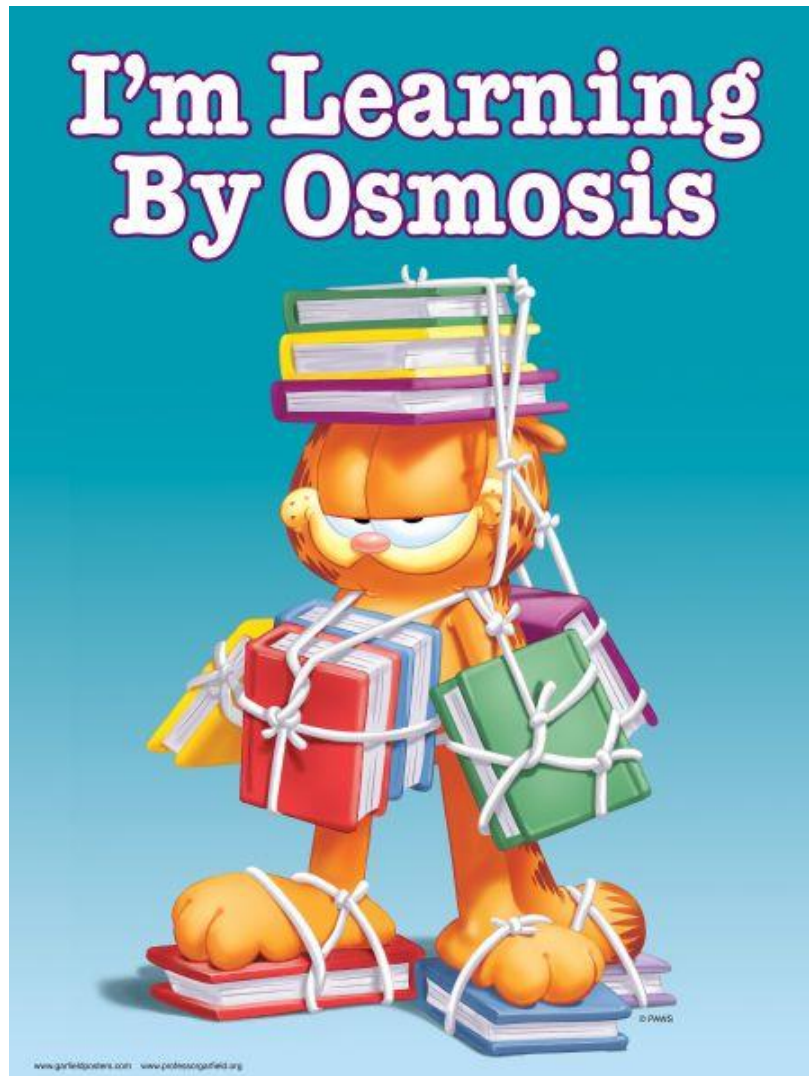


BIOLOGY 504
END OF YEAR REVIEW



BIOLOGY 504 - End of Year Review

Topics

1) Animalia

- a) Characteristics
- b) Metazoa vs Parazoa
- c) Body symmetry

2) Invertebrates

- a) Characteristics
- b) Porifera
- c) Cnidaria
- d) Worms
- e) Molluscs
- f) Echinoderms
- g) Arthropods

3) Vertebrates

- a) Characteristics
- b) Fish
- c) Amphibians
- d) Reptiles
- e) Birds
- f) Mammals

4) Evolution

- a) Evidence of evolution
- b) Theory of evolution
- c) Process of evolution

Readings

- 1) Class notes
- 2) Heath Biology (material seen in notes)
Chapters 1, 14,27,28,29,30,31,32,33,34,35,36
- 3) Biology 11:
Chapters 3(3.4), 7,8,9 & App. A pp. 630-636

Questions for Review: Animalia

1. What are the 9 characteristics of animals given in your notes?
2. Differentiate between the subkingdoms Parazoa and Metazoa.
3. All animals are motile. Name 3 animals that are sessile in their adult stage?
4. Why is internal fertilization such an important adaptation? Explain why so few offspring are born to animals that reproduce using internal fertilization compared to those that use external fertilization.
5. Briefly describe and give an example of each type of symmetry.
6. The following terms may be used during a dissection: anterior, posterior, frontal, dorsal, lateral. What do they mean?
7. List, in order of complexity, the levels of organization in animals.
8. What are the 3 body layers found in most animals. Briefly describe each.
9. What is a coelom? Describe its significance in terms of evolution.
10. What is segmentation? Give 3 examples of segmented animals.

Questions for Review: Invertebrates

Phylum: Porifera

1. Identify the types of cells found in a sponge.
2. Describe the structure of a typical sponge.
3. Explain how a typical sponge eats.
4. Explain asexual and sexual reproduction in sponges.

Phylum: Cnidaria

1. Name 4 animals that are part of the Cnidarian phylum.
2. Where do all Cnidarians live?
3. What type of symmetry do jellyfish possess?
4. How many cell layers do coral have?
5. The sea anemone has a simple nervous system. Explain how a sea anemone will capture prey.
6. Explain the difference between a polyp and a medusa. Give an example of animals that have these body forms.

Phylum: Platyhelminthes, Nematoda, Annelida

1. What type of symmetry do worms have?
2. Flatworms are acoelomates. What does this mean?
3. What is meant by cephalization?
4. What is a coelom?
5. Compare digestion in platyhelminthes, nematodes and annelids.
6. What organ system is missing in tapeworms? Why has it evolved this way?
7. Compare respiration in flatworms and earthworms.
8. What is a one-way digestive system?
9. Describe segmentation in earthworms.
10. How does the presence of a coelom in earthworms make them so evolved compared to flat worms?
11. How do earthworms reproduce?

Phylum: Mollusca

1. Name and give an example of the 3 classes of mollusks.
2. What is a radula?
3. Describe how the different groups of mollusks move.
4. In which group of mollusks does cephalization not exist?
5. How do cephalopods capture and eat their prey?

Phylum: Echinodermata

1. If you were to find an organism on the beach, how would you know it was an echinoderm?
2. Does a starfish show cephalisation? Why or why not?
3. How does a starfish eat?
4. Briefly explain the functioning of a starfish's water vascular system.
5. Correctly identify the internal and external features of a starfish on a diagram.
6. How do starfish regenerate?

Phylum: Arthropoda

1. What are the general characteristics of arthropods?
2. What are the 2 sub-phylums associated with arthropods?
3. Other than insects, name 4 animals that are arthropods.
4. How do chelicerate bodies differ from those of the mandibulata?
5. What is an exoskeleton?
6. What do all insects have in common?
7. What is metamorphosis? Explain and give examples of the 2 types of metamorphosis insects go through.
8. Briefly explain feeding, digestion and excretion in grasshoppers.
9. How do grasshoppers breathe?
10. Insects show exceptional diversity. Give 5 examples of different insect adaptations.

Overall:

Select 2 invertebrates studied in class and describe them according to: habitat, nutrition and digestion, circulation, respiration, reproduction and special anatomical features.

Questions for Review: Vertebrates

1. What are the 3 basic characteristics of chordates?
2. List, in order from the least to the most evolved, the 5 major classes of vertebrates.
3. Describe how the skeleton and jaws of the fish in the classes agnatha, chondrichthyes and osteichthyes differ.
4. How does the swim bladder in a fish help it change the depth at which it swims?
5. Explain how fish breathe.
6. How is it believed that fish evolved into amphibians?
7. What are tetrapods? Which vertebrates are considered tetrapods?
8. Describe respiration in amphibians.
9. Why are amphibians so susceptible to pollution?
10. Why are amphibians not considered true land animals?

11. Why are reptiles considered true land animals?
12. Draw a diagram of a reptilian egg. Label the following parts of the egg and give the function of each part: chorion, amnion, allantois, yolk sac.
13. Give evidence that reptiles evolved into birds.
14. Explain 4 reasons as to why birds are able to fly.
15. Describe the differences in the development of the brain and heart in each of the classes of vertebrates.
16. Compare and contrast the development of offspring in each of the 3 groups of mammals.
17. Identify the characteristics of each group of vertebrate (fish, amphibians, reptiles, birds, mammals).
18. Select 2 vertebrates studied in class and describe them according to: habitat, nutrition and digestion, circulation, respiration, reproduction and special anatomical features.

Questions for Review: Evolution

1. How are fossils formed?
2. How do the fossils at the top of a sedimentary rock layer differ from those further down in the rocks?
3. How can we date a fossil? Explain in terms of the half-life of an isotope.
4. What are homologous structures? How can they be used as evidence of evolution?
5. What are vestigial organs? How can they be used as evidence of evolution?
6. Why do you think that the embryos of an alligator and of an ostrich are so similar? Discuss in terms of evolution.
7. How can DNA analysis be used to show that animals have been evolving over time?
8. Explain Darwin's theory of Natural Selection.
9. Give 3 examples observed in nature showing "Survival of the Fittest".
10. How would both Darwin and Lamarck have explained the following statement:
"Wolves have sharp teeth because..."
11. What is a mutation? How can it influence the evolution of an organism?
12. Select 3 of the animals from the African savannah that we saw during the movie "Challenge of Change". Discuss how they are so well adapted to their environment.
13. Select 3 animals we saw in the movie "Galapagos: The Islands that Changed the World". Show how they have successfully adapted to living on these islands.
14. Ecotourism is becoming increasingly important throughout the world. How do you suggest the government of Equador help conserve the Galapagos Islands?
15. What is a species?
16. Explain how isolation contributes to the formation of species. Define and give an example of each of the following types of isolation: geographic isolation, ecological isolation, temporal isolation, gametic isolation, mechanical isolation, behavioural isolation.
17. What is adaptive radiation? Give 3 examples.
18. What is convergent evolution? Give 3 examples.
19. What is meant by stabilizing selection? Give 3 examples.
20. What is meant by the terms catastrophism and uniformitarianism?
21. Do you believe evolution happened gradually (gradualism) or suddenly at certain time intervals (punctuated equilibrium)? Explain your choice.

ANIMALIA

Agnatha	Chondrichthyes	Mesoderm	Porifera
Amphibia	Cnidaria	Metazoa	Posterior
Annelida	Dorsal	Mollusca	Radial symmetry
Anterior	Echinodermata	Motile	Reptilia
Arthropoda	Ectoderm	Nematoda	Sessile
Aves	Endoderm	Osteichthyes	Specialization
Bilateral symmetry	Germ layer (2)	Parazoa	Sphericalsymmetry
Body symmetry	Mammalia	Platyhelminthe	Ventral

N W B R O I R E T S O P M A P R S O D E
 G O P O N A L E A D A K T R O M P S X N
 B W I X D I I R C R O A S I E N H T M D
 X I N T S Y E B T T M R R X M G E E A O
 A A L S A F S H I R O E S A C S R I D D
 D C E A I Z R Y E H T D M A P E I C I E
 O S S R T O I D M N P M E L L Y C H L R
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 V E N T R A L T R O F T G O T C Y L E T
 P K H C E G C M E E Y M U U Y R H E G Y
 I E Y R T E M M Y S L A I D A R Y C U N

INVERTEBRATES

Vocabulary:

Porifera

Amoebocytes
Asexual reproduction
Asymmetrical
Budding

Collar cells
Parazoa
Porocytes
Sexual reproduction

Spicules
Sponge

Cnidaria

Coral
Hydra
Jellyfish

Medusa
Nematocyst
Polyp

Radial symmetry
Sea anemone
Tentacles

Worms

Anus
Bilateral symmetry
Cephalization
Clitellum
Closed circulatory system

Coelom
Hermaphrodite
Nematodes
One-way digestive system
Open circulatory system

Platyhelminthes
Segmentation
Setae
Tapeworm

Mollusca

Aquatic
Bivalve
Bivalves
Cephalopod
Clam

Gastropods
Mantle
Muscular foot
Mussel
Octopus

Radula
Siphon
Snail
Squid
Terrestrial

Echinodermata

Endoskeleton
Madreporite
Marine

Radial symmetry
Sand dollar
Sea cucumber

Starfish
Tube feet
Water vascular system

Arthropoda

Abdomen
Camouflage
Carapace
Centipede
Cephalothorax
Chitin
Complete metamorphosis
Crab
Crustacean

Exoskeleton
Head
Incomplete metamorphosis
Insects
Jointed appendages
Lobster
Millipede
Mimicry
Molting

Nymph
Pheromone
Pupa
Shrimp
Society
Spider
Thorax
Tick

VERTEBRATES

Vocabulary:

agnatha
amphibia
aves
brain
cephalisation
cerebrum
chondrichthyes

chordate
dorsal nerve cord
endoskeleton
evolution
gill slits
heart
land

mammalia
notochord
osteichthyes
reptilia
spinal chord
spine
vertebrae

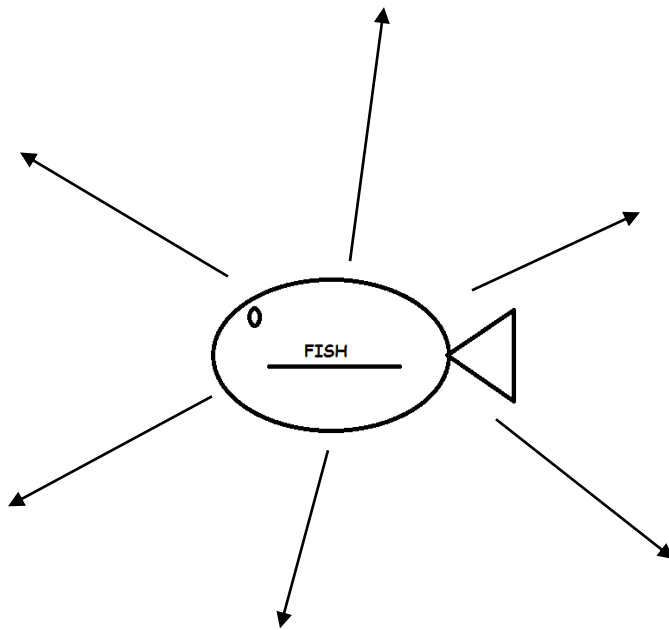
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B H G S T I L S L L I G R C S
C E N D O S K E L E T O N O U
H E A R T W A I L I T P E R D

CONCEPT MAP: THE FISHES

agnatha
bone
cartilage
chondrichthyes
coelacanth
ectothermic
gills

hagfish
jawless
lamprey
movable jaw
osteichthyes
pectoral fin
pelvic fin

ray
salmon
scales
shark
trout



AVESBIRDS OF A FEATHER FLOCK TOGETHER

Special adaptations

Create a concept map that shows your understanding of:

a) feathers



b) feeding adaptations

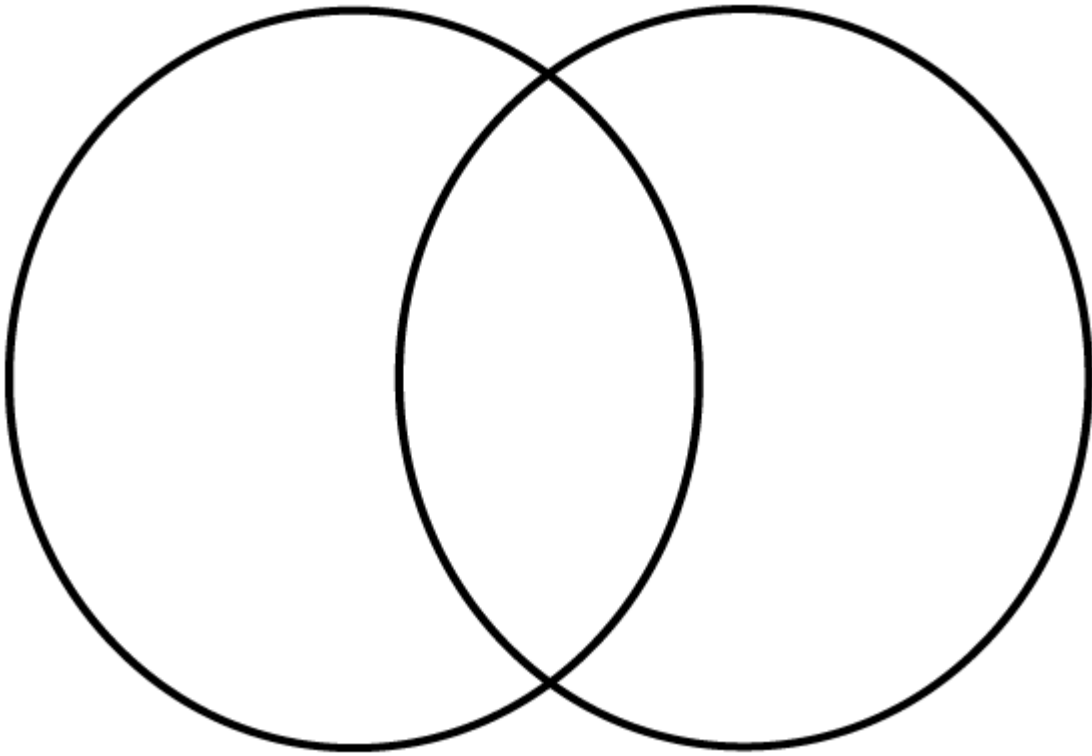


c) flight

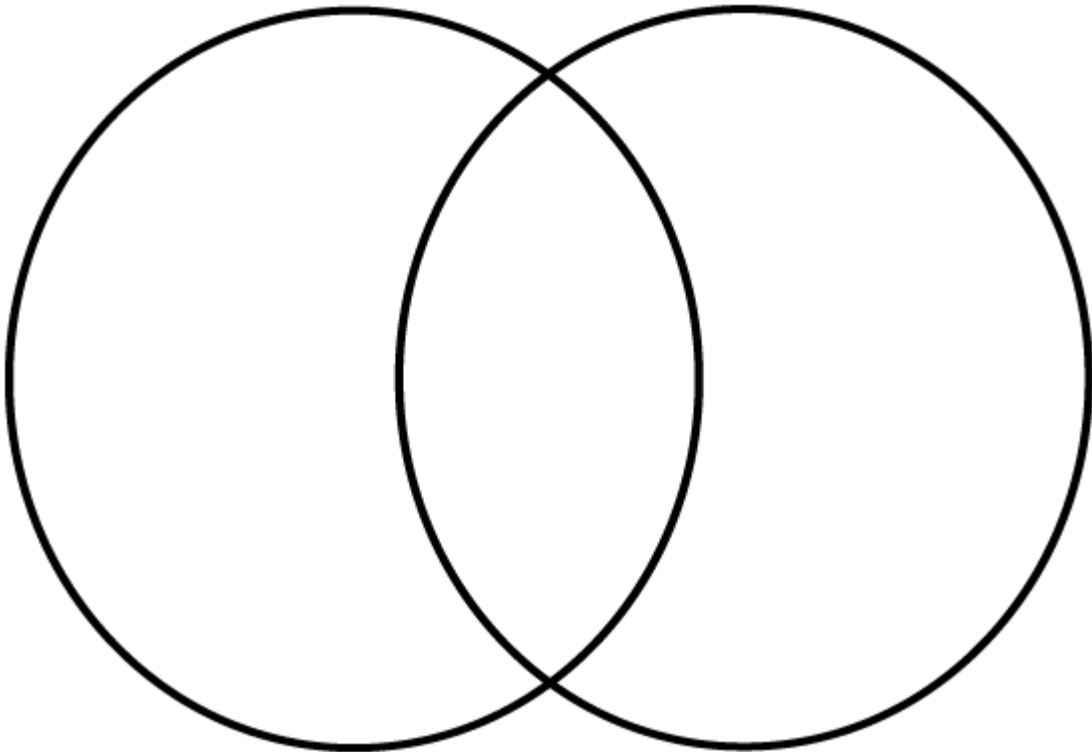


COMPARE AND CONTRAST

FISH & AMPHIBIANS

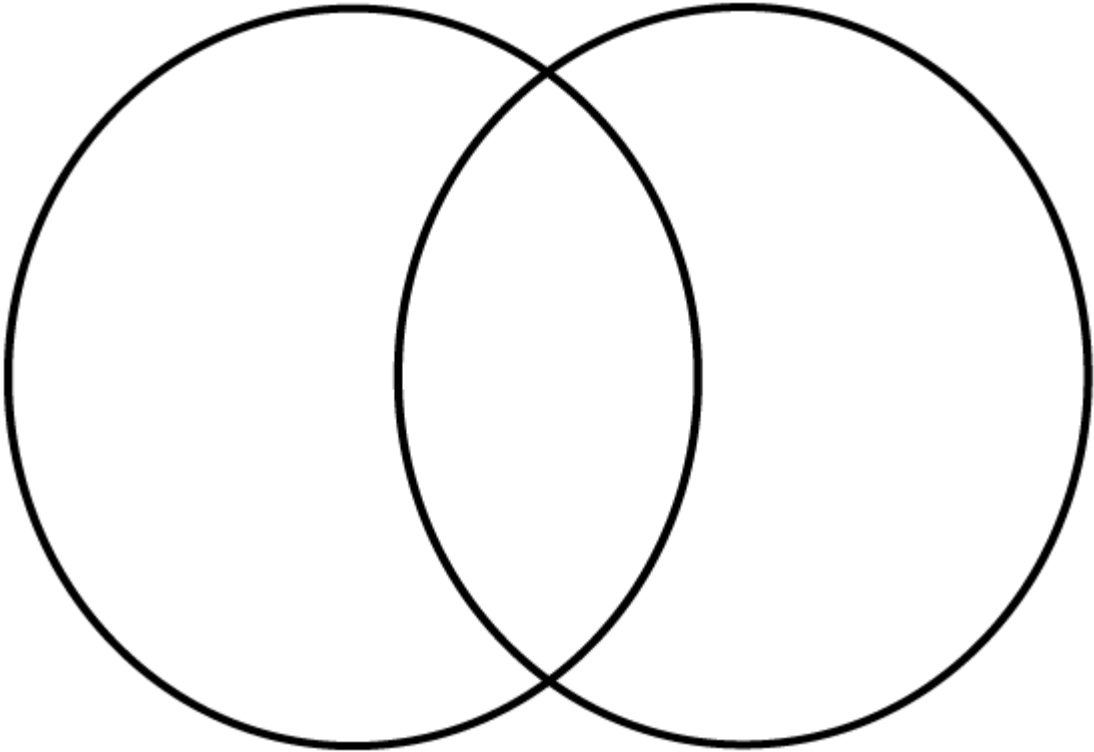


AMPHIBIANS & REPTILES

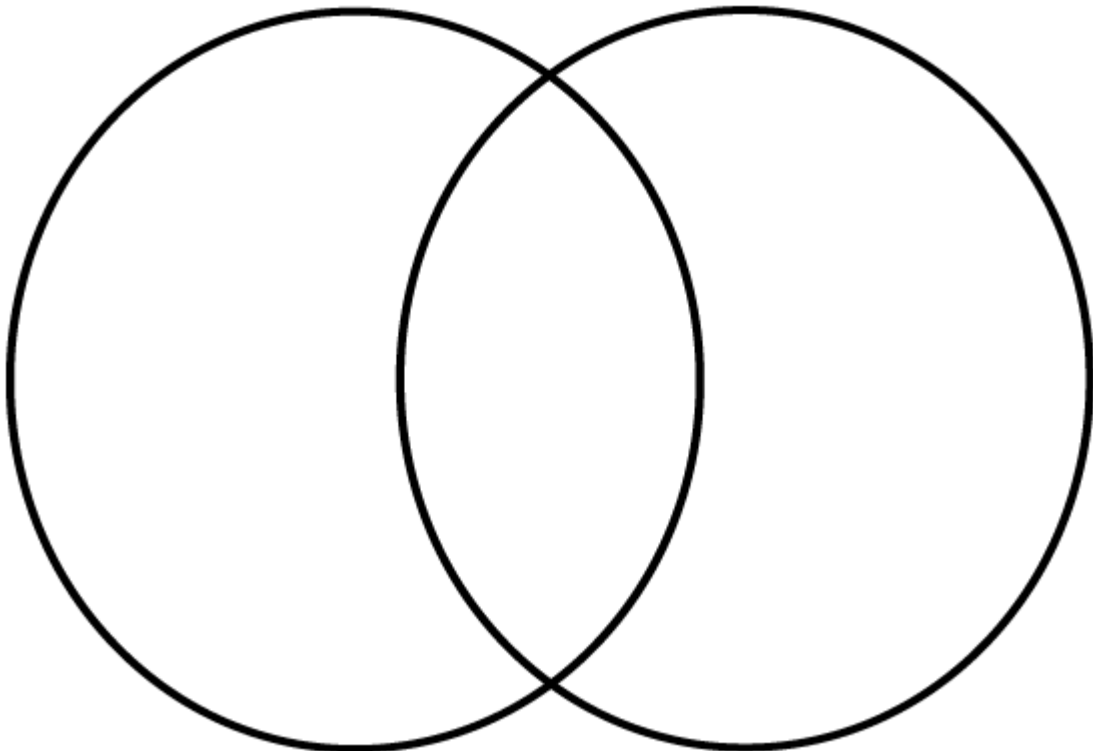


COMPARE AND CONTRAST

REPTILES & BIRDS

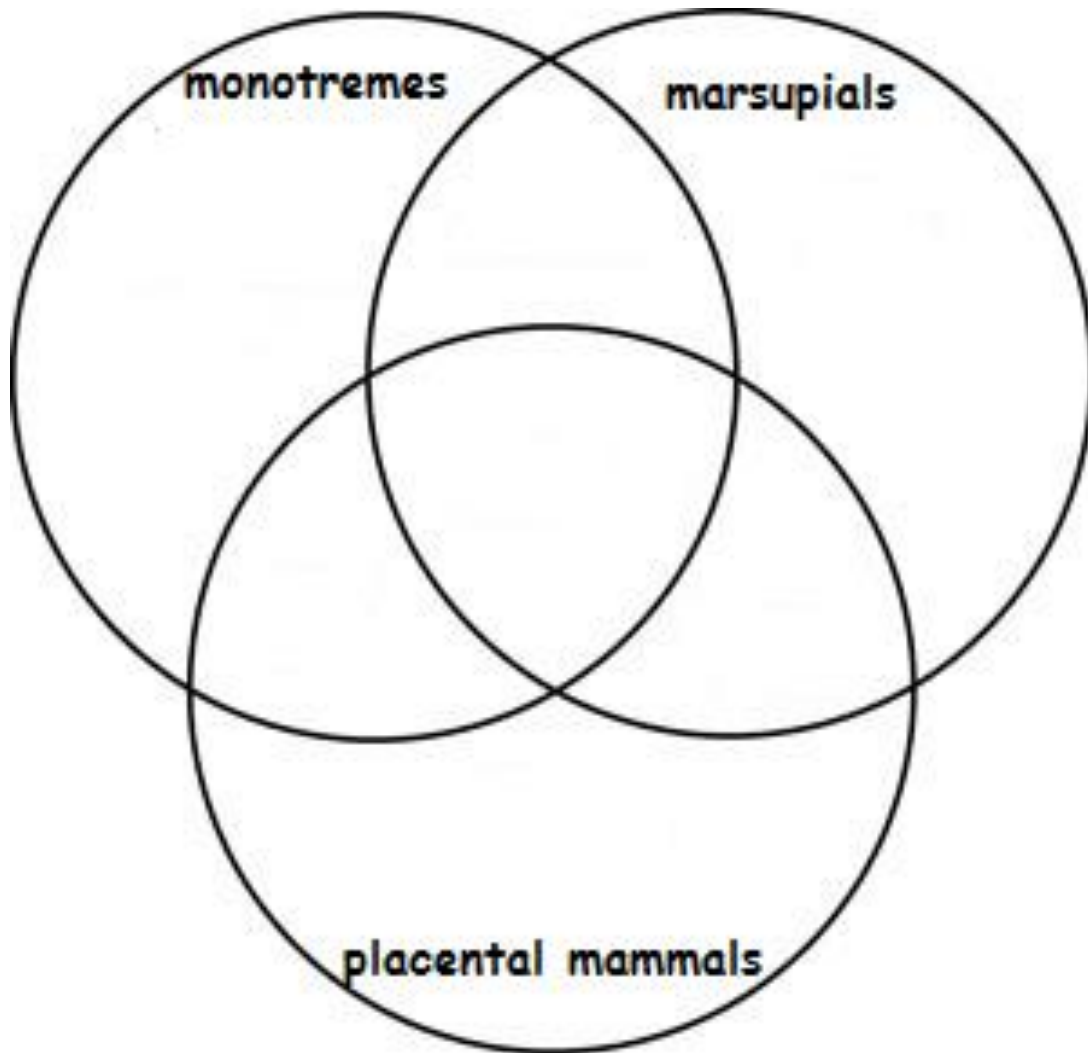


BIRDS & MAMMALS

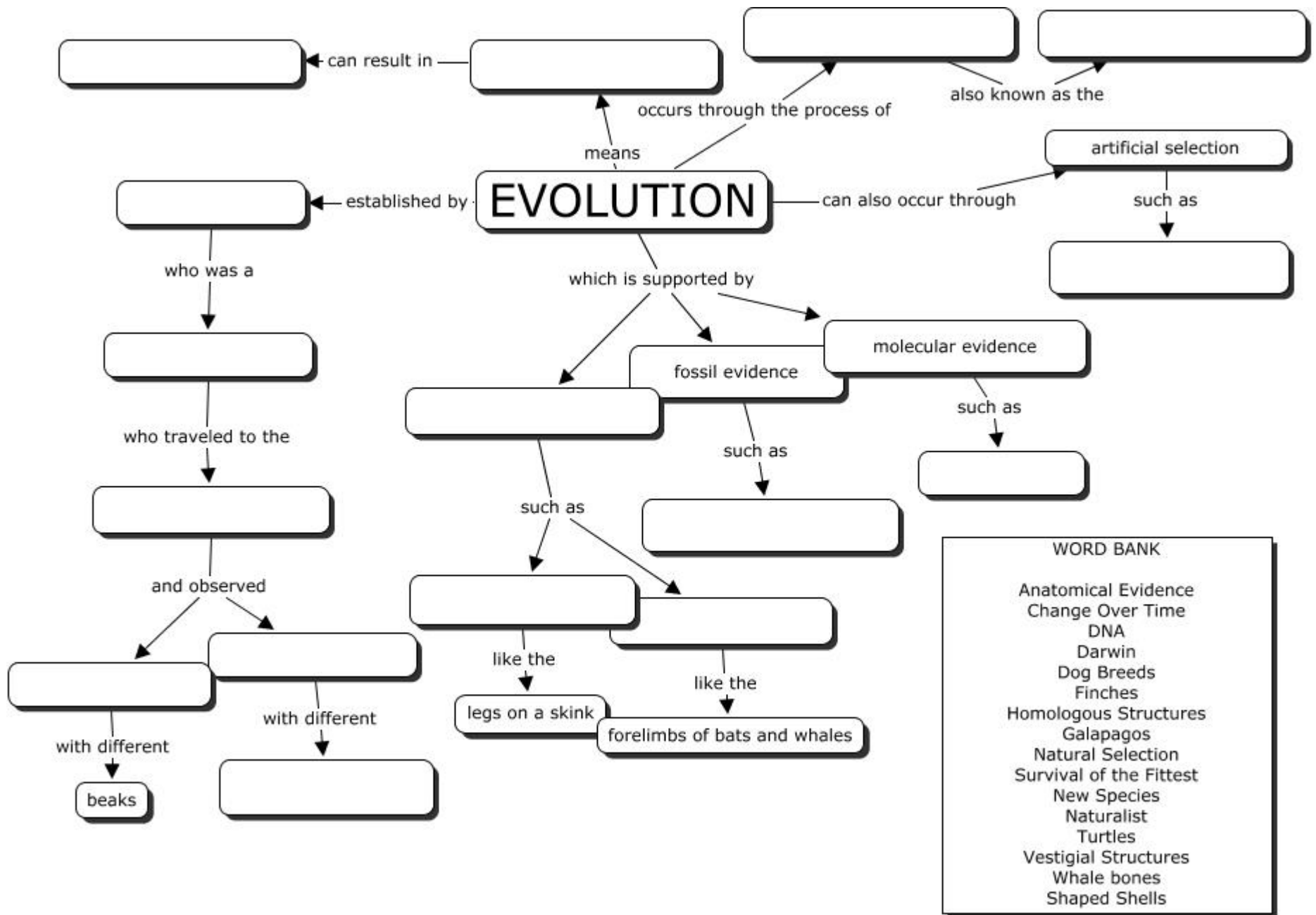


COMPARE AND CONTRAST

MAMMALS

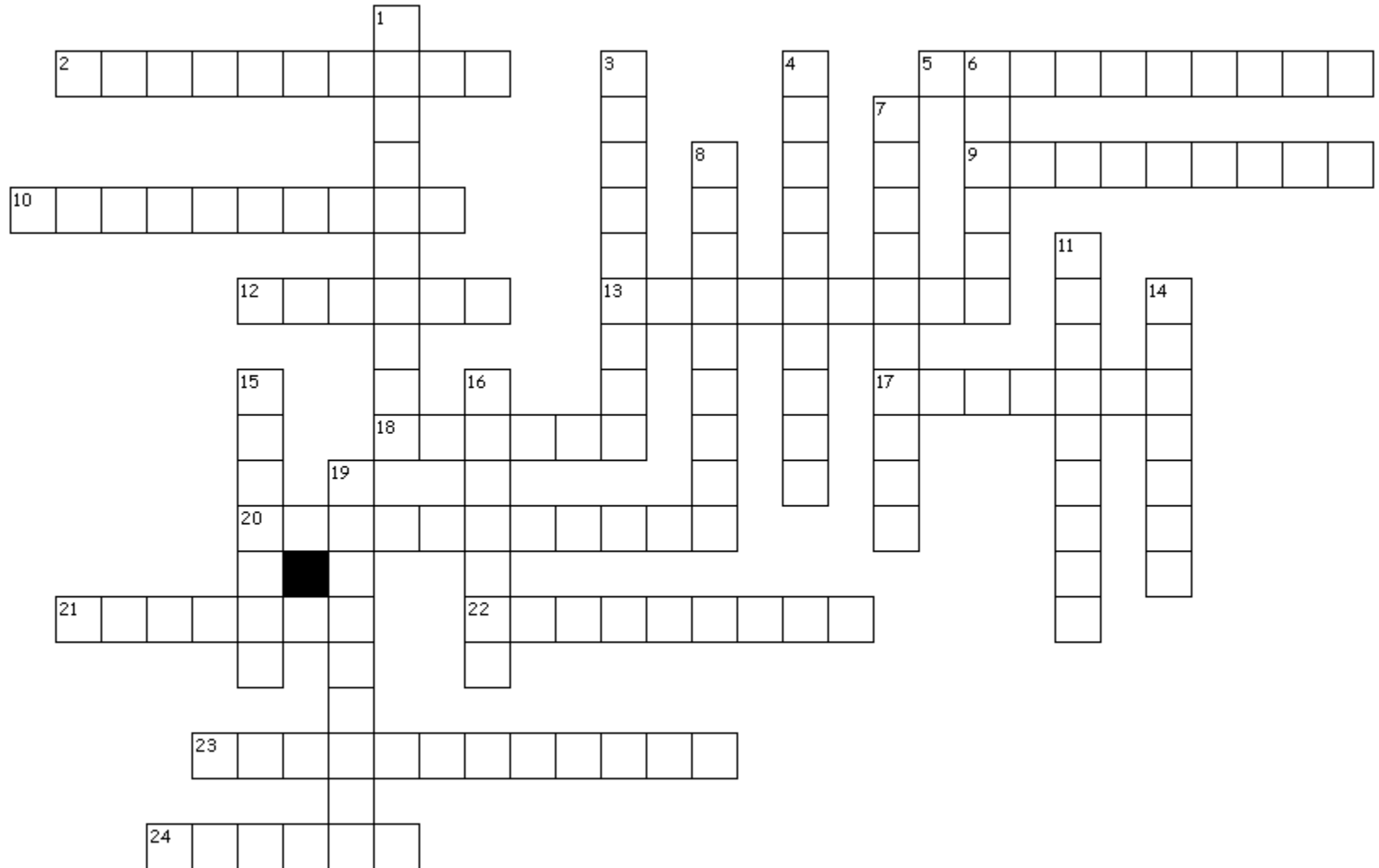


EVOLUTION CONCEPT MAP



- WORD BANK**
- Anatomical Evidence
 - Change Over Time
 - DNA
 - Darwin
 - Dog Breeds
 - Finches
 - Homologous Structures
 - Galapagos
 - Natural Selection
 - Survival of the Fittest
 - New Species
 - Naturalist
 - Turtles
 - Vestigial Structures
 - Whale bones
 - Shaped Shells

Evolution Crossword



Down

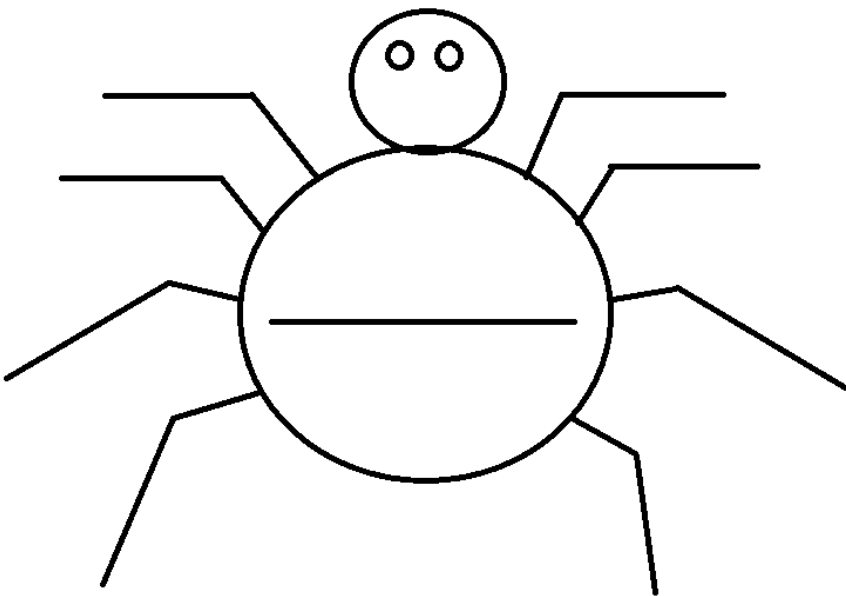
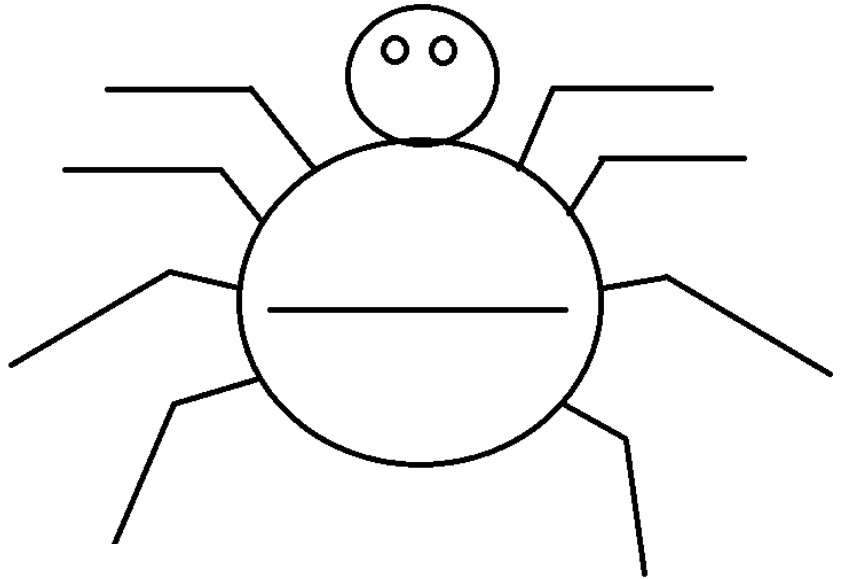
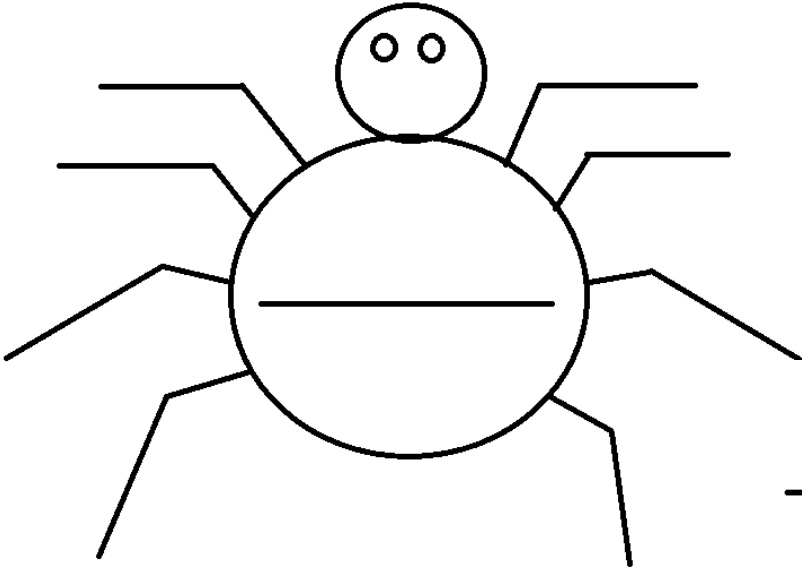
1. when two unrelated organisms look alike (sharks & dolphins)
3. refers to the variety of living things
4. when organisms disappear from the earth
6. proposed the theory of evolution by natural selection
7. formation of new species
8. change over time
11. required for new species to form
14. preserved remains of ancient organisms
15. had different shaped beaks depending on the island they were from
16. the study of the earth
19. structures that have no current function

Across

2. structures that are similar
5. a characteristic that helps an organism survive
9. when one species evolves into many; adaptive _____
10. pattern of evolution where a species is stable for a long time then rapidly changes; _____ equilibrium
12. the name of Darwin's book; the ____ of species
13. process by which evolution occurs; natural _____
17. had different shaped shells depending on the island they were from
18. well-supported testable explanation
20. when two species evolve together
21. natural selection is also known as the survival of the _____
22. islands that Darwin visited
23. principle that states that living species are descended from ancient ones; descent with _____
24. the name of the ship that Darwin travelled on

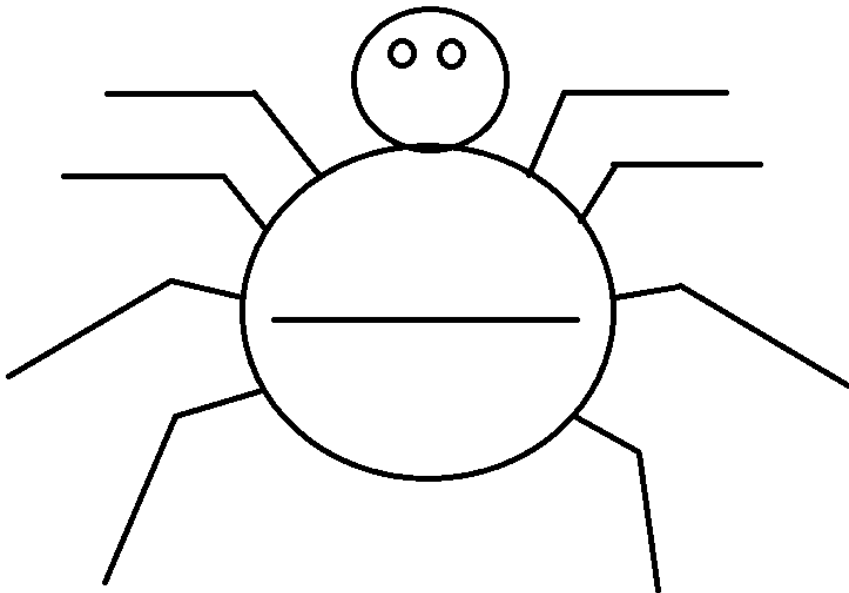
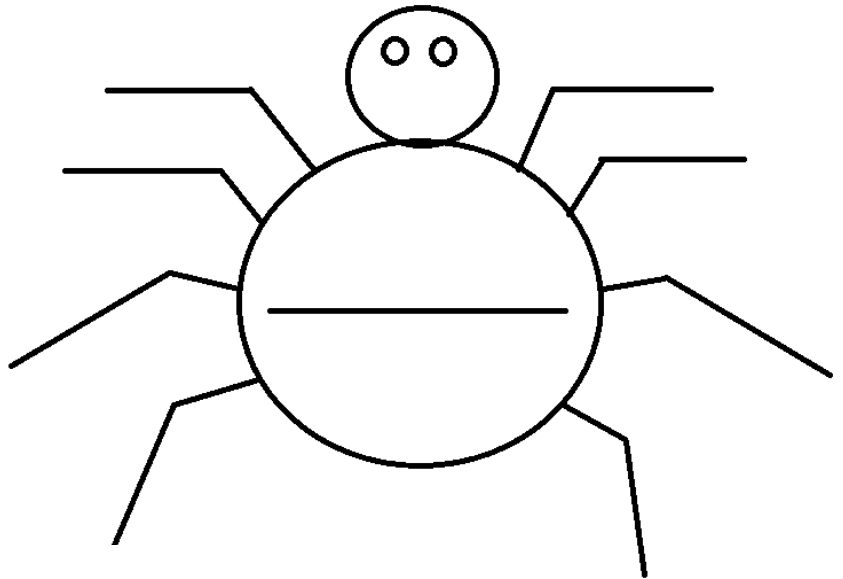
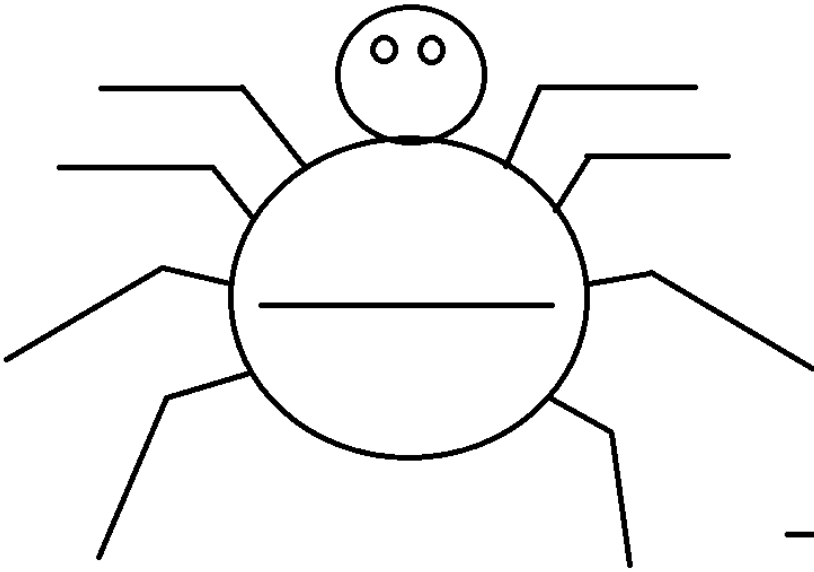
SPIDER MAPS

What do I know about _____?



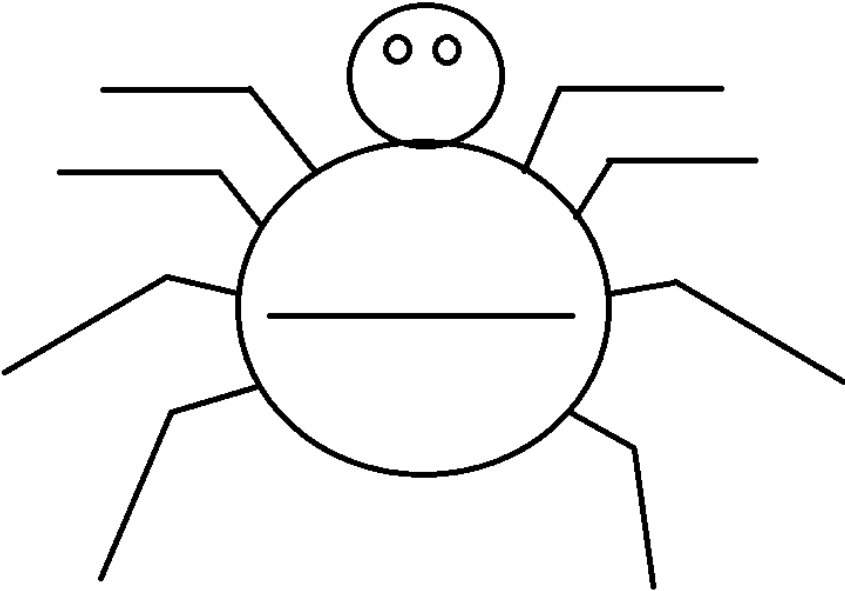
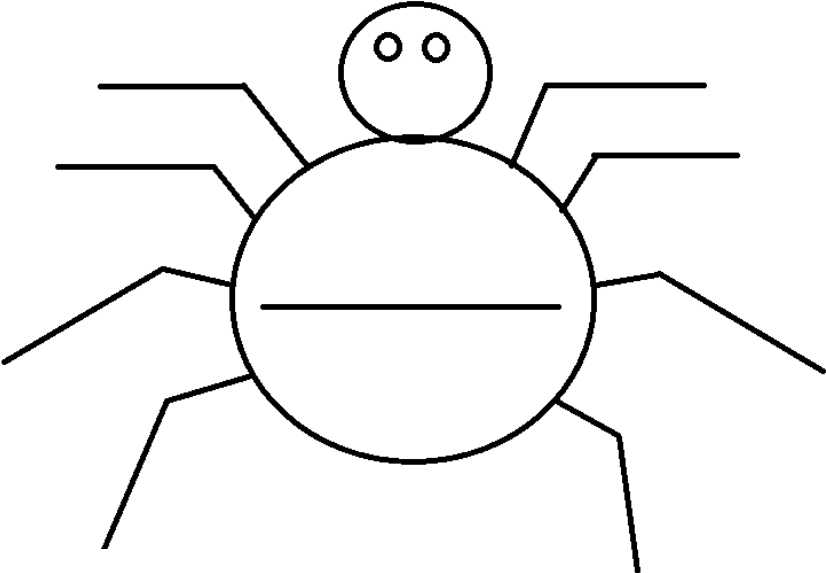
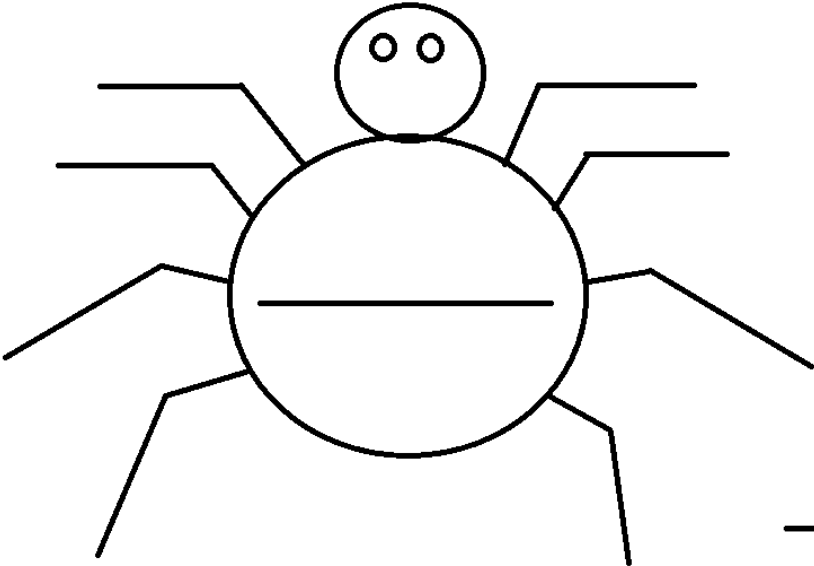
SPIDER MAPS

What do I know about _____ ?



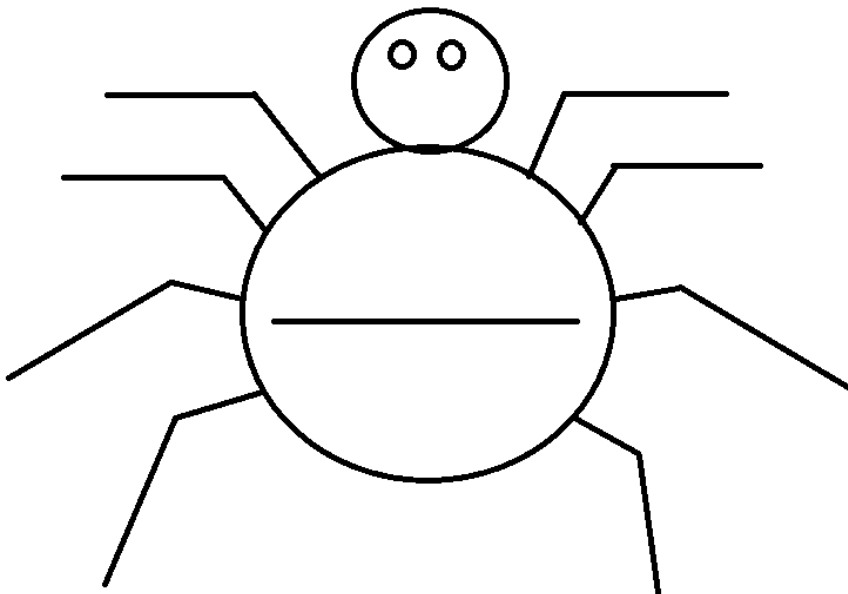
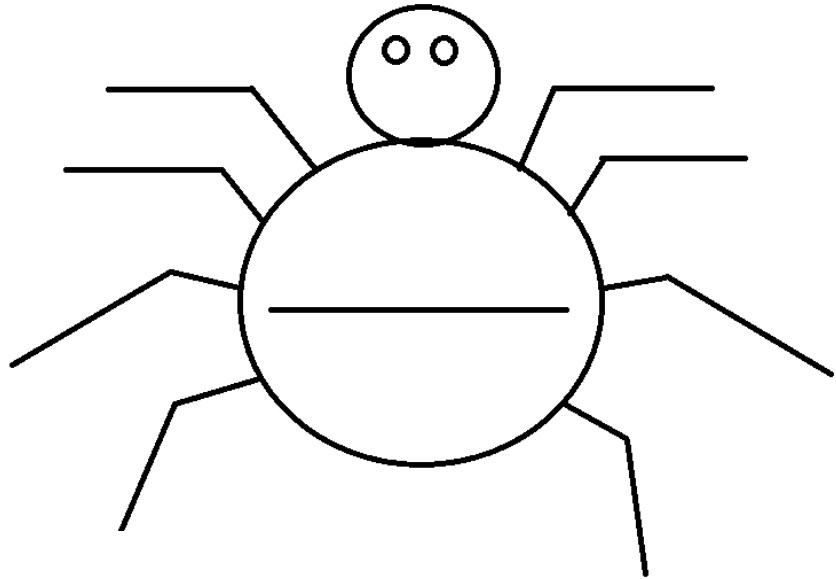
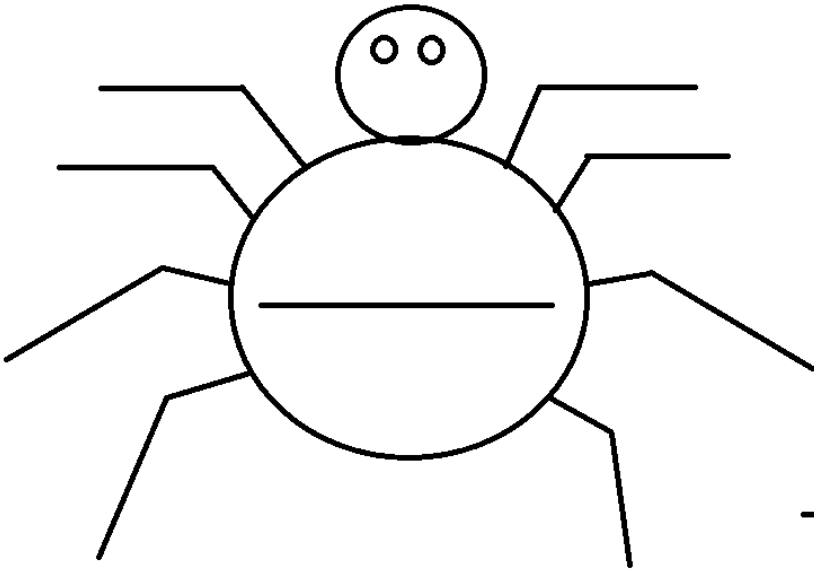
SPIDER MAPS

What do I know about _____ ?



SPIDER MAPS

What do I know about _____ ?



One of these words is not like the others...

Circle the word that does not belong in each group. Justify your choice.

agnatha
bony skeleton
osteichthyes
pectoral fin
scales

cephalisation
fish
human
starfish
worm

crab
exoskeleton
metamorphosis
molting
spider

gastropod
mandible
mantle
muscular foot
radula

endoskeleton
jellyfish
madreporite
radial symmetry
tube feet

bear
eagle
ectothermic
endothermic
giraffe

annelid
coelom
earthworm
hermaphrodite
nematode

abdomen
endoskeleton
exoskeleton
head
thorax

arachnid
arthropod
cephalod
crustacean
myriapod

cerebrum
diaphragm
feather
hair
mammary glands

amniotic egg
amphibian
external reproduction
moist skin
water

scales
ectothermic
claws
basking
tuna

complete metamorphosis
egg
larva
nymph
pupa

jointed appendages
exoskeleton
chitin
sebaceous glands
open circulatory system

2 chambered heart
swim bladder
caudal fin
cartilage
hollow skeleton

sponge
bird
jellyfish
snake
frog

radial canal
tube feet
madreporite
stomach
ring canal

bivalve
muscular foot
filter feeder
mantle
siphon

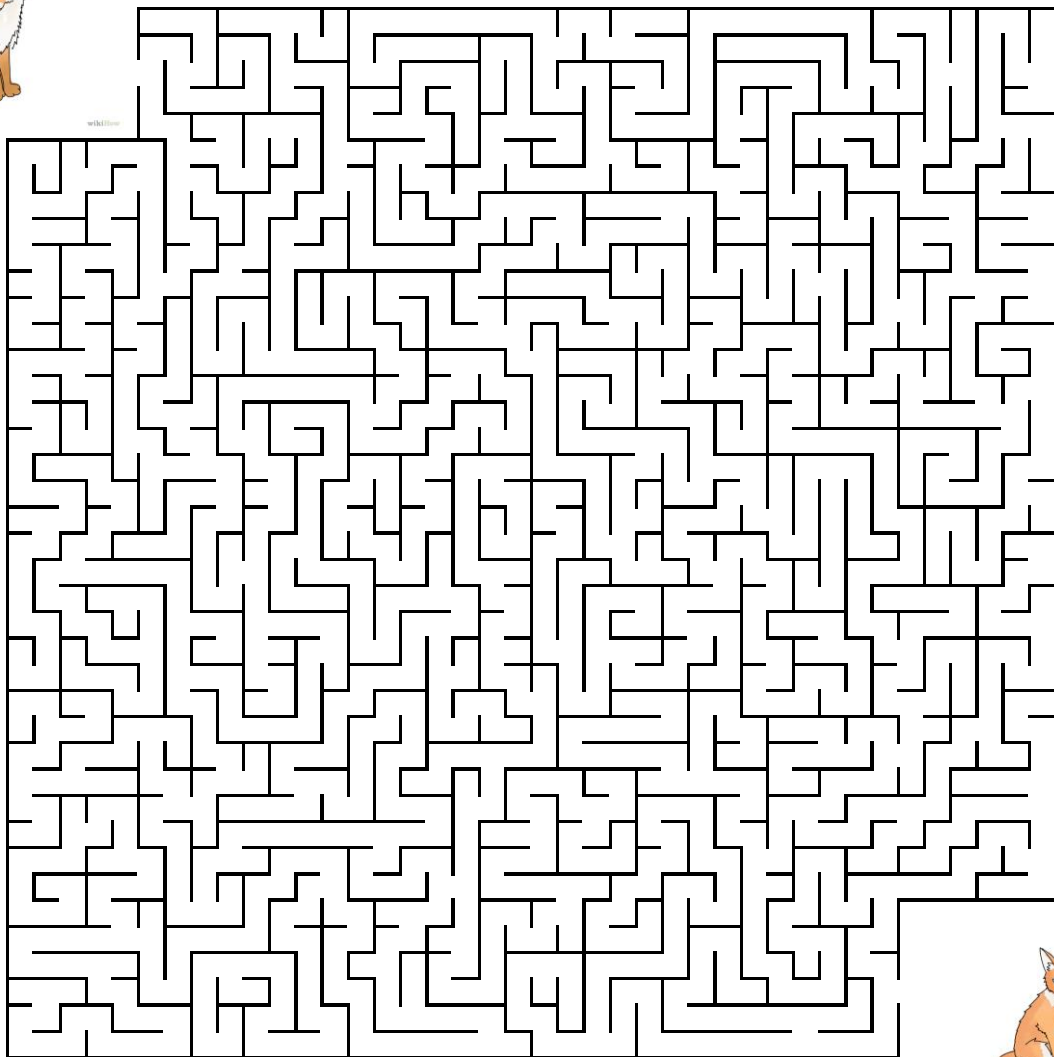
Darwin
natural selection
finches
survival of the fittest
Lamarck

bilateral symmetry
cephalisation
anterior
ventral
sessile

SPECIATION

A group of red foxes (*Vulpes vulpes*) has been separated from the other members of their species. If they do not find their way back they won't be *Vulpes vulpes* anymore!

Explain why this could occur.



The Formation of Species

Fill in the blanks using the words in the list below:

Behavioural

Mutations

Viable

Gametic

Speciation

Ecological

Geographic

Species

Mechanical

Temporal

Organisms belong to the same _____ if they look similar and can produce _____ offspring. The formation of new species, _____, is due to the evolution of genetic differences between individuals due to _____. The genes of each individual groups become so different, they no longer share a common gene pool and become two distinct species.

The genetic makeup of the individuals will change if they are separated due to physical or biological reasons.

Male bowerbirds make elaborate nests to impress the females. Different species of bowerbirds make different types of nests. This would be an example of _____ isolation.

The penises of male damselflies are illustrated below.



Because of the changes in the shape of the genitalia, the males can only reproduce with certain females. This is an example of _____ isolation.

Sometimes, the organisms mate and different times. This _____ isolation prevents them from being able to reproduce together.

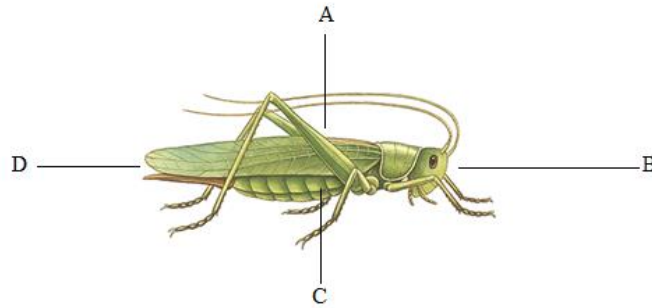
In some cases, eggs and sperm can meet however, no fertilisation occurs. This is due to _____ isolation.

_____ isolation occurs when animals cannot mate with each other because of a physical barrier such as a river or mountain range. One reason lions and tigers cannot reproduce, for example, is because they live on different continents.

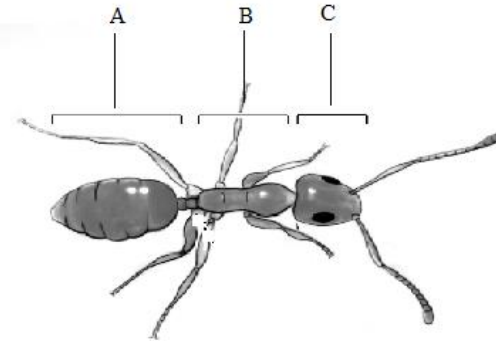
Two organisms might live in the same habitat but could occupy a different area. An insect could live on tree branches while another lives underground. They would become different species due to _____ isolation.

Labelling

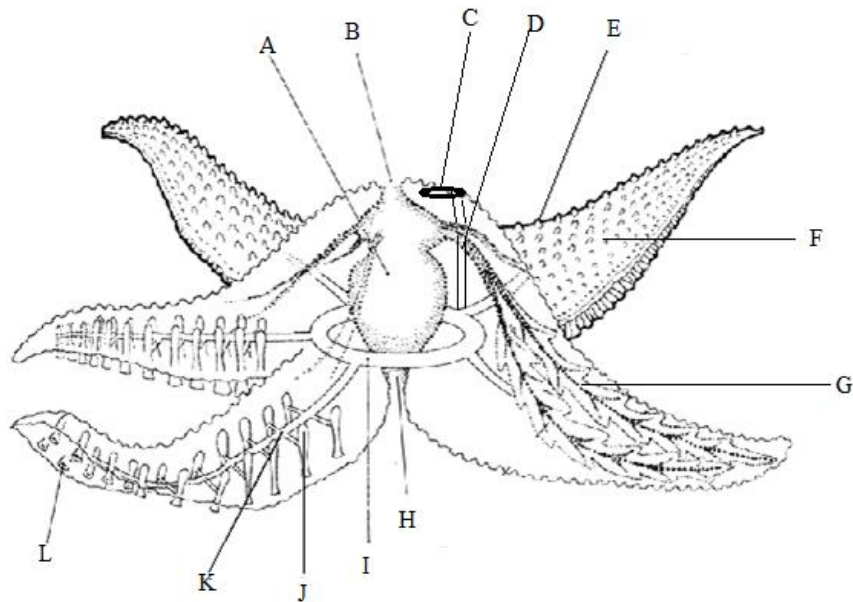
A) Label the grasshopper using the terms describing an organism with bilateral symmetry.



B) Identify the 3 body parts of the insect.



C) Identify all the structures labeled in the diagram. Colour the water vascular system in blue and the digestive system in green.



ECOTOURISM – We're all in this together!

Protestors are picketing outside the government offices in Quebec City. The government wants to develop a National Park near Quebec's northern most town, Ivujivik. The protestors agree that this area of the province is beautiful. The arctic tundra is unique; the flora, fauna and way of life of the northern people needs to be seen! They want the government to ensure that the development of this park respects the ecotourism rules.

Use the illustration below to show your understanding of ecotourism.

- On the picket signs write down the rules of The International Ecotourism Society (TIES).
- Indicate in the speech bubbles a way this rule could be addressed/enforced in the new park.

