

A. Principles of organisation

1. Describe the levels of organisation in the human circulatory system in size order from the smallest part.

(4)

- *Muscle Cell – can contract and respiration occurs here*
- *Muscle (cardiac) tissue – Group of muscle cells working together to contract and respire (cardiac muscle does not fatigue)*
- *Heart (organ) – muscle, valves and blood vessels, puts blood under pressure*
- *Circulatory system – Heart, blood and blood vessels working together to pump blood around the body.*

B. Animal tissues, organs and organ systems Part 1

1. Explain why enzymes are needed in digestion. (4)

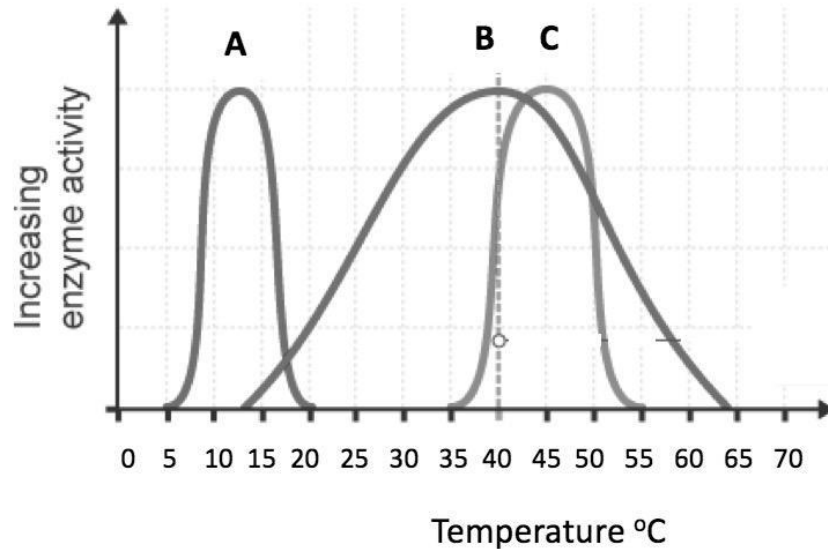
- *Biological catalysts*
- *Breakdown large insoluble molecules (in food)*
- *Into small soluble molecules*
- *That can be absorbed into the blood*

2. Explain how the release of bile into the small intestines increases the rate of fat breakdown. (3)

- *Neutralise acid*
- *Maintain optimum pH*
- *For lipase enzyme*
- *Emulsifies fats to reduce surface area*

3. Different enzymes work best at different temperatures.

The graph shows the effect of temperature on different enzymes.



a. Describe and explain the shape of the graph for enzyme A. (4)

Description:

- *Rate is (initially) slow*
- *Rate increases as temperature increases up to 40°C*
- *Rate declines to return to 0*
- *Use of data*

Explanation:

- *Low (kinetic) energy initially*
- *Fewer/lower energy collisions*
- *Optimum rate reached when there is the maximum number of (successful) collisions and all active sites are being used*
- *Rate falls due to enzymes denaturing*

b. Enzyme B is protease and is produced in the stomach, pancreas and small intestine.

Explain why protease works more effectively in the stomach. (3)

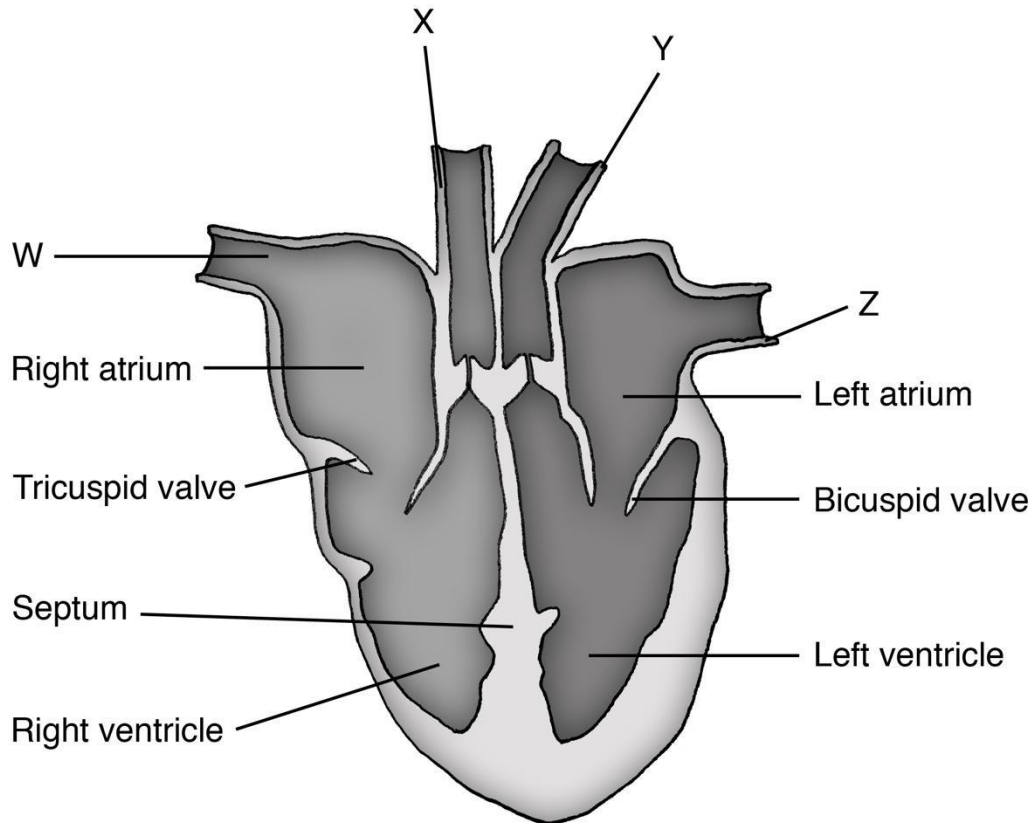
- *Stomach contains acid*
- *Acid is low pH (pH2)*
- *pH provides optimum conditions for protease enzyme*

C. Animal tissues, organs and organ systems Part 2

1. The diagram below shows the structure of the heart.

a. Name and describe the function of the parts W, X, Y and Z. (4)

- *W – vena cava – sends deoxygenated blood into the heart*
- *X – pulmonary artery – delivers deoxygenated blood into the lungs*
- *Y – aorta – sends oxygenated blood to the body*
- *Z – pulmonary vein – delivers oxygenated blood into the left atrium/left side of the heart*



b. The heart is

described as a 'double pump', explain why two separate circulation systems are needed. (2)

- *The right-side pumps blood to the lungs for gas exchange*
- *The left-side pumps oxygenated blood to the rest of the body*

c. Look at the bicuspid valve on the diagram of the heart. This is one of the atrioventricular valves.

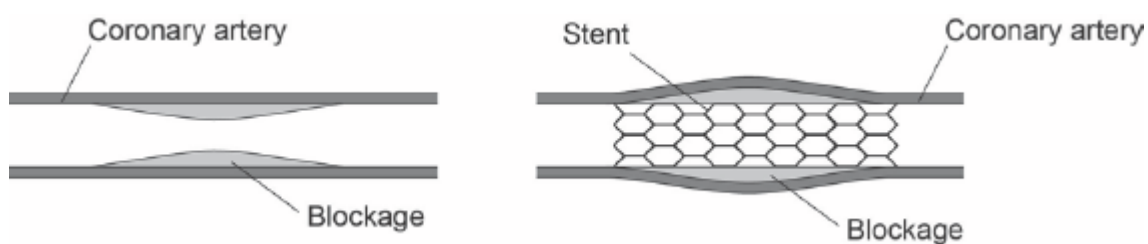
Using this information, explain the function of this valve. (2)

- *Prevents blood from flowing from the left ventricle into the left atrium*
- *Left atrium*

2. Coronary heart disease (CHD) develops when layers of fatty material build up in the coronary artery.

One treatment for CHD is to insert a stent into the coronary artery.

The diagram shows a stent in a coronary artery.



a. Explain why the stent helps to prevent a heart attack.(3)

- *Keeps the (coronary) artery open/wide*
- *So the blood flow can carry glucose and oxygen*
- *To the heart (muscle)*
- *For respiration*

Coronary heart disease (CHD) can be caused by many factors.

The table below shows data related to CHD for five countries.

Country	Number of deaths from CHD per 100 000 population per year	Percentage of the population who smoke tobacco	Percentage of the population who drink alcohol heavily	Amount of fruit and vegetables eaten in kg per person per year
A	279	38	20	186
B	254	64	35	408
C	182	4	37	257
D	151	24	35	217
E	123	28	14	221

b. Name **one** risk factor for CHD that is **not** shown in the table above. (2)

- *(Lack of) exercise*
- *Other drugs being misused (not including alcohol and smoking)*
- *Stress*

c. A student concludes that the main cause of CHD is not eating enough fruit and vegetables.

Give two reasons why the student's conclusion is not correct. (2)

- *The second highest death rate has the highest fruit and vegetable consumption.*
- *The lowest death rates don't have high fruit and vegetable consumption.*
- *Lowest death rates have a low percentage of the population that smokes.*

D. Animal tissues, organs and organ systems Part 3

1. Extended response question:

Explain the risks of pregnant women smoking tobacco and drinking alcohol. (6)

- Level 3 (5-6 marks)
Explains at least 2 risks of BOTH smoking AND alcohol consumption to the mother and unborn baby
- Level 2 (3-4 marks)
Explains a risk of BOTH smoking AND alcohol consumption to the mother and unborn baby
- Level 1 (1-2 marks)
Explains risks of EITHER smoking OR alcohol consumption to the mother and unborn baby.

Biology content:

Smoking:

- *Carbon monoxide (a toxic gas) reduces the amount of oxygen available to the unborn baby.*
- *Increases the risk of: miscarriage, premature births, sudden infant death syndrome (SIDS).*

Alcohol:

- *In first 3 months of pregnancy: – can increase the risk of miscarriage and premature birth.*
- *Heavy drinking during pregnancy can lead to foetal alcohol syndrome (FAS)*

2. Describe and explain the similarities between benign and malignant tumours. (4)

Similarities-

- *uncontrolled cell growth*
- *formed from a person's own cells*

Differences:

- *Benign tumours are in a membrane and don't invade nearby tissue whereas malignant tumours are not in a membrane and can invade nearby tissues.*
- *Malignant tumours are cancerous and can spread and form secondary tumours whereas benign cannot.*

L. Plant tissues, organs and systems

1. Extended response question:

Compare the processes of transpiration and translocation in a plant and explain the conditions that would bring about maximum transpiration. (6)

- Level 3 (5-6 marks)

Detailed comparison of transpiration AND translocation in terms of transport direction, vessels and substances AND an explanation of the environmental factors that increase the rate of transpiration.

- Level 2 (3-4 marks)

Basic comparison of transpiration AND translocation in terms of transport direction, vessels and substances or an explanation of the environmental factors that increase the rate of transpiration

- Level 1 (1-2 marks)

Basic comparison of transpiration OR translocation in terms of transport direction, vessels and substances OR/AND an explanation of the environmental factors that increase the rate of transpiration.

Biology content:

In transpiration xylem tissue transports water from the roots to the leaves and stem whereas in translocation phloem tissue transports dissolved sugars from the leaves to the rest of the plant.

Increase temperature, air movement and light intensity all increase the rate of transpiration. Increased humidity decreases the rate of transpiration.