

Circulatory Systems

Metabolic Rates

Birds and mammals	Highest metabolic rates
Amphibians and reptiles	Lower metabolic rates
Fish	Lowest metabolic rate

Organisms with high metabolic rates require more efficient oxygen delivery to cells.

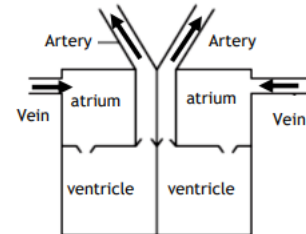
Birds and mammals Complete Double Circulatory System

Highest metabolic rate.

2 atria and 2 ventricles.

Prevents mixing of oxygenated and deoxygenated blood.

More efficient oxygen delivered to cells for respiration.



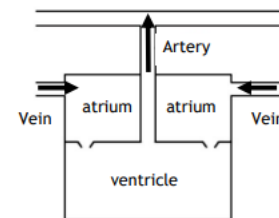
Amphibians and Reptiles Incomplete Double Circulatory System

Lower metabolic rates.

2 atria and 1 ventricle.

Allows mixing of oxygenated and deoxygenated blood.

Less oxygen delivered to cells for respiration.



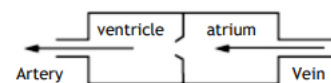
Fish Single Circulatory System

Lowest metabolic rates.

1 atria and 1 ventricle.

Allows mixing of oxygenated and deoxygenated blood.

Less oxygen delivered to cells for respiration.



Circulatory Systems

Explain why complete double circulatory systems enable higher metabolic rates.

1. There is **no mixing** of oxygenated and deoxygenated blood.
2. **Oxygenated blood** can be pumped out at a **higher pressure** enabling more efficient oxygen delivery to cells.

High & Low pressure

Veins carry blood at low pressure into the heart.

Arteries carry blood at high pressure away from the heart .

