# Classification

<table>
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<tr>
<th>Category</th>
<th>Scientific Name</th>
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<tr>
<td>Kingdom</td>
<td>Animalia</td>
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<td>Phylum</td>
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<td>Class</td>
<td>Amphibia</td>
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<tr>
<td>Order</td>
<td>Anura (&quot;without a tail&quot;)</td>
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<td>Ranidae</td>
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**Scientific Name:** *Rana pipiens*

**Common Name:** Grass Frog or Leopard Frog
External Anatomy

* Draw External Dorsal View
Skin

- smooth and loosely held to the body
- dark on top and light on the bottom (camouflage)
- patches of color due to pigment cells called **chromatophores**
- **mucus cells** produce a secretion that
  a) prevents underlying skin from drying out
  b) keeps it moist for respiration
- **poison cells** produce a bitter secretion in some (protection)
- rich supply of blood vessels for gas exchange (respiration)

Limbs

- hind legs (hind limbs)
  long and muscular with 5 toes which are webbed
  positioned on side of body
  used for hopping and swimming

- front legs (forelimbs) *note thumbpads of males!*
  short and stubby with 4 toes which lack claws/nails
  positioned on side of body
  used as shock absorbers when landing

Head

- two bulging eyes to see above water
- paired nostrils for smelling and breathing
- **tympanic membrane** for hearing
- 3rd eyelid (**nictitating membrane**) to protect the eye
Mouth Cavity

- large so they can swallow food whole
- 2 sets of teeth on upper jaw used to hold prey (not for chewing)
  - maxillary teeth are very small along outer edge of jaw (many)
  - vomerine teeth are larger pair in roof of mouth
- two internal nostrils (internal nares) used for smelling and breathing
- two eye orbits used to help swallow food
  (eyes push down and squeeze food to back of mouth)
- eustachian tube openings let air enter/leave ear to equalize pressure
- glottis is the opening to trachea (found on lower jaw)
- vocal sacs are found in males (help produce sound to attract females)
- tongue is long and sticky; attached at front and flips out to catch food
Internal Anatomy
Opening up the Frog

1) Lay frog on dorsal side (on its back)
2) Insert scissors just above anal opening
3) Make incisions as shown, but NOT TOO DEEP!
4) Pin skin back putting pins at 45° angles
5) Repeat incisions for muscle layer
6) Keep slightly to the right of the midsagittal line
7) Angle scissors to cut through breastbone (to avoid heart!)
8) Reinsert pins to hold skin and muscles back
9) Draw the first internal view as you see it

***Do the FIRST INTERNAL VIEW drawing now before moving anything!***

NOTE: Remove fat bodies, oviducts and eggs on one side only if you have them. If you're not sure at any point, ask!
Body Systems
Digestive System

- **carnivores**: usually feed on worms and insects
- use teeth to hold food while swallow it whole
- sticky tongue flips out from back to catch food

- **mouth**
- **pharynx**
- short **gullet** *(esophagus)*
- **stomach** *(pyloric valve* controls flow out)*
- **sm intestine** *(duodenum + ileum)* supported by **mesentery**
- 3-lobed **liver** produces bile which is stored in the gall bladder
- **gall bladder** releases the bile through bile duct into duodenum
- **pancreas** is flat and located in mesentery btw stomach and sm intestine
- secretions from pancreas enter duodenum *(enzymes act on 3 major nutrients)*
- cells of intestine also secrete enzymes to complete breakdown of food
- end products of digestion are absorbed from small intestine
- wastes pass into **large intestine**
- then into the **cloaca** and out through the **anus / cloacal opening**

**Cloaca** - space that receives the following and releases them into the environment:
- wastes from digestive system *(feces)*
- wastes from excretory system *(urine)*
- sex cells from sex organs *(eggs or sperm)*
Urinary System

2 kidneys - long, dark, along back (dorsal) surface

ureters (tubes that carry liquid waste from kidney to bladder)

urinary bladder (stores liquid waste until time of elimination)

cloaca

* Draw Urogenital System (Show urinary system on 1 half, reproductive on other)
Reproductive System

**Male**
- two bean-shaped testes; creamy white
- located one on each side of the spine on anterior end of kidney
- sperm leave testes through vasa efferentia and enter kidneys
- sperm then travel down ureter into cloaca
- during amplexus, sperm are released from cloaca over eggs of female

**Female**
- 1 pr large bi-lobed ovaries
- eggs burst through the ovary wall and enter body cavity
- muscles push eggs to top of abdominal cavity where they enter oviduct
- eggs pass down oviduct and are released out cloaca
- eggs can be stored in ovisac or uterus until mating

**Amplexus**
- male frog approaches female from behind
- uses enlarged thumbpads on forelimb to push eggs out of female
- male releases sperm over eggs as they are released from female
- increases the chances of fertilization occurring!
Respiratory System

- gas exchange through their skin (O₂ diffuses into capillaries, CO₂ out)
- lungs are thin walled sacs that assist in mouth breathing when active
- lining of mouth is thin and moist with lots of blood vessels for respiration

Steps in Breathing

1) with mouth closed, mouth floor lowers, drawing air in through nares
2) nares close and mouth floor rises, forcing air through glottis into lungs
3) mouth floor drops again, pulling air back into mouth from lungs
4) air is passed back and forth several times to allow more gas exchange
5) nares open and mouth floor forces air back out into atmosphere
Nervous System

The Brain

- found inside cranium (skull)
- protected by 3 membranes as well as cerebrospinal fluid
- divided into 5 specific regions starting from the anterior end

1) **olfactory lobes** (2) - detect smell; connected to nostrils by olfactory nerves
2) **cerebrum** (2 long lobes) - center of instinct and intelligence
3) **optic lobes** (2) - center of sight; connected to eyes by optic nerves
4) **cerebellum** (1) - controls coordination
5) **medulla oblongata** (1) - joins the spinal cord; controls life support activities

The Nerves

- 10 pr cranial nerves; these do not enter spinal cord, but go directly from brain
- spinal nerves branch off spinal cord, going to and from muscles, glands, etc.

* Draw Brain (head region)
Circulatory System

The Heart
- has 3 chambers; 1 ventricle + 2 atria (right atrium and left atrium)
- protected by fluid filled sac called the pericardium

Circulation in the Frog
- right atrium receives blood from the body (except lungs)
- left atrium receives blood from lungs
- both atria contract when full and force blood into ventricle
- ventricle contracts to push blood into the conus arteriosus
- conus arteriosus divides into right and left truncus arteriosus
- each truncus divides into three arches to supply body tissues:
  (8) carotid arch - supplies head region
  (7) aortic / systemic arch - join to form dorsal aorta - supplies rest of tissues
  (6) pulmocutaneous arch - forms branches that go to pick up oxygen
Some of the Major Vessels

Arterial System

Each Truncus Arteriosus Divides into:

1) carotid arch
   - carries blood to head region

2) aortic arch / systemic arch
   - loop around heart and join
   - form dorsal aorta

   dorsal aorta has several branches
   a. brachial / subclavian artery - front limbs
   b. coeliacomesenteric artery branches into:
      coeliac artery - stomach, liver, pancreas
      mesenteric artery - intestines and spleen
   c. testicular or ovarian artery - reproductive organs
   d. renal arteries - kidneys
   e. iliac arteries which divide into:
      femoral artery - thigh region
      sciatic artery - lower leg

3) pulmocutaneous arch - splits into two branches that go to pick up oxygen (resp)
   a. pulmonary artery - lungs
   b. cutaneous artery - skin
Some of the Major Vessels

Venous System

You should be able to find:

- **abdominal vein** - drain blood from lower leg region into hepatic portal system
- **renal veins** - drain kidneys, empty into inferior vena cava
- **inferior vena cava** - drains blood from lower body tissues into sinus venosus
- **superior vena cava (left and right)** - drain blood from head region into sinus venosus