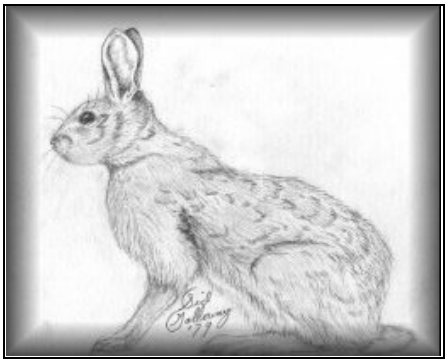
Write the correct word in the blanks to show directions on an animal body: ** Word Bank (Posterior, Ventral, Dorsal, Anterior)

	_____ top surface	
_____ front end		_____ hind end
	_____ bottom surface	

Write the correct word in the BOXES to identify the correct SYMMETRY: ** Word Bank (bilateral, radial, asymmetrical, spherical)			
sphere-shaped, the body can be divided into two identical parts by any plane passing through the center.	the body can be divided into two identical halves by any plane that passes through the longitudinal axis.	the body can be divided into two identical halves (mirror images) by only one specific plane passing through the longitudinal axis.	the body has no definite shape and cannot be divided into two identical halves.

Animals:

- Multicellular, also need water, food, and oxygen to survive
- Heterotrophs
  - * Carnivores (Predators of Prey) (Eat other animals)
  - * Herbivores (Eat plants)
  - * Omnivores (Eat plants and other animals)

- Backbone of Classification of Animals
  - * 95 % Invertebrates (No backbone – jellyfish, worms, snails, spiders, insects)
  - * 5 % Vertebrates (Backbone – fish, amphibians, reptiles, birds, mammals)

- Adaptation through natural selection
    * The “Family” or “Genus” level of classification represents a biblical “Kind”.
    * The “Dog” kind includes wolves, foxes, dogs, etc…..
    * There are many different species within each “Kind”.
    * Mutations always result in a loss of information, never new information.
    * So, only changes within “Kinds” (Dogs: wolf to a poodle) can occur.
    * Impossible for one “Kind” to become a new “Kind”. (Reptile to a bird)
    * “Kinds” of animals do adapt (change), due to environmental pressures.
      (size, color, hair length, teeth shape, ear length, etc.)

Sponges (asymmetrical)

- Live in both salt and fresh water.

- Not plants, since they are heterotrophs (take food into their bodies).

A sponge’s **body** is like a bag with lots of holes called **pores**.

* No specialized tissues.

It **feeds** by filtering (straining) food particles from the water.
It gets **oxygen** from the water by diffusion into its cells.
“**Spikes**” all throughout its body give it extra support.

Reproduction is both asexual and sexual.

- Asexual (budding)
- Sexual (each can produce eggs and sperm)
* After fertilization, a **larva** is produced.
* The larva looks very different from an adult.

Cnidarians – hydras, jellyfish, anemones, corals

- All have radial symmetry
- Two body plans (Some go through both as stages):
    - Polyp = vase shaped (hydra, anemone, coral)
    - Medusa = bowl shaped (jellyfish)
- All are carnivores using stinging cells = **nematocyst**
- They do have specialized tissues
- Digestive tract has only one opening for food & waste

Worms: Three Major Phyla

- Flatworms

- Roundworms

- Segmented Worms

What Worms have in common:

- **Invertebrates**
- **Bilateral symmetry**

- **Long bodies without legs**
- **Tissues, organs, organ systems**
- **Heads and tails (Brain = knot of nerves in head)**
- **Reproduction**
    - **Both asexual and sexual types of worms**
    - **Asexual by breaking off pieces that grow**
    - **Some have separate male and females**
    - **Others are hermaphroditic (both in one)**

- **Regeneration = regrowth of body parts (earthworm tail)**

Flatworms

- Most flatworms are parasites (tapeworms, etc)

- Tapeworms can grow to 10 meters (30 feet)

- Planarian = free-living scavenger, not a parasite

- Two big eye spots on head
- Smelling cells to detect food
- Feeds like a vacuum cleaner
  (It sticks a feeding tube into food, dissolves some of it and then it sucks up the liquid food. Wastes go back out the same front end of the feeding tube.)

Roundworms

Have a digestive system different from cnidarians or flatworms.

Roundworms digestive tract is like a tube, open at both ends: (Mouth / Anus)

Segmented Worms:

- Bodies made of linked sections called segments
  (Earthworms have more than 100)

- Each segment has repeated sets of organs

- Nerve cords and a digestive tube run length of the body

- Digestive tract like roundworms (one-way tract)

- Closed circulatory (blood) system
  (blood moves only within blood vessels)

- Earthworms tunnel in the ground, eating decayed material
  (They are good for gardens and farmers' fields.)

Chapter 11 Mollusks, Arthropods, Insects,

11.1 Mollusks – Invertebrates with soft bodies

- **Bilateral symmetry**
- **MANTLE = thin layer of tissue which produces the shell**
- **Kidneys which remove wastes**
- **Gills on water-dwelling mollusks to get oxygen from water**
- **Radula = flexible ribbon of tiny teeth (like sandpaper)** (250,000 teeth)
- **Foot (snails crawl on it)**

Three Major groups of Mollusks:

1. Gastropods – snails and slugs

2. Bivalves – two shelled (**Giant Clam** Filter feeders, clams, oysters, etc.)
- Use mucus covered gills to catch food particles

3. Cephalopods – tentacles (octopuses, squids, etc.)

- **Suckers sense touch and taste**
- **Camo-capable**
- **Large eyes with great vision**
- **Most complex invertebrate nervous system and brain**
- **Very smart and learn quickly**

11.2 Phylum – Arthropod ("Joint Leg")

- **Invertebrates**
- **Exoskeleton** made of **Chitin**, so it must **molt** (shed old skin to get bigger)
- **Segmented** body (Insects 3) (Arachnids 2) (Crustaceans 2 or 3)
- **Jointed** appendages
  * Legs (Insects 3 pairs) (Arachnids 4 pairs) (Crustaceans 5 or more)
  * **Antennae** (Insects 1 pair) (Arachnids 4 pairs) Crustaceans 2 pair)
- Open circulatory system (blood flows freely, not in tubes/vessels)
- Most reproduce sexually, with internal fertilization
- Metamorphosis (body changes dramatically during life cycle)

Major Groups of Arthropods:

Crustaceans – Crawfish, crabs, lobsters, etc
Arachnids – spiders, mites, ticks, scorpions

Centipedes – venomous predators with 1 pair of legs for each segment
("centipede" means "hundred feet - 100 pairs)
Millipedes – herbivores with two pairs of legs on each segment
("Millipede" means "thousand feet")
Insects – 3 sections, six legs, 1 pair antennae, usually 1 or 2 pair of wings

11.3 Insects:

Camouflage
- God included information in the genetic code for adaptation.
- Now adapted to the predator / prey competition in the "wild" kingdom

Insect Metamorphosis – Two Kinds:

1. **Complete** Metamorphosis
   a. egg
   b. **larva** = looks different from adult
   c. **pupa** = inside a protective case
   d. adult = emerges from case

2. **Gradual** Metamorphosis
   a. egg
   b. **nymph** (looks like a little adult & grows)
   c. adult

11.4 Chemistry of Communication:

Pheromones = a chemical released by one animal that affects the behavior of another of the same species.

- Used to attract mates, to recognize colony members, to leave a trail to food, etc.

- Pest Control (Pheromones can be used to control pest, by attracting and killing them)
(electric light bug zappers)

Bioluminescence (Fireflies, etc.) Chemical light

11.5 Echinoderms (Sea stars, sea urchin, etc.)

- Radial Symmetry
- "Spiny skinned", yet supported by an endoskeleton of spiny plates made of calcium.
- Legs are 5 or multiples of 5
- Internal water vascular system, to control tube feet.
- No brain, yet sea stars hunt for crabs, etc.