatively tight. Have the students be very quiet and listen carefully. Pluck the string. Show the students how making the string tighter or loser changes the pitch slightly.


4. Distribute Worksheets #3D.14a and #3D.14b. Go over the directions.

Assignments:

2. Do Worksheets #3D.14a and #3D.14b.
Science Grade Three Topic D: Hearing and Sound, Part II
Worksheets
Producing Sounds with Strings

Directions: Use Mini Textbook, pages 33 – 36 to help you with the questions.

1. What are four ways you can make strings vibrate?
   a. ____________________________________________
   b. ____________________________________________
   c. ____________________________________________
   d. ____________________________________________

2. Use the words in the box to fill the spaces.

<table>
<thead>
<tr>
<th>lower</th>
<th>volume</th>
<th>harder</th>
</tr>
</thead>
<tbody>
<tr>
<td>higher</td>
<td>longer</td>
<td>pressing</td>
</tr>
</tbody>
</table>

a. The ____________ of the sounds made by strings depends on how much the strings are made to vibrate.

b. The ____________ a string is plucked, the greater the volume.

c. The thicker the string, the ____________ the pitch.

d. The ____________ the string, the lower the pitch.

e. The tighter the string, the ____________ the pitch.

f. A guitar players can shorten the part of a string that vibrates by ____________ down on a string.
3. Look at the picture at the bottom of Mini Textbook, page 36. Which instruments use a bow?

a. 

b. 

c. 

4. What is the purpose of the bow?


5. Number these instruments from the highest pitched to the lowest pitched.

   ____ bass
   ____ violin
   ____ guitar
   ____ harp
   ____ cello
Lesson Fifteen

Concept: Making a Stringed Instrument

Resources/Materials: Worksheets #3D.15a and #3D.15b (student copies)
small boxes with good stiff sides
various sizes of elastic bands

Introduction: Recall that sound can be made when strings or cords vibrate. Explain that today, students will be able to make their own stringed instrument.

Procedure:

1. Distribute Worksheet #3D.15a. Go over the directions, so that students know what to do.

2. Have students work in pairs to make the instrument.

3. Distribute the boxes and elastic bands.

4. As students test them out, try to conclude:
   - The harder the elastic is plucked, the higher the volume
   - The thinner the elastic, the higher the pitch.
   - The shorter the elastic, the higher the pitch.
   - The tighter the elastic, the higher the pitch.

5. Distribute Worksheet #3D.15b. Go over the directions.

6. ALTERNATELY. Students can make stretch various sizes of elastic bands over an identical set of cups, small jars, or small cans.

Assignments:

1. Make the stringed instrument, using the directions on Worksheet #3D.15a.
2. Do Worksheet #3D.15b.
Making a Stringed Instrument

Challenge: Make an stringed instrument that can produce different sound pitches.

Materials: small box  several elastic bands of different thicknesses  ruler

Procedure:

1. Take the box. Remove the lid, if there is one.

2. Stretch one elastic band over the box. Pluck it and listen for the sound.

3. Place a ruler under the elastic band. Pluck the elastic band again. What do you notice?

4. Stretch the other elastic bands over the box. Be sure to place them in order from thinnest to thickest.

5. Pluck each elastic band to be sure they are in order from highest-pitched to lowest-pitched. If they are not, change the order.
Making a Stringed Instrument

Directions: Use the stringed instrument you made to answer the questions.

1. Draw a picture of your stringed instrument.

2. On your diagram, number the elastics in order from highest to lowest.

3. Describe the elastic that makes the lowest-pitched sound.

4. Describe the elastic that makes the highest-pitched sound.
Lesson Sixteen

Concept: Making Sounds by Blowing

Resources/Materials: Mini Textbook, pages 37 – 40
            Worksheets #3D.16a and #3D.16b (student copies)
            plastic straws

Introduction: Briefly, review making sounds by striking and with strings.

Give each student a straw. Have he/she hold it about a centimetre in front his/her mouth. Then with slightly puckered lips, blow a strong steady stream of air into the straw. Listen for the sound, and in particular the pitch.

Then have students cut 1/3 of another straw off. Take the short straw and blow into it. Compare with the pitch made by the whole straw. Finally, take the 2/3 long straw, blow into it. Compare the pitch with the whole and 1/3 straw.

Explain that blowing into a container produces a sound. The air inside the container vibrates.

Procedure:

1. Referring to the straws, have students conclude that the longer the straw, the lower the pitch will be. Explain that this is generally true for all containers you could blow into.

2. Explain that blowing causes the air inside the container as well as the container itself to vibrate. The more air in the container, the lower the pitch.


4. Distribute Worksheets #3D.16a and #3D.16b. Go over the directions.

Assignments:

2. Do Worksheets #3D.16a and #3D.16b.
Producing Sounds by Blowing

Directions: Use Mini Textbook, pages 37 – 40 to help you with the questions.

1. Finish these sentences with words that make sense.
   a. Blowing into a container makes sound because ___________________________

   b. The volume of the sound made by blowing into a container depends on ___________________________

   c. The harder you blow, ___________________________

   d. The pitch made by blowing into a container depends on ___________________________

   e. The longer the length, the ___________________________

2. Explain why many instruments are coiled up.

   ___________________________

   ___________________________

3. What is the purpose of the holes you find on sides of many musical instruments.

   ___________________________

   ___________________________
4. All the musical instruments below work by someone blowing into them. Number them in order from highest pitched to lowest pitched.

5. All the musical instruments below work by someone blowing into them. Number them in order from highest pitched to lowest pitched.
Lesson Seventeen

Concept: Making a Blowing Instrument

Resources/Materials:  Worksheets #3D.17a and #3D.17b (student copies)
set of identical bottles, 5 or more (preferably transparent and narrow mouthed)
pitcher of water  metal spoon

Introduction: Review how the length of a straw affected the pitch when you blew into it. Explain that today students will have the chance to make an instrument that can produce different pitches by blowing.

Procedure:

1. Recall from reading the Mini Textbook that when you blow into a container, it causes the air to vibrate and produce sound. The bigger the container, the lower the pitch.

2. Explain that today’s activity starts off with identical containers. Students will change the size of part of each container that vibrates by varying the amount of water in the containers.

3. Distribute Worksheet #3D.17a. Go over the directions.

4. Distribute the bottles and pitchers of water.

5. Once students have had the chance to make their instruments, have them demonstrate how they work.

6. Distribute Worksheet #3D.17b. Go over the directions. Have older students help younger students.

Assignments:

1. Make bottle instrument using Worksheet #3d.17a.
2. Do Worksheet #3D.17b.
Challenge: Make an instrument that makes sound by blowing and that can produce different pitches.

Materials: set of identical bottles pitcher of water metal spoon

Procedure:

1. Line the bottles up in a row.

2. Fill the first bottle so that it is about ¼ full.

3. Fill the last bottle so that it is about ¾ full.

4. Fill the other bottles so that when all the bottles are put in a line, they go from ¼ to ¾ full in even amounts.

5. Start with the bottle on the left. Blow into it with a strong steady breath. Go down the row of bottles, blowing into each. What do you notice about the pitch as you the amount of water increases?

6. Now hit each bottle with the spoon. What do you notice about the pitch of the sound produced?
Making a Bottle Instrument

Directions: Use your blowing instrument to answer the questions.

1. Look at the bottle instrument below. Number the bottles from lowest to highest pitch.

2. Look at the set of bottles. Colour in the water so that they go from highest pitch to lowest pitch.

3. Fill in the spaces with the words more and less.

   The ________________ air in the bottle, the higher the pitch.

   The ________________ air in the bottle, the lower the pitch.

4. When the top of each bottle in the bottle instrument you made with a metal spoon, what did you notice about the pitch?

   ___________________________________________________________________
   ___________________________________________________________________
Lesson Eighteen

Concept: Changes in Hearing

Resources/Materials: Mini Textbook, pages 41 – 43
Worksheet #3D.18a (student copies; transparency)
Worksheet #3D.18b (student copies)

Introduction: Review that our ears work by taking sound waves and making vibrations, which our brain then recognizes and tells about the sound.

Discuss with students people they know that are hard of hearing. (Most colonies have seniors who do not hear as well as they once did.)

Procedure:

1. Explain that some people are born with a hearing impairment. This is because some part of the ear does not work properly. Other people are born with good hearing, but they lose some of their ability to hear during their life.

2. Explain that there are several reasons why a people who are born with good hearing might lose some of their hearing.


4. Review the four main causes of hearing loss. Then explain that a major cause of hearing loss for farmers is being around loud noises for long periods of time. These loud noises can be made by tractors and combines or by noisy power tools like electric saws. Note that tractor and combine cabs are good because they help to reduce the amount of noise.

5. Review that volume is measured in decibels and that sounds greater than 90 decibels are considered harmful.

6. Distribute Worksheet #3D.18a and put up the transparency, if you have one. Discuss what the activity. If you have younger students in the group, you will most likely have to guide them through the worksheet.

7. Distribute Worksheet #3D.18b. Go over the directions. Have older students help younger students.

Assignments:

1. Read Mini Textbook, pages 41 – 43.
2. Do Worksheet #3D.18a.
3. Do Worksheet #3D.18b.
**How Loud Is Too Loud?**

**Directions:** Use the information in the table to make a bar graph.

**Loudness Chart**

<table>
<thead>
<tr>
<th>Noise</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>power saw</td>
<td>110 decibels</td>
</tr>
<tr>
<td>telephone dial tone</td>
<td>80 decibels</td>
</tr>
<tr>
<td>jet engine</td>
<td>140 decibels</td>
</tr>
<tr>
<td>whisper</td>
<td>40 decibels</td>
</tr>
<tr>
<td>power nailer</td>
<td>125 decibels</td>
</tr>
<tr>
<td>motorcycle</td>
<td>100 decibels</td>
</tr>
</tbody>
</table>

**Volume (decibels)**

**Type of Noise**

Which noises can be harmful to your ears? ____________________________________________

Worksheet #3D.18a
**Losing Your Hearing**

**Directions:** Use Mini Textbook, pages 41 – 43 to help you with the questions.

Write the four main causes of hearing loss. Then under each cause, write one thing about that type of hearing loss.

1. ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

2. ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

3. ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

4. ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
Note: This lesson requires something small that makes noise, like a portable timer that buzzes or a portable radio. If you end up bringing something like a radio to class, it is probably best to inform the German teacher about the purpose and provide him with assurances that you are going to use it to entertain the children.

Lesson Nineteen

Concept: Soundproofing

Resources/Materials: Mini Textbook, pages 44 and 45
Worksheet #3D.19 (student copies)
large fluffy bath towel
small device that can make a noise without being plugged in, such as an egg timer, portable radio, old-fashion alarm clock
box that will hold the egg timer, etc.
insulating material of some kind: sawdust, Styrofoam chips, Fibreglass insulation, terry towel, etc.

Introduction: Discuss with students that they cannot hear everything their neighbours say and do, even though there is only a wall about 15 cm thick that separates them. Have students speculate as to why this is. Explain that between housing units, there are usually three layers of materials. Two of them are drywall or wallboard. In between them is a layer of insulation. Sound does not go through insulation very well.

Explain that when we use materials so that sound will not go through, it is called soundproofing.

Procedure:

1. Have a volunteer come to the front of the class. Ask him/her to say the words “I love science.”

2. Then ask the class what they think will happen if you put the towel over the student’s head and he or she speaks.
Place the towel over the student’s head, and gather it loosely around his or her neck. Then direct the student to say “I love science.” again. Have students notice how sound does not travel well through the towel.

3. Have students turn to Mini Textbook, page 44. Guide the reading of pages 44 and 45.

4. Display the device you brought in. Set it so that it makes noise. Then show students the box.
Place the device in the box while it is still making noise. Close the box. Have students not that they cannot hear the device as well, but they can still hear it a little.

5. Have students give you ideas about how you could make the box more soundproof. Then open the box and place the soundproofing materials around the device. Close the box back up. Note the difference in the sound students can hear.


Assignment:
Read Mini Textbook, pages 44 and 45. Do Worksheet #3D.19
1. Describe the sound the device made before it was placed in the box.

2. How did the sound change when the device was placed in the box?

3. Draw a picture of the device in the box with the soundproofing material.

Describe the sound of the device when it was in the box with the soundproofing material.

Worksheet #3D.19
ADVANCE PREPARATION: With a small nail and a hammer, punch a hole in the bottom of each tin can. The hole should be just large enough to thread the string through it.

Lesson Twenty

Concept: Making Sounds Louder

Resources/Materials: Mini Textbook, pages 46 – 48
Worksheet #3D.20 (student copies)
Large sheet of Bristol board or Manila tag 
tape
2 tin cans paper clips string (4 m)

Introduction: Review that there are ways to soundproof.

Tell students that sometimes we need to make sounds louder, but we can’t always shout. It would wear our voices out. Elicit ideas from them as to how sounds can be made louder.

Procedure:

1. Shape the Bristol board or Manila tag into the shape of a megaphone. Secure it with tape.

2. Talk normal to the students and then through the megaphone. Discuss with students how the cone shape of the megaphone amplifies or makes the sound louder.


4. Explain that today, students will make a communication device that amplifies or makes sound louder. (tin can telephone)

5. Distribute Worksheet #3D.20a. Go over the directions.

6. Once the tin can telephones have been completed, distribute Worksheet #3D.20b. Go over the directions.

Assignments:

2. Make a tin can telephone using Worksheet #3D.20a.
3. Do Worksheet #3D.20b.
**Making a Device That Amplifies Sound**

**Challenge:** Make a tin can telephone.

**Materials:** 2 tin cans  
string  
2 paper clips

**Procedure:**

1. Thread the string through the bottom of one of the cans. Be sure to start from the outside of the can so that the loose end comes up through the inside of the can.

2. Pull the string through the hole and up through the open end of the can.

3. Tie the loose end of the string to a paper clip.

4. Pull the string from the outside bottom of the can, so that the paper clip ends up at the inside of the bottom of the can.

5. Repeat the steps for the other end of the string and the other can.

![Image of a tin can telephone](image)

**How it Works**

1. Each person holds one of the cans. Pull on the cans until the string is tight.

2. One person talks into his or her can; the other person puts his or her can to his or her ear.

3. Take turns talking and listening.

4. Try making the string less tight. Does this make a difference?
Tin Can Telephone

1. Draw a picture of your tin can telephone.

2. Does the tightness of the string make a difference? Tell how.

3. Have someone pinch the string firmly while you are trying to talk on the tin can telephone. What happens? Tell why.
Lesson Twenty-one (Optional)

Concept: Sign Language

Resources/Materials: Mini Textbook, pages 49 and 50

Introduction: Review that many people are born with little or no hearing or they lose their hearing. Explain that many people in this situation use a different way of communicating. It is called sign language.

Procedure:

1. People who use sign language use their hands to make signs that stand for words, phrases, and letters of the alphabet.

2. Have students turn to Mini Textbook, page 49. Point out that the signs shown are from the point of view of the person seeing the sign, not the signer.

3. Have students try to make the signs for the numbers and letters.

4. Have students try to spell short words or even their names.
Lesson Twenty-two

Concept: Hearing and Sound, Part II Test

Resources/Materials: Hearing and Sound, Part II Test (student copies)

Introduction: Explain that the unit on Hearing and Sound is complete and now there is only the test to do.

Procedure:

1. Distribute the tests.

2. If you have students who cannot read the test independently, you will have to go through the test question by question with the students.
Hearing and Sound, Part II

Test

1. These hanging clay pots produce sounds when you hit the pots.

   Put an H under the pot that will produce the highest pitch.
   Put an L under the pot that will produce the lowest pitch.

2. Circle the sentence that is true about objects that produce sounds by striking them.
   
   • The larger the object, the higher the sound it will produce.
   • The larger the object, the lower the sound it will produce.

3. Circle the sentence that is true about objects that produce sounds by striking them.
   
   • The harder you strike it, the greater the volume of the sound.
   • The harder you strike it, the less the volume of the sound.
4. Susanna stretched an elastic band over a jar. When she plucked the elastic it make a low-pitched sound.

Now she wants to make a higher-pitched sound.

Put a check mark (✓) in front of all the things she could do to produce a higher-pitched sound.

_____ Pull the elastic band tighter.

_____ Loosen the elastic band.

_____ Use a thinner elastic band.

_____ Use a thicker elastic band.

5. Bill made a stringed instrument like the one in the picture. Circle the sentence that tells what Bill could do to make a higher-pitched sound.

- Move the pencils closer together.
- Take away the pencils.
6. Circle the instrument that can make the lowest-pitched sound.

7. This is a picture of a pan-flute. To make sounds, you blow into the pipes. Put an H on the pipe that will produce the highest-pitched sound.

8. To make sounds you blow into these bottles. Put an L on the bottle that will make the lowest-pitched sound.

9. Circle the sentence that is true about instruments that work by blowing?
   - The longer the tube, the lower the pitch it produces.
   - The longer the tube, the higher the pitch it produces.
10. Put an X in front of the phrase that is **not** a reason that a person would lose his or her hearing.

- disease
- injury
- ageing
- listening too much
- being around loud sounds too much

11. Listening to sounds that are louder than 90 decibels can harm your hearing. According to the table, which sounds can harm your hearing.

<table>
<thead>
<tr>
<th>Sound</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>jet flying</td>
<td>140 decibels</td>
</tr>
<tr>
<td>whisper</td>
<td>30 decibels</td>
</tr>
<tr>
<td>police whistle</td>
<td>85 decibels</td>
</tr>
<tr>
<td>normal talking</td>
<td>50 decibels</td>
</tr>
<tr>
<td>lawnmower</td>
<td>110 decibels</td>
</tr>
<tr>
<td>city traffic</td>
<td>85 decibels</td>
</tr>
</tbody>
</table>
12. Put a check mark (✓) in front of all the materials that would be good for soundproofing.

- Styrofoam chips
- steel
- Fibreglass insulation
- water
- thick towels

13. Look at the device below. Circle the phrase that tells what it is for.

- soundproofing
- making sound louder
Topic D

Hearing and Sound

Mini Textbook
Hearing and Sound

Contents

Introduction 4

Part I: What is Sound?

Introduction 7

Familiar Sounds 8

What Causes Sound? 11

How We Describe Sound

Volume 14

Pitch 16

Quality 19

How We Hear Sounds 20

What Animals Can Hear 26
Part II: Making Sound

Introduction 29
Producing Sound by Striking 30
Producing Sounds with Strings 33
Producing Sounds by Blowing 37
Losing Your Hearing 41
Soundproofing 44
Making Sound Louder 46
Sing Language 49
These people are using their hands to communicate with others. They are using sign language. You may wonder why they are not talking. The reason is simple.

They cannot hear other people talking. They are hearing impaired. Those who are hearing impaired can hear little or no sound.

One way to communicate with hearing impaired people is to use one of the other senses – the sense of sight.

When using sign language, you use your hands to make letters, words, and phrases.
Being able to hear sounds is not only important for communication. It is an important way for us to know what is going on around us.

These students are listening to their teacher. Their sense of hearing allows them to do this.

We use our sense of hearing together with the other senses.

When a delivery van backs up, it makes a “beep, beep, beep” sound. You look around to see what is making that noise. Once you see the van, you decide if you have to get out of the way or not.
There are many questions we could ask when it comes to hearing and sound.

- What makes sound?
- Why are some sounds louder than others?
- How does sound travel?
- How do we hear sounds?
- Why is it that some people cannot hear sounds?

The unit *Hearing and Sound* will answer these questions and more.

Hearing is one the five senses. The senses help us to know what is going on around us.
Part I

What is Sound?

Introduction

You have already learned how sound helps people to communicate with each other.

From the time you were born, you made sounds to let your parents know if you were hungry or if your diaper needed changing. You couldn't talk, so you made some kind of noise – usually crying.

After a while you learned to laugh and make other happy sounds. This was a way to communicate with those around you.

When you are less than a year old, you begin to know other people’s voices, especially those of your mother, father, and brothers and sisters. You use your sense of hearing.

Even very young babies use sound and hearing to communicate.
Familiar Sounds

Sounds are all around us.

If you walk around your colony, you will hear many different sounds.

You may hear people talking. You might hear children laughing and playing.

You might hear a van or truck roaring down the road. You might also hear the putt-putt of tractors pulling farm machinery.
As you get close to the kitchen, you would hear the clang of pots and pans or the sizzle of meat as it fries. You would hear people talking.

When you get close to the barns, you might hear cows mooing for duck quacking.

If you sit very still, you might be lucky enough to hear birds chirping or a crow cawing. In the summer you will most likely hear mosquitoes humming.
At school, you will hear the teacher and children talking, the buzz of a pencil sharpener, or the thud of a book as it accidentally falls on the floor. Even if the class is working quietly and not talking, there are still sounds – pages turning and chairs shuffling. Even pens and pencils make very tiny sounds as they write on paper.

While class is on, the school looks quiet. At recess you will hear many different sounds. What kinds of sounds do you think you will hear inside the school?
What Causes Sound?

Sound happens when something **vibrates**. Vibrate means to move back and forth.

A thing does not have to vibrate much to make sound. If you tap your finger on your desk, your desk top vibrates a little. This makes a soft sound.

If you slap your desk hard, the desk top will vibrate more. This makes a louder sound.

When you talk, air from your lungs makes your **voice box** vibrate. Your voice box is found in your throat.

Put two fingers on the front of your throat. Then say something in a loud voice. Can you feel your voice box vibrate? If you don't feel the vibration, move your fingers up or down your throat a little and try again.

**This woman can feel her voice box vibrate as she talks.**
How does sound travel?

Sound travels in waves. They go up and down, up and down like waves of water.

Sound waves are **invisible**. You cannot see them.

This drawing shows what sound waves look like. In real life you cannot see sound waves.

The farther sound travels, the smaller the waves get. The smaller the waves are, the weaker the sound they make.

This is why you can hear someone close up, but you cannot hear the person when you are farther away.

When you whisper, your voice box makes small waves that you can just hear.
Sound travels in all directions.

When the bell rings to call everyone to church or to lunch, you can hear it all over the colony.

If sound did not travel in all directions, not everyone would be able to hear the bell.

The bell rings to call everyone to church. You can hear it all over the colony.

You know that sound travels through air.

Did you know that sound can also travel through liquids and solids?

These dolphins communicate with each other by making sounds. Like humans, dolphins seems to have a language too. They make sounds that travel through the water.
How We Describe Sound

We can describe what a sound is like in many different ways.

- **Volume** – loudness or softness
- **Pitch** – how high or low
- **Quality** – how pleasant or unpleasant

Let’s take a look at each of these ways.

**Volume**

When we talk about a sound’s volume, we are talking about how loud or soft the sound is.

Volume depends on two things:

1. **Distance.** Distance refers to how far it is between the thing that is making the sound and the ear. The smaller the distance, the louder the sound. The greater the distance, the softer the sound.

There are many sounds being made on this farm. We cannot hear them because they are too far away.
2. **Force.** Force refers to how hard an object was hit so that it began vibrating, causing a sound to be made. The greater the force, the louder the sound.

Someone shouting causes the voice box to make big sound waves. Big sound waves mean big volume.

Loud sounds mean big sound waves. Quiet sounds mean small sound waves.

Volume is measured in **decibels**. If the volume of a sound is near 0 decibels, a person with good hearing could just make it out. If the volume of a sound is near 90 decibels, it would be so loud that it could even cause you to start losing your sense of hearing.
Pitch

Another way to describe sound is pitch. Pitch tells about how high or low a sound is.

A squeaky sound has a high pitch. So do a tiny baby’s cry, a mosquito buzzing, and glass breaking.

Thunder, a big dog’s growl, and tractor engine have low pitched sounds.

Young children usually have higher pitched voices than older men.

Most older men have low pitched voices.
What makes some sounds high pitched and others low pitched?

The difference between high pitched sounds and low pitched sounds has to do with frequency. Frequency is the number of times sound waves vibrate every second.

You might remember that sound happens when something moves back and forth – it vibrates. When sound waves vibrate quickly, they have a higher frequency. When sound waves vibrate slowly, they have a lower frequency.

Sounds that have a high pitch, have a high frequency.

Sounds that have a low pitch, have a low frequency.

High pitched sound waves vibrate quickly.

Low pitched sound waves vibrate slowly.
Pitch is measured in **Hertz**.

The lowest pitched sound humans can hear is about 20 Hertz.

The highest pitched sound humans can hear is about 20 000 Hertz.

*A dog’s growl has a low pitch.*

*A tiny baby’s scream has a high pitch.*
Quality

When we talk about the quality of a sound, we mean how pleasant or unpleasant it is. This means how nice or not a sound seems to us.

Another word for sound quality is timbre.

If a sound is too low or too high pitched, it is unpleasant and we want to cover our ears.

Sometimes objects can give off sounds with different pitches at the same time. When those sounds reach our ears, they might seem pleasant because they seem to go together well. Other times, sounds that are made together might seem unpleasant.

**Noisy machinery can seem unpleasant.**

Most people can agree on what sounds are nice to listen to and what sounds are not.

**Good singing has a high sound quality.**
How We Hear Sounds

You know that sounds are made when something vibrates.
You also know that sounds travel in waves.

But how do we hear those sounds?
With our ears, of course!

How this happens is really quite amazing!

To understand what happens, you have to know some things about the ear.
The Main Parts of the Ear

There are three main parts to the ear:

- the outer ear
- the middle ear
- the inner ear
The Outer Ear

The outer ear is the part you can see. It has two main parts, the pinna and the ear canal.

The pinna is the part that sticks out from your head. It is also called the auricle.

The job of the pinna is to catch the sound waves as they go through the air. Once it has caught the sound waves, it funnels them into the ear canal, which passes them on to the middle ear.

The main job of the outer ear is to funnel sound waves into the middle ear.
The Middle Ear

The middle ear is filled with air. It contains the ear drum and the three tiniest bones in the body: the hammer, the anvil, and the stirrup.

When sound waves go into the middle ear, they make the ear drum and the three tiny bones vibrate.

The three tiniest bones in your body are in the middle ear. Doctors have special names for these bones. They call the hammer the *malleus*. They call the anvil the *incus*. They call the stirrup the *stapes*. They call the ear drum the *tympanic membrane*.
The Inner Ear

The inner ear is way inside the head. You cannot see into the inner ear from the outside of your head. There are three main parts to the inner ear: the cochlea, the semicircular canals and the Eustachian tube.

The vibrating parts of the middle ear make the **cochlea** vibrate too. The cochlea looks like a coiled tube.

The cochlea sends messages to the brain telling it about the vibrations.

The brain then takes those messages, and from that you know about the pitch, volume, and quality of the sounds.
There are three looped tubes called the semicircular canals. They do not help you with your hearing. Instead they do another job. They help you to keep your balance.

Another part of the inner ear is the Eustachian tube. Its job is to try to keep the middle and inner ear working properly.

**HOW WE HEAR**

**The Outer Ear**
The outer ear funnels sound waves into the middle ear.

**The Middle Ear**
The sound waves make the ear drum and the three tiny bones vibrate.

**The Inner Ear**
The vibrating of the middle ear parts make the cochlea vibrate. The cochlea sends messages to the brain about these vibrations.

**The Brain**
The brain takes the messages from the cochlea. It then tells us about the volume, pitch, and quality of the sound.
What Animals Can Hear

You might think that humans can hear all sounds.

This is not true.

Humans can hear sounds whose pitch is between 20 Hertz and 20 000 Hertz.

Humans cannot hear sounds whose pitches are lower than 20 Hertz or higher than 20 000 Hertz.

You may know that dogs can hear sounds that people cannot. They can hear much higher pitched sounds than people can. This is one reason why many dogs are used as watch dogs. They cannot only hear higher pitched sounds, but they can hear softer sounds than people.

Dogs can hear much higher pitched sounds than people.

Bats can hear even higher pitched sounds than dogs.
On the other hand, elephants can hear lower pitched sounds than people. Elephants and people can hear some of the same sounds too.

Elephants can hear sounds that people can’t.

Hearing range tells the lowest and highest frequencies. This chart tells the hearing range of some animals you might know.

<table>
<thead>
<tr>
<th>Animal</th>
<th>Hearing Range (Hertz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>turtle</td>
<td>20 – 1 000</td>
</tr>
<tr>
<td>frog</td>
<td>100 – 3 000</td>
</tr>
<tr>
<td>elephant</td>
<td>1 – 20 000</td>
</tr>
<tr>
<td>human</td>
<td>20 – 20 000</td>
</tr>
<tr>
<td>rabbit</td>
<td>300 – 45 000</td>
</tr>
<tr>
<td>dog</td>
<td>40 – 46 000</td>
</tr>
<tr>
<td>cat</td>
<td>30 – 50 000</td>
</tr>
<tr>
<td>mouse</td>
<td>1 000 – 100 000</td>
</tr>
<tr>
<td>bat</td>
<td>20 – 120 000</td>
</tr>
<tr>
<td>dolphin</td>
<td>1 000 – 130 000</td>
</tr>
</tbody>
</table>
More Facts About Animals and Hearing

1. Mice use high-pitched squeaks to communicate with other mice. These squeaks cannot be heard by humans, but they can be heard by cats.

2. A fish’s ears are hidden under its scales.

3. Snakes do not have ears. They pay careful attention to the vibrations along the ground. Their tongues also help them to sense vibrations.

4. Rabbits have large ears that can stick straight up. This helps them to catch sound waves. They can hear very quiet sounds. This warns them of danger.

5. Bats send out short, high-pitched sounds that reflect off the bodies of their prey. This helps them to know where their prey is located.

6. Earthworms use the tiny hairs on their bodies to sense vibrations.

7. Birds and reptiles have eardrums in a small dip in their heads.

8. Humans can produce the widest variety of sounds.
Part II

Making Sound

Introduction

You have learned that volume, pitch, and qualities are three ways that we used to describe the different sounds we hear.

You also learned that sound begins when an object vibrates. Sound can travel through the air, through water, and through solids.

Sound travels in waves.

Now it is time to learn about how different types of sounds are made.
Produce Sounds by Striking

When you strike an object, you hit it.
This makes all or part of the object vibrate.

The volume of the sound depends on how hard
you strike the object. The harder you strike, the
louder the sound.

Tapping a pencil on a
notebook can be loud
or soft, depending on
how hard you tap.

The volume also depends on the object you are
hitting.
If you strike a piece of sponge with a hammer, the
sponge will vibrate, but the sound it gives off will
be very soft.
If you strike something made of metal with the
same hammer, the sound it gives off will be much
louder.

Striking a glass cup with spoon with make a slightly
softer sound than striking metal cup with the same
spoon.
The **pitch** of a sound describes how high or low the sound is.

The pitch of a sound made by striking depends on size and thickness of the object.

The larger and thicker the object, the lower the pitch will be.

The place where you strike a drum is called the **membrane**.

The drum on the left has a thin plastic membrane. The drum on the right has thick rubber membrane. The drum with the rubber membrane will make a lower-pitched sound than the drum with thin plastic membrane.

If you strike a tiny cooking pot, it will make a higher-pitched sound than if you strike a large cooking pot.
The name for this musical instrument is bells. It is made of several hollow tubes of differing lengths. You strike the tubes with a special hammer called a mallet. The shorter tubes make a higher-pitched sound than the longer ones.

The **quality** of sound made by striking also depends on the object.

Some objects make smooth regular sounds. Others make uneven irregular sounds.

The tuning fork makes even sounds. It is more pleasant than the hammer, which makes uneven, jarring sounds.
Producing Sounds with Strings

In science when we talk about making sound using strings, we think about the word strings in a slightly different way.

Like the string used to tie things, strings used to make sound are also long and thin. Strings can be made of many different types of materials like plastic, metal, twine, rubber, and cat gut.

When strings are made to vibrate, they make sound. In order to make sound you can hear, the strings must be pulled quite tight.

You can make strings vibrate in many different ways.

- Forcing air over them.
- Rubbing them.
- Striking them.
- Plucking them.

A violin makes sound by rubbing the strings with a bow made of horse tail hairs.
You have a set of strings with you no matter where you go. They are in your voice box.

Inside your voice box are strings. When air passes over these strings, you make sound.

When air from your mouth or your lungs passes over your voice box, the strings vibrate and make sounds.

The **volume** of the sounds made by strings depends on how much the strings are made to vibrate.

If you pluck the strings of a guitar really hard, the size of the vibrations will be large. This produces louder sounds.

When you shout, you are making air passes over the strings of your voice box very quickly. This makes the vibrations big and that increases the volume.
The **pitch** of sounds made by strings depends mainly on three things:
- thickness of the string
- length of the string
- tightness of the string

The thinner the string, the higher the pitch. The shorter the string, the higher the pitch. The tighter the string, the higher the pitch.

A guitar can make many different sound pitches. This guitar player is using the fingers on his right hand to pluck the guitar strings. On a guitar, the thickest string is on the top. As you go down, the strings get thinner and thinner. The top string makes the lowest sounds and the bottom string makes the highest sounds.
The **quality** of sounds produced by strings can be good or poor.

The same set of strings can be used to make many different sounds.

Musical instruments that use strings can make one sound or they can make several sounds at the same time.

When some sounds are produced together, they sound pleasant. But when other sounds are produced together, they sound unpleasant.

---

Many musical instruments use strings to make sound.
Producing Sounds by Blowing

Have you ever watched someone whistling a tune? If you have, you will notice that the shape they make with their lips changes. Not only that, their cheeks puff in and out. They may even raise and lower their chins.

Whistlers can make different sounds by changing the shape and size of the inside of their mouths. They take air from their lungs and force it through a tiny opening made by their lips.

This girl whistles a tune by forcing air from her lungs into her mouth and out of her lips.

When air is blown into a container and it is forced out of an opening, it makes the container and the air inside vibrate. This vibration makes sound.

These girls are blowing into bottles that are partly full of a liquid. The vibrating air inside the bottles makes sounds.
The **volume** of the sound made by blowing into a container depends on how hard you blow.

The harder you blow, the louder the sound.

This trumpet player has to blow hard into the thin long tube.

The **pitch** made by blowing into a container depends on length of the container.

The shorter the length, the higher the pitch.

The alpine horn is very long. It can make only low-pitched sounds. The alpine horn was used in a country called Switzerland. It was used to communicate from one village to the next.

The piccolo is tiny. It makes high-pitched sounds.
Some musical instruments have such long tubes that they are coiled up to make them easier to carry. These instruments produce lower-pitched sounds.

You make sound with a tuba by blowing into the end of a long tube. It produces very low-pitched sounds. The tube is coiled up to make it easier to carry.

These bottles are all the same size. They have different amounts of water in them. If you blow into the first one, it will produce the lowest-pitched sound because it has the most air. If you blow into the last one, it will produce the highest-pitched sound because it has the least amount of air.

Some musical instruments are a tube with several holes in the side. By covering one or more of the holes, you change the size of the tube. This way you can make sounds of different pitches.
A recorder is made out of a wooden or plastic tube. You play it by blowing into one end. You use your fingers to plug the holes. Plugging the holes makes the size of the inside of the tube smaller. This makes the pitch higher.

The **quality** of the sound produced by blowing into a container depends on a few different things.

- How steadily you blow into the container.
- How well you can keep the size of the inside of the container the right size.

The more steady the stream of air that is blowing into the container, the more pleasant the sound will be.

Keeping the size of the inside of the container the size it should be might seem like it should easy, but it is very difficult. If you do not have your finger tightly covering a hole, the sound produced is not pleasant at all.
Losing Your Hearing

You learned earlier that your ear takes the sound waves travelling through the air and communicates information about these waves to your brain. The brain then lets you know something about the sounds these vibrations make – their volume, their pitch, and their quality.

Why do people lose their hearing?

There are several reasons why people lose some or all of their hearing:

- disease
- injury
- getting older
- being around loud sounds for too long

1. Hearing Loss Due to Disease

Diseases such as German measles and spinal meningitis can cause hearing loss, even in young children.

A child with German measles gets rashes all over his or her body. Getting German measles can also cause hearing loss.
2. Hearing Loss Due to Injury

Sometimes people are in car accidents where their heads are injured. This can result in a hearing loss.

Other times people accidentally get hit in the head. This can also cause hearing loss.

Do not stand too close to the batter in a baseball game. You may get hit with the bat and lose your hearing.

3. Hearing Loss Due to Ageing

Often, as you reach old age, you lose some of your hearing. Some parts of your middle and inner ear seem to wear out a little.

You may have noticed that some of the older people in your community have lost some of their hearing.
4. Hearing Loss Due to Being Around Loud Sounds

If you are around loud sounds for long periods of time, you will lose some of your ability to hear.

Sounds louder than 90 decibels are harmful.

People who work around loud sounds should wear ear protection. Many people who work around electric shop tools and farm machinery for years and years find that they lose some of their hearing.

This airline worker wears ear protection. Being around airplane engines day after day will cause hearing loss if ear protection is not worn.
Soundproofing

Sometimes we don't want sound to travel. When we do things to stop sound from travelling, it is called soundproofing.

Hospitals often use soundproofing, especially in large busy cities. They know that sick people need rest if they are to get better. They can't rest if there is too much noise from cars and trucks going by.

There is soundproofing in the cars and trucks we use. The engine in a truck is very noisy. Without soundproofing, we could not hear each other talk while sitting inside truck.

Airplane engines are very noisy. Airplanes have soundproofing to make riding inside the airplane more pleasant.

Our houses have soundproofing too. Without soundproofing, you would be able to hear most of what your neighbours do and say. You might notice that if you are downstairs, you can hear people walking upstairs. This is because there is usually no soundproofing in the floor.
What makes good soundproofing material?

Soundproofing materials do not let sound waves travel through them easily. They usually have a soft uneven surface with pockets or layers of air.

Some good soundproofing materials are

- insulation
- foam
- wood chips
- Styrofoam chips
- carpets
- heavy drapes
- thick towels
- cotton batting

Even before the seats and steering wheel are put into a car, soundproofing material is put in. People riding in the car will hear less engine and road noise.
Sometimes we want to make sounds louder.

**Hearing Aids**

You learned earlier that some people are born hearing impaired. You also learned that some people lose some or all of their hearing later in their lives.

Hearing aids are designed to make sounds louder. They can help people who still have some hearing.

A hearing aid uses a battery. The hearing aid is placed in the outer ear. A hearing aid gathers sound waves and makes them larger. This makes the ear drum and tiny bones vibrate more. When this happens, the volume of the sound gets bigger.

**Hearing aids are tiny and fit inside the outer ear.**
Stethoscope

A stethoscope is used by doctors and nurses. They use it to listen to your heart and to your breathing. When the end piece is placed on your chest, it picks up the sounds made by your heart and lungs and makes them louder.

Doctors and nurses use the stethoscope so they can listen to how well your heart and lungs are working.

Megaphone

Megaphones are used by speakers who want people far away to hear what they are saying. Megaphones make sound louder.

Megaphones are funnel-shaped. When a person shouts into it, the sound becomes louder.

Today, most megaphones run using batteries. You don’t have to shout into them.
Microphones

Microphones are used when people want to talk to large groups of people.

Canada’s prime minister Stephen Harper uses a speaks into a microphone when giving a speech.

- The person talks into the microphone.
- A cable carries the sound into a box called an amplifier.
- The amplifier makes the sound louder.
- From the amplifier the sound is carries by other cables to speakers.
- The louder sounds come out of the speakers.
Sign Language

Some people have little or no hearing. That does not mean they cannot communicate with others. They use their hands to make signs that stand for letters, words, and phrases. They use sign language.

The Numbers

1 2 3

4 5 6

7 8 9 0
Topic E

Animal Life Cycles

Fish

Reptile

Birds

Mammals

Amphibians
About the Lessons

In the unit *Animal Life Cycles* students use the Mini Textbook as a resource for research. The lesson plans outline different ways that students can report on their findings. Although they do not write reports, they summarize their findings in such ways as making booklets and wall displays.

There are no specific lessons for younger students. Teachers may want to consider have older students help younger students. In addition, they may want to consider modifying assignments to suit the development and abilities of those students.

Mini Textbook

All students should have a copy of the Mini Textbook.

Other Resources

It would be of great benefit to students if students could see coloured photographs of the animals they are studying. Encyclopedias and other reference sources are great resources in this regard.

Raising an Animal

One of the expectations for grade three classrooms is for the students to be able to observe at least one animal through one or more stages of development. In this regard, guidelines are provided in Lesson Two for raising tadpoles/frogs and mealworms/frogs. There are many other possibilities as far as classroom animals are concerned. Teachers are encouraged to select an animal that suits their own interests and that can be raised in their classroom environment.
## Science Grade Three
### Topic E: Animal Life Cycles

**Contents**

**Part I: Mammals, Reptiles, and Birds**

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson One</td>
<td>Introduction</td>
<td>5</td>
</tr>
<tr>
<td>Lesson Two</td>
<td>Observing and Describing the Growth and Development of a Living Animal</td>
<td>6</td>
</tr>
<tr>
<td>Lesson Three</td>
<td>Characteristics of Animals</td>
<td>7</td>
</tr>
<tr>
<td>Lesson Four</td>
<td>Characteristics of Mammals</td>
<td>8</td>
</tr>
<tr>
<td>Lesson Five</td>
<td>Mule Deer – Part I</td>
<td>9</td>
</tr>
<tr>
<td>Lesson Six</td>
<td>Mule Deer – Part II</td>
<td>10</td>
</tr>
<tr>
<td>Lesson Seven</td>
<td>Characteristics of Reptiles</td>
<td>11</td>
</tr>
<tr>
<td>Lesson Eight</td>
<td>Prairie Rattlesnake – Part I</td>
<td>12</td>
</tr>
<tr>
<td>Lesson Nine</td>
<td>Prairie Rattlesnake – Part II</td>
<td>13</td>
</tr>
<tr>
<td>Lesson Ten</td>
<td>Characteristics of Birds</td>
<td>14</td>
</tr>
<tr>
<td>Lesson Eleven</td>
<td>American Robin – Part I</td>
<td>15</td>
</tr>
<tr>
<td>Lesson Twelve</td>
<td>American Robin – Part II</td>
<td>16</td>
</tr>
<tr>
<td>Lesson Thirteen</td>
<td>Animal Life Cycles, Part I Test</td>
<td>17</td>
</tr>
</tbody>
</table>
Part II: Amphibians, Fish, and Insects

Lesson Fourteen  Characteristics of Amphibians  18
Lesson Fifteen   Northern Leopard Frog – Part I  19
Lesson Sixteen  Northern Leopard Frog – Part II  20
Lesson Seventeen Characteristics of Fish  21
Lesson Eighteen Lake Trout – Part I  22
Lesson Nineteen Lake Trout – Part II  23
Lesson Twenty Characteristics of Insects  24
Lesson Twenty-one Darkling Beetle  25
Lesson Twenty-two Animal Life Cycles Test  26

Life Cycle of a Trout
Lesson One

Concept: Introduction

Resources/Materials: Mini Textbook, pages 4 – 6
Worksheet #3E.1a (teacher copy)
Worksheets #3E.1b and #3E.1c (student copies)
Worksheet #3E.1d (older students)

Introduction: Write these words on the board and read them to the group:

child   cub   kitten   puppy   calf

Ask students what these words have in common. (all names for young animals)
Identify the adults that go with each; i.e., child-adult human; cub-adult bear; kitten-adult cat; puppy-adult dog; calf-adult cow.

Explain that the next unit is about animals and the stages they go through from the time they are born or are eggs until they are adults. These stages of development are called a life cycle.

Procedure:

1. Distribute the Mini Textbooks. Give students a few moments to flip through the pages.

2. Ask students about the stages they go through from the time they are born to the time when they become adults. (This may vary, depending on how specific you want to get. One way is: infant, childhood, pre-adolescence, adolescence, adulthood. Another way combines pre-adolescence and adolescence; i.e., infant, childhood, adolescence, adulthood.)


4. Discuss how the term “cycle” means “circle”. In life cycles, adults are ready to lay eggs or have babies and the whole process starts again.

5. Explain that scientists group humans, birds, fish, and insects with other animals. Together, they are the animal kingdom.

6. Explain that we have special names for the young of many animals. In today’s lesson, students will be matching the names of adult animals with the names of their young.

7. Distribute Worksheets #3E.1b and #3E.1c to all students. In addition, distribute Worksheet #3E.1d to older students. Go over the directions. (Worksheet #3E.1a is for teacher reference only.) Some of these names might be new to many students. If possible, do the sheets with the students. If not, you may want to have Worksheet #3E.1a available for students to refer to.

Assignments:
2. Do Worksheets #3E.1b and #3E.1c (all students) and Worksheet #3E.1d (older students).
<table>
<thead>
<tr>
<th>Animal</th>
<th>Young</th>
<th>Animal</th>
<th>Young</th>
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<tbody>
<tr>
<td>Antelope</td>
<td>Calf</td>
<td>Hippopotamus</td>
<td>Calf</td>
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<tr>
<td>Bear</td>
<td>Cub</td>
<td>Horse</td>
<td>Foal, yearling, or colt (male, filly (female))</td>
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<tr>
<td>Bird</td>
<td>Chick</td>
<td>Kangaroo</td>
<td>Joey</td>
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<tr>
<td>Butterfly</td>
<td>Caterpillar</td>
<td>Lion</td>
<td>Cub</td>
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<tr>
<td>Cat</td>
<td>Kitten</td>
<td>Partridge</td>
<td>Cheeper</td>
</tr>
<tr>
<td>Chicken</td>
<td>Chick</td>
<td>Pig</td>
<td>Piglet</td>
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<tr>
<td>Cow</td>
<td>Calf</td>
<td>Pigeon</td>
<td>Squab</td>
</tr>
<tr>
<td>Deer</td>
<td>Fawn</td>
<td>Quail</td>
<td>Cheeper</td>
</tr>
<tr>
<td>Dog</td>
<td>Puppy (pup)</td>
<td>Rabbit</td>
<td>Bunny, kit</td>
</tr>
<tr>
<td>Duck</td>
<td>Duckling</td>
<td>Rat</td>
<td>Pup</td>
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<tr>
<td>Eagle</td>
<td>Eaglet</td>
<td>Rhinoceros</td>
<td>Calf</td>
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<tr>
<td>Eel</td>
<td>Elver</td>
<td>Salmon</td>
<td>Fry, fingerling, parr, smolt</td>
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<tr>
<td>Elephant</td>
<td>Calf</td>
<td>Seal</td>
<td>Pup</td>
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<tr>
<td>Elephant seal</td>
<td>Weaner</td>
<td>Shark</td>
<td>Cub</td>
</tr>
<tr>
<td>Fish</td>
<td>Fry</td>
<td>Sheep</td>
<td>Lamb, lambkins</td>
</tr>
<tr>
<td>Fox</td>
<td>Cub, pup</td>
<td>Spider</td>
<td>Spiderling</td>
</tr>
<tr>
<td>Frog</td>
<td>Polliwog, tadpole</td>
<td>Swan</td>
<td>Cynet</td>
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<tr>
<td>Goat</td>
<td>Kid</td>
<td>Tiger</td>
<td>Cub, whelp</td>
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<tr>
<td>Goose</td>
<td>Gosling</td>
<td>Turkey</td>
<td>Poult</td>
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<tr>
<td>Grouse</td>
<td>Cheeper</td>
<td>Whale</td>
<td>Calf</td>
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<tr>
<td>Guinea fowl</td>
<td>Keet</td>
<td>Wolf</td>
<td>Pup</td>
</tr>
<tr>
<td>Hawk</td>
<td>Eyas</td>
<td>Zebra</td>
<td>Foal</td>
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</table>
**Animals and Their Young**

**Directions:** Write the names of the young under the pictures of the adults

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<tbody>
<tr>
<td>lamb</td>
<td>kitten</td>
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<tr>
<td>piglet</td>
<td>cub</td>
<td>gosling</td>
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<td>cat</td>
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<tbody>
<tr>
<td>sheep</td>
<td>pig</td>
<td>bear</td>
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Worksheet #3E.1b
<table>
<thead>
<tr>
<th>spiderling</th>
<th>caterpillar</th>
<th>joey</th>
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<tbody>
<tr>
<td>calf</td>
<td>kit</td>
<td>eyas</td>
</tr>
<tr>
<td>bunny</td>
<td>eaglet</td>
<td>fry</td>
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<tr>
<th>beaver</th>
<th>hawk</th>
<th>fish</th>
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<table>
<thead>
<tr>
<th>spider</th>
<th>butterfly</th>
<th>rabbit</th>
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<th>whale</th>
<th>eagle</th>
<th>kangaroo</th>
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NOTE: Learner Expectation 2 requires that students “Observe and describe the growth and development of at least one living animal, as the animal develops from early to more advanced stages.” Lesson Two offers suggestions for addressing this expectation with guidelines for raising mealworms and frog’s eggs/tadpoles. Student observations can be recorded on Worksheets #3E.2c and #3E.2f. They can be used for any animal.

Lesson Two

Concept: Observing and Describing the Growth and Development of a Living Animal

Resources/Materials: Worksheet #3E.2a (teacher copy)
OR Worksheet #3E.2b (teacher copy)
Worksheet #3E.2c (student copies)
Worksheet #3E.2d (one copy per student for each stage of development after the first one)

Introduction: Explain that just like humans, all animals go through life cycles. The stages in some animal life cycles take only a few days, while others, like humans, can take many years.

Tell students about the animal they will be raising. Stress that the animal must be treated with respect and that once the unit is over, the animal will be returned to nature.

Procedure:

1. Show student the animal they will be raising. Briefly go over the animal’s needs – food, air, water, shelter.

2. Then show students how the animal will be raised. Display the container and contents, explaining how this artificial environment provides for the animal’s needs.

3. Distribute Worksheets #3E.2c and #3E.2d. Stress to students that they will be recording various things about the animal as it develops. They must not lose these sheets.

4. Begin today’s lesson by having the students start Worksheet #3E.2c. As changes occur in the animal, have students complete Worksheet #3E.2d. If the animal goes through a third stage, have student record this on another copy of Worksheet #3E.2d.

Assignment:

1. Make initial observations on Worksheet #3E.2c.
2. As the animal goes through subsequent stages, have students record their observations on copies of Worksheet #3E.2d.
Obtaining Frog Eggs and Tadpoles

**Frog eggs** are laid in gelatinous clumps and are clear with black dots in the centre. They can often be found at the edge of ponds just under the water’s surface. Scoop them up with a clean ice cream pail.

**Tadpoles** will be found in shallow areas of ponds. There are usually several swimming around the same area. They can be scooped up with a plastic container and placed in an ice cream pail full of pond water.

You may want to limit the number of eggs or tadpoles you decide to raise or you may find yourself with an overpopulation problem. A good dozen should be about right.

**The Container**

You will need a good-sized container for your eggs or tadpoles, such as an aquarium. Fishbowl, plastic garbage bin, or child’s swimming pool. Tadpoles like shallow water. Rocks or smooth gravel can be placed in the bottom. As the tadpoles develop into juveniles, they will need a way to get out of the water – a partially submerged rock or piece of wood should do the trick.

**Water**

Eggs and tadpoles must have fresh clean water. If you take the water from a local stream, creek, or pond, be sure it is not polluted. If using tap water, let it stand exposed to full sunlight for 5 to 7 days. This will allow all the chlorine in the water to evaporate. (You can get de-chlorinating drops at a pet store. Even then, leave the water to sit overnight.) Always keep a little de-chlorinated water on hand.

**Feeding**

Tadpoles are mostly vegetarian. Frozen and then thawed lettuce or spinach is a good staple. Chop the frozen and thawed lettuce/spinach up. Then keep little clumps frozen in a Ziploc. Take out clumps as you need them. Feed small amounts a couple times a day. Excess feeding will create water quality problems. If you don’t feed them enough, they may go after each other. Change a quarter of the water every week or so with fresh water.

**Development**

The length of frog development from egg to tadpole to frog usually takes between 6 and 12 weeks. But it depends on the temperature and species.

When the tadpoles develop into juvenile frogs, they will need to start eating tiny insects. If you live near a pet store, you can buy bloodworms and add a few to the water.

Return the little frogs to nature.
It is probably best to start with mealworms as they relatively easy to obtain.

**Obtaining Mealworms**

Mealworms are readily available at pet stores. Many places that sell fishing licenses often carry mealworms as well.

**Container**

A clean plastic dishpan or even an ice cream pail will do. If you can find a container that is clear, that’s even better. An aquarium is the best!

Fill the container with about 15 cm of bran. Keep the top of the bran moist by slicing apples or potatoes and/or moistening crumpled up paper towels.

**Food and Water**

The bran not only acts as shelter, it will serve as food. Mealworms do need a little moisture so the sliced apples, potatoes and/or moistened paper towels will serve this purpose. Replace them as needed.

**Development**

There is really not much to do except wait. Within a few weeks the meal worms will pupate and then another week or so later, darkling beetles will develop.

**Handling**

The beetles and larvae can be picked up quite safely. If you put them into small dishes, the students can examine them with magnifiers.
Watching an Animal Develop

**Directions:** Complete the sheets as your animal develops.

Name of the adult: ____________________________________________

Tell about your animal when you **first** got it.

Draw what you see. Colour your picture.

Describe what you see.

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

Draw a picture of your animal in its container.
Tell how you take care of your animal.


Tell about how your animal changed?

Draw what you see. Colour your picture.


Describe what you see.


How have the needs of your animal changed?


Worksheet 3E.2d
Lesson Three

Concept: Characteristics of Animals

Resources/Materials: Mini Textbook, pages 4 – 8
Worksheets #3E.3a and #3E.3b (optional, student copies)

Introduction: Review the idea of life cycle and the stages in development of humans.

Then ask students “If someone asked you to describe humans, what would you say?” Discuss students’ responses.

Explain that things that describe things are called characteristics. When we look at life cycles, we want to describe the characteristics of animals at each stage of its life cycle.

Procedure:

1. Explain that today’s lesson focuses on describing humans.

2. Review the life cycle of humans. If necessary, have students refer back to Mini Textbook, page 5.

3. Then have them turn to Mini Textbook, page 7. Guide the reading of pages 7 and 8.

4. Distribute Worksheets #3E.3a and #3E.3b. Go over the directions. Some of this activity relies on students’ present knowledge of the stages of development of humans. Some of it relies on students reading the information in the Mini Textbook. This can also be done in notebooks. However, younger students will probably find this a little too challenging.)

5. Show students how to make point-form notes. (For many this will be one of their first experiences with making point-form notes, so adjust your expectations accordingly for your own peace of mind!)

Example:

Baby – small
- relies on others for needs

Assignments:

1. Read Mini Textbook, pages 7 and 8.
2. Do Worksheets #3E.3a and #3E.3b OR do the same activities in notebooks.
Characteristics of Humans

Directions: Use Mini Textbook, pages 4 – 8 to help you find the information you need. Make point-form notes.

1. Draw a diagram of the life cycle of a human.

2. Describe a human at each stage of development.
   a. baby
   b. child
3. Tell about these characteristics of humans.

a. overall shape

b. limbs

c. body covering

d. teeth

e. backbone
Lesson Four

Concept: Characteristics of Mammals

Resources/Materials: Mini Textbook, pages 9 – 12
Worksheets #3E.4a, #3E.4b, and #3E.4c (student copies)
pictures of various mammals from encyclopedias and other reference materials
(Coloured photos are always best.)

Introduction: Display the pictures of the mammals. Ask students to study them and then tell you how they are alike. (Encourage them to think in terms of the characteristics covered in the last class.) Write the ideas on the board.

Then explain that humans are also part of this group. Ask students if there are any things from the board that need changing.

Explain that the name for the group to which humans and the other animals belong is mammal.

Procedure:

1. Explain that today students are going to find out more about mammals. When you try to find out more information, you are doing research.

2. On the board write the words: body covering, teeth, backbone, and limbs. Explain that the Mini Textbook has this information about mammals. It also has examples of different kinds of mammals.


4. Lead students to the idea that in each animal category, most animals in that category have the same characteristics, but there are always exceptions.

5. Distribute Worksheets #3E.4a, #3E.4b, and #3E.4c. Go over the directions.

Assignments:

1. Read Mini Textbook, pages 9 – 12.
2. Do Worksheets #3E.4a, #3E.4b, and #3E.4c.
Directions: Use Mini Textbook, pages 10 – 12 to help you with the questions.

1. Look at the examples of mammals on page 10. Write the names of the animals that
   a. are raised on farms ________________________________
   b. can swim ________________________________
   c. you have never seen in real life ________________________________

2. Draw a picture of your favourite mammal.
3. Write three important facts about each of the following.

- Limbs
- Body Covering

4. Tell about an important fact about each of the following.

- Teeth
- Backbone
5. In the box below, write the names of as many other mammals as you can think of. When you have finished, ask your teacher to check your work.
Lesson Five

Concept: Mule Deer – Part 1

Resources/Materials: Mini Textbook, pages 13 and 14
Worksheet #3E.5a (teacher copy)
Worksheets #3E.5b, #3E.5c, and #3E.5d
Colour picture of a mule deer, if possible

Introduction: Review some of the characteristics of mammals. Explain that students will be learning about five more types of animals in this unit.

Explain that for the new few days students will be learning about a mammal that lives in most parts of Alberta. It is called the mule deer. Show students the picture of the mule deer, if you have one.

Show students the picture of the mule on Worksheet #3E.5a. Have students make observations about the mule. If they do not do it first, point out how large a mule’s ears are.

Explain that the mule deer gets its name from the fact that it has large ears, like a mule.

Procedure:

1. Have students speculate about why large ears might be important to a deer.

2. Explain that it is time to find out more about the mule deer. Have students turn to Mini Textbook, page 13. Guide the reading of pages 13 and 14.

3. Distribute Worksheets #3E.5b, #3E.5c, and #3E.5d. Go over the directions. Remind students that they need not answer the questions in sentences. Point form is fine.

4. If necessary, do the first couple of questions with the students.

Assignments:

1. Read Mini Textbook, pages 13 and 14.
2. Do Worksheets #3E.5b, #3E.5c, and #3E.5d.
Mule
Directions: Use Mini Textbook, pages 13 and 14 to help you find the information.

1. Appearance

Body Shape ______________________________________

______________________________________________

Size __________________________________________

______________________________________________

Colour _________________________________________

______________________________________________

Ears ___________________________________________

______________________________________________

Doe ____________________________________________

______________________________________________

Buck ____________________________________________

______________________________________________

Fawn ___________________________________________

______________________________________________
2. Habitat
3. Food

Draw pictures of four foods that mule deer like to eat. Write the name of the foods under the pictures.

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4. Life Cycle

Draw a diagram of the life cycle of a mule deer.

How long does it take a fawn to become an adult?
Lesson Six

Concept: Mule Deer – Part II

Resources/Materials: Mini Textbook, pages 15 and 16
Worksheets #3E.6a and #3E.6b (student copies)

Introduction: Briefly review what students have learned so far about the mule deer. Be sure to emphasize the characteristics that make it a mammal.

Explain that today we will do some more research on the mule deer.

Procedure:

1. Discuss that humans take eighteen or twenty or more years before they are ready to be independent. Up until that time parents help to look after their children’s needs. The older the children get, the more they are able to do on their own. The same goes for mule deer. The difference is that a fawn typically takes a year or two to be on its own.


3. Discuss the fact that all living things survive because there are things about them that better enable them to live in certain surroundings. They are called adaptations. Explain that mule deer are the prey of cougars, eagles, and coyotes. Ask students how they feel their large ears might help them escape from these predators.

4. Guide the reading of Mini Textbook, pages 15 (bottom) and 16.

5. Distribute Worksheets #3E.6a and #3E.6b. Go over the directions.

Assignments:

1. Read Mini Textbook, pages 15 and 16.
2. Do Worksheets #3E.6a and #3E.6b.
6. **Looking After Its Young**

   Number of fawns born ________________________________

   Who looks after them ________________________________

   How fawns are looked after

   __________________________________________________

   __________________________________________________

   How long the fawns are with their parent

   __________________________________________________

   __________________________________________________

7. **How It Survives**

   Enemies ____________________________________________

   __________________________________________________

   Ears ______________________________________________

   __________________________________________________

   Legs ______________________________________________

   __________________________________________________

   Camouflage ________________________________________

   __________________________________________________

   How humans threaten the mule deer

   __________________________________________________

   __________________________________________________

   __________________________________________________
8. In the box below, draw and colour a picture of a mule deer fawn when it is camouflaged by its surroundings.

Write a sentence that tells about the mule deer fawn.

________________________________________________________________________________________________________________________________________________________
Lesson Seven

Concept: Characteristics of Reptiles

Resources/Materials: Mini Textbook, pages 17 – 19
Worksheets #3E.7a and #3E.7b (student copies)
Colour pictures of a variety of reptiles (from encyclopedias, etc.)

Introduction: Explain that we are now ready to go onto the next group of animals. It is the reptile.
Show students any pictures of reptiles you brought to class. Have students make observations and speculate how reptiles are alike.

Procedure:


2. Explain that most reptiles lay leathery eggs. They bury them in sand and then crawl away. There are a few that do not lay eggs. Instead, the young are born alive.

3. Distribute Worksheets #3E.7a and #3E.7b. Explain that students are to write information about different characteristics of reptiles in the boxes.

Assignments:

1. Read Mini Textbook, pages 17 – 19.
2. Do Worksheets #3E.7a and #3E.7b.
Directions: Use Mini Textbook, pages 17 – 19 to find information about reptiles.
Draw a picture of your favourite reptile. Tell why it is your favourite.
Lesson Eight

Concept: Prairie Rattlesnake – Part I

Resources/Materials:  Mini Textbook, pages 20 – 22
Worksheets #3E.8a, #3E.8b, #3E.8c, and #3E.8d (cut in half and stapled into a booklet)

   coloured photo of a prairie rattlesnake

Introduction: Briefly review the main characteristics of reptiles.

Ask students what comes to their minds when they think of snakes.

Explain that there are hundreds of different kinds of snakes. Some are as long as a pencil. Others are as long as our classroom.

Explain that most people do not know too much about snakes. Many people have ideas about snakes that are not true. It is important to remember that snakes are just trying to survive, like all creatures.

Finally, explain that the prairie rattlesnake lives in our province, but it only lives in the southern parts.

Procedure:

1. Explain that during the next few classes, we will read about the prairie rattlesnake. We will make a booklet about it.

2. Have students turn to Mini Textbook, page 20. Guide the read of pages 20 – 22 (appearance, habitat, and food)

3. Distribute the booklets made from Worksheets #3E.8a, #3E.8b, #3E.8c, and #3E.8d. Explain that we will just start on the booklet today.

4. Have students work on the areas pertaining to Appearance, Habitat, and Food.

Assignments:

1. Read Mini Textbook, pages 20 – 22.
2. Do booklet pages pertaining to Appearance, Habitat, and Food.
PRAIRIE RATTLESNAKE

Appearance

Body Shape

Size

Head

Colour

Tail
Habitat

Prairie rattlesnakes live close to river valleys or coulees.

You often see prairie rattlesnakes in farm fields and pastures.

Prairie rattlesnakes like to sun themselves on gravel pits or large rocks.

Food

What They Eat

Adults

Babies

How They Catch Their Prey
Life Cycle

Usual number of babies

________________________________________

________________________________________

Size of babies

________________________________________

________________________________________

Length of babyhood

________________________________________

________________________________________

Looking After Its Young

________________________________________

________________________________________

________________________________________

Mother and Babies
How It Survives

Camouflage

Body Shape

Venom

Rattles

What Threatens Rattlesnakes?

Two things that threaten rattlesnakes

Two Rattlesnake Safety Rules
Lesson Nine

Concept: Prairie Rattlesnake – Part II

Resources/Materials: Mini Textbook, pages 22 – 25
Prairie Rattlesnake booklet (started last day)

Introduction: Explain that unlike most reptiles and most other snakes, prairie rattlesnakes are born alive. The female looks after the babies for a few days and then they are on their own.

Explain that today, students will continue finding out more about the prairie rattlesnake.

Procedure:


2. Discuss that it has sometimes been difficult for humans and rattlesnakes to share the land. It is important to point out that rattlesnakes were part of the land long before humans came on the scene. It is also good to emphasize that rattlesnakes serve to keep the rodent population under control. Finally, explain that if a rattlesnake knows a person is near, it will retreat. The trick is to make plenty of noise and to carry a long stick with you to rustle the bushes, grasses, and garden plants to flush them out.

3. Have students continue with their booklets.
   - Life Cycle (p. 5) Draw a diagram of the life cycle.
   - Looking After Its Young (p. 6) Draw a picture of a mother and her babies.

Assignments:

2. Finish the booklet.
Lesson Ten

**Concept:** Characteristics of Birds

**Resources/Materials:** Mini Textbook, pages 26 – 28
Worksheets #3E.10a and #3E.10b (student copies)
coloured pictures of various birds

**Introduction:** Explain that the next group of animals students will study is birds.

Show students the pictures of birds you brought to class. Ask students how birds are alike. Write their responses on the board.

**Procedure:**

2. Distribute Worksheets #3E.10a #3E.10b. Go over the directions.

**Assignments:**

2. Do Worksheets #3E.10a and #3E.10b.
Directions: Use Mini Textbook, pages 26 – 28 to help you with the questions.

1. Write the name of a bird that
   a. cannot fly ______________________________
   b. hunts ________________________________
   c. wades in shallow water ________________________________
   d. eats gravel ______________________________
   e. lives near you ______________________________

2. Draw a picture of your favourite bird. Then tell why it is your favourite.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
3. Fill in the spaces with words from the box.

<table>
<thead>
<tr>
<th>backbone</th>
<th>feathers</th>
<th>feet</th>
<th>four</th>
</tr>
</thead>
<tbody>
<tr>
<td>gizzards</td>
<td>teeth</td>
<td>types</td>
<td>wings</td>
</tr>
</tbody>
</table>

Limbs

All birds have ____________ limbs.

Two of the limbs are ____________.

Two of the limbs are ____________.

Body Covering

All birds are covered with ____________.

Every bird has different ____________ of feathers.

Teeth

Birds do not have ____________.

Birds have ____________ to grind up their food.

Backbone

All birds have a ____________.
Lesson Eleven

Concept: American Robin – Part I

Resources/Materials: Mini Textbook, pages 29 – 31
Worksheets #3E.11a and #3E.11b (student copies)
Worksheets #3E.11c and #3E.11d (student copies)
coloured picture of a robin

Introduction: Explain that one of the birds that is found all over Alberta is the robin. It is sometimes called the robin redbreast because it has an orangey-red breast. It is often considered to be a sign of spring. It is too cold in Alberta for robins to survive in the winter, so it flies to warmer places. But in the spring, it flies back. There are many different types of robins in the world. The most common one found in our area is the American robin. It is also called the North American robin.

Show students the picture of the robin and discuss what characteristics it has that make it a bird.

Procedure:

1. Explain that it will take two or three days to complete the research on robins.


3. Distribute Worksheets #3E.11a, #3E.11b, #3E.11c, and #3E.11d. Show students how to put them together. (See below.)

Directions for Assembling the Worksheets.

Note: Your students may have difficulty cutting out three sides of the boxes on the front page of each pair. If you like, cut them before hand, using an X-acto knife and ruler.

- The worksheets go in pairs (Worksheet #3E.11a goes with Worksheet #3E.11b, for example).
- The first sheet has a series of doors. Each door has a question on it. To make the doors open, cut on the solid lines and fold on the dotted lines.
- The second sheet has some rectangles on it. This is where students write the answers to the questions on the doors.
- Students are to paste the first sheet in the pair on top of the second sheet in the pair, BEING SURE TO ONLY PUT GLUE AROUND THE EDGES. If you put glue everywhere, you will glue the doors shut.
- If the sheets in each pair are assembled and completed correctly, the student should be able to read the question on each door, and then open the door to find the answer to the question.

Assignments:

2. Do and assemble Worksheets #3E.11a - #3E.11d.
Appearance

What colours are robins?
What is the robin’s body like?
How big is a robin?
Science Grade Three Topic E: Animal Life Cycles, Part I
Worksheets

Directions: Write the answer to the questions in the boxes below.
Habitat

Where do robins live?

In what kinds of places do robins not like to live?

Food

What kinds of plants do robins like to eat?

What kinds of animals do robins like to eat?
Lesson Twelve

Concept: American Robin – Part II

Resources/Materials: Mini Textbook, pages 31 – 34
Worksheets #3E.11e and #3E.11f (student copies)
Worksheets #3E.11g and #3E.11h (student copies)

Introduction: Write the words Life Cycle and Adaptations on the board.

Tell students that today we will continue gathering information about robins.

Review the terms on the board:
Life cycle – stages a living thing goes through as it grows and develops
Adaptations – things about a living thing that help it to survive

Explain that today’s lesson focuses on the robin’s life cycle and adaptations.

Procedure:


2. Distribute Worksheets #3E.11e to #3E.11h. Help students assemble the pairs of sheets, and then have them write the answers to the questions on Worksheets #3E.11f and #3E.11h.

Assignments:

1. Read Mini Textbook, pages 31 – 34.
2. Do Worksheets #3E.11e to #3E.11h.
Life Cycle

**Egg**

- How many eggs are there?
- What colour are the eggs?
- How long does it take for them to hatch?

**Hatchling**

- For how long do hatchlings stay in the nest?

**Adult**

- How do the adults look after the eggs?
- How do the adults look after the hatchlings?
- How do the adults look after the fledglings?

**Fledgling**

- What is a fledgling?
- How long is a robin in the fledgling stage?
How It Survives

**What are the robins enemies?**

**How does the robin escape from its enemies?**

**Where do robins build their nests?**

**How do humans threaten robins’ survival?**
Lesson Thirteen

Concept: Animal Life Cycles, Part I

Resources/Materials: Animal Life Cycles, Part I (student copies)

Introduction: Explain that the first part of the unit is now complete. It is time for a test.

Procedure:

1. Distribute the tests.

2. If some of the students are not able to read the questions independently, consider going through the test question by question with the students.
Animal Life Cycles, Part I

Test

1. Match the animals with their young.

a. cow ______ foal

b. pig ______ duckling

c. horse ______ calf

d. sheep ______ kid

e. goat ______ piglet

f. duck ______ gosling

g. bear ______ lamb

h. goose ______ cub
Science Grade Three Topic E: Animal Life Cycles, Part 1
Test

2. Use the words in the box to make a diagram of the life cycle of a human.

\[ \begin{array}{c|c|c|c}
\text{adult} & \text{child} & \text{baby} & \text{teenager} \\
\end{array} \]

3. Match the groups of animals with their names.

a. mammal

\[ \begin{array}{ccc}
\text{snake} & \text{alligator} & \text{turtle} \\
\end{array} \]

b. reptile

\[ \begin{array}{ccc}
\text{eagle} & \text{sparrow} & \text{penguin} \\
\end{array} \]

c. bird

\[ \begin{array}{ccc}
\text{lion} & \text{mouse} & \text{cow} \\
\end{array} \]
4. Read the information in the box.

<table>
<thead>
<tr>
<th>Limbs</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>some have four short legs</td>
<td>some have no legs</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Teeth</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>most have them, but some do not</td>
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</table>

<table>
<thead>
<tr>
<th>Body Covering</th>
<th></th>
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<tr>
<td>scales or scutes</td>
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</table>

<table>
<thead>
<tr>
<th>Backbone</th>
<th></th>
</tr>
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<tbody>
<tr>
<td>all have backbones</td>
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</table>

a. Which of the animal groups best goes with the information in the box? Circle it.

- mammal
- reptile
- bird

b. Circle the word that tells how this animals in this group move from place to place.

- flying
- running
- crawling
5. Read this information about the mule deer.

- They have large ears.
- They are brown.
- They can leap over bushes.
- Fawns are spotted.

a. Which sentence best tells about the information in the box? Circle it.

- The information tells how the mule deer protects itself from enemies.
- The information tells how the mule deer gets food.
- The information tells how the mule deer travels.

b. The mule deer’s brown colour and the spots on its fawn are examples of

- camouflage.
- limbs.
- smartness.

c. Which of the following tells about the stages in a mule deer’s life cycle?

- fawn, adult
- egg, fawn, adult
- baby, teenager, adult
6. Circle **all** the characteristics that tell about mammals.

- four limbs
- covered with hair or fur
- crawl
- have backbones
- have teeth
- live only in cold places

7. Dinosaurs were part of which group?

- mammals
- reptiles
- birds

8. In which of the following habitats would you **not** find a prairie rattlesnake.

- grasslands
- farm fields and pastures
- oceans

9. Which sentence best tells why rattlesnakes have venom?

- The venom makes it so the animal it catches cannot move.
- The venom helps the animal slide down the snake’s throat more easily.
- The smell of the venom attracts animals.
10. Which of the following is a threat to the prairie rattlesnake?

- mice and gophers
- growing cities and more roads
- warm temperatures

11. One of the following sentences is not true about birds. Circle it.

- have feathers
- have teeth
- have backbones

12. Use the following words to make a diagram of the life cycle of a robin.

```
egg   fledgling   adult   hatchling
```
13. Read the information. Then answer the question.

**Robin’s Food**
- raspberries
- strawberries
- mountain ash berries
- earthworms
- caterpillars
- grasshoppers

From the above information you can tell that

- robins eat only plants.
- robins eat only animals.
- robins eat both plants and animals.

14. Which of the following is true about the robin?

- Once the eggs are laid, it does not look after its young.
- The parents look after the babies until they can look after themselves.
- Only the female helps look after the young.
Lesson Fourteen

Concept: Characteristics of Amphibians

Resources/Materials: Mini Textbook, pages 36 – 38
Worksheet #3E.14a (teacher copy or transparency)
Worksheets #3E.14b and #3E.14c (student copies)

Introduction: Show students a copy or transparency of Worksheet #3E.14a. Ask them to describe it and then guess what kind of animal it is.

Explain that the name of the animal is a caecilian. It is found in hot moist climates near the equator. They vary in length from about 30 cm to 150 cm. The caecilian is related to the frog, even though they do not look much alike.

Today’s lesson is about the family to which the frog and the caecilian belong. It is the amphibian family. Write “amphibian” on the board.

Procedure:

1. Explain that the word “amphibian” means “both lives”. The group gets its name because all the animals in that group start out their lives living in water, but then change so they live on land. Most amphibians start out as eggs that are laid in water. When the eggs hatch, the hatchlings can breathe in water using something called gills. As the hatchlings grow, they develop lungs. Then they can live on land. Almost all amphibians spend their entire lives near water or places where it is moist.

2. Have students turn to Mini Textbook, page 36. Guide the reading of the page. Note that all the animals shown at the bottom of the page are amphibians. Within the amphibian family, there are groups: frogs and toads are in one group; salamanders, newts, and mud puppies are in one group; and caecilians are in a group of their own.


4. Distribute Worksheets #3E.14b and #3E.14c. Go over the directions.

Assignments:

2. Do Worksheets #3E.14b and #3E.14c.
Caecilian
Amphibians

Directions: Use Mini Textbook, pages 36 – 38 to help you with the questions.

1. Why do scientists say that amphibians have two types of lives?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2. Look at the pictures of the amphibians on page 36. They can be sorted into three groups. Write the names of the animals shown in these groups.

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<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
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3. Limbs

   a. Number of Legs ____________________________________________

   b. How Legs Are Used _________________________________________

   c. Caecilians ________________________________________________
4. **Body Covering**
   a. What is it like ____________________________
   b. How it is used ____________________________
   c. Toads ____________________________

5. **Teeth – All amphibians have teeth.**
   a. Salamanders and mud puppies ____________________________
   b. Toads ____________________________
   c. Frogs ____________________________

6. **Backbone**
   ____________________________

7. **Draw a picture of your favourite amphibian. Tell what it is.**

Worksheet #3E.14c
Lesson Fifteen

Concept: Northern Leopard Frog – Part I

Resources/Materials: Mini Textbook, pages 39 - 41  
Worksheet #3E.15a (teacher copy or transparency)  
Worksheets #3E.15b, #3E.15c, and #3E.15d (student copies)  
construction paper (cut in half)  
Coloured picture of leopard frog

Introduction: Briefly review the characteristics of amphibians. Then explain that we will be looking more closely at an amphibian that once lived all over Alberta. We only see this animal in the spring, summer, and fall. In the winter, it digs down deep in the mud at the bottom of ponds and streams. It digs down so deep that the ground is not frozen. That is how it survives.

The animal is the frog. There are thousands of different kinds of frogs in the world. We will be studying about the northern leopard frog. Like many animals, it is really named after another animal, the leopard.

Show students a copy or transparency of the leopard. Then show the picture of the leopard frog. Discuss how the leopard frog gets its name.

Procedure:

1. Explain that students will learn about the appearance, habitat and food of the northern leopard frog first. Then later they will learn about its life cycle and how it survives.


Note: Students will make a booklet. They are to complete the worksheets; then cut them out on the lines and mount them on half-sheets of construction paper. Once all the sheets are completed, cut, and mounted; they should staple them together.

3. Distribute Worksheets #3E.15b, #3E.15c, and #3E.15d. On some pages, students illustrate the captions provided. On others they write in information.

Assignments:

2. Do Worksheets #3E.15a, #3E.15b, and #3E.15c. (Complete, cut out, and mount on construction paper halves.)
Leopard
Northern Leopard Frog

Appearance

How it gets its name: ________________

__________________________________________________________________________

Size: ________________

__________________________________________________________________________

Colour: ________________

__________________________________________________________________________

Legs and Feet: ________________

__________________________________________________________________________

By: ____________________________

Worksheet #3E.15b
Northern leopard frogs have strong back legs, so it can leap.

Northern leopard frogs like to live along the edges of ponds like this one.
Food

Northern leopard frogs will eat just about anything.

It eats only other animals.

Some of the animals it eats are

_____________________________________

_____________________________________

_____________________________________

It feeds mostly at night.

Frogs use their sticky tongues to catch insects.
Lesson Sixteen

Concept: Northern Leopard Frog – Part II

Resources/Materials: Mini Textbook, pages 41 – 45  
                     Worksheets #3E.16e, #3E.16f, and #3E.16g (student copies)  
                     construction paper

Introduction: Briefly review what students learned about the appearance, habitat, and food of the northern leopard frog.

Explain that it is now time to learn more about the life cycle and adaptations of the northern leopard frog.

Procedure:

1. Review that the northern leopard frog has two lives. One where it lives only in water; the other where it can live on land. Emphasize that this frog breathes in water using gills during the first part of its life. Then it develops lungs later on. Then it breathes air.


3. Distribute Worksheets #3E.16e, #3E.16f, and #3E.16g. Go over the pages so students will know where to make illustrations and where to add written text.

4. When the sheets are completed, have students cut them out and mount them on construction paper halves. Then staple the booklets together.

Assignments:

1. Read Mini Textbook, pages 41 – 45.
2. Do Worksheets #3E.16e, #3E.16f, and #3E.16g.
Life Cycle

Diagram of the life cycle of the northern leopard frog.

Stages in a Frog’s Life Cycle

Egg: __________________________________

_____________________________________

Tadpole: ______________________________

_____________________________________

Froglet: ______________________________

_____________________________________

Adult: ________________________________

_____________________________________

Worksheet #3E.16e
Looking After Its Young

Once the female has laid her eggs, she goes away. She has nothing more to do with the eggs or the tadpoles.

How It Survives

The northern leopard frog has many enemies.

Tadpole Enemies: ________________

Adult Enemies: ________________
Adaptations

The northern leopard frog has many adaptations that help it to survive.

strong back legs: _____________________________
________________________________________________________________________
webbed feet: _____________________________
________________________________________________________________________
sticky tongue: _____________________________
________________________________________________________________________
camouflage: _____________________________
________________________________________________________________________

How Humans Threaten the Northern Leopard Frog

At once time there were northern leopard frogs over most of Alberta. Today they are only found in the southern part of the province.

Humans do things that threaten the northern leopard frog. Some of them are:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
**Lesson Seventeen**

**Concept:** Characteristics of Fish

**Resources/Materials:** Mini Textbook, pages 46 – 48  
Worksheets #3E.17a and #3E.17b (student copies)

**Introduction:** Explain that the next category of animal is the fish. Many people who live in some parts of Alberta do not know much about fish. In northern Alberta there are many more lakes and rivers than in southern Alberta. People who live where there are more bodies of water naturally learned more about the animals that live in the water, including fish.

Like other animals, fish come in different shapes and sizes, different colours, and live in different types of water. Some fish can only live in oceans, where the water is salty. Other fish cannot live in ocean water because of the salt. Still others spend some of their lives in ocean water and the other part in fresh water.

**Procedure:**

1. Discuss with students what they already know about fish.


3. Distribute Worksheets #3E.17a and #3E.17b. Go over the directions.

**Assignments:**


2. Do Worksheets #3E.17a and #3E.17b.
Directions: Use Mini Textbook, pages 46 – 48 to help you get the information.

1. What do fish use to get air from the water?

2. Of the fish pictured on Mini Textbook, page 46, which is your favourite? Tell why.

3. If you have any books, like encyclopedias in your school, find some pictures of fish. Draw and colour a picture of one of the fish you found. Write the name of the fish.
Lesson Eighteen

Concept: Lake Trout – Part I

Resources/Materials: Mini Textbook, pages 49 – 51
Worksheet #3E.18a (photocopy or transparency)
Worksheets #3E.18b, #3E.18c, #3E.18d, and #3E.18e (student copies –
photocopy back-to-back, then fold and staple on the fold to make a booklet.)

*If you can find a colour photo of a lake trout, use it instead of
Worksheet #3E.18a.

Introduction: Review the characteristics of fish. Then explain that we will learn about a fish that is
found in all areas of Alberta. It is the lake trout. Lake trout like deep lakes. There are more deep lakes in
central and northern Alberta than in southern Alberta.

Show students the photo of the lake trout (coloured photo or Worksheet #3E.18a. Have students make
observations. Write them on the board.

Procedure:

1. Explain that students will be reading about the lake trout and then making a booklet about it.

2. Explain that today’s lesson involves finding out what the lake trout looks like, where it lives, and
what it eats.


4. Distribute the booklets. Allow students a moment to flip through it.

5. Tell them that today they use the Mini Textbook pages to do pages 1 – 4.

Assignments:

1. Read Mini Textbook, pages 49 – 51.
2. Do pages 1-4 of the booklet made from the worksheets.
Science Grade Three Topic E: Animal Life Cycles, Part II
Worksheets

Lake Trout
Threats to the Lake Trout

Natural Threats: ________________

______________________________

Threats caused by humans:

______________________________

______________________________

What can be done: _____________

______________________________

______________________________

______________________________

By: __________________________

Worksheet #3E-18b
Appearance

Overall body shape: 


Size: 


Colour: 


Eyes: 


Tail: 


How It Survives

The lake trout has several adaptations that help it survive.

Fins: 


Eyes: 


Slimy Coating: 


Worksheet #3E.18c
Stages of Development

Egg

Fry

Juvenile

Adult

Habitat

Worksheet #3E.18d
Food

Lake trout eat many different types of food. They eat only other animals.

Young lake trout: ________________
______________________________
______________________________
______________________________

Adult lake trout: ________________
______________________________
______________________________
______________________________

Life Cycle

Diagram of the life cycle of the lake trout
Lesson Nineteen

Concept: Lake Trout – Part II

Resources/Materials: Mini Textbook, pages 51 – 54
                 Worksheet #3E.19 (teacher copy or transparency)
                 Booklet made from Worksheets #3E.18b - #3E.18c (from last class)

Introduction: Briefly review what students already know about the lake trout. Explain that today students will do more research and then finish the booklet they started.

Show the picture on Worksheet #3E.19. Explain that lake trout do not have many natural enemies, but one of them is the sea lamprey. It is a type of fish. It attaches itself to the lake trout and sucks on it. The lake trout ends up dying. The biggest threat to the lake trout is humans.

Procedure:


2. Then have the students continue working on the booklets they started last class.

Assignments:

2. Finish the booklet.
Sea lampreys attach themselves to lake trout.
Lesson Twenty

Concept: Characteristics of Insects

Resources/Materials: Mini Textbook, pages 55 – 58
Worksheets #3E.20a and #3E.20b (student copies)
colour pictures of insects from encyclopedias, etc.

Introduction: Explain that the next group of animals to study is one of the largest groups. Most are very tiny, but they are important. They are insects.

Show students any pictures of insects you may have.

Explain that insects are alike in many ways and students will learn about these ways today.

Procedure:

1. Have students turn to Mini Textbook, page 55. Guide the reading of pages 55 and 56. On page 55 have students identify the three body parts on the insect pictures. Note also that each of the insects has a pair of antennae attached to the head. They are sometimes called feelers. The problem is they are not really used to feel. They are used to smell!

2. Guide pages 57 and 58.

3. Distribute Worksheets #3E.20a and #3E.20b. Go over the directions.

Assignments:

1. Read Mini Textbook, pages 55 – 58.
2. Do Worksheets #3E.20a and #3E.20b.
Directions: Use Mini Textbook, pages 55 – 58 to help you with the questions.

1. Label the three main body parts of an insect.

2. Fill in the boxes.

Parts of the Head

Parts Attached to the Thorax

Abdomen

Worksheet #3E.20a
2. Draw a picture of your favourite insect. Tell why it is your favourite.

Insect:


3. Tell about the following characteristics of insects.
   a. Limbs. ________________________________

   ________________________________

   ________________________________

   ________________________________

   b. Body Covering. ________________________________

   ________________________________

   ________________________________

   ________________________________

   c. Teeth. ________________________________

   ________________________________

   ________________________________

   ________________________________

   d. Backbone. ________________________________

   ________________________________

   ________________________________

   ________________________________
Lesson Twenty-one

Concept: Darkling Beetle

Resources/Materials: Mini Textbook, pages 59 and 63

Introduction: Briefly review the characteristics of insects.

Explain that the insect students will learn more about is the darkling beetle. Darkling beetles are found in all parts of Alberta. The darkling beetle is best known for one of its stages of development – the mealworm. Mealworms are used for fish bait and for food for pets.

Procedure:


2. Explain that students will be able to choose how they want to record information about the darkling beetle. They must include all the important information. You might want to give them some options, such as:

   - Make a wall display. Each student could do their own OR it could be a class project where each person is assigned a part.
   - Make a class presentation. Each student is assigned a part. Then he or she tells about that part, talking about the topic and showing pictures he or she has drawn.
   - Make a booklet. Students can make their own booklets. If you like, they can model them after some of the booklets they have already made.
   - Questions and Answers. Each student is assigned a particular part. He or she is responsible for making up two or three questions about the part. Then all the questions are gathered up. The teacher copies them out with lines or spaces after each question. The pages of questions are copied and distributed. All students find and write the answers to them.
   - Any other ideas.


Assignments:

2. Do a follow-up activity, as decided by the teacher or the class.
Lesson Twenty-two

Concept: Animal Life Cycles, Part II Test

Resources/Materials: Animal Life Cycles, Part II Test (student copies)

Introduction: Explain that the unit on Animal Life Cycles is now at an end. It is time for a test.

Procedure:

1. Distribute the tests.

2. Go through the test question by question if you have students who will not be able to read it independently.
**Animal Life Cycle, Part II**

**Test**

1. Circle the best answer.

<table>
<thead>
<tr>
<th>a</th>
<th><strong>Which of the following is true about amphibians?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- They start their lives in water and end it on land.</td>
</tr>
<tr>
<td></td>
<td>- They all have legs.</td>
</tr>
<tr>
<td></td>
<td>- They do not have eyes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>b</th>
<th><strong>Which of the following is not an amphibian?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- lizard</td>
</tr>
<tr>
<td></td>
<td>- caecilian</td>
</tr>
<tr>
<td></td>
<td>- salamander</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c</th>
<th><strong>How do amphibians breathe when they are on land?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- with lungs</td>
</tr>
<tr>
<td></td>
<td>- with gills</td>
</tr>
<tr>
<td></td>
<td>- through large holes in the sides of their heads</td>
</tr>
</tbody>
</table>
d  Which of the following are characteristics of most amphibians?

- They have smooth moist skin and no legs.
- They have backbones and four legs
- They have no teeth or backbones.

e  The northern leopard frog starts its life as

- an egg.
- a froglet.
- an adult.

f  The adult northern leopard frog eats insects, mice, small fish, and worms. This tells you that

- it eats mostly plants.
- it eats mostly animals.
- it eats plants and animals.

g  Which of the following tell about all the stages of growth of a frog?

- egg – tadpole – froglet – adult
- polliwog – adult
- egg – tadpole – juvenile
2. Circle **yes** or **no**.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Fish are covered with scales.</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>b</td>
<td>Fish have limbs.</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>c</td>
<td>Most fish have teeth.</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>d</td>
<td>Fish have backbones.</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>e</td>
<td>The lake trout is one of the smallest in the fish family.</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>f</td>
<td>The most likely reason that lake trout like to live in deep lakes is because they like cooler waters.</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>g</td>
<td>Lake trout eat mostly plants.</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>h</td>
<td>A young fish is called a fry.</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>i</td>
<td>Lake trout have no enemies in nature.</td>
<td>yes</td>
<td>no</td>
</tr>
</tbody>
</table>
3. Circle the best answer to each question.

| a  | Insects have                                                                 | • three main body parts.  
|    |                                                                             | • two main body parts.  
|    |                                                                             | • four main body parts.  
| b  | Insects have                                                                 | • four legs.  
|    |                                                                             | • six legs.  
|    |                                                                             | • eight legs.  
| c  | Which of the following is not a good example of an insect?                   | • spider  
|    |                                                                             | • butterfly  
|    |                                                                             | • mosquito  
| d  | For what do insects use their antennae?                                     | • to smell  
|    |                                                                             | • to feel  
|    |                                                                             | • to taste  

j  When farmers spray their crops too much, it can harm the lake trout. yes no

k  The lake trout’s slimy coating helps to protect its scales. yes no
| e | Most insects have                  | • a backbone.  
|   |                                  | • an exoskeleton.  
|   |                                  | • a softer body covering  
| f | The darkling beetle likes a habitat that is | • light and airy.  
|   |                                  | • wet.  
|   |                                  | • dark, cool and moist.  
| g | Why do people say that the darkling beetle is a scavenger? | • It eats only fresh food.  
|   |                                  | • It does not eat.  
|   |                                  | • It eats dead and rotting plants and animals  
| h | The first stage of a darkling beetle’s life is | • egg.  
|   |                                  | • larva.  
|   |                                  | • pupa.  
| i | The larva stage of the darkling beetle is called a  | • mealworm.  
|   |                                  | • beetle.  
|   |                                  | • earthworm.  

| **j** Which best tells about how the darkling beetle looks after its young? | - It has nothing to do with its young.  
- Only the female looks after the young.  
- Only the male looks after the young. |
|---|---|
| **k** Which of the following is true of mealworms? | - They do not eat.  
- Other animals eat them.  
- They are usually green. |
| **l** In which way are humans not a threat to many animals? | - They take over land where animals live.  
- They often pollute the air and water.  
- They breathe the same air. |
Topic E

Animal Life Cycles

Mini Textbook
Animal Life Cycles

Contents

Introduction 4
Life Cycles 5
Animal Characteristics 7

Part I: Mammals, Reptiles, and Birds

Mammals 10
A Closer Look at a Mammal: Mule Deer 13

Reptiles 17
A Closer Look at a Reptile: Prairie Rattlesnake 20

Birds 26
A Closer Look at a Bird: American Robin 29
Part II: Amphibians, Fish, and Insects

Introduction

Amphibians

A Closer Look at an Amphibian: Northern Leopard Frog

Fish

A Closer Look at a Fish: Lake Trout

Insects

A Closer Look at an Insect: Darkling Beetle
Animal Life Cycles

Introduction

Nothing brings joy to a home like a newborn baby.

A newborn baby relies on others for its needs: food, water, clothing, shelter, and space.

As the baby gets older, it can do more for itself. Still it needs the help of others to live.

By the time a child is ready for school, he or she has learned to do so much more. The child is much more independent, but still relies a great deal on others.
Finally, by the time a person is an adult, he or she has learned to provide for all his or her needs. Because of this, adults are ready to marry and have children of their own.

**Life Cycles**

The stages that humans go through from being a baby to being an adult is called a **life cycle**.

![The Life Cycle of a Human](image)

Like humans, all living things go through life cycles as they grow.
The stages in those life cycles depend on the type of living thing.

The stages in plant life cycles are different than the stages in animal life cycles.

The stages in the life cycles of animals are not all the same. Animals can be divided into groups. The life cycles of the animals in each group are more or less the same.

In this unit called *Animal Life Cycles*, you will learn more about the stages of growth of six different types of animals:

- mammals
- reptiles
- birds
- amphibians
- fish
- insects

We do not always think of birds, fish, and insects as being animals. However, in science, they are thought of as being animals.

Besides learning about animal life cycles, you will also learn about what they look like, where they live, how they get food, and how they look after their young.
Animal Characteristics

Characteristics are things that tell about what something is like. The characteristics of different groups of animals tell what those animals are like. They help us to know how one group of animals is the same and how it is different from another group.

Now let’s take a look at some of the characteristics that describe animals.

1. Overall Shape. The overall shape of an animal describes what its body looks like and how the different parts of the body are put together.

A human’s overall shape is long and thin.

A human’s body is long and thin
2. **Limbs.** Limbs refer to arms, legs, and wings.

   A human has two arms and two legs. Both can bend in the middle.

3. **Body Covering.** The body covering tells what you can see on the outside.

   Humans are covered with skin that is covered with hair.

4. **Teeth.** Teeth are parts of the mouth that bite off and chew. Some animals have teeth, while others do not.

   Humans have two sets of teeth, an upper row and a lower row.

5. **Backbone.** The backbone is not just one bone, but several bones that run along an animal's back, just under the skin. Some animals have a backbone, but others do not.

   Humans have a backbone.

   The backbone runs down the middle of your back. It is really made up of many bones that form a row starting at your neck and running all the way down the back.
Part I

Mammals, Reptiles, and Birds

Introduction

In Part I, you will learn about three groups of animals: mammals, reptiles, and birds.

First, you will learn about some of the characteristics of each of these groups: limbs, body cover, teeth, and backbone.

Then, you will learn more about one animal in each group.
You will read about each of the following:

- appearance (what it looks like)
- habitat (where it lives)
- food
- life cycle
- how it looks after its young
- how it survives
- dangers it faces
Mammals

Humans are mammals.

There are many different mammals in the world.
Characteristics

1. **Limbs.** Most mammals have four limbs. Most mammals, like the horse, have four feet. Some mammals like humans and monkeys have two legs and two arms. Some mammals, like seals and walruses have limbs that are shaped like flippers. Some mammals that live in the ocean, like whales and dolphins, have two, three, or four flippers.

   A seal’s limbs are flippers that help it swim.

2. **Body Covering.** All mammals are covered with skin. Fur grows out of the skin. The fur on humans is called *hair*. Some mammals, like cows, have a lot of fur. In other mammals, the fur does not grow out of the skin.

   Most mammals have lots of fur, but dolphins have only the hair roots.
3. **Teeth.** All mammals have teeth. This helps them to bite and chew their food.

A wolf is a mammal With long sharp teeth that help it to tear and chew meat.

A horse is a mammal too. It does not eat meat. It eats plants. Its teeth are shaped so it can chew.

4. **Backbone.** All mammals have a backbone.

A tiger’s backbone runs along the top of its back.
A Closer Look at a Mammal: Mule Deer

The mule deer is a mammal that is found in all parts of Alberta.

1. Appearance

The mule deer’s body is shaped like a rectangle. It has a thick neck and a head shaped like a triangle.

Most mule deer are about a metre tall at the shoulders, and about two metres long from head to tail. Males are bigger than females.

The mule deer is light grey-brown in colour. Its tail is white with a black tip.

It has big ears, like a mule’s.

The female mule deer is called a **doe**. The doe does not have antlers.
The male mule deer is called a **buck**. It has antlers that fork out as they grow.
2. **Habitat**

Mule deer live in many different types of places. They live in places where there is mostly grass. They also live in places where there is mostly forest. Some even live in the mountains.

3. **Food**

Mule deer eat only plants. Their favourite food is fresh grass, and they eat a lot of it.

Mule deer also eat tree leaves, tree bark, and berries.

![Mule deer like to eat fresh grass.](image)

4. **Life Cycle**

Mule deer go through two stages in their life cycle, baby and adult. The baby is called a **fawn**. A mule deer is a fawn until it is about one year old.
5. **Looking After Its Young**

The mother mule deer has one or two fawns.

Only the mother looks after the fawns. When they are just born, they drink her milk. As they get older, the mother shows them what to eat. She also shows them how to watch for danger and how to hide. A male fawn stays with its mother for about a year. A female fawn stays with its mother for about two years.

![A young doe usually has one fawn. An older doe often has two.](image)

6. **How It Survives**

The body of the mule deer has many special things that help it to survive.

The mule deer has many enemies: cougars, bears, bobcats, coyotes, eagles, and wolverines. These animals hunt the mule deer for food.

The mule deer’s big ears give it excellent hearing. It can hear its enemies if they get too close.
Mule deer can also leap over bushes and fences. They can also change direction very quickly.

The fawns are spotted. This helps them to camouflage themselves when they are hiding in tall grass and bushes.

One of the mule deer’s enemies is humans. As humans build more cities, roads, and farms, they take away the land where the mule deer live. Humans also hunt deer for sport.

These mule deer are grazing on grass. If you look carefully, you can see a city in the background. Growing cities mean fewer places for mule deer to live.

All of these things help it to escape from its enemies.
Reptiles

Reptiles are some of the oldest animals on earth. Scientists say that dinosaurs were reptiles.

Dinosaurs no longer live on earth. They were reptiles.

There are many different types of reptiles living today.

turtle
lizard
snake
alligator
tuatara
Characteristics

1. **Limbs.** All reptiles crawl. Most have four short legs. One type of reptile does not have any legs at all. It is the snake.

![Saltwater Crocodile](image1.png)

Most reptiles have four short powerful legs, like this saltwater crocodile. It is the largest reptile on Earth. It grows to be as long as 6 m and weighs almost 1400 kg.

2. **Body Covering.** Reptiles are covered with scales or scutes. Snakes have scales. Other reptiles have scutes, which are bony hard plates. A turtle’s shell is a large scute. Reptile bodies feel dry and leathery.

![Alligator Foot](image2.png)

This photo shows the foot of an alligator. It is covered with scutes.

3. **Teeth.** Turtles and snakes do not have teeth, but all other reptiles have teeth.

![Crocodile Teeth](image3.png)

Crocodiles have long teeth used to grab and hold onto prey.
Lizards have many short teeth.

Turtles do not have teeth. They have a sharp beak and very strong jaws that can tear and crush food.

4. Backbone. All reptiles have a backbone.

A snake’s backbone covers the whole length of its body.
A Closer Look at a Reptile: Prairie Rattlesnake

The prairie rattlesnake is a reptile that is found in southern parts of Alberta. It gets its name from the rattling sound it makes with its tail if enemies get too close.

1. Appearance

Like other snakes, the prairie rattlesnake’s overall body shape is long and thin.

Adults grow to be somewhere between 1 and 1-1/2 metres long.

It has a wide and heart-shaped head. Its body ranges in colour from yellow-green to brown, with dark brown blotches and spots down the back and sides.

The rattlesnake's tail is tipped by a rattle that vibrates and makes a buzzing sound. It makes this sound to warn larger animals that they are getting too close.
2. Habitat

Prairie rattlesnakes live in natural grasslands and sagebrush. They often live close to a river valley or a coulee.

Prairie rattlesnakes can be found in farm fields and pastures too.

Rattlesnakes are often spotted in gravel pits and sunny rocky places. This is because lying on rocks in the sun helps them to keep warm.

Rattlesnakes sun themselves on large rocks, on roads and even on sidewalks to keep their bodies warm.

3. Food

Rattlesnakes live where they can find food. They like to eat small mammals and birds, such as mice, gophers, voles, and songbirds.

Some adult rattlers also eat frogs, salamanders, and small lizards.

Rattlesnakes coil up and strike their prey. They bite it with their fangs. Each fang has a small hole in the end. A drop of poison called venom comes out of the hole. This venom kills or paralyzes the prey.
Venom comes out of a rattlesnake's fangs. The fangs look like long teeth.

Rattlesnakes eat their prey whole, starting with the head.

Like other snakes, rattlesnakes do not have teeth. They swallow their prey without even chewing.

Baby rattlesnakes start their lives by eating insects, spiders, and worms. When they get a little older and bigger, they start to eat the same foods as adults.

4. Life Cycle

Most reptiles lay many soft leathery eggs. These eggs hatch into babies that grow up to be adults.

Rattlesnakes do not lay eggs. Their young are born alive.
A female rattler has between eight and twelve babies. Some have been known to have more than two dozen – that’s twenty-four!

The baby rattlesnakes are usually 25 to 30 centimetres long. They do not become adults until they are somewhere between five and seven years old.

**Life Cycle of the Prairie Rattlesnake**

baby  adult

This photo shows a rattlesnake with its babies. The patterns on their bodies make it hard to see them. This helps to protect them from their enemies.

5. **Looking After Its Young**

The female rattlesnake looks after its newborn babies for one to one and a half weeks. After that the babies are on their own.
6. How It Survives

There are many things about the prairie rattlesnake that help it to survive. Here are a few of them.

**Camouflage.** The prairie rattlesnake’s colour and pattern help it to blend into the background. They are usually shy animals and don’t want to be seen.

*Camouflage helps the rattlesnake to blend into its surroundings.*

**Body Shape.** With its long thin body, it can crawl through the grass and into narrow places easily.

**Venom.** Rattlesnakes do not have teeth for chewing. They eat their prey whole. The venom that comes out of its fangs kills or paralyses its prey. This makes it easier for the rattlesnake to begin to swallow its prey.

**Rattles.** The rattles are found on the tip of the rattlesnake’s tail. If its enemies get too close, the rattlesnake vibrates the rattles and hopes to scare its enemies.
What Threatens the Rattlesnake?

One of the biggest dangers that rattlesnakes face is humans. Growing cities, more roads, and more farms mean that the land where the rattlesnake lives is growing smaller. Many people kill rattlesnakes for fun or because they are afraid of them. They also get killed when they are run over by cars and trucks driving down the roads.

Rattlesnake Safety

- Try not to go where you know there are rattlesnakes.
- If your farm or garden is near places where rattlesnakes live, wear high rubber or leather boots.
- Use a long stick to swish around cucumber and strawberry patches. This will warn the snakes and give them a chance to get away.
- If you get bitten, immediately go to a hospital or medical clinic. Hospitals and clinics that are close to areas where rattlesnakes live, have the right medicines to treat you.

Remember that rattlesnakes are quite shy. They won’t attack you unless they feel they have no other choice.

Rattlesnakes do a lot of good. They keep the number of mice and gophers under control. More people become ill or die from bee stings than rattlesnake bites.
Alberta is home to many different types of birds. Some are tiny; others are huge.

There are many different types of birds in the world.

- ostrich
- penguin
- eagle
- hummingbird
- heron
- Canada goose
- owl
- chicken
- albatross
Characteristics

1. **Limbs.** All birds have four limbs.
   Two of the limbs are feet. The feet are used for walking. But on top of that, some birds have feet that are also designed for swimming. Some birds have feet that are designed for wading. Some birds have feet that are designed for catching and holding prey. Other birds have feet that are designed for climbing.

   **Birds with long thin legs like this egret like to wade through shallow water looking for food.**

   All birds have two wings. In most birds the wings help them to fly. Other birds have wings, but they cannot fly.

   **The rhea is a bird that lives in New Zealand. it has wings, but it cannot fly.**

2. **Body Covering.** If it is a bird, it has feathers. The feathers grow out of the skin that covers the body.
Birds have three main types of feathers. **Contour feathers** cover most of a bird’s body. They are the ones that you can see from the outside. Contour feathers protect the bird from the weather and help protect it from getting injured. **Filoplumes**. These are fine, hairlike feathers with a long stem, but few branches. Scientists are not sure why birds have them. **Down feathers** are found next to the skin. They are small and fluffy. They help keep a bird’s body warm.

3. **Teeth.** Birds do not have teeth. They have beaks that help them to get food.

Without teeth, birds cannot chew food like humans do. Instead of teeth, birds have **gizzards** that help them to grind up food. The gizzard is like another stomach.

Chickens often peck the ground for tiny pieces of gravel. The gravel helps the gizzard grind food.

4. **Backbone.** Birds have backbones. Animals that have backbones are called **vertebrates**. A bird’s backbone runs along the top of its back.
A Closer Look at a Bird: American Robin

The robin is often referred to as one of the first signs of spring.

You can see robins all over Alberta in the spring, summer, and fall. Alberta's winters are too cold for robins. They fly to Mexico and southern parts of the United States every autumn. Then they fly back to Alberta in the spring.

1. Appearance

   It is easy to spot a robin because it has a reddish-orange breast. Its back and head are brown or grey. Males are more brightly coloured than females.

   It has an round body with a thick neck, long legs and a fairly long tail.

   Robins are between 23 and 28 centimetres long. If you spread its wings out, they will measure between 31 and 41 centimetres from tip to tip. The robin usually weighs around 75 grams.

Robins are one of our most beautiful-sounding songbirds.
2. Habitat

Robins live in several different types of habitat. Some live in woodlands, while others live in more open farmland. Robins even live in cities and towns.

Robins can live in just about any area but places that are too marshy.

Robins try to build their nests so their enemies cannot easily see them or get to them.

3. Food

Robins eat both plants and animals.

Most of the food they eat is fruits and berries. If they have their nests near a garden, they will eat the fruits and berries from that garden.

Sometimes robins will eat berries that are too ripe. When this happens, they fall over while they walk. It is as if they are drunk!
Berries are a favourite food of robins.

Robins also like to eat beetles, grubs, caterpillars, grasshoppers, and worms.

This robin is tugging hard on an earthworm. The earthworm is doing its best not to become the robin's lunch.

4. Life Cycle

Robins build nests somewhere between two and five metres above the ground. They like to build them in spruce or maple trees, but they will make nests anywhere they think they will be safe.

During the spring or summer the female lays three to five light blue eggs. The eggs are not big.
The female lays tiny light blue eggs in a cup-shaped nest.

Once the eggs are laid, the female sits on them to keep them warm. She leaves the nest only to get food for herself. Sometimes, while the female is gone from the nest, the male watches the nest to make sure nothing happens to the eggs. After about 12 days, the eggs hatch.

Newly hatched robins are called hatchlings or nestlings. The hatchlings stay in the nest for about two weeks.

After two weeks, it is time for the babies to start leaving the nest. When this happens, they are called fledglings. At first the fledglings stay close by the nest.

After three or four weeks the fledglings are ready to go out on their own.

**Life Cycle of the Robin**
5. Looking After Its Young

You learned earlier that robins look after their young even before they hatch.

After the babies are born, the parents take turns going out to look for food. They take it back to the nest and feed the hungry hatchlings.

The hatchlings grow quickly. They are always hungry. They eat 35 to 40 times a day.

Even while the little robins are fledglings, their parents keep an eye on them. At first, one of the parents feeds them all their meals. After a while, they are ready to find their own food.

A fledgling robin
6. How It Survives

Robins are a favourite food of squirrels, snakes, and some birds. When robins live where there are people, cats are also an enemy.

Robins try to protect themselves by flying away if there is danger.

Robins usually build their nests where they think their enemies cannot get at them, their eggs, or their babies.

Robins are not afraid of humans. They often build their nests on light fixtures like this one.

One of the biggest dangers that robins face is the sprays that humans put on their lawns and crops. This makes the robins sick and they often die.
Part II

Amphibians, Fish, and Insects

Introduction

In Part I, you learned about the characteristics of mammals, reptiles, and birds.

In Part II, you will learn about three more groups of animals.

For each group you will read about some of the characteristics of animals in that group. Things such as:

- limbs
- body covering
- teeth
- backbone

Then you will learn about one member of that group. You will read about

- appearance
- habitat
- food
- life cycle
- looking after its young
- how it survives.
Amphibians spend the first part of their lives in water and the second part of their lives on land. The name *amphibian* means "both lives".

Amphibians live in almost every part of the world.

Like other animals there are many different kinds of amphibians.
Characteristics

1. **Limbs.** Almost all amphibians have four legs when they are adults.

   Their legs are quite fat. Many amphibians crawl so their legs are short. Other amphibians like frogs and toads have very strong and long back legs so they can leap from place to place.

   One group of amphibians has no legs at all. They are the caecilians. They look like snakes, but they are not.

   ![A newt uses its legs for crawling.](image)

2. **Body Covering.** Most amphibians have soft smooth moist skin. The skin is not only a body covering, it can also be used to take in water and air. Unlike most amphibians, toads have dry leathery warty skin.

   ![This salamander can take in air through it skin. The skin must be kept moist. It cannot stand to be away from water for long.](image)
3. **Teeth.** Amphibians have teeth. Some amphibians like salamanders and mud puppies have two rows of teeth, one on the top and one on the bottom. Other amphibians, like most frogs, only have upper teeth. Toads do not have any teeth.

Amphibians’ teeth help them to grab and crush food.

![Frogs only have an upper set of teeth.](image)

4. **Backbone.** All amphibians have backbones. That makes them vertebrates.

Of all the amphibians, the caecilian is the least well-known. Like other amphibians, it is a vertebrate.
A Closer Look at an Amphibian:
Northern Leopard Frog

The northern leopard frog is the largest frog found in Alberta.

1. Appearance

The northern leopard frog gets its name because it has spots like a leopard.

Adults range in size from 5 to 13 centimetres in length. Females are usually larger than males.

Northern leopard frogs are either green or brown with a pale white belly. It has large dark spots on its back, sides, and legs.

It has long back legs with large feet. The legs are powerful so it can leap long distances. The back feet are webbed so that it can swim fast. The front legs are short.

The northern leopard frog gets its name from its spots.
2. Habitat

At one time leopard frogs lived in much of Alberta. Today, they are only found in the southern part of the province.

Northern leopard frogs like clear, clean water. They are often found along the edges of ponds, marshes, streams, rivers, and lakes. They do not like to live in forests.

In the winter, the leopard frog digs deep down in the mud at the bottom of ponds, rivers, and lakes.

3. Food

Northern leopard adult frogs will eat almost anything they can catch. Prey for adult leopard frogs includes:

- insects
- mice
- small fish
- worms
- other frogs or tadpoles.

Most feeding takes place at night.
The leopard frog has a long sticky tongue. It uses it to catch insects.

4. Life Cycle

**Egg**
The adult frog lays a big mass of jelly-like eggs in the water. It may lay up to 7,000 eggs in one mass. Each egg is less than two millimetres across.

**Tadpole**
The eggs hatch in one to three weeks, depending on the temperature of the water and air. Baby frogs are called *tadpoles* or *polliwogs*.

Tadpoles are dark grey or brown, with gold speckles and a white underside.
Tadpoles live in the water. They breathe using gills, like a fish. Tadpoles also have a tail. They eat plants.

Tadpoles spend their lives in the water. They look like fish.

As a tadpole gets older, it begins to change. It starts to grow legs and lose its tail. It also develops lungs.

This young frog has grown legs, but it still has its tail.

Froglet
It can take two or three months for a tadpole to change to a young frog. The young frog is called a froglet. A froglet is like a human teenager. The froglet can live on land because it has lungs.
Frogllets look like small adult frogs.

**Adult**
Once a froglet can spend its time on land, it takes another several weeks for it to change into an adult.

**Life Cycle of a Frog**

```
egg

froglet

adult

tadpole
```
5. Looking After Its Young

Once a female has laid its eggs, it has nothing to do with taking care of the eggs or raising the tadpoles.

Tadpoles are on their own when they are born.

6. How It Survives

Like other frogs, the leopard frog starts its life as a water animal and then turns into a land animal.

Leopard frogs are food for many other animals. While they are tadpoles, they are eaten by fish, water bugs, and turtle. While they are adults, they are eaten by turtles, foxes, raccoons, and birds.

Frogs are a favourite food of birds like this heron.
There are many things that help it to survive.

**Strong Back Legs.** These help the frog to jump quickly to catch food.

**Webbed Feet.** They help the leopard frog to swim easily in water.

**Sticky Tongue.** The leopard frog’s tongue can stick way out. Because it is sticky, insects stick to it.

**Camouflage.** The leopard frog’s spot help it to blend into the background so its enemies will not see it easily.

### Northern Leopard Frogs in Danger

The number of northern leopard frogs has gone way down in the past several years. Scientists are not sure of all the reasons. They do know that some things that humans do are some of the reasons.

Air and water pollution make the frogs sick and they die. The land where frogs live is gone when cities and towns get larger. Farmers often drain the ponds and marshes where leopard frogs live.
Fish

Fish are interesting animals. It might seem like they are all alike, but just like mammals, reptiles, birds, and amphibians, there are many different types.

All fish live in water. Like land animals, they need air to live. They have gills. Gills are the way that fish take air from the water.

Here are some of the different kinds of fish.

- shark
- seahorse
- salmon
- angel fish
- barracuda
- sailfish
- eel
- tuna
- flying fish
Characteristics

1. **Limbs.** Fish do not have limbs. They do have fins that help them to stay upright and keep their balance. All fish also have a tail that helps them move through the water.

![The Siamese fighting fish has several large fins.](image1)

2. **Body Covering.** Almost all fish are covered with scales. The scales protect the fish’s body. They are attached to the body in such a way that it helps them glide through the water.

![A fish’s scales overlap like shingles on a roof.](image2)
3. **Teeth.** Fish have teeth. Most fish have two rows of teeth, one on top and the other on the bottom. Other fish, like some sharks have several rows of teeth on top and several rows on the bottom.

Some fish have teeth on the top of their mouths.

Other fish have teeth at the back of their mouths.

![The tiger fish has long sharp teeth. The sheep head fish has teeth that look like a human’s.](image)

4. **Backbone.** All fish are vertebrates. This means that they have a backbone. It runs from the head to the tail.

You can see the backbone on this fish skeleton.

![You can see the backbone on this fish skeleton.](image)
A Closer Look at a Fish: Lake Trout

Lake trout are found in all areas of Alberta. They are most likely found in lakes that are deep. They are not likely found in streams and marshes.

1. Appearance

Lake trout have long bodies that can glide easily through the water. Their heads are pointed.

When compared to some other types of fish, lake trout grow quite slowly and can live to be 20 – 25 years old. They grow to be somewhere between 45 and 65 centimetres long and weigh about 10 kilograms.

Most lake trout are dark green, grey, or brown on the back. Their bottoms are lighter in colour. Sometimes they have spots on their backs.

The lake trout’s eyes are large and round.

The lake trout’s tail is shaped like a V. It has one fin on its back called the dorsal fin. It also has fins on its bottom and on its sides.
2. Habitat

Lake trout like to live in lakes that are deep and cold.

In the summer, when the surface of a lake warms up, the lake trout swim down towards the bottom of a lake where it is cooler.

In the spring and fall, when the surface of a lake is cooler, the lake trout live closer to the surface.

Rainbow Lake in northern Alberta is home to lake trout.

3. Food

Young lake trout feed on freshwater shrimp and small creatures that live in the water.

Adult lake trout like to eat other fish, such as whitefish, sticklebacks, and sculpins. They also feed on insects, clams, snails, leeches, mice, and sometimes even birds!
Fairy shrimp are a favourite food of young lake trout.

4. Life Cycle

Lake trout go through several stages in their lives. The main ones are:

**Egg.** Lake trout lay their eggs in the fall. The eggs are laid in a large mass on a large rock in shallow water. They then get scattered over a small area. They look like little balls of jelly. A female can lay as many as 17,000 eggs.

**Fry.** The eggs are laid in the fall, but they do not hatch until spring. The newly hatched eggs are called fry. They feed mainly on tiny plants and animals called plankton. Lake trout are in the fry stage for about a year.
**Fingerling.** The fry reach the fingerling stage when they get to be eight or nine centimetres long. They keep growing and changing. They start to eat larger things, such as insects, shrimp, and small fish. As the fingerlings grow, they become parrs and then smolts. During the fingerling, parr, and smolt stages, the lake trout are called juveniles.

![Lake trout parr](image)

**Adult.** Lake trout do not become adults until they are seven or eight years old.

**Life Cycle of the Lake Trout**

```
egg

adult

fry

juvenile (fingerling, parr, smolt)
```

5. **Looking After Its Young**

Once the eggs are laid, lake trout have nothing to do with raising their young.
6. How It Survives

There are many things about the lake trout that help it to survive. Here are a few of them.

**Fins.** The fin on its back helps it to swim upright. The fins on its sides help it to sense rocks, other fish, and even its enemies.

**Eyes.** The lake trout’s big eyes help it look for food. Lake trout like to eat insects that live in and on the surface of the water. Its eyes help it to look up and out of the water when looking for food.

**Slimy Coating.** Lake trout are coated with a slime. This slime protects its skin and its scales.

**Threats to Lake Trout**

Lake trout are predators. That means they eat other animals. There are very few things that eat lake trout. There is one that does. It is the sea lamprey. In lakes where there are many sea lamprey, the number of lake trout has gone down.

The sea lamprey is an enemy of the lake trout.
Another threat to lake trout is people. People like to fish for lake trout, and in some places they have fished too much.

Water and air pollution are also causing lake trout to die in some areas. When people spray their lawns and gardens and farmers spray their fields, some of the spray can make its way into the lakes where lake trout live. The sprays kill the animals that lake trout eat. This means that there is less food for the trout.

What can be done?

Humans are doing many things to help lake trout survive. One thing is they are trying to be more careful about how much they use sprays on their lawns, gardens, and fields.

Another way that humans are trying to help is to get rid of some of the sea lampreys.

Lake trout are often fished for sport. They grow to be very large.
Insects are the largest group of animals on earth. They live almost everywhere.

Insects have three body parts: the head, the thorax and the abdomen.

The head contains the antennae, eyes, and mouth.

The thorax is the middle part. The legs and wings are fastened to the thorax.

The abdomen is where the stomach is and where the eggs are produced. Insects like bees and wasps have their stingers at the end of their abdomens.
There are many different kinds of insects.

- swallow tail butterfly
- dragonfly
- leaf-footed bug
- praying mantis
- honeybee
- whirligig
- ladybug
- springtail
- grasshopper
- katydid
- prairie walking stick
- scarab beetle
Characteristics

1. **Limbs.** All insects have six legs. The legs are attached to the thorax. Like humans, insects’ legs are jointed, which means that they can bend.

Many insects can fly. Insects that fly have either one or two pair of wings.

The housefly’s wings are attached to its thorax.

2. **Body Covering.** Insects have an **exoskeleton.** An exoskeleton is a covering on the outside of the body. It is hard and protects the inside of the insect’s body.

When an insect grows, its exoskeleton splits open. The insect comes out with a new exoskeleton. At first it is soft. In a short while it becomes hard.

Insects have no bones inside their bodies.

**This cicada is moulting.** When it does this, it gets rid of its old exoskeleton, wings and all. Its new exoskeleton is soft at first, but it soon hardens.
3. **Teeth.** Insects do not have teeth like humans do. Some insects, like the ant, have mandibles, which are parts of its jaw. The mandibles do the job that teeth do. They grab, crush, and cut food.

You can see the mandibles of this ant. They are sharp.

Some insects, like butterflies and mosquitoes, suck up food through a long tube that comes out of their mouths. The tube is called a **proboscis**. Other insects, like houseflies, turn their food into a liquid. They then sponge it up with a part of their mouths.

4. **Backbone.** No insects have backbones. Instead they use their exoskeletons to help them hold their shape.

5. **Antennae.** All insects have two antennae attached to their heads. They are sometimes called **feelers**. Insects do not actually feel with their antennae. The main use that insects have for their antennae is to smell!

Antennae are often called feelers because insects wave them around. This is a wrong name because they are not only used for touch, they are actually the insect nose.
A Closer Look at an Insect: Darkling Beetle

The darkling beetle is found in all parts of Alberta. It is also called the **darkening beetle** because the adult changes colour from creamy white to brown and finally, to black.

1. Appearance

Like all insects the darkling beetle has three main body parts.

And like all insects it has six legs, two antennae, a hard exoskeleton, and compound eyes. The compound eyes allow it to see in many different directions at once. It cannot see very clearly, however.

The darkling beetle can range anywhere from 12 to 25 millimetres in length.
2. Habitat

Darkling beetles live in many parts of the world. They like to live in places like Alberta that are neither hot all the time nor cold all the time.

Darkling beetles usually live in dark, cool, moist places, like under rocks and logs.

If you look under a rotting log, you may find darkling beetles.

3. Food

The darkling beetle is called a scavenger. A scavenger eats dead and rotting things. The darkling beetle does not care whether its food is a rotting plant or a rotting animal.

Darkling beetles also eat living plants and even grain. They get all the water they need from what they eat.

This darkling beetle is eating a tiny creature called a millipede.
4. Life Cycle

There are four stages to the life cycle of a darkling beetle.

**Egg.** The female darkling beetles lays 250 – 500 tiny, white, oval eggs. They are about two millimetres long and less than a millimetre wide. After four to eighteen days, the eggs hatch.

**Larva.** The larvae of the darkling beetle are called **mealworms.** Mealworms look like worms, but they are not true worms.

Mealworms are dark yellow with brown bands. Their bodies are divided into several sections. They are about 25 millimetres long. They have a hard exoskeleton.

Mealworms eat a lot so they grow fast. They eat dead and rotting plants and animals, just like the adults.

The larvae like to live in dark places. They also like to have their bodies touching something.

The larva of the darkling beetle is called the mealworm. It has six legs near the head.
Mealworms stay in the larva stage for six to nine months. Then they turn into pupae.

**Pupa.** The pupa stage lasts for six to eighteen days. The pupa is creamy white with a large head and a pointed tail. The pupa darkens as it grows.

When the darkling beetle is in the pupa stage, it does not look like it is alive. However, inside the pupa many changes are taking place. An adult is developing.

**Adult.** Once the pupa stage is over, an adult comes out. At first, it is white. Then it turns to brown and finally black. The adult stage lasts for two or three months.

**Life Cycle of a Darkling Beetle**

```plaintext
Egg
   ↓
  adult
   ↓
  pupa
   ↓
larva (mealworm)
```
4. **Looking After Its Young**

Once the female lays the eggs, it has nothing to do with the eggs, the larvae, or the pupae. They are left to look after themselves.

5. **How It Survives**

Darkling beetles love to eat. They are good for the environment because they help to get rid of dead and rotting plants and animals.

Some people think of them as pests because both the adults and larvae eat grain, cereals, and some seedlings.

**Enemies.** The larvae (mealworms) are eaten by many animals, including many birds, mice, spiders, lizards, and some other beetles.

When they are disturbed, they play dead. Sometimes they stand on their heads and give off bad smells.