Core 1

Two characteristics of living organisms are nutrition and respiration.

(a) (i) List **three** other characteristics of living organisms.

1. .................................................................................................................................
2. .................................................................................................................................
3. .................................................................................................................................[3]

(ii) Name the process by which green plants produce carbohydrates.

.................................................................................................................................[1]

(b) Living **organisms** release gases into the atmosphere as a result of their various activities. Complete the table, using a tick (✓) or a cross (×), to show which gases are released.

<table>
<thead>
<tr>
<th></th>
<th>carbon dioxide released into the atmosphere</th>
<th>oxygen released into the atmosphere</th>
</tr>
</thead>
<tbody>
<tr>
<td>animals in bright light</td>
<td></td>
<td></td>
</tr>
<tr>
<td>green plants in bright light</td>
<td></td>
<td></td>
</tr>
<tr>
<td>animals in the dark</td>
<td></td>
<td></td>
</tr>
<tr>
<td>green plants in the dark</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[Total : 8]
Core 2

(a) Table 1 shows the frequency of human blood groups in a population.

<table>
<thead>
<tr>
<th>human blood group</th>
<th>% frequency in the population</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>46</td>
</tr>
<tr>
<td>B</td>
<td>9</td>
</tr>
<tr>
<td>AB</td>
<td>3</td>
</tr>
<tr>
<td>O</td>
<td>42</td>
</tr>
</tbody>
</table>

(i) Plot the data in the table as a bar chart on the grid below.

(ii) What type of variation is illustrated by these data? State a reason for your answer.

Type of variation 

Reason 

[2]
Core 3

Fig. 1 shows a section through the heart.

Fig. 1

(a) On Fig. 1

(i) name the parts labelled A and B;  

(ii) shade the cavity of the ventricle which contains oxygenated blood;  

(iii) suggest why the wall around chamber C is much thicker than that around chamber D.

(b) The coronary arteries supply blood to the heart muscle.

(i) Suggest two activities of humans which might cause a clot in a coronary artery.

1. .................................................................................................................................

2. .................................................................................................................................[2]

(ii) Explain what might be the result of such a blockage.

..........................................................................................................................[2]
(c) Fig. 2 shows a plan of the circulatory system.

![Diagram of the circulatory system]

**Fig. 2**

On Fig. 2:

(i) label where urea is formed; [1]

(ii) label where urea is excreted; [1]

(iii) show, using a series of arrows, the route taken by urea between these two organs. [2]

[Total: 13]
Alternative to Practical 1

Fig. 3 shows the apparatus that was used to investigate the activity of yeast in a glucose solution.

![Diagram of apparatus](image)

**Fig. 3**

The number of bubbles released in one minute was counted. This was repeated another four times.

The temperature in the water bath was then raised to 35 °C and five more counts were made.

**Table 2**

<table>
<thead>
<tr>
<th></th>
<th>number of bubbles released in one minute</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25 °C</td>
</tr>
<tr>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>total</td>
<td></td>
</tr>
<tr>
<td>mean (average)</td>
<td></td>
</tr>
</tbody>
</table>
Alternative to Practical 1

(a)  (i) Complete Table 3.1 to show the totals and mean numbers of bubbles released at each temperature.  
[2]

(ii) Name the physiological process in yeast which is investigated in this experiment.  
.........................................................................................................................[1]

(iii) State the effect of raising the temperature on the activity of yeast.  

Explain your answer.  

Effect .............................................................................................................................

Explanation ....................................................................................................................[3]

(b)  (i) Name the gas present in the bubbles.  
.................................................................................................................................

(ii) Describe a test you could use to identify this gas.  
.................................................................................................................................[2]

(c) Explain why it is better to leave the apparatus for a few minutes at each temperature before beginning to count the bubbles.  
.................................................................................................................................[2]

[Total : 10]
Extension 1

(a) Describe the functions of each of the following parts of the heart:

(i) right atrium;
(ii) right ventricle;
(iii) tricuspid valve.

(b) Outline the likely causes of a heart attack and suggest what preventive measures can be taken to maintain a healthy heart.

Extension 2

An athlete takes part in a race.

(a) Describe and explain what happens to her breathing rate as a result of the race.

(b) The level of adrenaline increases at the start of the race. Describe the effect of this increased level of adrenaline in the athlete’s body.

(c) At the end of the race the athlete’s body temperature has increased. Outline the body processes which cause her temperature to return to normal after the race.
Core 1

a(i) any three of these
  growth
  movement
  irritability / sensitivity
  excretion
  reproduction

(ii) photosynthesis

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<thead>
<tr>
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<th>oxygen released in to the atmosphere</th>
</tr>
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<tbody>
<tr>
<td>animals in bright light</td>
<td>√</td>
<td>X</td>
</tr>
<tr>
<td>green plants in bright light</td>
<td>X</td>
<td>√</td>
</tr>
<tr>
<td>animals in the dark</td>
<td>√</td>
<td>X</td>
</tr>
<tr>
<td>green plants in the dark</td>
<td>√</td>
<td>X</td>
</tr>
</tbody>
</table>
Core 2

a  for three marks
    axes oriented correctly
    both axes labelled and with suitable scale on frequency axis
    all four columns correctly plotted

b  type  discontinuous variation
    reason  there are no intermediate values between the four groups / there are
distinctly separate sets of values
Core 3

a(i) A tricuspid / right atrio-ventricular / right cuspid valve
   B pulmonary vein
(ii) all of cavity of left ventricle shaded
(iii) thicker wall can generate a greater pressures / more powerful push / pump
(iv) to pump / push / force blood further / all round the body / not just to the lungs

b(i) any two of these
   smoking
   fat / cholesterol rich diet
   lack of exercise
   stress
(i) restrict supply of oxygen / glucose / sugar to heart / ventricle
   muscle in area dies / heart attack/ cannot respire

c(i) label to liver
(ii) label to kidney
(iii) arrows from liver to heart and heart to kidneys
     arrows from heart to lungs and back to heart
Alternative to Practical 1

a(i)

<table>
<thead>
<tr>
<th></th>
<th>25 °C</th>
<th>35 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>total</td>
<td>60</td>
<td>90</td>
</tr>
<tr>
<td>mean (average)</td>
<td>12</td>
<td>18</td>
</tr>
</tbody>
</table>

(ii) respiration / fermentation

(iii) **Effect**

increase in number of bubbles released per min
reference to a numerical increment

**Explanation**

reference to role of enzymes involved / kinetic energy / more molecular collisions of enzyme and substrate

b(i) carbon dioxide

(ii) limewater turns milky white

c agitation of tubes

equilibrium / temperature to be reached
Extension 1

a(i) any three from these
- receives blood from vena cava
- reference to blood being deoxygenated
- acts as reservoir
- reference to thin muscle wall
- contracts / reference to atrial systole to move blood to right ventricle

(ii) any three of these
- receives blood from right atrium
- reference to thick / thicker muscle wall
- reference to builds up blood pressure
- contracts / reference to ventricular systole to move blood to lungs via pulmonary artery

(iii) any three of these
- reference to position
- prevents backflow of blood / maintains blood flow in one direction
- reference to closing a ventricular systole / when pressure starts to build in right ventricle
- so blood can only leave via pulmonary artery

b any six of these
- reference to high saturated or animal fat diet / reduce saturated or animal fat content of diet
- reference to too much cholesterol / reduce cholesterol content of diet
- fat / cholesterol builds up on coronary artery
- atherosclerosis / atheroma
- high salt diet / reduce salt content of diet
- stress / stress management
- high blood pressure
- smoking / stop smoking
- lack of exercise / take regular exercise
- obesity / take control of diet to reduce obesity
Extension 2

a  any five of these
   breathing rate increases
   to increase amount of oxygen / to replace used oxygen
   needed for aerobic respiration
   reference to muscles
   repaying oxygen debt
   remova of lacic acid
   reove / exhale morecarbon dioxide
   control of breathing rate by brain

b  any four of these
   increased heart rate / pulse rate
   to move blood faster
   so more oxygen / glucose goes to muscles
   non-essential processes slow down
   increased air flow into lungs / breathing rate
   so aerobic respiration increases
   stimulates conversion of glycogen to glucose
   increases mental awareness

c  any six of these
   increase in sweat production
   secreted from sweat glands
   onto skin
   sweat evaporated
   removing heat from skin surface / reference to cooling effect
   vasodilatation
   arterioles
   more blood flows near skin
   blood carries heat
   so heat is lost from skin
   panting causes heat loss from lungs
   hairs lowered to allow more heat loss