INITIATION AND CONTROL OF THE HEARTBEAT

Initiation of Heartbeat
1. An area of the heart called the _________________ or _________________ node (SA node) initiates the heartbeat without the need for outside influence (ie. it has “intrinsic” rhythm)
   - the SA node is a specialized patch of ________________ tissue in the ______________ wall
   - it spontaneously generates nerve impulses and sends them through the ______________ causing both to contract
2. Nerve impulses also travel from the ___________ node to the _________ (atrioventricular) node
   - the AV node is another specialized patch of nerve tissue
   - located in ___________________ 
   - nerve impulses spread from the AV node, down nerve fibres called the _________________ of __________ (in the ____________) and then up the _________________ fibres which travel through the walls of the _______________
   - when impulse travels along the ______________ fibres, the ventricles ____________ (from bottom to top)

Control of Heartbeat
- two nerves run to the pacemaker of the heart from a part of the brain called the “_______________ control centre” or “heart rate centre” located in the __________ (brain stem)
  a) one stimulates heartbeat (______________ nerve)
  b) one inhibits heartbeat (______________ nerve)
1. Heartbeat can be SPEEDED up (increasing BP) when:
   - impulses along the _________________ nerve increase
   - impulses along the _________________ nerve decrease
2. Heartbeat can be SLOWED down (decreasing BP) when:
   - impulses along the _________________ nerve increase
   - impulses along the _________________ nerve decrease

How Does The Heart “Know” to Speed Up or Slow Down?
- stretch receptors in major blood vessels sense BP and send nerve impulses along _________________ up to the heart rate centre
1. If blood pressure is too HIGH:
   - nerve impulses from the _________________ artery and _____________ tell heart rate centre to slow down heartbeat
   - heartbeat is then slowed when nerve impulses travel to the _________________ along the _________________ nerve (also, decreased impulses along the _________________ nerve)
2. If blood pressure is too LOW:
   - nerve impulses from the _________________ tell heart rate
   - heartbeat is then sped up when nerve impulses travel to the _________________ nerve (also, decreased impulses along the _________________ nerve)

Note that blood pressure can also be raised by _________________ blood vessels and lowered by _________________ blood vessels. Various solutes also affect blood pressure. For example, high _________________ intake causes blood to become more _________________ which leads to osmosis of water into the blood vessel, increasing BP.