Mammalian Circulatory System

There are 3 branches to the circulatory system:

1. Cardiac circulation

2. Pulmonary circulation

3. Systemic circulation

Circulatory Facts

- the average adult man has about ________ litres of blood,
- the average woman has about ________ litres of blood
- of your blood right now _____________ is in systemic circulation and the rest is in the pulmonary circulation

- three main elements of the circulatory system:
  1 –
  2 –
  3 -

Transport vessels

- main blood vessels: ____________________________, ____________________________, ____________________________

- small artery =

- small vein =
Arteries

ARTERIES carry blood _________________________ the heart. Arteries have ________________________ walls that have a lot of elasticity. They are able to expand when the heart pushes blood out of the heart, and then snap back as the ventricles relax and fill. This helps to direct blood flow in the right direction (away from the heart).

Arteries generally carry _________________________ blood, with the exception of the ________________________ artery, which carries __________________________ blood from the heart to the lungs.

Arterioles

ARTERIOLES are small _________________. As the arteries carry blood toward the tissues, the arteries reduce in ________________________ to become arterioles. This helps reduce the ___________________________ of the blood as it comes to the capillary beds in the body tissues.

Capillaries

These are the ___________________________ blood vessels. Their diameter is just large enough to allow a _____________________________ to pass through. The walls of capillaries are ________________ thick. This allows materials to be able to ________________ rapidly through the cells to go into or leave the cells of the body.
**Venules**

A venule is a very small blood vessel that allows blood to return from the capillary beds to the larger blood vessels called veins. Venules are formed when capillaries unite (come together). Venules are blood vessels that drain blood directly from the capillary beds. Many venules unite to form a vein.

![Diagram of vascular system](image)

**Veins**

Veins are large blood vessels that____________ the blood to the ______________ to be pumped.

Veins have _______________________ than arteries, but have a ________________ inner diameter. They are not ________________, so the veins must rely on other mechanisms to ensure blood flows in the correct direction:

a. 

b 

Most veins carry _______________________ blood, except the _______________________ veins.
Components of blood

- blood is considered a __________ because it is specialized to perform a set of specific functions
- blood consists of two distinct elements: ______________ and ______________
- 55% is ______________, consisting of ______________, ______________, ______________, ______________, ______________, ______________
- the remaining 45% is ______________
- when centrifuged (_________________________), the___________

1.
2.
3.

Plasma - This is the __________ portion of the blood. It is pale yellow and clear. The plasma is 92% ______________, 7% dissolved blood ______________ (albumin, globulin, fibrinogen), and 1% dissolved organic and inorganic materials.

Water – dissolves and transports materials

Plasma protein – albumin –

fibrinogen –

globulins –

Salts – maintain fluid balance, assist in nerve and muscle function, maintain alkaline pH (blood is slightly basic)

Leucocytes (white blood cells)
These cells play an important role in the __________________. They make up only about _______% of the total blood volume, but they multiply rapidly during infections.

Phagocytes (macrophages) –

Lymphocytes –
**Platelets (thrombocytes)**
These are ___________ of cells that play a major role in _______________.

Blood clotting is an important process that helps to prevent blood loss when a blood vessel is broken. It involves a complex series of steps.

**Blood clotting**
- When a blood vessel is broken, chemicals are released from cells that attract ___________.
- Platelets break open releasing chemicals that combine with some plasma proteins to make the enzyme ________________.
- In the presence of calcium ions (Ca2+), thromboplastin reacts with ________________ (a protein made in the liver) to produce the enzyme ________________.
- Thrombin reacts with fibrinogen (plasma protein) to form ________________ – the insoluble protein that forms the mesh of a clot.

**Erythrocytes (red blood cells)**

These cells are specialized for _______________ transport. They have a disc-like shape that allows them to bend slightly as they move through capillaries. Erythrocytes have _______________ and are packed with iron containing molecules called ________________, to which the oxygen molecules bind chemically. The hemoglobin is also able to carry a small amount of ________________, though only about ____% of the total blood CO₂ is carried this way.