Thus a change happens to the frog during its development; i.e. it is an animal which begins life in water but finishes it on land.

Thus (22) the frog undergoes a metamorphosis during its development.
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Unit 40 Osmosis

A semi-permeable membrane has a \textit{weak} solution of sugar on one side and a \textit{strong} solution of sugar on the other, then more water molecules will diffuse through the membrane from the weak solution to the strong one than the \textit{opposite way}. \textit{The result is that} water diffuses from the weak solution, through the semi-permeable membrane, into the strong solution.

This process is known as osmosis. When both solutions on either side of the membrane are of the same strength, osmosis stops happening.

The \textit{taking up} of water from the soil by the roots of plants is a good \textit{example to show} osmosis. Water molecules diffuse from the weak solution in the soil to a stronger solution inside the \textit{cells of the roots}. From here, they pass up the stem to the leaves.

All \textit{plant and animal bodies} depend on osmosis to \textit{carry/food materials} and waste materials through the cell walls. Osmosis is one of the most important \textit{things that happen in nature}, and many life processes depend upon it.
B
If a semi-permeable membrane has a (1)dilute solution of sugar on one side and a (2)concentrated solution of sugar on the other, then (3)a greater number of water molecules will diffuse through the membrane from the (1)dilute solution to the (2)concentrated one than the (4)reverse. (5)In effect, water diffuses from the (1)dilute solution, through the semi-permeable membrane, into the (2)concentrated solution.

This process is known as osmosis. When both solutions on either side of the membrane are of (6)equal concentration, osmosis (7)ceases.

The (8)absorption of water from the soil by the roots of plants is a good (9)illustration of osmosis. Water molecules diffuse from the (1)dilute solution in the soil to a more (2)concentrated solution inside the (10)root cells. From here, they pass up the stem to the leaves.

All (11)living organisms depend on osmosis to (12)transport (13)nutrients and waste materials through the cell walls. Osmosis is one of the most important (14)phenomena, and many life processes depend upon it.

Exercise 1 Find the way in which the words and phrases italicised in Text A are expressed in Text B:

1 weak  8 taking up
2 strong  9 example to show
3 more  10 cells of the roots
4 opposite way  11 plant and animal bodies
5 The result is that  12 carry
6 the same strength  13 food materials
7 stops happening  14 things that happen in nature
Exercise 2  Rewrite these phrases as compound nouns, as in example (b):

(a)  *walls of cells*  (b)  *cell walls*
1  cells of roots 10  a layer of plastic
2  a solution of sugar 11  a coat of cloth
3  roots of plants 12  bodies of animals
4  a process of life 13  cells of leaves
5  organisms of plants 14  transport of nutrients
6  absorption of heat 15  molecules of water
7  impulses of nerves 16  rays of light
8  transmission of energy 17  nutrition of plants
9  cells of animals 18  an atom of hydrogen

Exercise 3  Compare these ways of expressing the same ideas:
In everyday speech or writing:  In Science:
(1a)  to be different  (1b)  *to differ*
(2a)  to change  (2b)  *to vary*
(3a)  depending on  (3b)  *according to*
(4a)  The velocity of sound *changes depending on* the medium.
(4b)  The velocity of sound *varies according to* the medium.

Rewrite these sentences as in examples (b):

1  The boiling point of different liquids is different.
2  The freezing point of different liquids is different.
3  The boiling point of a liquid changes depending on the pressure of the surrounding atmosphere.
4  The rate of expansion of gases, liquids and solids is different.
5  Water is different from most other liquids because it expands on solidifying.
6  The state of a substance changes depending on its temperature.
7  The temperature of the air will be different at different times of the day.
8  The climate in most places is different depending on the season.
9  The amount of rainfall on an area is different depending on the season.
10  The rate of heat transfer by conduction is different in different solids.
11  The method of heat transfer in solids and fluids is different.
12  The rate of development of plants will be different depending on their environment.
13  Methods of seed dispersal are different for different varieties of plant.
14  The focal length of a convex lens changes depending on its thickness.
15  The length of light waves changes depending on their frequency.
The frequencies of waves of light and sound are different.
The velocity of sound changes depending on the medium through which it travels.
The velocity of light and that of sound are different.
A colloid and a suspension are different depending on the size of the suspended particles.
The atom of one element is different from that of any other.

**Exercise 4**
Rewrite this passage, using passive forms. You will then have summarised the Texts. (The subjects of the passive sentences are italicised):
The semi-permeable membrane allows water molecules to pass through but will not allow the sugar molecules to do so. In osmosis, the semi-permeable membrane allows the water molecules to diffuse from the dilute to the concentrated solution. Roots of plants absorb water and its solutes from the soil in this way. They absorb water from the dilute solution in the soil into the concentrated solution inside the root cells. Living organisms depend upon osmosis for many of their life processes.

**Exercise 5**
Read and rewrite this passage, using a single word in place of each phrase italicised. (One small *change in word order only is necessary):
If a material allows water to pass through, it is said to be permeable to water. A material which does not, is said to be impermeable to water. All plant and animal bodies *that live/are made of cells, which are like tiny boxes and their walls are known as membranes. These are permeable to water but not always to every substance dissolved in it. This kind of membrane is said to be semi-permeable.

If a semi-permeable membrane lies between a very weak and a very strong liquid with a substance dissolved in it, more water molecules diffuse from the very weak to the very strong than the opposite way. This process is known as osmosis, and it does not stop happening until the concentrations of molecules on both sides of the membrane are the same.

A good way of showing (with an example of) osmosis is the taking up of water from the soil by the roots of plants, which have in them a more concentrated solution than that in the soil. It is also by osmosis that food materials are transported in plant and animal cells, and this is one of the most important things that happen in nature on which life processes depend.
-ABILITY/-IBILITY
Adjectives ending in -ABLE/-IBLE may form a noun ending with -ABILITY/-IBILITY:
permeable permeability
visible visibility
They also form their negatives by putting IN-/IM-/UN- in front:
impermeable impermeability
invisible invisibility

Exercise 6 Complete the table below as shown in the examples above:

<table>
<thead>
<tr>
<th>ADJECTIVE</th>
<th>NOUN</th>
<th>NEGATIVE ADJ.</th>
<th>NEGATIVE NOUN</th>
</tr>
</thead>
<tbody>
<tr>
<td>permeable</td>
<td>permeability</td>
<td>impermeable</td>
<td>impermeability</td>
</tr>
<tr>
<td>visible</td>
<td>visibility</td>
<td>invisible</td>
<td>invisibility</td>
</tr>
<tr>
<td>variable</td>
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<tr>
<td>penetrable</td>
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<td>combustible</td>
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<td>diffusible</td>
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<td>able</td>
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<td>digestible</td>
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<td>assimilable</td>
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<td>movable</td>
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<td>available</td>
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<tr>
<td>absorbable</td>
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</tbody>
</table>

Adjectives ending with -IC
Some adjectives are formed by adding -IC to the noun:
vulcan volatile
Notice the difference in pronunciation, thus: The stress moves forwards to the syllable just before the -IC ending, e.g. MAG-net – mag-NET-ic.

Exercise 7 Read and write the adjectives formed from these nouns, as in the above examples:

1 ion
2 atom
3 magnet
4 state
5 volcano
6 electron
7 mercury
8 atmosphere
9 dynamo
10 organ
11 sulphur
12 acid
13 base
14 metre
15 metal
16 microscope
17 carbon
18 protoplasm
19 alcohol
Nouns ending with -sis, -se, change to -tic in the adjective, e.g. ellipse – elliptic.
Read and write the adjectives formed from these nouns:
    osmosis – osmotic
    synthesis – synthetic

Exercise 8  Answer these questions without referring to the Texts:
1  What is the difference between the two sugar solutions on either side of the membrane?
2  Which way will the greater number of water molecules diffuse?
3  What is this process of diffusion called?
4  When does it cease?
5  Give a good illustration of osmosis.
6  Which solution is more concentrated, that in the root cells or that in the water in the soil?
7  Where does the absorbed water travel from the root cells?
8  What do living organisms depend on osmosis to do?

Exercise 9  Questions for further discussion:
1  Why can’t salt-water fish live in fresh water, or fresh-water fish live in salt water?
2  Why is it unwise for a ship-wrecked sailor to drink sea-water when he can’t find fresh water?
3  Why should fertilisers be used only in very dilute solutions?

Vocabulary
fresh water         ship-wrecked

Exercise 10  Suggestions for further activities:
1  Water a healthy (but unwanted) plant with salt solution for a few days. The plant will die. Why?
2  Water a healthy (but unwanted) plant with a concentrated sugar solution for a few days. The plant will die. Why?