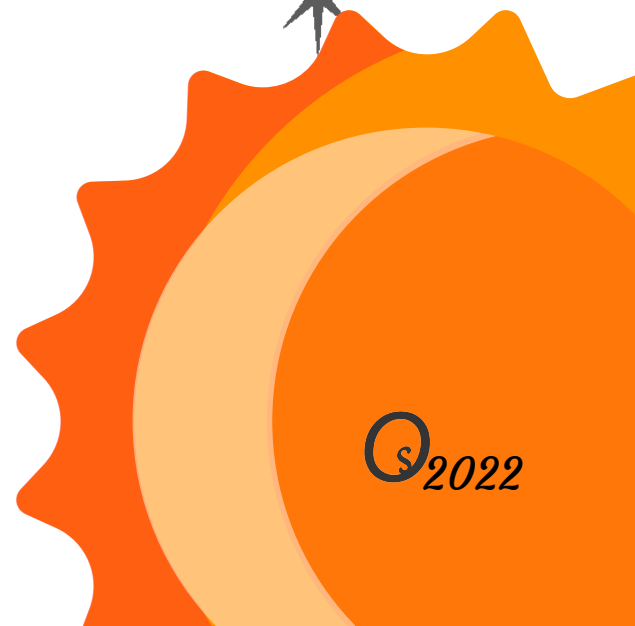


# *Amazing God*

*Alberta Conference  
Grade 5 & 6 - Outdoor School*

Alberta Conference of Seventh-day Adventists  
5816 Highway 2A  
Lacombe, AB T4L 2G5  
Ph. 403-342-5044  
Fax: 877-300-8843



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**Great** is our Lord and **mighty** in power;

His **understanding** has no limit!

*Psalm 147:5 NIV*



## to the PARENT

We at the Education Department are excited about the upcoming annual Outdoor School scheduled for May 30th - June 2nd, 2022 at a subsidized cost of \$110/student. This handbook explains the intent of the program. We ask that you look it over as you help your child plan for this adventure. This learning experience will provide a practical, hands-on approach to our curriculum- enhancing not only the student's interest in learning, but also allowing them to see the outdoors as God's lesson book.

We anticipate that this program will not only benefit your child, but also provide your child's teacher with valuable training and resources. They, in turn, can improve the variety of learning experiences that the students at your school will receive.

Thank-you for your support of Adventist Christian Education as we train young people to develop a relationship with Jesus.

## to the STUDENT

This handbook has been written for you, the student. You will soon be leaving the four walls of your indoor classroom to attend school in the out-of-doors. The week you will spend at Outdoor School will give you a chance to learn about our natural resources and also learn outdoor recreation skills, which will help you to appreciate those resources.

You and your parents need to read this handbook carefully so that you will be prepared for your Outdoor School experience. Discuss the handbook with your parents and teacher. If you follow the suggestions in this book, it will help you feel more at home at Outdoor School and make your time there more valuable.

We look forward to seeing you at Outdoor School! There will be a special Outdoor School t-shirt waiting for you!



Gail Wilton  
Education Director

## DAILY SCHEDULE

### First Day

4:45 - 5:45	Registration
5:45 - 6:45	Supper
6:45 - 8:15	General Assembly and Ice Breakers
8:15 - 9:30	Evening Activity - 20th Anniversary Celebration
9:30 - 10:00	Campfire
	Lights out is 15 minutes after



### Daily Schedule

7:00 am	Rise & Shine
7:30	Breakfast
8:00	Chores
8:50 - 9:20	General Assembly
9:30 - 12:00	<b>Morning Field Study</b>
12:00 pm	LUNCH
12:45 - 1:00	Group Time with cabin counselor
1:15 - 2:30	<b>1<sup>st</sup> afternoon Field Study</b>
2:45 - 4:00	<b>2<sup>nd</sup> afternoon Field Study</b>
4:00	Organized Recreation
5:00	Supper
6:00 - 7:00	Debriefing with Teacher
7:15 - 8:30	<b>Evening Activity</b>
8:45 - 9:30	Campfire
	Lights out 15 minutes after or as announced.



### Last Day

7:00 am	Rise & Shine
7:30	Breakfast
8:00	Chores
8:50 - 9:20	General Assembly
9:30 - 12:00	<b>Morning Field Study</b>
12:00 pm	LUNCH
12:45 - 1:00	Group Time with cabin counselor
1:15 - 2:30	<b>1<sup>st</sup> afternoon Field Study</b>
2:45 - 4:00	<b>2<sup>nd</sup> afternoon Field Study</b>
4:30 - 5:00	Float-a-Boat Finale
5:15 - 5:45	Supper
	<b>Have a safe trip home!</b>





## FIELD STUDY SCHEDULE

### Tuesday

Morning Field Study	Group	1 <sup>st</sup> Afternoon Field Study	Group	2 <sup>nd</sup> Afternoon Field Study	Group
Pond Ecology	Crocs	Rockin' Rockets	Crocs	Rockin' Rockets	Snapping Turtles
	Snakes	Hooks 'n' Ladders	Snakes	Hooks 'n' Ladders	Crocs
River Rush	Dragonflies	Owl Pellet Dissection	Dragonflies	Owl Pellet Dissection	Snakes
	Diving Beetles	Project Wild	Diving Beetles	Project Wild	Dragonflies
Marsh Monsters	Leaping Lizards	Craft	Leaping Lizards	Craft	Diving Beetles
	Snapping Turtles	Light & Optics	Snapping Turtles	Light & Optics	Leaping Lizards

### Wednesday

Morning Field Study	Group	1 <sup>st</sup> Afternoon Field Study	Group	2 <sup>nd</sup> Afternoon Field Study	Group
Trading Post	Leaping Lizards	Rockin' Rockets	Leaping Lizards	Rockin' Rockets	Diving Beetles
	Snapping Turtles	Hooks 'n' Ladders	Snapping Turtles	Hooks 'n' Ladders	Leaping Lizards
River Rush	Crocs	Owl Pellet Dissection	Crocs	Owl Pellet Dissection	Snapping Turtles
	Snakes	Project Wild	Snakes	Project Wild	Crocs
Marsh Monsters	Dragonflies	Craft	Dragonflies	Craft	Snakes
	Diving Beetles	Light & Optics	Snapping Turtles	Light & Optics	Dragonflies

### Thursday

Morning Field Study	Group	1 <sup>st</sup> Afternoon Field Study	Group	2 <sup>nd</sup> Afternoon Field Study	Group
Trading Post	Dragonflies	Rockin' Rockets	Dragonflies	Rockin' Rockets	Snakes
	Diving Beetles	Hooks 'n' Ladders	Diving Beetles	Hooks 'n' Ladders	Dragonflies
River Rush	Leaping Lizards	Owl Pellet Dissection	Leaping Lizards	Owl Pellet Dissection	Diving Beetles
	Snapping Turtles	Project Wild	Snapping Turtles	Project Wild	Leaping Lizards
Marsh Monsters	Crocs	Craft	Crocs	Craft	Snapping Turtles
	Snakes	Light & Optics	Snakes	Light & Optics	Crocs

**Morning Field Studies** will meet directly after the Morning Assembly  
**Afternoon Field Studies** will meet at the "Swamp", field area in front of the cabins



## The Outdoor School Site

Since the Outdoor School is intended to let you study the outdoors, an effort has been made to move your class to a place where you can live comfortably right next to your outdoor laboratory. Foothills Camp, near Bowden, Alberta, provides the perfect site for this. You will have cabins to live in, with shower and wash facilities for your personal cleanliness, a dining room and a large meeting room right nearby.

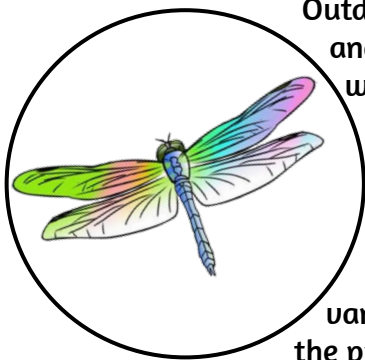
During the week, you will be using the out-of-doors as your classroom. This outdoor classroom will be quite different from the one that you are accustomed to. For one thing, it is much larger. You will find forested areas, open meadows, a variety of plant and animal life, different types of soil, a river, and a pond. Here, assisted by Outdoor School staff, your class will discover much about God's wonderful creations



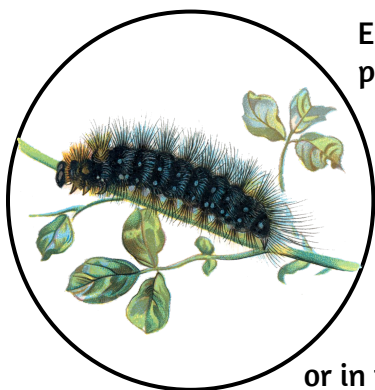
## The Outdoor School Staff

School in the out-of-doors requires a great many people working together. Many of the people you will get to know during this week are teachers from schools in Alberta and student/parent volunteers. Mrs. Gail Wilton, our Conference Education Director, Mr. Brent van Rensburg, our Associate Education Director, and Mr Steven Gabrys have planned this year's Outdoor School program once again. They will be happy to answer any questions that you may have. We also have the skills of our Alberta Conference grade 5/6 classroom teachers and parent volunteers to bring education to life. All teachers and volunteers are there to see that you enjoy your week of Outdoor School and learn as much as possible.

## Living at Outdoor School



Outdoor School is a great place to spend time with the friends you already have and to make new ones. Different activities call for different groupings, so you will work with a number of groups at Outdoor School. You will have a cabin group, a field study group, your class from school, and the whole Outdoor School group. You and a couple of your classmates will join students from other schools to form a cabin group. You will live and eat with this group during your stay. While at first it may seem that school groupings would make good cabin groups, we've found that a mixture of students from various schools helps kids break down barriers and make friends from all over the province. Each student will have one or two of their own classmates in their cabin so that there is a familiar face as well as the chance to meet new people. Each group has an adult cabin leader who is there to help you with anything during your stay at Outdoor School



Everyone will eat in the cafeteria that is located in the lodge. The kitchen staff prepares all meals served at the Outdoor School and a special effort is made to see that the meals are well balanced. All meals will be vegetarian, which will be a new experience for some. Even though there may be some things you do not like, we encourage you to be adventurous and try everything. Good table manners are encouraged at Outdoor School. Many people will be eating at the same time so it is important to remember that conversations should be quiet and manners should be like those of a guest. Don't forget PLEASE and THANK YOU when asking for articles at the table

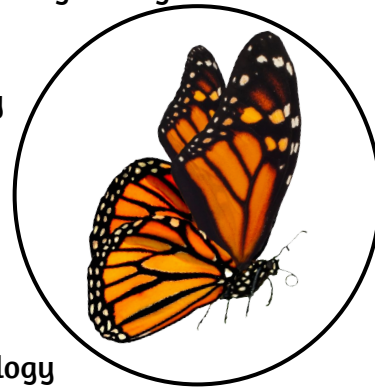
or in the serving line.

Each day you will perform a small share of the chores, which are important for the successful operation of the school. Chores will be done with the members of your cabin group and supervised by your cabin leader. In addition to the general school chores, it is the responsibility of each of you to see that your bed areas and cabin are in good shape.

Much of your personal enjoyment during this week will come from meeting and making friends with students from other classes. Your enjoyment depends on you using co-operation and common sense while at Outdoor School. This will ensure a good, safe time.

## Studying Together at Outdoor School

Each morning from 9:30-12:00 and afternoon from 1:15-4:00, you will go to your outdoor classroom. Since you will be in the out-of-doors, surrounded by nature, you will be concentrating on natural science, ecology, conservation and recreation. However, your other school subjects will not be neglected; they will simply be presented to you in new and different ways and will become a part of your study in the outdoors. You will find that you will be working in small groups sometimes, and larger groups other times. You will be doing things that will help you to learn about and understand the out-of-doors by using all subjects such as reading, writing and mathematics. This type of study where all subjects are taught using one topic such as Pond Ecology is called integration. In a typical Pond Ecology Study, you might be hiking to the pond area (recreation), dissecting a log and writing down your observations (science / language arts), measuring and calculating populations (science / mathematics), and discussing the changes in wetland environments including global change influences (science / socials).



## Recreation at Outdoor School

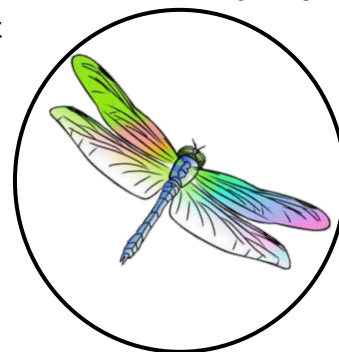
Tuesday and Wednesday from 4:00-5:00 there is recreation period in which all students will participate. These recreation periods will include sports that will be organized by the teachers and volunteers. It is a time for students to relax from their schoolwork and burn off some energy before supper



## Health and Safety

If you are injured in any way, or if you do not feel well, you must report this immediately to your teacher or other staff member who will see to it that you are taken care of. There are teachers who are trained in first aid that will help you and want you to enjoy your stay at the Outdoor School. Teachers will help you call your parents if it is needed.

**NOTE:** Any medication that you bring to the Outdoor School must be turned over to your teacher. Make sure that your name and prescribed dosage is written clearly on the container. That teacher is responsible to see that your medication is given to you as required – please make it easy for your teacher and approach him/her at the appropriate time.



## Phone Use

Cell phones are not permitted in Outdoor school. Since activities are run outside and we don't have a secretary to take calls, parents should avoid calling the camp. In an emergency, parents should call the principal/teacher who will know of the best way to get in touch with students.

## Getting Ready for Outdoor School

All personal items and equipment should have your name and the name of your school clearly marked on them. It is recommended that you use a felt pen, sewn-on name tags or embroidery, to mark all items. It would also be to your benefit to make out a checklist of what you take along to the Outdoor School and recheck it carefully before returning home. You are responsible for your own luggage so everything should be packed with this in mind. You will find a list of suggested supplies in this book. It is there to help you as you decide what to pack. If you bring anything that is not permitted at Outdoor School, it will be confiscated. Your teacher will discuss what to do with a confiscated item.

Electronic devices are usually returned to your parents; junk food, etc., which attracts mice, will probably not be returned.

## Departing for Outdoor School

Your teacher will arrange for rides to Outdoor school. If it's a bus or if you carpool, it is recommended that you double-check to see that you have not forgotten anything.





## COVID-19 at Outdoor School

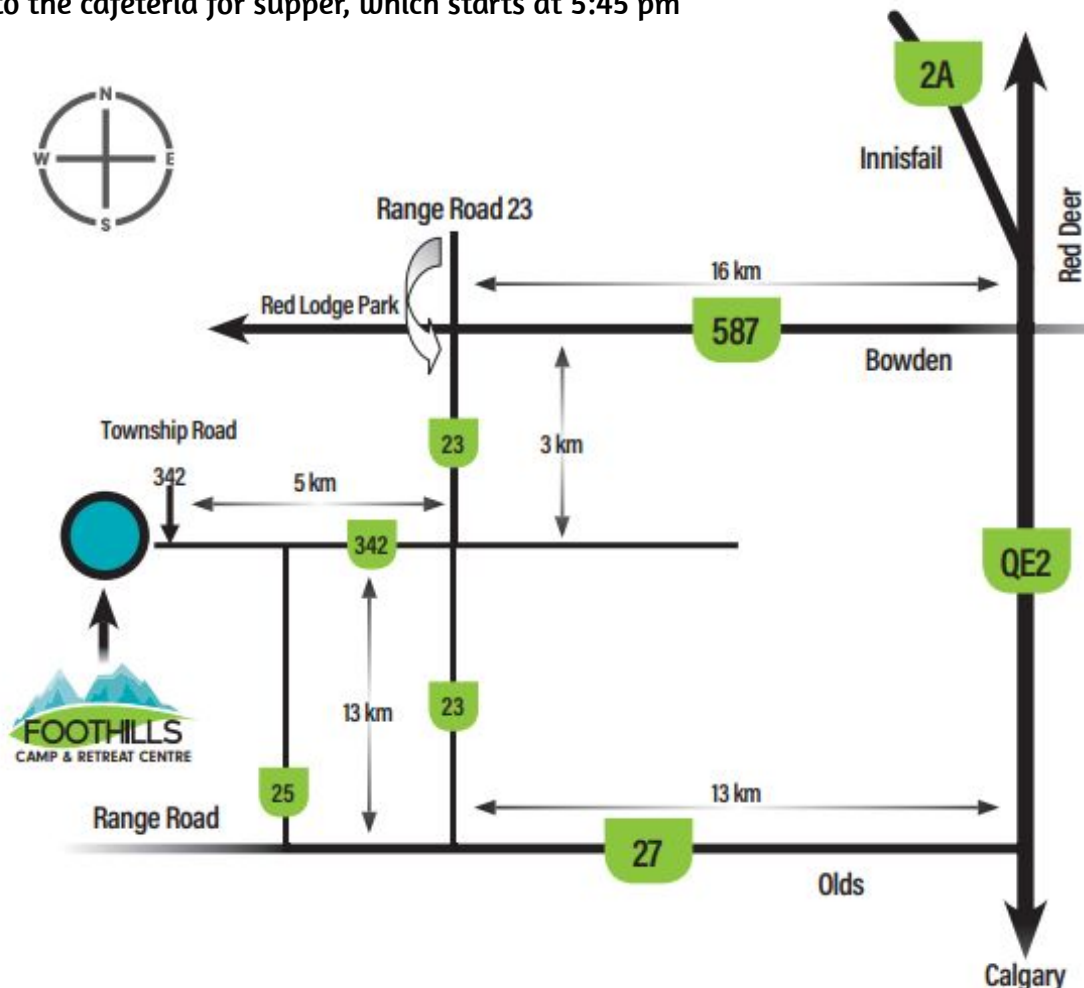
Before leaving home, staff, children/students, visitors, and volunteers who will attend outdoor school should self-screen for symptoms using the applicable checklist for their age group. ([Child Alberta Health Daily Checklist](#) or [Adult Alberta Health Daily Checklist](#)).

To prevent spread please stay home if you have symptoms. Individuals exhibiting signs of illness will be separated to a designated infirmary room or area. Masks will be used. Appropriate medical attention will be given and Parents / Caregivers will be notified to pick up their child as soon as possible. Frequent handwashing with soap and water for 20 seconds for cleaning hands. If unavailable, hand sanitizer, containing at least 60% alcohol will be provided.

Spending as much time outdoors as possible is a great way for our students to learn and have fun together while mitigating the spread of Covid-19.

## Arriving at Outdoor School

When you arrive at the Outdoor school site, check in at the lodge in the cafeteria where there will be staff to direct you to your cabins. Once you find your cabin, you may choose a bed that you can claim as yours for the week and get settled in by making your bed and putting away personal equipment (usually under the bed is a good spot). Make your way back to the cafeteria for supper, which starts at 5:45 pm





# CLOTHING & EQUIPMENT

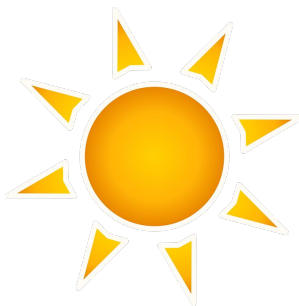
The following is a suggested list of items you will need. Please do not put your family to needless expense, but rather bring older clothing and equipment that you might already have around your home or that you can borrow from friends and family. The main thing you want to consider is whether you will be dressed warmly enough and can keep dry in case of rainy weather. It is a good idea to label all of these items with your name

## Sleeping Gear

- Warm Sleeping Bag (extra blanket if sleeping bag is lightweight)\*
- Pillow

## Clothing

- Shirts (3 or 4)
  - Warm Jacket\*
  - Sweater
  - Socks (4-5 pairs)
  - Underwear (4-5 changes)
  - Pajamas
  - Hat
  - Pants (3 pairs)
  - Raincoat\*
  - Waterproof Head Covering\*
  - Waterproof (Rubber) Boots\*
  - Walking Shoes
  - Sandals or Water Shoes (not just flip flops)
- (\*These are essential)



## Toilet Kit

- Towel
- Washcloth
- Soap and Container
- Comb/Hairbrush
- Toothbrush/Toothpaste
- Sunscreen
- Insect Repellent
- Medication (if needed)
- Lip Salve (optional)
- Tissues (optional)

## Equipment

- Pen
- 3 Pencils
- THIS BOOK
- Water Bottle\*
- Flashlight
- Bible
- Clipboard (optional)
- Binoculars (optional)
- Camera (optional)



**DO NOT BRING:** Money, Knives, Jewelry, Music Machines (CD, MP3, iPods, tape, record players, 8-tracks - just a joke, etc.), Electronic Games (Gameboy, PSP, Game Cube, etc.), Movie Machines (DVD, iPod, etc.), or Junk Food/Candy/Gum. Yes, you will live without this stuff for 4 days



## RULES

The following rules are designed to help Outdoor School run smoothly and to make sure everyone can enjoy their time here. Besides following your school rules for field trips, here are some specific Outdoor School rules. As you're out and about, remember the keys:

### **Co-operation & Common Sense**

1. **Be where you are supposed to be!** Stay within the Outdoor School boundaries (as explained in the General Assembly) unless under the direction of a teacher.
2. **Respect.** Your school's rules for how to treat others are to be followed at Outdoor School.
3. **Respect.** Treat animals and plants with care. If it is necessary to collect specimens for observation, return them to their original habitat after the study.
4. Remember that your cabin is your home for the time that you are at Outdoor School and others share it with you and will use it after you leave. Treat it with respect and never go into anyone else's cabin.
5. Between lights-out and rise-and-shine, there should be no noise. Students must remain in their cabins, with the exception of using the washroom facilities.
6. All Recreation activities are to be supervised by a teacher. It is important to follow directions.
7. Report sickness or accidents to a teacher. Persons seriously ill or injured should not be moved. Teachers should be called to them.
8. Do not light fires or carry matches.
9. Leave unnecessary items (see clothing & equipment page) at home.
10. Abide by your school's dress regulations and please leave all jewelry at home.



# Activity 1

(DO NOT write anything here until it's time!)

Drove more than 2 hours to get here	Has touched a snake	Rode a bike to school this year	Has seen a bald eagle	Went to summer camp last summer
Has held a bug	Has a caught a fish	Camped in a tent last summer	Has been to another province	Made a snowman this winter
Has been out of Canada	Has been to Outdoor School before	Hugged someone this week	Has seen a bear in the wild	Has been in a canoe before
Has gone swimming in a river before	Can find the North Star	Has never been to Outdoor School	Has been farther north than Edmonton in Alberta	Has seen a moose in the wild
Has never camped in a tent	Has caught a frog before	Has seen a butterfly emerge from a chrysalis	Has hiked for more than 2 hours before	Has been to an ocean before



## Activity 2

**ACROSTIC POEM:** An acrostic poem uses the letters of a word to start each line describing that word. Here is a sample:

**B** others you forever  
**U** ntil you go nuts  
**G** onna run away fast

Now it's your turn. Write two acrostic poems. Use the word wetlands for the first one, then think up a good Outdoor School word to write a poem about

**W**

**E**

**T**

**L**

**A**

**N**

**D**

**S**

Now you make up an acrostic poem of your own



## Activity 3

Find 5 Bible verses out of 5 different books of the Bible that talk about wild animals.  
Write the verse in the space provided.

**1.** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**2.** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**3.** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**4.** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**5.** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



## Activity 4

### Animal Scramble

Unscramble these letters to discover the names of some of the animals you may have seen today, either in person or from their signs



**LEK**

**TILERATEWHIDEED** (3 words)

**DERIPS**

**AREB**

**EVBARE**

**NOREATGROWLHED** (3 words)

**PETARLIACLR**

**CEYOTO**

**CRINEPPUO**

**REHA**

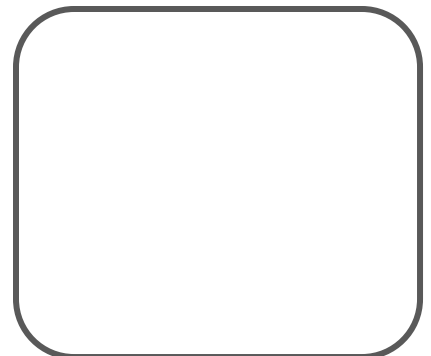
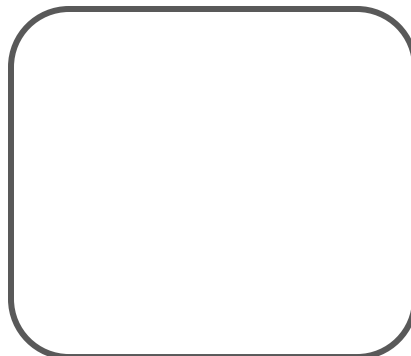
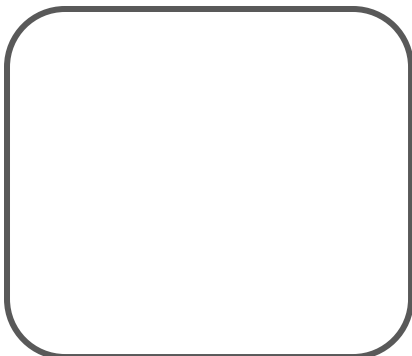
**QRILESUR**

**GOOPKETHERCP** (2 words)

**TARDEN**

**RILFECK**

Now choose 3 of these animals and draw a picture of each one eating in its natural habitat (home).









## Weather Log

Record the weather each day you are at Outdoor School. How well did the weather match forecasts that you heard for the week?

### Monday

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Temperature: Current: \_\_\_\_\_ High: \_\_\_\_\_ Low: \_\_\_\_\_

Air Pressure: \_\_\_\_\_ Change in A.P.: \_\_\_\_\_ Humidity: \_\_\_\_\_

Wind Speed: \_\_\_\_\_ Wind Direction (from): \_\_\_\_\_ Precipitation: \_\_\_\_\_

### Tuesday

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Temperature: Current: \_\_\_\_\_ High: \_\_\_\_\_ Low: \_\_\_\_\_

Air Pressure: \_\_\_\_\_ Change in A.P.: \_\_\_\_\_ Humidity: \_\_\_\_\_

Wind Speed: \_\_\_\_\_ Wind Direction (from): \_\_\_\_\_ Precipitation: \_\_\_\_\_

### Wednesday

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Temperature: Current: \_\_\_\_\_ High: \_\_\_\_\_ Low: \_\_\_\_\_

Air Pressure: \_\_\_\_\_ Change in A.P.: \_\_\_\_\_ Humidity: \_\_\_\_\_

Wind Speed: \_\_\_\_\_ Wind Direction (from): \_\_\_\_\_ Precipitation: \_\_\_\_\_

### Thursday

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Temperature: Current: \_\_\_\_\_ High: \_\_\_\_\_ Low: \_\_\_\_\_

Air Pressure: \_\_\_\_\_ Change in A.P.: \_\_\_\_\_ Humidity: \_\_\_\_\_

Wind Speed: \_\_\_\_\_ Wind Direction (from): \_\_\_\_\_ Precipitation: \_\_\_\_\_

## How much water is flowing past where we are standing?

## sec

 $\text{m}^3/\text{s}$

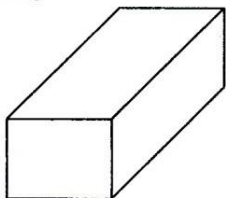


# How Many Bathtubs?

## Measuring Pond Volume

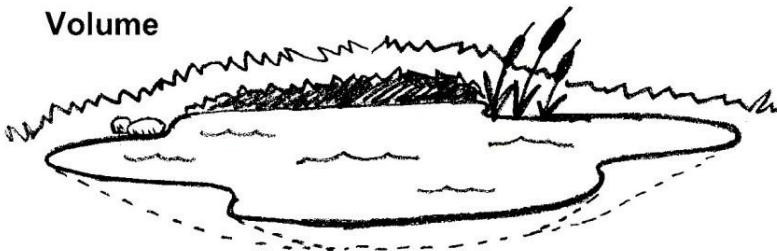
Volume – the amount of space an object takes up; measured in  $m^3$  (cubic meters)

### Volume



length x width x height

### Volume



average length x average width x average height

Measuring the volume of a rectangular prism is easy. You simply multiply the length by the width and by the height. Measuring the volume of a pond is a bit trickier because the measurements vary, or change, from place to place. How deep a pond is depends on where you measure it. To solve this problem, we take a few measurements of the depth and find the average. After that, it's a piece of cake!

### LENGTH

Measure the length of the pond in 2 places. Then add them up to average them out.

#1 \_\_\_\_\_ m

#2 \_\_\_\_\_ m

Total \_\_\_\_\_ m  $\div 2 =$

### WIDTH

Measure the width of the pond in 3 places. Then add them up to average them out.

#1 \_\_\_\_\_ m

#2 \_\_\_\_\_ m

#3 \_\_\_\_\_ m

Total \_\_\_\_\_ m  $\div 3 =$

### DEPTH

Measure the depth of the pond in 15 places. Then add them up to average them out.

#1 \_\_\_\_\_ m

#6 \_\_\_\_\_ m

#11 \_\_\_\_\_ m

#2 \_\_\_\_\_ m

#7 \_\_\_\_\_ m

#12 \_\_\_\_\_ m

#3 \_\_\_\_\_ m

#8 \_\_\_\_\_ m

#13 \_\_\_\_\_ m

#4 \_\_\_\_\_ m

#9 \_\_\_\_\_ m

#14 \_\_\_\_\_ m

#5 \_\_\_\_\_ m

#10 \_\_\_\_\_ m

#15 \_\_\_\_\_ m

Total \_\_\_\_\_ m  $\div 15 =$

### VOLUME

Now multiply the average length, average width, and average depth.

How many bathtubs is that?

# How Many Deer?

**Fill out the graph with the data from our game. You need:**

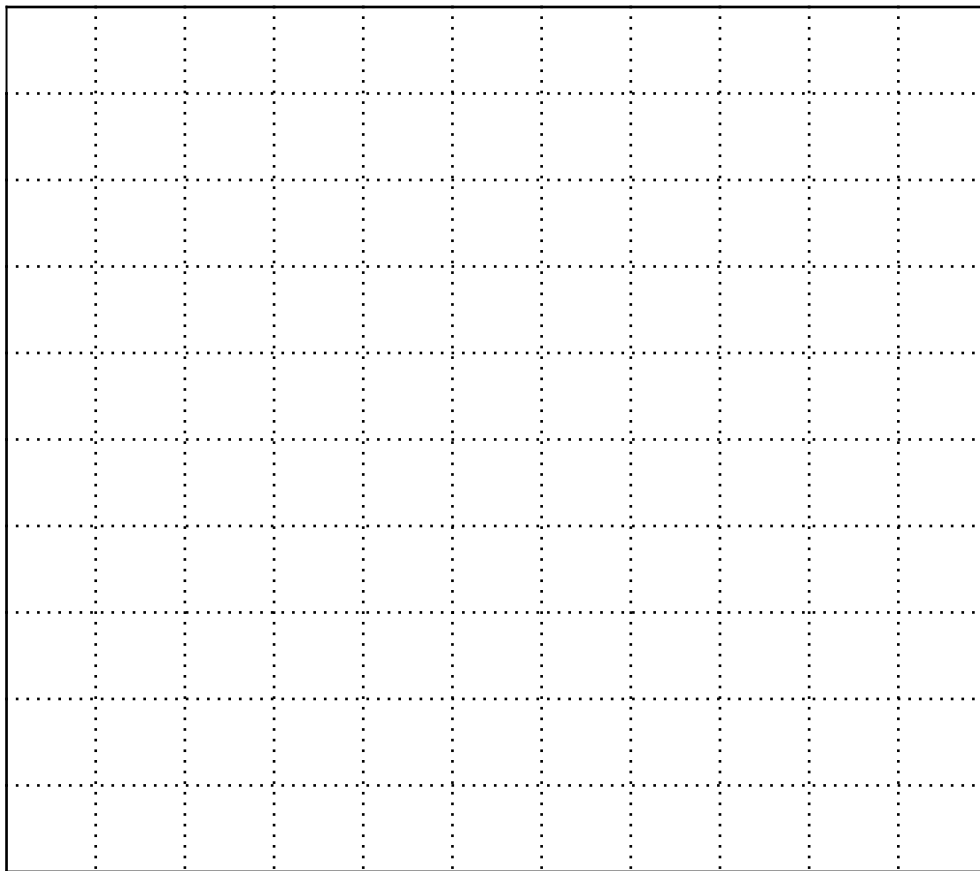
**Title** (Yearly Deer Populations)

Label x-axis (Year)

Number x-axis (1,2,3,4...)

**Label y-axis (Number of Deer)**

Number y-axis (2,4,6,8,10...)



## Our Game Data

[illegible]



## Owl Pellet Analysis



Owls, like all birds of prey, eat large amounts of bones, feather, and fur with their prey. After the bird has digested its meal, this indigestible material is rolled and compacted in part of the raptors digestive tract to form a pellet. This pellet is regurgitated through the mouth several hours after feeding. Since owls digest very little bone, these pellets are a great way to find out what the owl has been

### Procedure:

1. Place a pellet on a sheet of white paper.
2. Using the probe, carefully separate the bones from fur and feathers. Clean the bones as well as possible and place them to one side.
3. Determine the number of animals in the pellet by pairing right and left lower jaw bones with the upper part of the skull.
4. Using the illustrations, identify the skulls found in the pellet.

Record **your findings** below

Type of Prey	Voles	Mice	Shrews	Moles	Rats	Small Birds	Total
Number							

Record the results for the **whole class** below

Type of Prey	Voles	Mice	Shrews	Moles	Rats	Small Birds	Total
Number							

Total # of Prey Animals: \_\_\_\_\_ Total # of Pellets: \_\_\_\_\_ Average Prey Animals/Pellets: \_\_\_\_\_



# Bone Sorting Chart

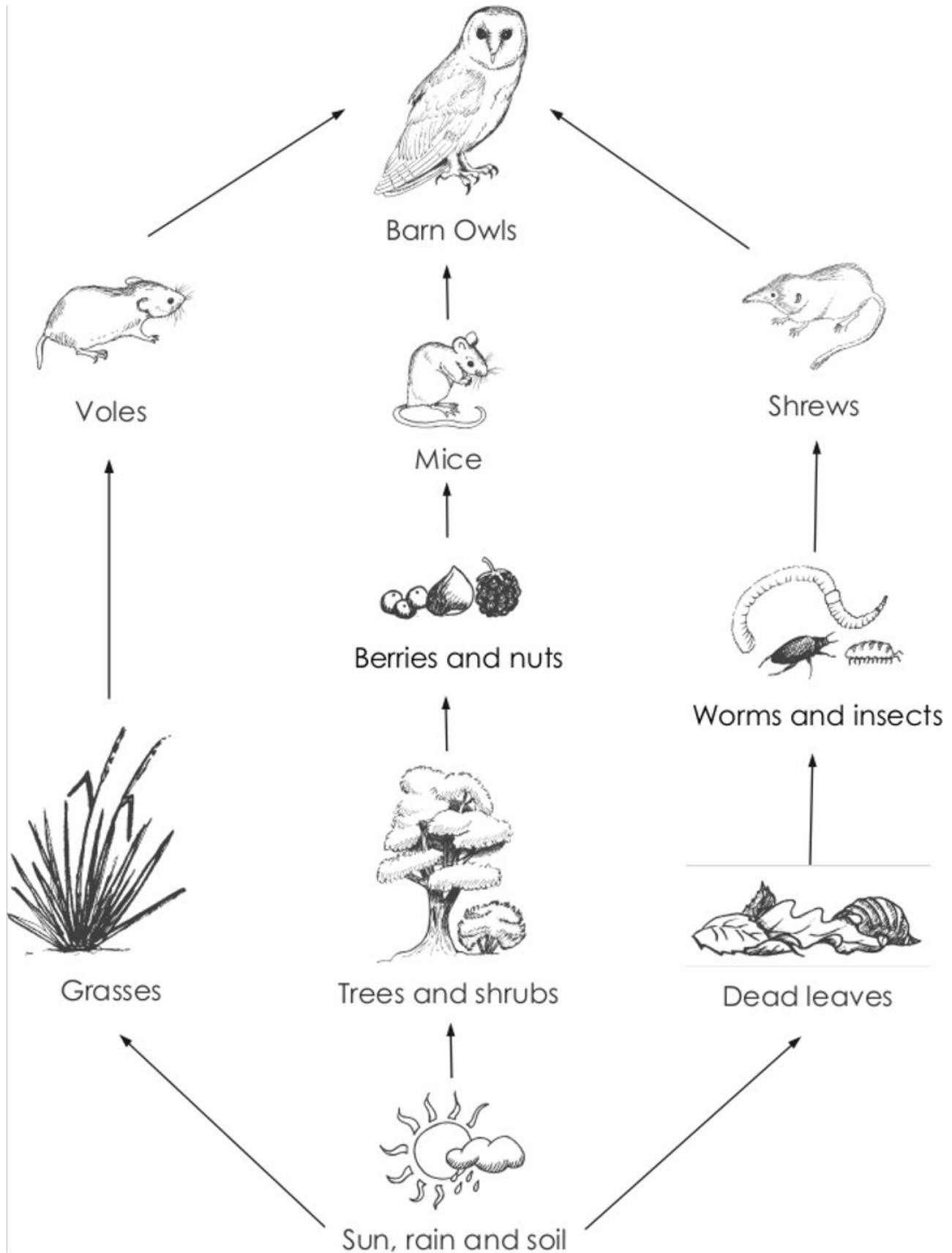
Use this chart to identify the different types of bones that you discover in your owl pellets.

	RODENT	MOLE	SHREW	BIRD
Skull				
Jaw				
Shoulder Blade				
Front Leg				
Hip				
Back Leg				
Rib				
Vertebrae				
Misc. Items	Caterpillar larvae & caterpillar cocoons 		Caterpillar droppings 	



# Owl Science

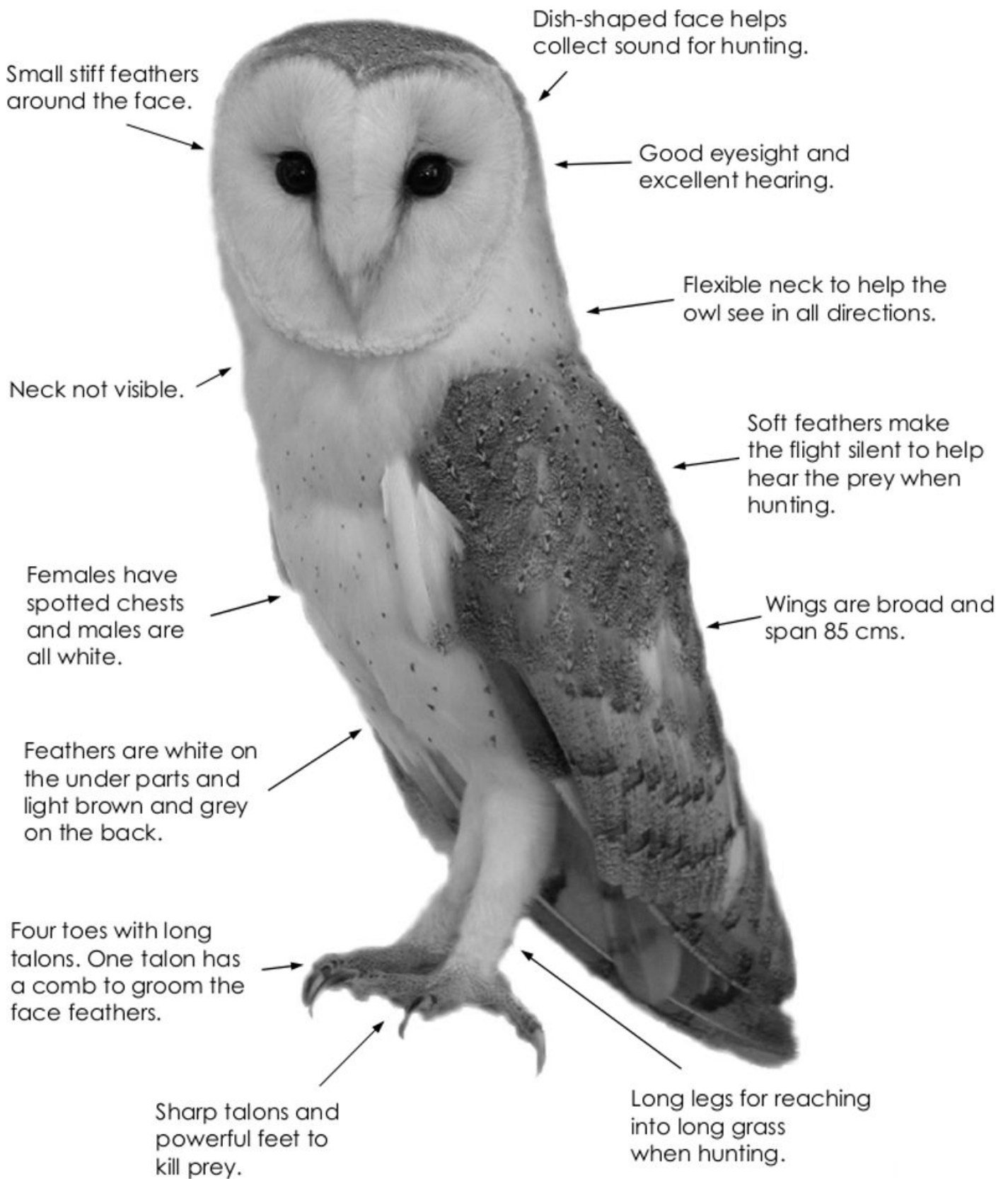
## Food Web





# Owl Science

## Owl features and adaptations







# Marsh Monsters

## Water Flea

Pink or orange in colour, it moves up and down in short hops and feeds on algae and bacteria. About this long ↔



## Copepod

Often called 'Cyclops', due to its single eye spot. Moves with a constant, jerky, swimming motion, eats dead plants and animals and is very tiny.



## Water Mite

Usually red, this tiny spider relative feeds on larvae and plankton and swims by wildly beating its 8 legs. About this long ↔



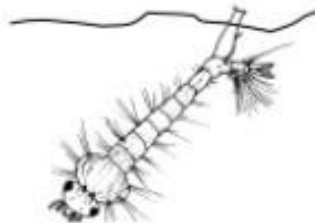
## Sideswimmer

A freshwater shrimp that is grayish in colour and swims on its side by beating its many legs. A scavenger about this long ↔



## Mosquito Larva

"Little black sticks" that float under the surface and feed on algae and protozoa. Wiggles wildly when disturbed. About this long ↔



## Mosquito Pupa

A tiny black "comma" floating just under the surface. It breathes through hollow tubes that stick out of the top of its head. About this long ↔



## Water Boatmen

Black with fine yellow bars, it swims by paddling with its oar-like legs. Eats algae and dead plants and animals. About this long ↔



## Phantom Midge Larva

Called a Phantom midge because this worm-like animal is transparent (see through). It moves by suddenly flicking its body. Eats plankton and is about this long ↔



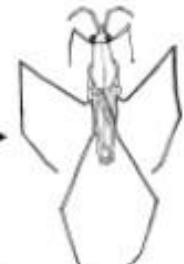
## Backswimmer

Black and white in colour, with big red eyes. It swims along on its back by using its legs as oars. Preys on insects and small fish. About this long ↔



## Water Strider

With long skinny legs, it runs on the surface of the water and feeds on small insects. About this long ↔



## Damselfly Nymph

Usually found on the bottom or on underwater plants. Notice the 3 leaf-like gills on the end of its body. Eats insects and plankton. About this long ↔



## Mayfly Nymph

Similar to the damselfly nymph except that the projections at the end of its body are finer and more feather or hair-like. Eats algae and plant material. About this long ↔





# Marsh Monsters

## Dragonfly Nymph

Brown in colour, it usually walks slowly on the bottom or among the vegetation. Eats plankton, worms and insects. About this long



## Caddisfly Larva

Builds a tubular home using bits of plants, sand grains or even old snail shells. Walks slowly along the bottom and eats algae and small aquatic animals. About this long



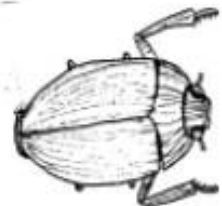
## Giant Water Bug

A large, flat, brown bug usually found among plants. Swims by kicking its hind legs. Eats a variety of aquatic animals. This drawing is about life size.



## Whirligig Beetle

A small, shiny black beetle usually seen zooming around on the surface of the water. Feeds on small insects and is about this long



## Predacious Diving Beetle (larva)

Also called a water tiger due to its voracious appetite for insects, minnows and tadpoles. Swims by 'dog paddling' with its legs. About this long



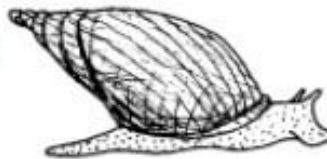
## Predacious Diving Beetle (Adult)

A shiny black beetle sometimes marked with dull yellow or green. Swims by paddling with oar-like legs. Eats a variety of aquatic animals. About this long



## Snails

Move around slowly on a muscular foot that extends out of a spiral or orb shell. Use a rough 'tongue' to scrape up algae and dead plant material. Size varies



## Seed Shrimp

A tiny clam-like animal that is greenish in colour and motors about using its legs and antennae. Filters bacteria and dead plant material out of the water. About the same size as the water flea.



## Leech

A flat-bodied, dark-coloured worm with a sucker at each end of its body. Moves along like an inchworm or swims in a ribbon-like fashion. Eats snails, insect larvae, worms and some suck blood. Size varies



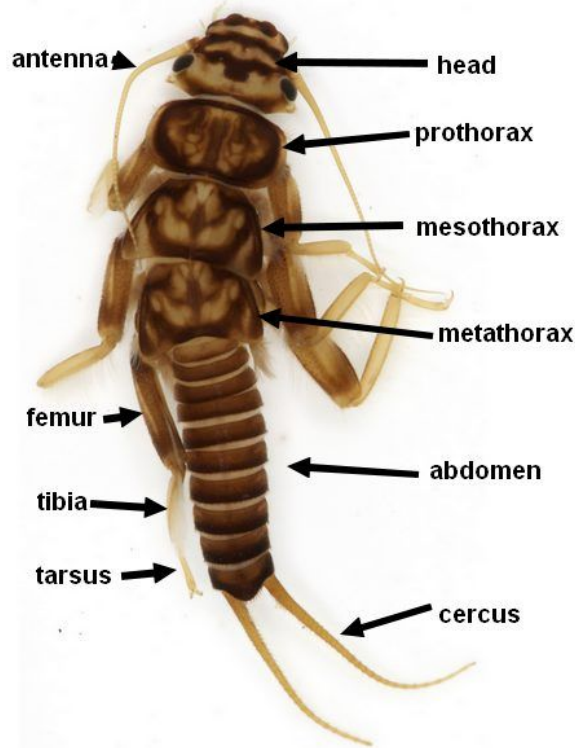
## Bloodworm

A dark red, segmented worm that spends its time moving about in the muck at the bottom of the marsh. Eats algae, tiny plants and other dead things on the bottom. About this long





# Identification Guide to Freshwater Macroinvertebrates



## GLOSSARY

**Abdomen:** posterior body segment of insect

**Filaments:** hair-like structures

**Jointed leg:** true legs, legs capable of bending

**Lateral:** at the side

**Portable case:** structure made of leaves, twigs, or sand that some caddisfly larvae carry with them

**Posterior:** tail end of the body

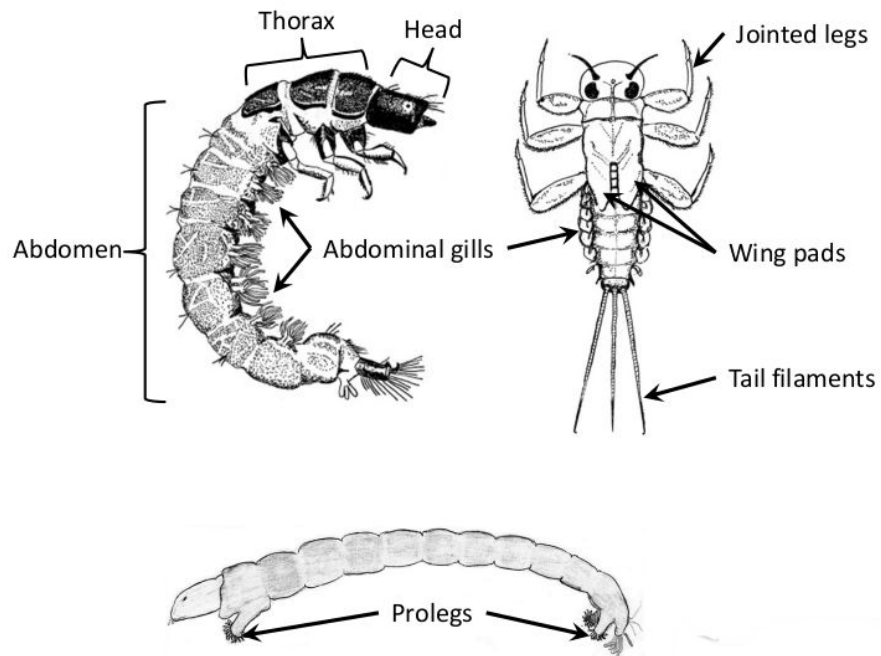
**Prolegs:** short, stumpy leg-like structures (not jointed)

**Protrusion:** part of the body that sticks out

**Segment:** a section of body

**Ventral:** underside

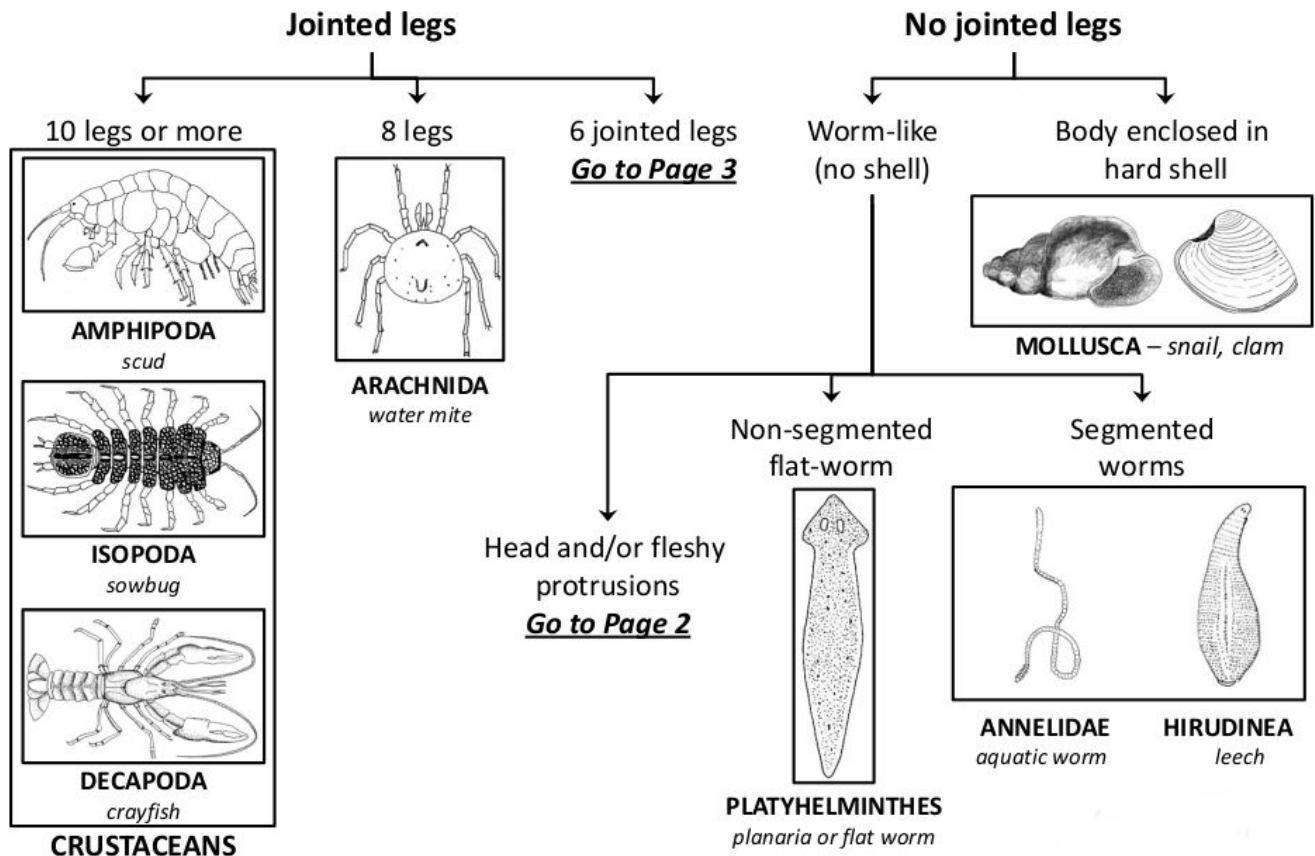
**Wing pads:** developing wings, often W in shape





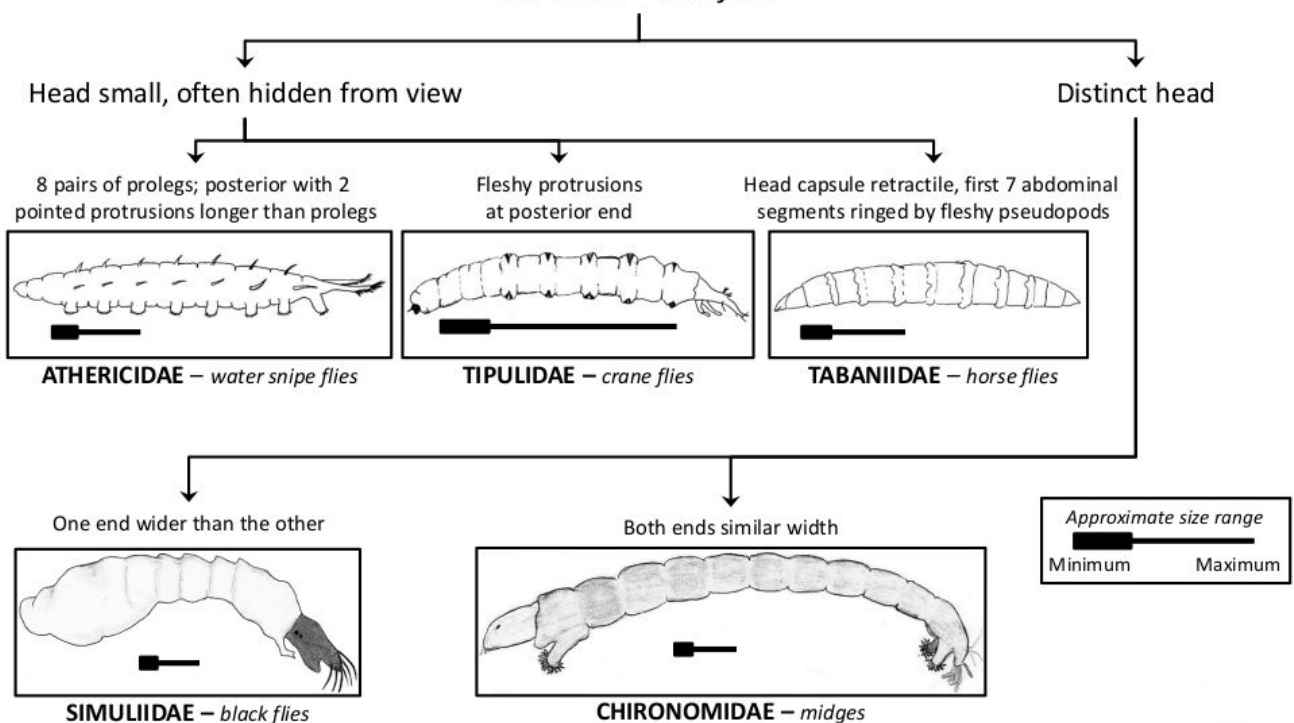


# Identification Guide to Freshwater Macroinvertebrates

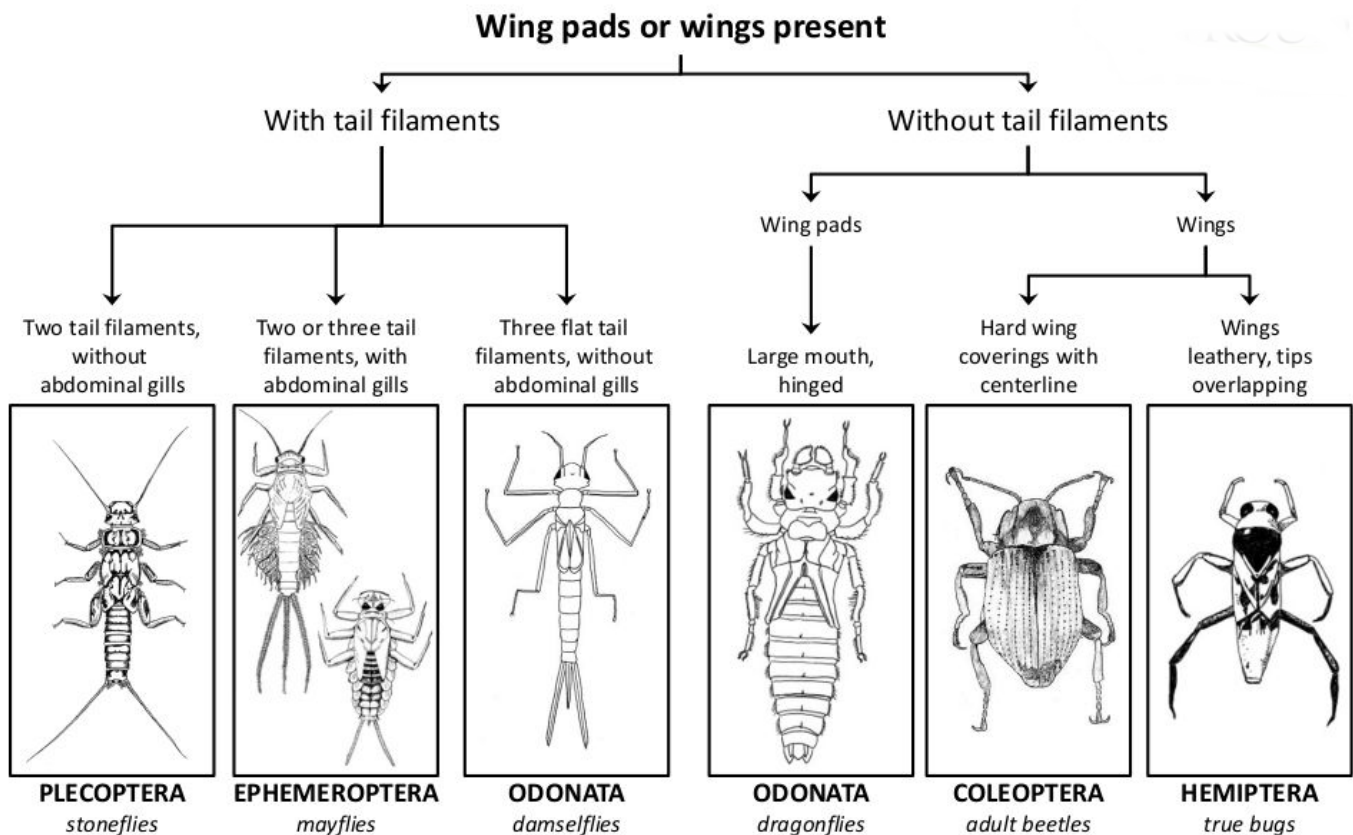
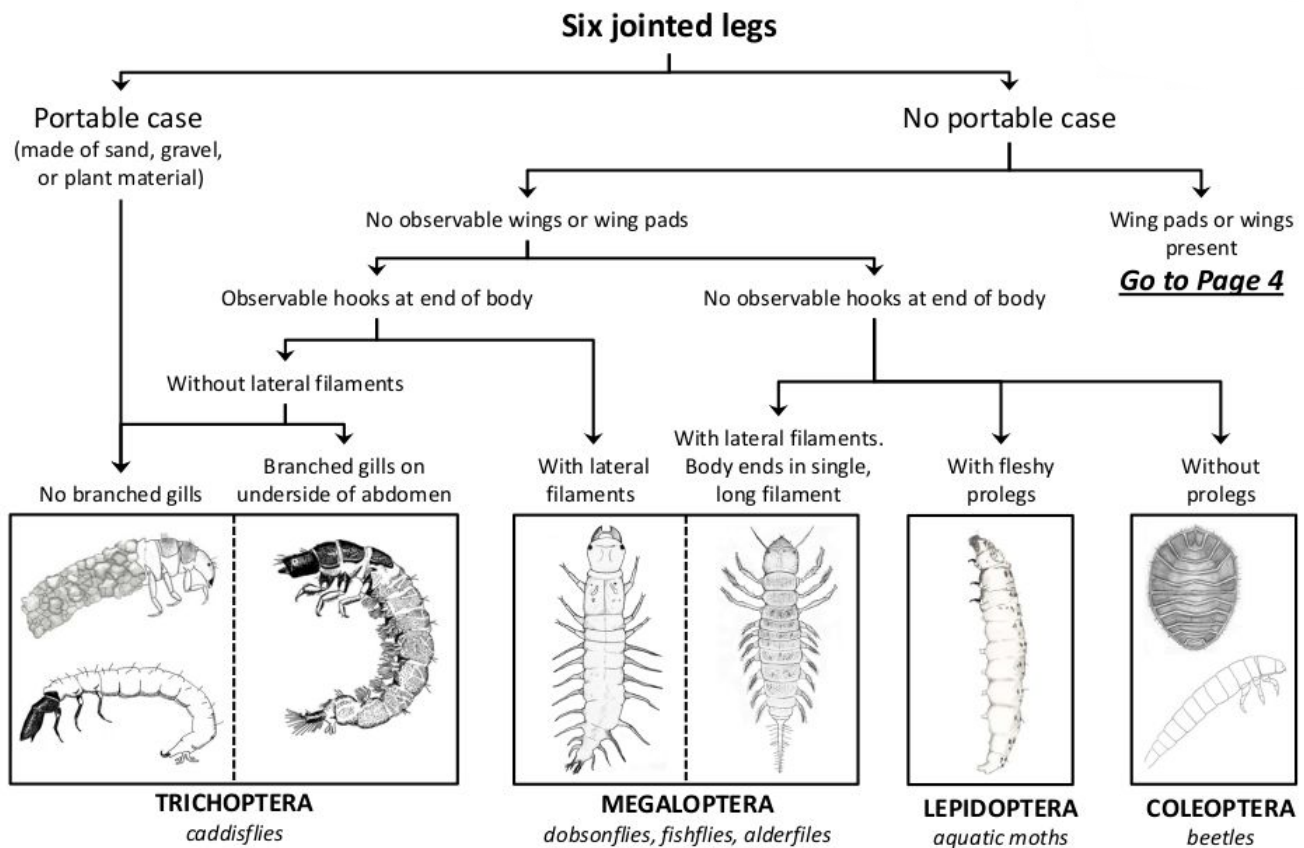


## Worm-like with distinct head or fleshy protrusion

### DIPTERA – *true flies*



# Identification Guide to Freshwater Macroinvertebrates



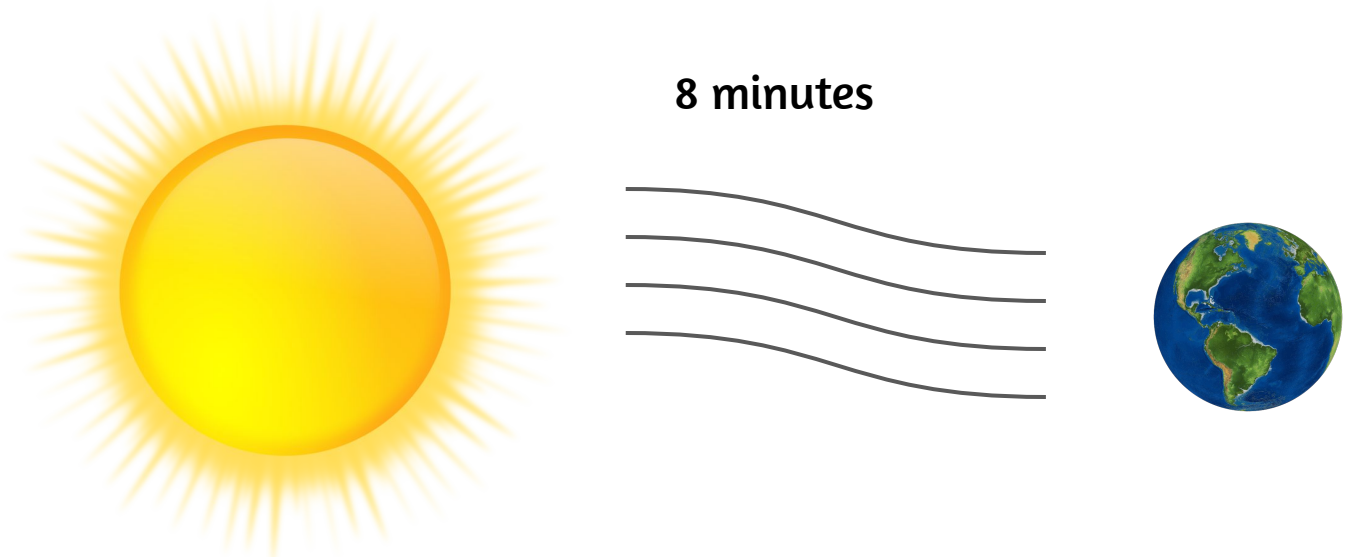


# Light and Optics

**What is light?**

Light is a type of energy which travels as a wave. It travels from a luminous source (such as the Sun, or a flame, or a torch), in a straight line

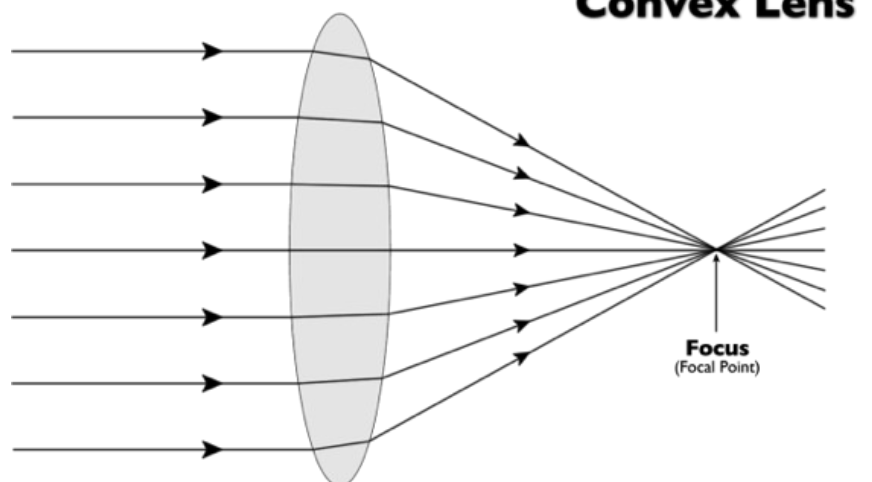
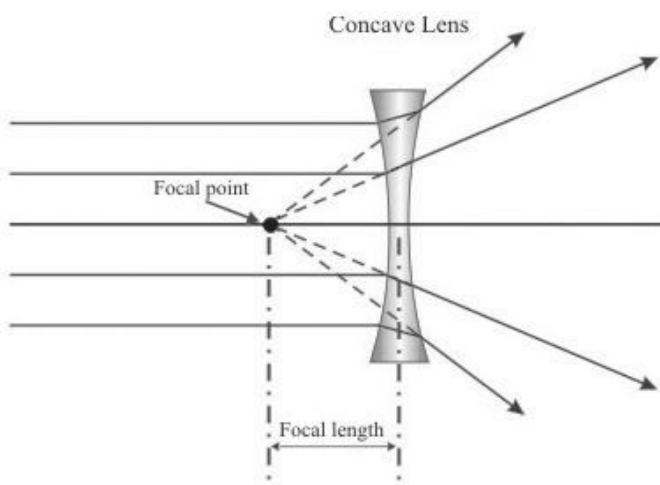
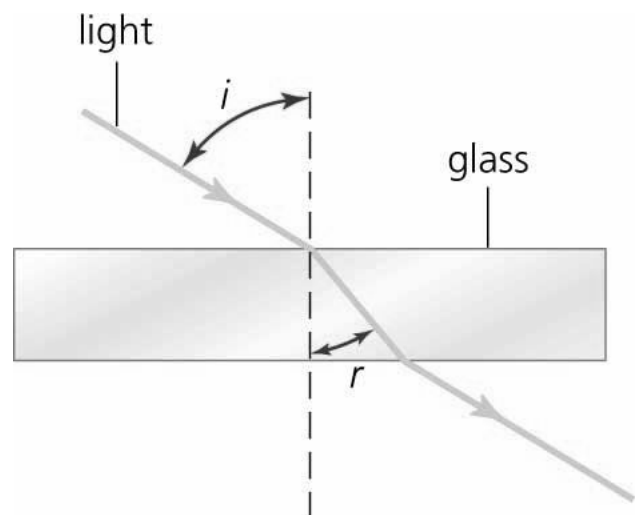
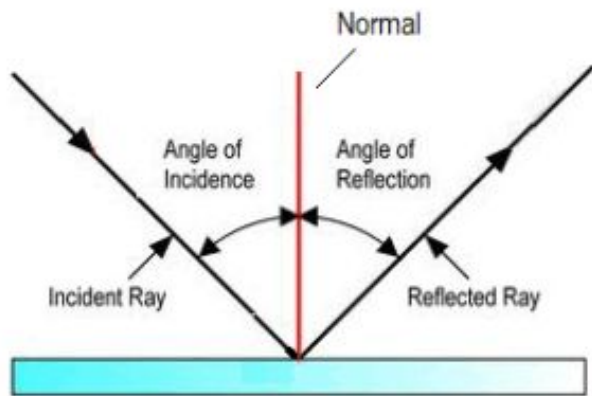
Sources of Light	Reflect Light



Objects which block light and don't let any through are called opaque. Those which allow some light through are called translucent, whereas transparent objects allow all light through.

State whether the following objects are transparent, translucent or opaque.

- a). A brick wall
- b). Eyeglasses
- c). Windows
- d). Frosted glass (like on a bathroom window)
- e). Cardboard



# ***I n d e s c r i b a b l e***

Written by Laura Story / Recorded by Chris Tomlin

From the highest heights to the depths of the sea,  
Creation's revealing Your majesty.  
From the colors of fall to the fragrance of spring,  
Every creature unique in the song that it sings.  
All exclaiming...

***Indescribable, uncontainable,***  
You placed the stars in the sky and you know them by  
name. You are amazing, God!  
***All powerful, untamable,***  
Awestruck, we fall to our knees as we humbly proclaim  
You are amazing, God.

Who has told every lightning bolt where it should go? Or  
seen heavenly storehouses laden with snow?  
Who imagined the sun and gives source to its light? Yet  
conceals it to bring us the coolness of night.  
None can fathom...

