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Unit 1  Shapes and Properties

Section 1  Presentation

1. Look at these diagrams:

- a triangle
- a pear
- a sphere
- a bean
- a cone
- a tube
- a dome
- a pyramid

Now look at this diagram and complete the sentences:

Example: The heart is shaped like a cone.

a) The eye is shaped like .......
b) The diaphragm .......
c) The kidneys .......
d) The lungs .......
e) The gallbladder .......
f) The oesophagus .......
g) The liver .......
h) The nose .......

2. Look at this example:

The gallbladder is a pear-shaped organ.

Complete the sentences with one of these words:

kidneys  oesophagus  duodenum  dome-shaped  S-shaped

a) The diaphragm is a ....... organ.
b) The sigmoid colon is an ....... organ.
c) The ....... is a C-shaped tube.
d) The ....... are bean-shaped organs.
3. Make six sentences from this table:

<table>
<thead>
<tr>
<th>Part of the Body</th>
<th>Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>The liver is</td>
<td>conical in shape.</td>
</tr>
<tr>
<td>The eye is</td>
<td>a long, tubular organ.</td>
</tr>
<tr>
<td>The nose is</td>
<td>triangular in shape.</td>
</tr>
<tr>
<td>The kidneys are</td>
<td>a small, spherical organ.</td>
</tr>
<tr>
<td>The heart is</td>
<td>pyramidal in shape.</td>
</tr>
<tr>
<td>The small intestine is</td>
<td>bean-shaped organs.</td>
</tr>
</tbody>
</table>

4. From exercises 1-3 find two ways of describing:
   a) the heart; the eye; the liver
   b) the kidneys; the gallbladder; the diaphragm

Now describe each of the following in two different ways:
   c) the oesophagus; the lungs; the duodenum; the sigmoid colon; the small intestine

Section 2 Development

5. Look and read:

   Elastoplast sticks to the skin.
   It is adhesive.

   The skin can bend into many shapes.
   It is flexible.

   Bones cannot bend.
   They are rigid.

   Some tissues can be stretched and then will return to their original shape.
   They are elastic.

   Some organs can stretch or contract by the use of muscles.
   They are muscular.

   Some cells can eat bacteria and destroy them.
   They are phagocytic.
Some cells move around the tissues. They are motile.
They move like the amoeba; they have the property of amoeboid movement.

Food can pass through the walls of the stomach but not through the walls of the oesophagus.
The walls of the stomach are permeable, but the walls of the oesophagus are impermeable.

Now look at this diagram of blood vessels:

Complete these sentences and match them with A to F in the diagram:

a) Arteries are long, tubular blood vessels which can bend and stretch, i.e. they are ...... and ......
b) Some cells and molecules can pass through capillary walls. In other words capillaries are .......
c) Some white blood cells (leucocytes) can destroy bacteria, i.e. leucocytes are .......
d) Platelets are very small particles which stick together to stop bleeding, i.e. they are .......
e) Red blood cells (erythrocytes) can bend to get through narrow blood vessels and then spring back into shape. In other words erythrocytes .......
f) Blood cells cannot pass through artery walls. This means that arteries .......
g) Leucocytes can pass through capillary walls. This means that capillary walls are ...... to leucocytes.
h) The leucocytes can move around in the tissues, or, in other words, they .......
i) Veins are wide blood vessels with some muscle tissue in their walls, i.e. veins .........
j) Erythrocytes can not usually pass through capillary walls. In other words, capillary walls are usually ......
6. Using information from exercise 5, complete these tables:

<table>
<thead>
<tr>
<th></th>
<th>flexible</th>
<th>phagocytic</th>
<th>motile</th>
<th>adhesive</th>
</tr>
</thead>
<tbody>
<tr>
<td>erythrocytes</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>leucocytes</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>platelets</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>permeable</th>
<th>impermeable</th>
<th>muscular</th>
<th>elastic</th>
</tr>
</thead>
<tbody>
<tr>
<td>arteries</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>capillaries</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>veins</td>
<td></td>
<td>✓</td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

Read these:

Both erythrocytes and leucocytes are flexible. 
Neither erythrocytes nor leucocytes are adhesive.

Leucocytes are phagocytic \( \text{but} \) (whereas) erythrocytes are not.

Leucocytes are phagocytic. Erythrocytes \( \text{however} \) on the other hand, are not.

Leucocytes can pass through capillary walls, but veins are impermeable to leucocytes.

Complete these sentences:

a) Both arteries and ....... impermeable.
b) Arteries are elastic blood vessels but ....... 
c) Capillaries have very thin walls whereas ....... muscular walls.
d) Capillaries are permeable to ....... Erythrocytes, on the other hand, ....... 
e) Leucocytes can pass through the walls of capillaries. Arteries, however ....... 
f) Neither ....... are phagocytic.
g) Platelets are ....... erythrocytes are not.
h) ....... do not have the ....... of amoeboid movement. Leucocytes ....... can ....... tissues.
i) Skin is ....... Bone ....... is rigid.
Section 3  Reading

7. Read the passage and label these diagrams:

(i) (ii) (iii) (iv)

a) sphere  b) ellipsoid  c) rod  d) spiral or helix

Bacteria
Bacteria are very small, unicellular organisms. Although there are thousands of different species of bacteria, the individual organisms have one of three general forms: ellipsoidal, or spherical; cylindrical or rod-like; and spiral or helicoidal.

The first type are called cocci (singular, coccus). They are nearly all spherical or ellipsoidal, but there are some exceptions. The gonococcus and meningococcus, for example, are coffee-bean shaped (e.g. Neisseria meningitidis), while the pneumococcus is slightly elongated, so that one end tapers a little (e.g. Diplococcus pneumoniae, in which the ends of each pair of cells are bluntly pointed).

The cylindrical bacteria are known as bacilli (singular, bacillus). Some of these are long and slender (e.g. Clostridium sporogenes) while others are short and thick (e.g. Bacillus megaterium). The sides may be more or less parallel to each other or the cell may be thicker in the centre and taper toward the end.

Spiral forms include rods with just enough curvature to give the organism a curved or comma shape (Vibrio), longer rigid rods with several curves or spirals (Spirillum) and long flexible organisms with several or many spirals (spirochaetes).

8. Read the passage again and label the following bacteria:

Diplococcus pneumoniae  Vibrio comma  
Neisseria meningitidis  Spirillum volutans  
Clostridium sporogenes  Spirochaeta stenostrepta  
Bacillus megaterium

a) b) c) d) e) f) g)
9. Summarise the types of bacteria mentioned in the passage by completing this classification diagram. Give an example of each type:

\[ \text{Bacteria} \]

\[ a) \ldots \quad b) \ldots \quad c) \ldots \]
\[ \text{e.g.} \ldots \quad \text{e.g.} \ldots \quad \text{e.g.} \ldots \]
\[ \text{d) \ldots} \quad \text{e) \ldots} \quad \text{f) \ldots} \]
\[ \text{e.g.} \ldots \quad \text{e.g.} \ldots \quad \text{e.g.} \ldots \]

10. Look at these bacteria which have irregular shapes. Describe them.

a) *Saprospira* sp.  b) *Caulobacter* sp.  c) *Streptomyces* sp.

\[ \text{\includegraphics[width=0.5\textwidth]{bacteria_diagram.png}} \]

Section 4  Listening

11. Listen to the passage and label these diagrams:

\[ \text{a)} \quad \text{b)} \quad \text{c)} \quad \text{d)} \]
\[ \text{erythrocytes} \quad \text{polymorphonuclear leucocytes} \quad \text{monocytes} \]

Now complete this classification diagram:

\[ \text{Blood cells} \]
\[ \text{\includegraphics[width=0.5\textwidth]{blood_cells_diagram.png}} \]
12. Listen to the passage again and choose the correct word(s) in these sentences:

a) Erythrocytes are flexible/rigid and concave/convex.

b) Polymorphonuclear leucocytes are adhesive/phagocytic and amoeboid/elastic.

c) Monocytes are permeable/phagocytic.

13. Describe the four types of cells, using the diagrams in exercise 11 and the information in exercise 12 to help you: