**`Vertebrate Notes**

**Class: Pisces- the Fishes**

| All Fish share the following features:   * Fins for movement * Scales for protection and maintaining homeostasis * Breathe with gills * Two chambered heart, blood flows in a loop * Tails entire lives | **How do the types of fish differ?** |
| --- | --- |
| Jawless Fish (Agnatha):   * Jawless * Suck blood out of other fish and suck all the nutrients out of them. Blood is their main source of food. * Release water and waste from their gills * Lack a stomach * No paired fins * Slimy skin * Has a pineal eye that can detect light * Has a notochord * The Jawless fish has 7 pairs of open gill holes * Branchial Arches * Ectothermic * Cylinder Shape long bodies * Has two chambered hearts * Suction feeding * No scales * Lamprey and Hagfish |
| Bony Fish (Osteichthyes):   * Have an operculum has a chamber that houses their 5 pairs of gills * Like sharks they have a lateral line system * They excrete a slimy substance that helps them glide very fast * They have a two chambered hearts * Lots of diversity * Two pairs of fins * And most are carnivores * They have an air sac that acts as their respiratory system * Skeleton of bone * Jaws * Swim bladder for buoyancy * Intestines like humans (coiled) * Floppier fins * Flat, flaky scales |
| Other Fish Features:   1. Oviparous: lay eggs, external fertilization (spawning)   - Skates, a few sharks  - Most bony fish  - Jawless fish   1. Ovoviviparous: Eggs with thin shells, retained in mother, internal fertilization   -Embryo absorbs nutrients from the yolk  -Shell disappears and embryo grows  -Hatch inside and swim out of mom  -Make and Sand Tiger sharks   1. Viviparous: live birth, no eggs  * Embryo absorbs nutrients from Placenta - like structure * 70% of sharks use this method * Hammerheads, and fish such as guppies, swordtails | Cartilaginous Fish (Chondrichthyes):   * Streamline bodies * Powerful muscles in tails * Sharks have to swim constantly or they will sink * Water has to flow through their mouth for them carbon dioxide and oxygen * Have really good eyes * Tail moves side to side not up and down * Their skeleton is made of cartilage * Poisonous spine for defense * And bigger than other fish * Jaws with rows of teeth * Pointed scales * No gill cover 5 - 7 pairs of gills slits * No swim bladder * Rigid fins or bat like fins * Ex. Sharks, skates, rays |

| **Claim:**  Fish are excellent swimmers and successfully survive an entirely aquatic life. | |
| --- | --- |
| **Evidence**  What features do fish possess that support the claim? | **Reasoning**  Connect the evidence to the claim. How do the features allow for survival in water? |
| **Gills, Pectoral fins, anal fins, pelvic fins, dorsal fins, caudal fins, scales and Countershading.** | * The Gills allow the fish to breathe underwater. * Pectoral fins breaks balances and steers. * Pelvic fins breaks balances and steers. * Dorsal fin used for balance. * Anal fin used for balance. * Caudal fin for balance and propulsion for a quick getaway. * Scales: streamline and hydrodynamic, waterproof and for protection * Countershading: makes the organism difficult to see or find like a sort of camouflage |
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**Tetrapods**

* **All tetrapods, which are vertebrate chordates, have**

1. Reptiles, frogs, four limbs, air breathing and Terrestrial

Examples include Frogs, Reptiles, Mammals, Snakes, but not FISH

**Class: Amphibia- the Amphibians**

| All Amphibians share the following features:   * They can have gills with legs strong enough to carry them onto land. * They have 4 working limbs * As a child they have gills but as a adult they have lungs * Smooth kin * Lack scales (L) * Webbed fins (W) * External ear drums (B) * Three chambered hearts (B) * Lay eggs in water (W) * Ectothermic * Moist skin that can exchange oxygen (W) * 4 sturdy legs * Mucous glands & some with poison glands (L) * Lungs (W) | **How do amphibians differ?** |
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| Caecilians (legless amphibians): |
| Frogs & Toads (Anura): |
| Salamanders (Urodela): |

**Amniotes**

* **All amniotes, which are tetrapods and vertebrate chordates, share the following features**

| 1. Amniotic egg: waterproof with a shell |
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| 2. External fertilization - sperm deposited into female no need for watery habitat |
| 3. Water tight skin, skin contains keratin that prevents dehydration, Scales and Keratin, hair nails and horns are made of Keratin. |

Examples include Birds, Reptiles, Mammals, but not fish or amphibians.

| **Claim:**  Amphibians must lead a double life, which restricts members to moist habitats. | |
| --- | --- |
| **Evidence**  What features do amphibians possess that support the claim? | **Reasoning**  Connect the evidence to the claim. How do the features allow for survival (double life)? |
| * **Soft squishy eggs** | The egg starts in the water to survive. If on land and stick into the ground. |
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**Regulation in the Vertebrates**

| Ectotherm: source of body heat is external | Endotherm: source of body heat is internal |
| --- | --- |
| Poikilotherm: body temperature varies | Homeotherm: maintain constant body temp |

* The endothermic amniotes are the \_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Class Reptilia-the Reptiles**

| All Reptiles have the following features:   1. Water - tight skin cover in scales 2. Most lay hard shelled eggs, a few give live birth 3. Well developed lungs to breathe 4. Molt to grow 5. Ectothermic 6. Clawed toes 7. Efficient kidneys - very effective at maintaining water balance 8. Most have 3 - chambered hearts, crocodilians have 4 | **How do reptiles differ?** |
| --- | --- |
| Squamata (lizards and snakes): |
| Crocodilians (crocodiles and alligators): |
| Testudines (turtles and tortoises): |

| **Claim:**  Reptiles can survive without moist habitats and were the first vertebrates to “rule” dry climates. | |
| --- | --- |
| **Evidence**  What features do reptiles possess that support the claim? | **Reasoning**  Connect the evidence to the claim. How do the features allow for survival on dry land? |
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**Class Aves- the Birds**

| Birds have adaptations to help with flight. | | | |
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| Reduce Drag | Reduce Weight | Increase Lift | Increase Thrust |
|  |  |  |  |
| Features related to endothermy |  | | |
| Features related to reproduction |  | | |
| Other features |  | | |

| **How are different types of birds grouped? Meaning, not all birds are exactly the same, why?** |
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| Ex. Beak and diet: different shape beak for dietary needs |

| **Claim:**  Birds are endotherms and are well adapted to flight. | |
| --- | --- |
| **Evidence**  What features do birds possess that support the claim? | **Reasoning**  Connect the evidence to the claim. How do the features allow for flight? |
|  |  |
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**Class Mammalia- the mammals**

| All Mammals share the following features: | **How do the groups of mammals differ?** |
| --- | --- |
| Monotremes (platypuses and echidnas): |
| Marsupials (kangaroos and koalas): |
| Placental Mammals (humans, cats, dogs, lions and tigers and bears) |

| **Claim:** Mammals can survive extreme climates like the arctic, warm and cold oceans, deserts, and tropics. | |
| --- | --- |
| **Evidence**  What features do mammals possess that support the claim? | **Reasoning**  Connect the evidence to the claim. How do the features allow for survival in extreme climates? |
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