

## 27 - Heart and Blood Vessels

### Activity 19a To investigate the effect of exercise on the pulse rate of a human

You have a choice between this activity and investigating the effect of exercise on the breathing rate of a human (Activity 19b on page 344).

1. Work in pairs, one person recording the results.
2. Sit down on a chair and rest for a few minutes.
3. Locate a strong pulse in your neck or wrist (just below the thumb).
4. Count the number of pulses per minute while at rest.
5. Repeat this two more times.
6. Calculate your average pulse rate per minute (measured in beats per minute, bpm) at rest by adding the three values and dividing the total by three. This is called the resting heart rate and is used as a control.
7. Walk slowly for 5 minutes.
8. Count your pulse rate per minute immediately after walking.
9. Walk briskly for 5 minutes.
10. Count your pulse rate per minute immediately after walking.
11. Exercise strenuously for 5 minutes (e.g. step up and down on a chair every 3 seconds or run).
12. Count your pulse rate per minute immediately after exercising.
13. Present your results in tables such as those shown below.

Heart rate before exercise					
Before exercise	Trial 1	Trial 2	Trial 3	Total	Average
Resting pulse rate (bpm)					

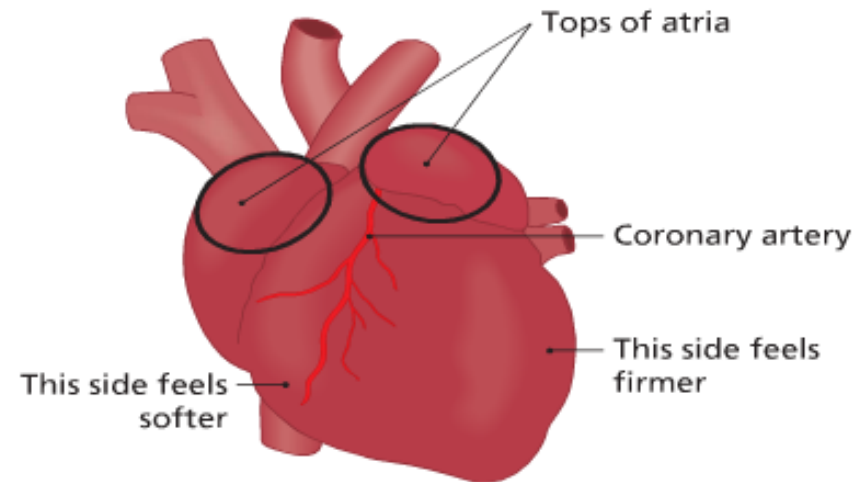
Heart rate after different types of exercise			
Activity	Gentle walk	Brisk walk	Strenuous exercise
Pulse rate (bpm)			

14. Compare the average resting rate with the rates after each type of exercise.

**Activity 18 To dissect, display and identify the parts of a heart**

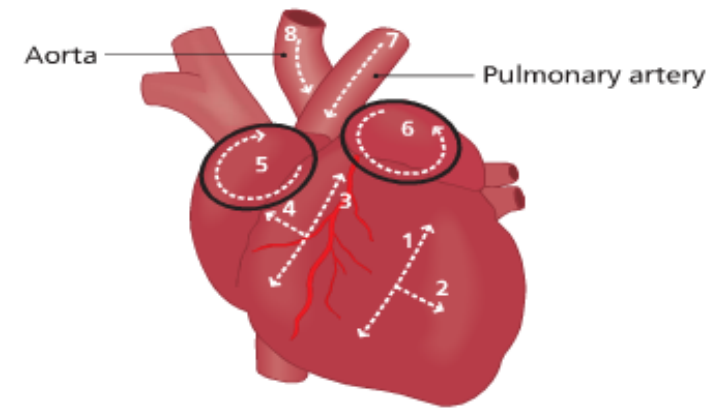
A sheep's heart is smaller than an ox's (or cow's) heart. Dissect an ox's or sheep's heart in the following manner.

1. Rinse the heart in cold water. Wash out any dark-coloured, jelly-like clumps of blood.
2. Place the heart on a dissecting board or tray.
3. Distinguish between the front (ventral) and back (dorsal) surface of the heart in one of the following ways:
  - ▶ The front is more rounded and the thick-walled arteries are on this side.
  - ▶ The lower part of the left side feels much firmer than the lower part of the right side.
  - ▶ One of the coronary arteries runs diagonally from the top right to the bottom left of the heart.

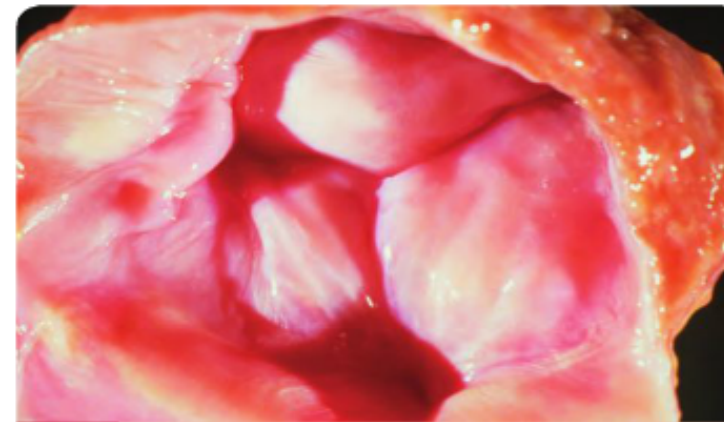


**26.20** Identifying the ventral surface of the heart

4. Identify the four major blood vessels that enter and leave the heart. (Note that very often the butcher will have removed many of the vessels). Notice how thick-walled the arteries are compared with the veins. Notice the coronary arteries and veins on the surface of the heart. These vessels supply blood to the heart itself.
5. Locate the four chambers of the heart. (Note that the upper chambers or atria are quite small, are very high up and look like 'ears' on the outside of the heart.)
6. Draw a labelled diagram of the external structure of the un-dissected heart.
7. Make eight cuts in the front of the heart using a scalpel or scissors, in the positions shown in diagram 26.21.
8. Cuts 1 and 2 open up the left ventricle. In this chamber you should observe:
  - ▶ A very thick wall
  - ▶ White 'strings', which are the tendons that hold the valves in place
  - ▶ The two flaps of the bicuspid valve.
9. Cuts 3 and 4 open up the right ventricle. In this chamber you should observe:
  - ▶ A thinner wall
  - ▶ White 'strings', which are the tendons
  - ▶ The three flaps of the tricuspid valve.
10. Cuts 5 and 6 open up the atria. In these chambers you should observe:
  - ▶ Very thin walls
  - ▶ The bicuspid and tricuspid valves.

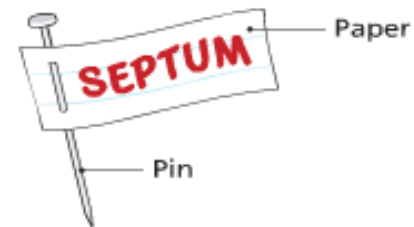


**26.21** Ventral view of the heart, showing the location of the cuts to be made



**26.22** A semilunar valve: the three flaps are closed

- 11.** Cut 7 opens up the pulmonary artery. This should allow you to see:
  - ▶ The three flaps of the semilunar valve (at the point where the artery emerges from the heart).
- 12.** Cut 8 opens up the aorta. This should allow you to see:
  - ▶ The second semilunar valve
  - ▶ The origin or beginning of the coronary artery (just above the semilunar valve). If you squirt water (or a dye) into the coronary artery you will see it flow down to the heart.
- 13.** Identify the septum between the ventricles.
- 14.** Draw a diagram of the dissected heart.  
This will be similar to diagram 26.9.
- 15.** Using small pins and paper labels, flag-label the parts you have identified.
- 16.** Wash your hands and sterilise the board and dissecting instruments.



**26.23** A flag label