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ENGLISH FOR FORESTRY

**АНГЛІЙСЬКА МОВА ДЛЯ СТУДЕНТІВ СПЕЦІАЛЬНОСТІ
«ЛІСОВЕ ГОСПОДАРСТВО»
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1.WHERE TREES COME FROM

I. Read

Trees grow from seeds. A young plant that has just germinated from its seed is called a seedling. Next, a seedling grows for some time, is bigger and stronger and becomes a sapling. Such a young tree, after many years depending on species, is mature enough and ready to be cut down.

The method of tree reproduction from seeds is very common in forestry. This way of plant propagation is called sexual because it requires gamete formation and fertilisation. In contrast, asexual reproduction known also as vegetative does not require gamete formation because a young plant is a part of the parent plant, e.g. shoot cuttings.

GLOSSARY

<ul style="list-style-type: none">• seed• germinate• is called• seedling• sapling• depend on• species• mature• cut down• reproduction, propagation• common• forestry• sexual propagation• require• fertilisation• vegetative• parent plant• shoot cutting	<ul style="list-style-type: none">• насіння• проростати• називається• розсада• саджанець• залежати від• види• зрілий• обрізати• розмноження, поширення• поширений• лісове господарство• статеве розмноження• вимагати• запліднення, удобрення• вегетативний• материнська рослина• обрізка пагонів
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READING COMPREHENSION

I. Read the text and decide whether the following statements are true or false.

1. A seedling is smaller than a seed.
2. Development of a young plant from the seed is called germination.
3. A sapling means the same as a young tree.
4. Seedlings produce a lot of wood and are mature enough to be cut down.
5. A sapling is younger than a mature tree.
6. Trees can be reproduced only from seeds.
7. Asexual reproduction is also known as vegetative.
8. Propagation is the same as reproduction.
9. Gamete formation means fertilisation.
10. A shoot cutting is an example of asexual reproduction.
11. Vegetative reproduction is the most popular method of tree propagation in forestry.

II. Ask the questions.

1.
.....?

A sapling is older than a seedling.

2.?

No, reproduction from seeds means the same as sexual propagation.

3.
.....?

Trees can be reproduced both sexually and asexually.

4.
.....?

Yes, a shoot cutting.

5.
.....?

Sexual reproduction. Vegetative propagation is definitely less common.

FOLLOW-UP: PROPAGATION METHODS

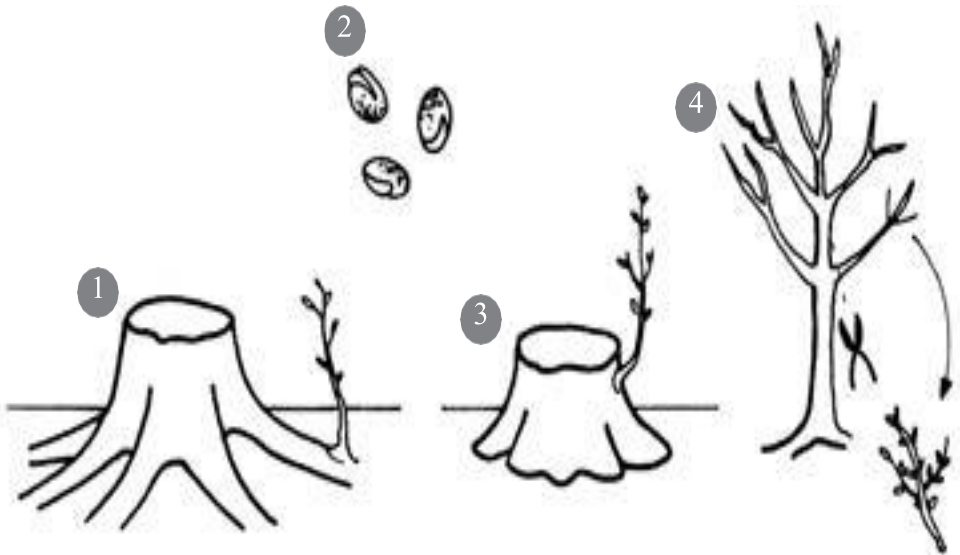
I. Look at the pictures and name the propagation methods. Use the words from the box.

shoot cutting

seed

stump sprout

root sucker



2. PARTS OF A TREE

I. Read.

Each tree consists of a root system, a trunk and a crown. A root system may have a different size and shape depending on tree species, soil and climate conditions. There are several types of roots forming a root system.

A taproot is the main root of a tree. It grows downwards. Lateral roots are the ones that grow from the taproot. Root hairs are the smallest parts of a root system. Pine, for example, does not usually have root hairs but their roots form a symbiotic relationship with fungi instead. Such symbiosis is known as mycorrhiza.

A trunk is the heaviest and the most valuable part of a tree. It is covered by bark. A trunk transports water and nutrients upwards (from roots to leaves) and photo- synthesis products downwards.

A crown consists of branches, twigs and leaves that take part in photosynthesis.

Other parts of a crown include: flowers, fruit and buds.

GLOSSARY

- | | |
|------------------|---------------------|
| • consist of | • складається з |
| • root system | • коренева система |
| • trunk | • стовбур |
| • crown | • крона |
| • species | • види |
| • soil | • ґрунт |
| • condition | • умова |
| • several | • декілька |
| • taproot | • стрижневий корінь |
| • downwards | • вниз |
| • lateral root | • бічний корінь |
| • root hair | • кореневий волосок |
| • pine | • сосна |
| • relationship | • зв'язок |
| • fungus , fungi | • гриб , гриби |
| • bud | • бутон |

- | | |
|--------------|--------------------|
| • bark | • кора |
| • nutrient | • поживна речовина |
| • branch | • гілка |
| • twig | • гілочка |
| • covered by | • вкритий |

READING COMPREHENSION

I. True or false?

1. A trunk protects bark.
2. A branch is bigger than a twig.
3. A trunk is a part of a root system.
4. A bud is covered by bark.
5. Not all trees have root hairs.
6. A crown is the uppermost part of a tree.
7. A bud is bigger than a twig.
8. A root hair is smaller than a lateral root.
9. Mycorrhiza is a kind of a lateral root.

II. Which part of a tree:

1. protects a trunk?
2. absorbs water and nutrients from the soil?
3. develops into a leaf or a flower in spring?
4. grows from a trunk?
5. is its main root?

III. Look at the picture and name the tree parts. Use the

trunk

crown

leaf

bark

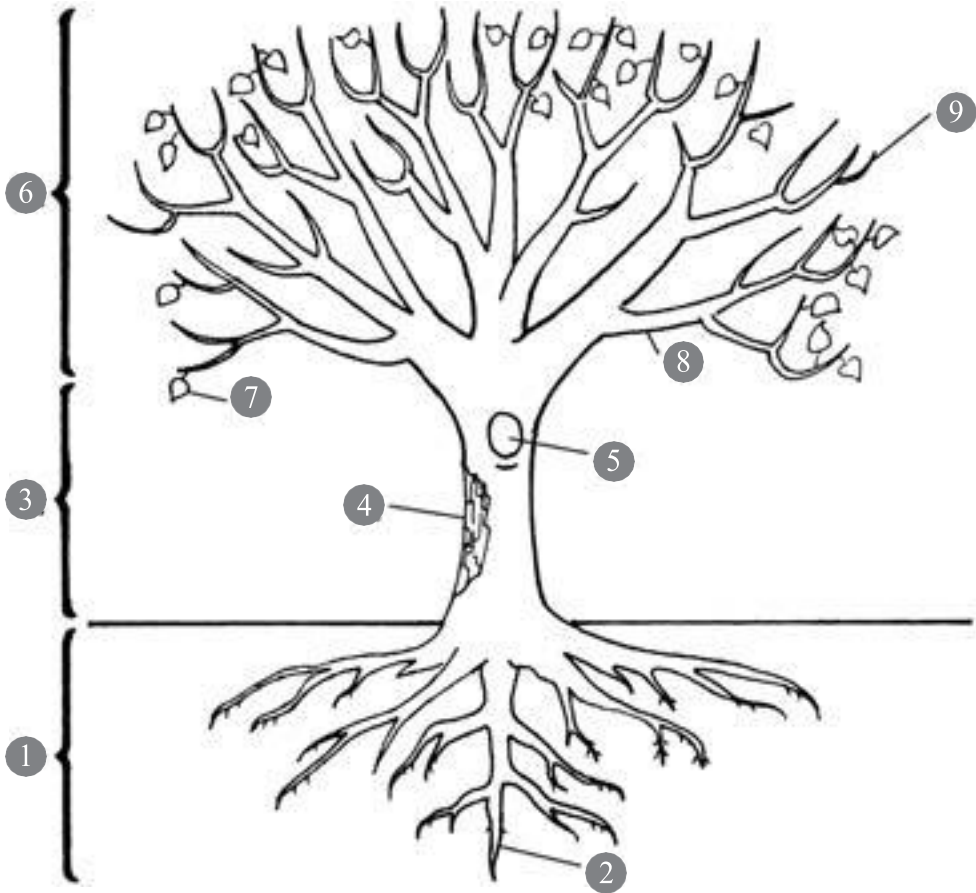
root system

branch

twig

taproot

hollow



words from the box.

3. FACTORS AFFECTING A TREE'S APPEARANCE

I. Read.

There are several factors which influence a tree's appearance. The most obvious are: age of a tree, species, and the place where a tree grows. A tree's appearance can also be modified by weather as well as pathogens and pests.

Age and species

Tree seedlings are different from saplings and mature trees belonging to the same species because first leaves, called cotyledons, usually do not resemble typical leaves which a tree produces. Saplings do not look like older trees either. They are of different shape and their bark does not look like mature tree bark. It is thinner, more delicate, or sometimes it is even not of the same colour, e.g. birch.

A tree's appearance also depends on species. For example, spruce has thinner branches than pine. Tree crowns, bark colour, bud shape also differ and foresters can recognise tree species easily even during winter when deciduous trees are leafless.

The place where a tree grows

If a tree grows alone its branches are compact and the crown is wider and longer. When a tree grows in the middle of a stand the crown is narrower and shorter. Trees growing at a stand periphery better develop the side of the crown which gets more sunlight.

The place where a tree grows means also its habitat, e.g. soil type and nutrients, precipitation and the like. All habitat factors modify a tree's appearance as well.

Weather, pathogens and pests

Weather conditions such as drought, rain, hail, snow, wind, lightning, as well as pathogens and pests can seriously damage the whole tree or its parts. As a result, a tree's shape is changed.

GLOSSARY

<ul style="list-style-type: none">• factor• affect• appearance • influence• obvious• seedling• mature• belong to• leaf. leaves• resemble• look like• shape• spruce• branch• crown• bud• recognise• leafless• develop• sunshine• habitat • soil• nutrient • drought• hail• damage	<ul style="list-style-type: none">• фактор• впливати• зовнішній вигляд • вплив• очевидний• розсада• зрілий• належати• листок. листя• нагадувати• виглядає як• форму• ялина• гілка• крона• бутон• розпізнати• безлисті• розвиватися• сонячне світло• середовище проживання• ґрунт• поживна речовина• посуха• град• пошкодження
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READING COMPREHENSION

I. Look at the words in bold in the text and guess their meaning from the context. Next, write their Ukrainian equivalents.

1. pests
2. saplings
3. cotyledons
4. bark
5. deciduous
6. stand
7. precipitation
8. lightning

II. Answer the questions.

1. Name six factors that influence a tree's appearance.
2. What are a seedling's first leaves called?
3. What is the difference between sapling bark and mature tree bark?
4. How does sunshine influence crown development?
5. What other factors can change a tree's appearance?

DID YOU KNOW?

- There are 80,000 tree species that grow on our planet.
- 10 per cent of them are in danger of extinction.
- The first tree, known as *Archaeopteris*, appeared on the Earth 370 million years ago.
- Trees differ in height. For example, the tallest giant redwood (*Sequoia sempervirens*) is 113 metres tall whereas snow willow (*Salix nivalis*) is rarely taller than 20 centimetres.
- Snow willow leaves are merely 5 millimetres long.
- Giant redwood bark is resistant to fire, pests and diseases due to tannin content.*

GLOSSARY

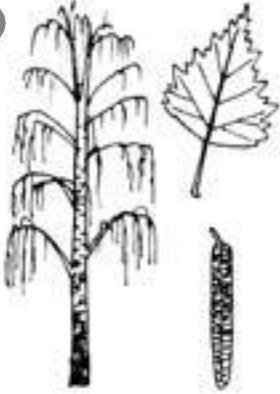
<ul style="list-style-type: none"> • be in danger of • appear • differ in • giant redwood • snow willow • merely • resistant to • due to • content 	<ul style="list-style-type: none"> • бути в небезпеці • з'являтися • відрізнятися • гігантська секвоя • сніжна верба • просто • стійкий до • через • вміст
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FOLLOW-UP: A TREE'S APPEARANCE

I. Look at the pictures and study a tree's appearance. Match the pictures with the expressions from the box.

broken tree	fir seedling	uprooted tree
tree growing in the stand	beech seedling	broad-leaved tree
tree growing alone	tree attacked by pests	sapling
birch	fir	oak

1



2



3



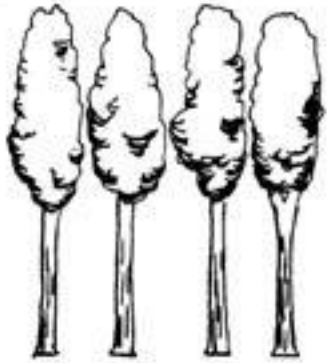
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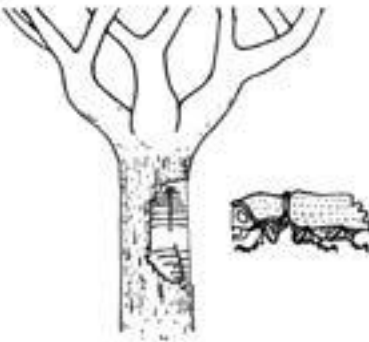
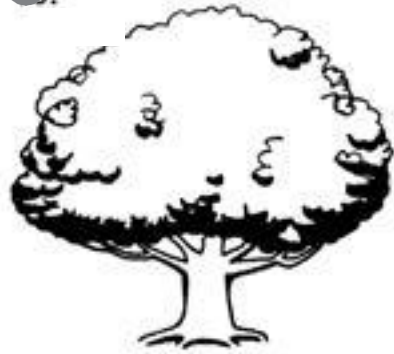
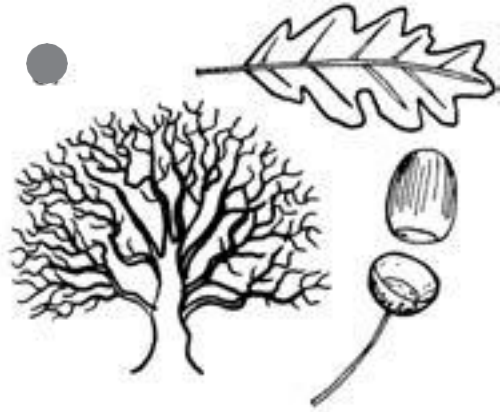


5



6





4. CONIFEROUS TREES

I. Read.

Coniferous trees produce cones that consist of scales and seeds. They have narrow needle-like leaves that are usually evergreen. In Europe coniferous trees are represented by pine, spruce, fir, larch and Douglas fir.

Pine

The most common tree species in Europe constitute almost 70 per cent of all trees growing in our forests. Pine leaves grow in groups called fascicles. There may be two, three or five needles in one fascicle. Scots pine (*Pinus sylvestris*) has two needles in one fascicle. Pine needs more light to grow than fir.

Spruce

A tree prone to windthrow because of its shallow root system. Spruce is often attacked by the European spruce bark beetles.

Fir

A shade-tolerant tree species whose cones grow upright. It grows slower than pine, spruce, larch or Douglas fir.

Larch

A tree that sheds its leaves in autumn. It has fairly soft needles grouped in fascicles.

Douglas fir

A tree native to North America. It was introduced to Europe at the beginning of the 19th century. The tallest coniferous tree with characteristic red-brown cones.

GLOSSARY

<ul style="list-style-type: none">• coniferous• consist of• scale	<ul style="list-style-type: none">• хвойні• складатися з• масштаб
---	---

<ul style="list-style-type: none"> • needle-like • evergreen • pine • spruce • fir • larch • Douglas fir • constitute • fascicle • Scots pine • prone to • windthrow • shallow • European spruce • bark beetle • shade-tolerant • upright • shed 	<ul style="list-style-type: none"> • голчасті • вічнозелені • сосна • ялина • ялиця • модрина • Дугласія • становлять • пучок • Сосна звичайна • схильні до • вітровал • неглибокий • Ялина європейська • короїд • тіньовитривалі • догори • скидати
--	--

READING COMPREHENSION

I. True or false?

1. Pine is shade-tolerant.
2. Douglas fir sheds its leaves in autumn.
3. Fir needs less light to grow than pine.
4. Larch isn't evergreen.

II. Name coniferous tree species and their features.

5. DECIDUOUS TREES

I. Read

Deciduous trees do not have leaves in winter. They come into leaf in spring. In autumn leaves turn yellow, red or brown and trees shed their leaves. Deciduous trees usually do not produce cones but different types

of fruit. The most common deciduous species in our country include such broad-leaved trees as oak, birch, alder, beech and poplar, as well as larch – the only coniferous tree that is leafless in winter.

READING COMPREHENSION

I. True or false?

1. Deciduous trees are evergreen.
2. All deciduous trees produce cones.
3. Fir is the most common deciduous tree species.
4. Deciduous trees shed their leaves in autumn.
5. Deciduous trees can be both broad-leaved and coniferous.

II. Next, read the definitions (1–7) and match them with the tree species

alder beech poplar birch willow oak maple

1. a tree that produces acorns and whose dryleaves often remain on trees in winter
2. a tree which contains salicylic acid. It is easily propagated from shoot cuttings
3. a fast-growing species, often grown on plantations
4. a pioneering species with white bark
5. a shade-tolerant tree that comes into leaf late in spring. It has smooth, dark grey bark and characteristic long, sharp buds
6. a tree whose leaf is the symbol of Canada
7. a tree that prefers very humid soils, grows along streams or rivers. It produces woody fruit resembling small cones

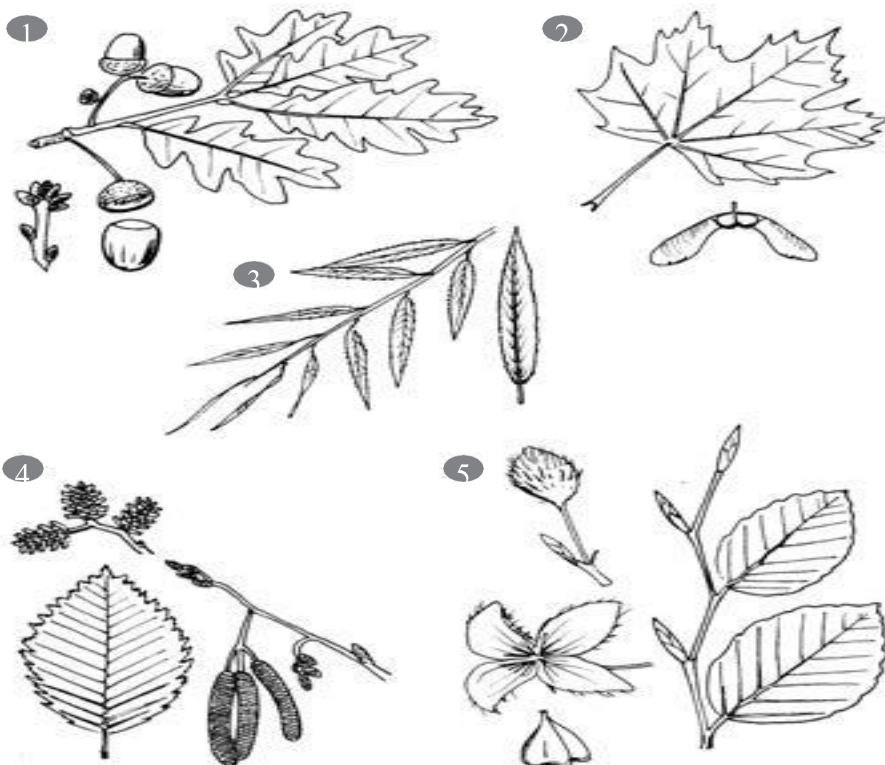
GLOSSARY

<ul style="list-style-type: none"> • deciduous • come into leaf • turn yellow • cone • oak • birch • alder 	<ul style="list-style-type: none"> • листяні • пустити листя • жовтіють • шишка • дуб • береза • вільха
---	--

- beech
- poplar
- acorn
- contain
- shoot cutting smooth
- humid
- woody
- resemble
- willow
- maple

- бук
- тополя
- жолудь
- містять
- різання пагонів гладке
- вологий
- деревні
- нагадувати
- верба
- клен

III. Name the following broad-leaved tree species.



REVISION I

I. Put the tree species from the box into two categories: coniferous and broad-leaved.

fir	maple	larch	birch
willow	spruce	poplar	pine
Douglas fir	alder	beech	oak

coniferous:.....

...

broad leaved:.....

True or false?

1. A trunk is a part of a root system.
2. Alder is deciduous.
3. Fir grows faster than pine.
4. Scots pine is the most common tree species in Poland.
5. Deciduous trees never produce cones.
6. Hail never changes a tree's appearance.
7. Root hairs are smaller than lateral roots.

II. What do the following definitions refer to?

- A. covers a tree trunk
- B. a coniferous tree that sheds its leaves in autumn
- C. a small branch
- D. the upper part of a tree consisting of leaves, twigs and branches
- E. the main tree root
- F. the part of a tree that supplies water and nutrients from the soil
- G. trees with needle-like leaves
- H. opposite to 'coniferous'
- I. a small, green part of a tree that takes part in photosynthesis

III. Match the words from the box with the definitions in exercise

taproot leaf root system

broad-leaved bark coniferous twig larch crown
--

IV. Choose the correct answer a, b or c.

1. A root system consists of:
 - a. a taproot, trunks and root hairs
 - b. a taproot, lateral roots and root hairs
 - c. cones, lateral roots and root hairs.
2. Seedling first leaves are called:
 - a. cots
 - b. cottagers
 - c. cotyledons.
3. Saplings are older than:
 - a. mature trees
 - b. poles
 - c. seedlings.
4. Which trees shed their leaves in autumn?
 - a. birch, maple, larch
 - b. larch, poplar, fir
 - c. willow, larch, spruce.
5. Scots pine has:
 - a. 3 needles
 - b. 5 needles
 - c. 2 needles in a fascicle.
6. Asexual propagation means the same as:
 - a. sexual
 - b. vegetative
 - c. seed propagation.
7. Pests are:
 - a. useful insects such as bees
 - b. tree fruits such as acorns
 - c. animals that damage trees and other plants.
8. Precipitation means:
 - a. rain, snow, hail
 - b. type of asexual propagation
 - c. tree damage caused by pathogens.

V. Put the following parts of a tree in the proper order: from

the smallest to the largest. Use the words from the box.

crown leaf branch bud twig

VI. Look at the pictures and name the species. Use the words from the box.

black locust (*Robinia pseudoacacia*)

sycamore (*Acer pseudoplatanus*)

hornbeam (*Carpinus betulus*)

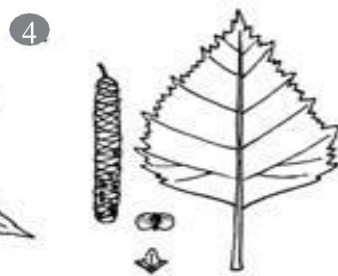
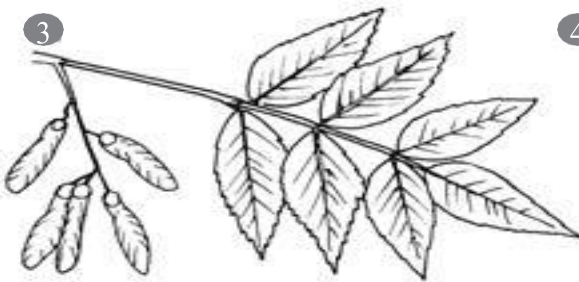
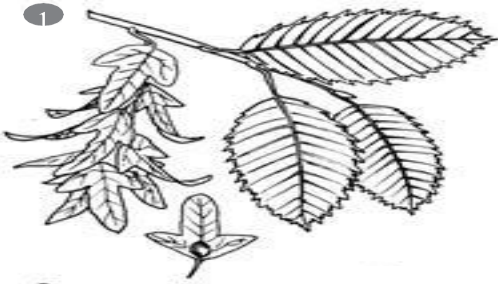
birch (*Betula pendula*)

rowan (*Sorbus aucuparia*)

aspens (*Populus tremula*)

ash (*Fraxinus excelsior*)

ginkgo (*Ginkgo biloba*)





GLOSSARY

<ul style="list-style-type: none"> • black locust • sycamore • hornbeam • birch • rowan 	
--	--

- | | |
|---|--|
| <ul style="list-style-type: none"> • ash aspen • ginkgo | |
|---|--|

6. BASIC FOREST TREE CHARACTERISTICS

I. Read.

There are several tree characteristics which are very important for foresters because they determine wood market value or provide useful information in forest management. Basic species characteristics include: longevity, growth rate, shade tolerance, soil and water requirements, and wood hardness.

Longevity

Some species are short-living, e.g. willow and poplar, others are long-living, e.g. oak or fir which can live as long as 700 years.

Growth rate

The information how fast trees grow is very useful, for instance, in establishing plantations. Fast-growing species include: poplar, larch, pine, birch and spruce.

Shade tolerance

In forest management knowledge about shade tolerance or intolerance is very important because it determines stand density and how long young trees can grow under the crowns of older ones. For instance, pine, birch or larch need more light to grow than fir or beech which are shade-tolerant.

Soil and water requirements

Soil and water requirements differ between species. For example, pine grows well on most soils, fir and beech prefer fertile ones, and spruce does not tolerate lack of water because of its shallow root system.

Type of root system

A root system is often modified by soil. However, some species have a tendency to develop a deep or shallow root system, e.g. spruce, aspen. Trees with a deep tap-root are more resistant to winds, e.g. pine, oak or elm.

Wood hardness

Some trees have very soft wood, e.g. poplar, willow, spruce, others – hard, e.g. oak, beech, hornbeam.*

GLOSSARY

<ul style="list-style-type: none">• basic characteristic• wood• market value• provide• forest management• include• longevity• growth rate• shade• wood hardness• establish• stand density• fertile• lack of• shallow• aspen• resistant to• hornbeam	<ul style="list-style-type: none">• основна риса• деревина• ринкова вартість• забезпечувати• управління лісами• включати• довголіття• темп зростання• тінь• твердість деревини• встановити• густина насадження• родючі• відсутність• неглибокий• осика• стійкий до• граб звичайний
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READING COMPREHENSION

I. Answer the questions.

1. Name basic tree characteristics.
2. Which tree lives longer: fir or willow?
3. Which species are fast-growing?
4. Which trees do not grow well in the shade?
5. Which species is tolerant to soil and water requirements?
6. Why does spruce not tolerate dry soils?
7. Which species are more resistant to winds and why?
8. Give examples of very soft and hard wood.

II. In the text find the words with the opposite meaning:

1. long-living
2. slow-growing

3. shade-intolerant
4. infertile
5. deep
6. soft

FOLLOW-UP: RELATED VOCABULARY

I. Fill in the blanks with the words from the box.

angiosperms	ginkgo	gymnosperms	softwoods
shade-bearing	hardwoods	conifers	

1. Shade-tolerant species are also known as
2. Trees whose seeds are naked are called
3. Typical representatives of gymnosperms are
4. Although belongs to gymnosperms, it does not have needle-like leaves.
5. Trees whose seeds are protected are called
6. Broad-leaved trees are also known as, and conifers as

GLOSSARY

<ul style="list-style-type: none"> • gymnosperms • angiosperms • ginkgo 	<ul style="list-style-type: none"> • ГОЛОНАСІННІ • ПОКРИТОНАСІННІ • ГІНКГО
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7. TREE TYPES

I. Read

There are different types of trees that grow in forests. They differ in age, shape and the role they play in forests.

The youngest trees are called seedlings, those older than them – saplings. Next, saplings enter a pole stage, which can be divided into small pole and high pole. Finally, when the trees are able to produce seeds and are old enough to be cut down they are called mature trees.

Trees can also play different roles in a stand. The tallest are known as dominant, a little shorter – codominant. Others that reach the bottom of their crowns are called intermediate. Finally, there are trees that do not have a chance to develop (suppressed trees) or the ones that are already dead (snags).

GLOSSARY

<ul style="list-style-type: none">• differ in• seedling• sapling• small pole• high pole• reach• intermediate	<ul style="list-style-type: none">• відрізняються• розсада• саджанець• мале деревце• високе деревце• досягати• середній
--	---

READING COMPREHENSION

I. Answer the questions.

1. How can a pole stage be divided?
2. What trees can be described as mature?
3. What is a tree that does not get enough sunlight and does not have a chance to grow called?

II. Match two parts of the definitions. What tree type they refer to?

1. a standing
2. a small plant that
3. a young tree that

- A. has all living branches
- B. dead tree
- C. has germinated from its seed

III. Match the definitions with the words from the box.

small pole	snag	seedling
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IV Read the definition and match them with tree types from the box.

intermediate tree high pole	dominant tree codominant tree	suppressed tree
--------------------------------	----------------------------------	-----------------

1. a tree that has lost its vigour as a result of getting not enough sunlight
2. trunk diameter increases, natural loss of branches up to certain height
3. a tree that forms the forest canopy but is a bit shorter than the surrounding trees and therefore captures sunlight mainly from above
4. a tree whose crown extends to the bottom level of a forest canopy
5. a high tree forming the forest canopy. It gets sunlight from above and around the crown

GLOSSARY

<ul style="list-style-type: none"> • loss • germinate • seed • sunlight • certain • height • surrounding • therefore • capture • extend • level 	<ul style="list-style-type: none"> • втрата • проростати • насіння • сонячне світло • певний • висота • оточуючі • тому • отримувати • розширити • рівень
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DID YOU KNOW?

- The bark of cork oak (*Quercus suber*) is used to produce stoppers that close wine bottles.
- A famous city in Italy, Venice, is built on black alder (*Alnus glutinosa*) poles.
- Mass-produced aspirin contains salicylic acid, which can also be found in white willow (*Salix alba*) bark.
- In Old English the word 'hornbeam' meant 'hard wood'.
- Even 1 million seeds can be produced a year by a mature birch.
- A trunk constitutes 60% of the total tree weight.*

GLOSSARY

<ul style="list-style-type: none">• cork oak• black alder• contain• salicylic acid• hornbeam• constitute	<ul style="list-style-type: none">• корковий дуб• вільха чорна• містити• саліцилова кислота• граб звичайний• становити
---	---

FOLLOW-UP

I. Give the definitions.

dominant tree	intermediate tree	codominant tree	sapling
broad-leaved tree	coniferous tree	mushroom	fallen tree
Uprooted tree	broken tree	dead tree	

8.TREE GROUPS

I. Fill in the blanks with the words (A–H).

- A. broad-leaved
- B. local
- C. non-productive
- D. jungle
- E. tropical
- F. rivers
- G. private
- H. temperate

When a tree grows alone its description may refer to its age (e.g. young, old, ma- ture), height (e.g. tall, low, small), general appearance (e.g. leafless, broken) or the role it plays, e.g. an ornamental, forest or fruit tree. The description may also referto a tree origin, e.g. native, exotic or **1**.When trees grow close to each other they are no longer called just trees but they have collective names such as: clump, forest, wood, **2**..... or a stand.

A forest is a complex ecosystem in which plants, animals as well as other factors such as water resources, soil and **3**.....
.....climate, coexist and interact.

There are different types of forests. Their names may refer to:

- CLIMATE ZONES

Forests that grow in our geographic zone are called **4**.
.....

Forests that can be found in other zones include: tropical rainforests, Medi- terranean forest and so on.

- TYPE OF DOMINANT TREE SPECIES

Forests can be divided into: coniferous, **5**.....or mixed. The name

may also refer to particular species, e.g. oak-hornbeam forest.

- TERRAIN THEY OCCUPY

For example, there are mountain forests (known also as montane) or ripar- ian forests that grow along streams or **6**.
....., on soils with shallow groundwater.

- ROLE THEY PLAY

Forests can be divided into productive, 7.....multipurpose and so on.

• OWNERSHIP

The majority of forests are state-owned. Only 17.4% are in 8.....hands.

GLOSSARY

<ul style="list-style-type: none">• description• refer to• height• leafless• ornamental• origin• native• clump• wood• stand• complex• factor• exist• interact• mixed• oak• hornbeam• terrain• occupy• temperate forest• Mediterranean• divide into• particular• productive• multipurpose• ownership• majority	<ul style="list-style-type: none">• опис• відноситься до• висота• безлисті• декоративні• походження• рідний• грудка• деревина• насадження• складні• фактор• існують• взаємодіяти• змішаний• дуб• граб звичайний• рельєф місцевості• займати• помірний ліс• середземноморський• розділити на• зокрема• продуктивний• багатocільовий• власність• більшість
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READING COMPREHENSION

I. Answer the questions.

1. How can a forest be defined?
2. What are forests growing in our climate zone called?
3. What is the difference between mountain and riparian forests?
4. Name three roles forests may play.
5. Are there more state-owned or private forests in Poland?

DID YOU KNOW?

Tree names are often used in book, film or song titles or even company names. For example:

- a classic children's novel *The Wind in the Willows* written by Kenneth Grahame in 1908 or *The Cherry Orchard* – a play by Anton Chekhov.
- such songs as: *Lime Tree* by Bright Eyes, *Little Willow* by Paul McCartney, *The Cherry Tree* by Sting.
- films: *Nightmare on Elm Street*, *Joshua Tree*, *The Tree of Life*.
- publishing companies' names such as Beech River Books, Oak Tree Press.

9. FOREST STANDS

I. Read.

A forest stand is a part of a forest. It consists of a relatively uniform group of trees that grow close together and cover a particular area. There are several ways a stand can be described. The basic characteristics include: age, species composition, stratification, stand density and stand origin.

Stand age can be described in many ways. The most common is based on age classes. Twenty years is a usual period of time limiting one class so typical age classes include trees 1–20 years old (class I), 21–40 (class II), 41–60 (class III) and so on. If trees in a stand belong to one age class, such a stand is called even-aged. When they belong to

more classes – uneven-aged.

Species composition tells us if the stand is single-species or mixed. In mixedstands there are dominant tree species and admixture, which in Polish forests usu- ally constitute 10–30 per cent.

Stratification refers to the numbers of tree layers from the forest floor to treetops. Stands can be divided into single-storey and multi-storey.

Stand density depends on a number of trees per hectare, their sizes (height and diameter) as well as canopy closure which tells us how close the crowns of neigh- bouring trees are.

Stand origin tells us if the stand regenerated naturally or artificially (was planted or sown).

GLOSSARY

<ul style="list-style-type: none">• stand• relatively• cover• area• species composition• stratification• stand density• origin• common• based on• belong to• even-aged• uneven-aged• single-species• mixed• admixture• layer• forest floor• single-storey• multi-storey• canopy• neighbouring• artificially	<ul style="list-style-type: none">• насадження• відносно• покривати• область• видовий склад• розшарування• густина насадження• походження• поширений• на основі• належати• одновікові• різновікові• одновидові• змішаний• домішка• шар• лісова підстилка• одношаровий• багат шаровий• крони дерев• сусідні• штучно
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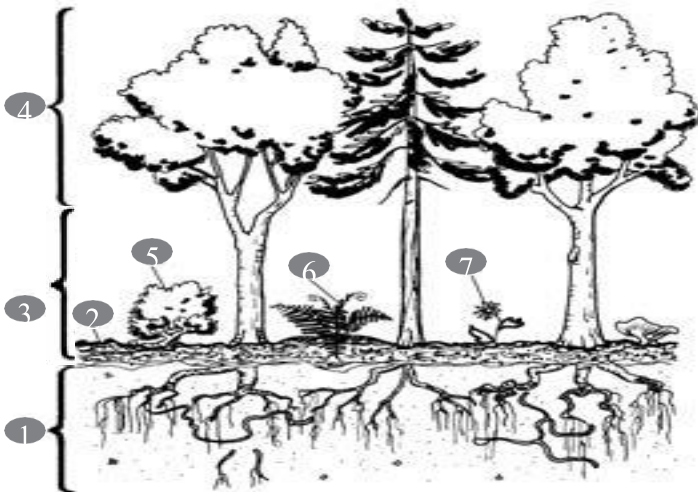
<ul style="list-style-type: none"> • was planted • was sown 	<ul style="list-style-type: none"> • було посаджено • було посіяно
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1. What is the difference between a forest and a forest stand?
2. How can a stand be characterised?
3. Explain the term ‘age class’.
4. Which stands can be called even-aged?
5. What is the difference between single-species and mixed stands?
6. What does stratification refer to?
7. What information does canopy closure provide?

FOLLOW-UP: FOREST STRATIFICATION

I. Study the drawing and match the words from the box with the numbers(1–7) in the picture.

litter	understory	fern	canopy	bush	soil	herbaceous plant
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GLOSSARY

<ul style="list-style-type: none">• litter• soil• canopy• herbaceous plant	<ul style="list-style-type: none">• підстилка• ґрунт• навіс• трав'яниста рослина
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10. FOREST FLORA

I. Read.

Trees are the tallest and most important plants in the forest. Their crowns form a forest canopy that shades the plants growing below. The canopy reduces the amount of sunlight that reaches the forest floor. Only in deciduous forests in spring, when trees are still leafless, can such plants get more light.

Fortunately, not all plants need a lot of sunlight to grow. Some of them prefer moist and shady areas, e.g. ferns and mosses, which can sometimes be seen on tree trunks.

Tree bark may also be covered by lichens – organisms that are only present when air is not polluted. Lichens consist of algae and fungi that live in a symbiotic relationship.

Fungi cannot produce their food as plants can, so they form a symbiotic relationship with algae or tree roots (mycorrhiza). Other fungi that cannot do it have to find food somewhere else. As a result, some of them attack trees and cause plant diseases. Fortunately, not all fungi are harmful. They can also act as decomposers or be picked and used to cook tasty food.

Apart from the tallest trees, there are also other plants that grow in forests: younger trees, saplings, seedlings and shrubs, e.g. hazel (*Corylus avellana*), black-thorn (*Prunus spinosa*), hawthorn (*Crataegus* sp.), alder buckthorn (*Frangula alnus*) or juniper (*Juniperus communis*).

Other well-known forest plants include those that produce tasty fruit, e.g. wild strawberry (*Fragaria vesca*), bilberry (*Vaccinium myrtillus*) or

sweet-smelling flowers, e.g. lily of the valley (*Convallaria majalis*), violet (*Viola* sp.). There are also plants that have medicinal properties, e.g. herbs.

GLOSSARY

<ul style="list-style-type: none"> • shade • amount • reach • forest floor • fortunately • sunlight • moist area • fern • moss • lichen • polluted • fungus / fungi • relationship • harmful • decomposer • pick • tasty • shrub • hazel • blackthorn • hawthorn • alder • buckthorn • wild strawberry • bilberry • lily of the valley • violet 	<ul style="list-style-type: none"> • тінь • кількість • досягати • лісова підстилка • на щастя • сонячне світло • вологе місце • папороть • мох • лишайник • звбруднений • грибок / гриби • зв'язок • шкідливий • декомпозитор • вибрати • смачно • чагарник • ліщина • терен • глід • вільха • обліпиха • лісова суниця • чорниця • Конвалія • фіалка
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1. What forms a tree canopy?
2. How does the amount of light that reaches the forest floor change during the year?
3. What sometimes covers tree bark?

4. What roles do fungi play?
5. Which plants produce edible fruit?
6. Which plants have medicinal properties?

REVISION II

I. What do the following definitions refer to? Use the words from the box.

canopy	litter	hazel	lichens
herbs	bilberry	blackthorn	fern
stand	admixture	moss	sapling

1. a small plant growing in moist areas, often seen on rocks and walls
2. plants possessing medicinal properties. They are also used in cooking
3. a part of a forest consisting of a relatively uniform group of trees growing closetogether and covering a particular area
4. *Prunus spinosa* in English
5. organisms consisting of fungi living in a symbiotic relationship with algae
6. a forest plant with feather-like leaves. It does not produce flowers
7. fallen leaves, twigs etc. covering the forest soil
8. a young tree
9. trees that constitute about 10–30 per cent of a forest stand
10. a small plant possessing very tasty small black berries
11. tree crowns in a forest
12. *Corylus avellana* in English

II. Give antonyms of the following words and expressions:

1. naturally regenerated stands
2. dominant tree species
3. broad-leaved
4. soft wood
5. private forests
6. short-living
7. even-aged stands
8. fast-growing
9. poor soil

10. deep root system
11. shade tolerance
12. single-storey stands
13. single-species stands

III. True or false?

1. Larch is shade-tolerant.
2. Birch grows faster than oak.
3. Pine needs a lot of shade when it is young.
4. Spruce has a shallow root system.
5. On the average, fir lives longer than willow.
6. Hornbeam has softer wood than spruce.
7. Beech has harder wood than willow.
8. Saplings are younger than seedlings.
9. Forests that grow in our climate zone are called temperate.
10. Lichens consist of ferns and fungi.
11. Forest stratification means decomposition of fallen leaves, twigs and dead animals.
12. There are only harmful fungi in forests.
13. Fungi can form a symbiotic relationship with trees.
14. Hawthorn, buckthorn and lily of the valley are the examples of forest shrubs.
15. 20 years is a usual period of time limiting one age class in forests.
16. Mushrooms are fungi.
17. Riparian forests grow on sandy and dry soils.
18. Mosses prefer moist and shady areas.
19. Canopy closure tells us how close the crowns of neighbouring trees are.
20. Hazel produces tasty nuts.

IV. Put the following tree growth stages in the proper order. Use the words from the box.

mature tree	sapling	seedling	pole
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V. Match Latin plant names with English ones.

VI.

1. hawthorn	A. <i>Vaccinium myrtillus</i>
2. Norway spruce	B. <i>Fragaria vesca</i>
3. alder buckthorn	C. <i>Convallaria majalis</i>
4. juniper	D. <i>Abies alba</i>
5. silver fir	E. <i>Juniperus communis</i>
6. wild strawberry	F. <i>Picea abies</i>
7. bilberry	G. <i>Crataegus</i>
8. lily of the valley	H. <i>Frangula alnus</i>

11. FOREST ANIMAL KINGDOM

I. Read.

A forest is 'home' for many species of animals. Some of them are very big, others are small. They can be dangerous for people, harmful for other animals or plants or beneficial. They can play different roles in forest ecosystems. The most common and well-known animals include: spiders, ticks, insects, snails and slugs, fish, amphibians, reptiles, birds and mammals.

Spiders

They have eight legs. They are predators so they build webs to catch other animals, usually insects, and feed on them. Spiders can be beneficial and reduce the number of insects dangerous for forests.

Ticks

They are very small arachnids that prefer wet, grassy areas or broad-leaved forests and shrubs. They are dangerous for people because they transmit *Borrelia burgdorferi* – a bacterium that causes Lyme disease.

Insects

They usually have three pairs of legs and antennae on their heads. Some of them have one or two pairs of wings so they can fly. Some insects feed on blood, e.g. mosquitoes. Some insects are beneficial, e.g. bees, because they pollinate flowers; others are forest pests, e.g. aphids or the European spruce bark beetle.

Snails and slugs

The difference between snails and slugs is that snails have shells and slugs do not. They are omnivorous and clean the forest floor. They eat leaves, other dead animals, mushrooms and the like.

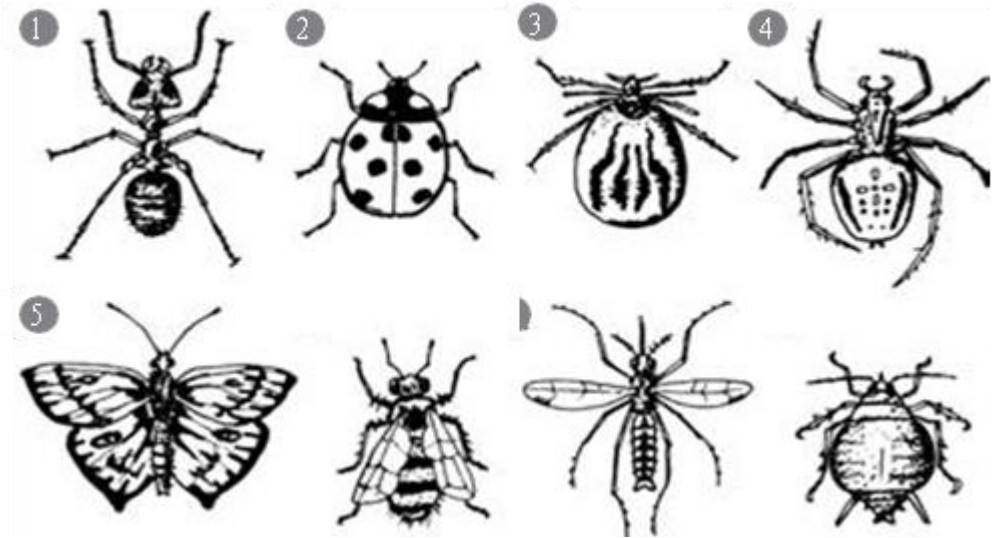
GLOSSARY

<ul style="list-style-type: none">• kingdom• harmful• beneficial• spider• tick• snail• slug• amphibian• reptile• mammal• predator• feed on• arachnid• transmit• Lyme disease• antenna / antennae• blood• mosquito• pest• aphid• European spruce• bark beetle• shell• omnivorous• forest floor	<ul style="list-style-type: none">• королівство• шкідливий• вигідно• павук• кліщ• равлик• слимак• амфібія• рептилія• ссавець• хижак• харчуватися• павукоподібний• передавати• Хвороба Лайма• вусики• кров• комар• шкідник• попелиця• ялина європейська• короїд• оболонка• всеїдний• лісова підстилка
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1. What animals are a part of the forest ecosystem?
2. How do spiders catch insects?
3. What is *Borellia burgdorferi*? How is it transmitted?
4. What roles can insects play?
5. What is the difference between a snail and a slug?

II. Look at the pictures and name the animals. Use the words from the box.

mosquito	ant	ladybird	tick
bee	aphid	butterfly	spider



Read.

Apart from spiders, ticks, insects and snails forests are 'home' to such animals as amphibians, reptiles, birds and mammals.

Amphibians

They live close to water because their skin is thin and moist and may dry out easily. In Poland, amphibians are represented by different types of toads and frogs.

Reptiles

In contrast to amphibians, reptile skin is dry and covered by scales, which protect skin from drying out. Polish reptiles include snakes and lizards.

Birds

They are very important in forest ecosystems because they can reduce the number of forest pests such as rodents or insects. They also help in seed dispersal and eat other dead animals.

Mammals

They feed their young with milk. Some of them can fly, e.g. bat, others can swim, e.g. beaver. Some of them are big, e.g. bear, deer, others are small, e.g. mouse.

GLOSSARY

<ul style="list-style-type: none"> • amphibian • mammal • skin • thin • moist • toad • frog • in contrast to • covered by • scale • snake • lizard • pest • rodent • insect • seed dispersal • bat • beaver • bear • deer • mouse /mice 	<ul style="list-style-type: none"> • амфібія • ссавець • шкіра • тонкий • вологий • жаба • жаба • на відміну від • вкритий • луска • змія • ящірка • шкідник • гризун • комаха • розповсюдження насіння • кажан • бобер • ведмідь • олень • миша /миші
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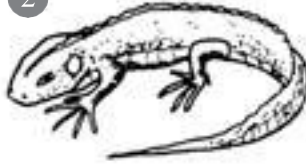
1. What is the difference between amphibian and reptile skin?
2. Name typical amphibians and reptiles.
3. What roles do birds play in forest ecosystems?
4. Give examples of mammals living in Polish forests.

I. Look at the pictures and name the animals.

1



2



3



4



5



6



7



FOLLOW-UP: RELATED VOCABULARY

I. Choose the correct answer: a, b or c.

ANIMAL QUIZ

1. Marmots in North America are called:
 - a. groundhogs
 - b. hedgehogs
 - c. hogs
2. Hibernating animals are represented by:
 - a. chamois, bear, mouse
 - b. bear, marmot, hedgehog
 - c. hedgehog, bear, chamois
3. Bears are:
 - a. herbivorous
 - b. carnivorous
 - c. omnivorous
4. Chamois is related to:
 - a. deer
 - b. fox
 - c. bear
5. Deer “horns” are called:
 - a. ants
 - b. antennae
 - c. antlers
6. Woodpeckers and partridges are:
 - a. resident birds
 - b. nocturnal birds
 - c. migrant birds
7. Owls can move noiselessly because:
 - a. they are fairly small
 - b. their feet and feathers are covered by down
 - c. they have bigger wings than other birds
8. Beavers are:
 - a. rodents
 - b. related to fish

- c. active mainly during the day
9. Which animals belong to the same family (*Canidae*)?
- chamois, bear, lynx
 - fox, wolf, dog
 - wolf, marmot, fox

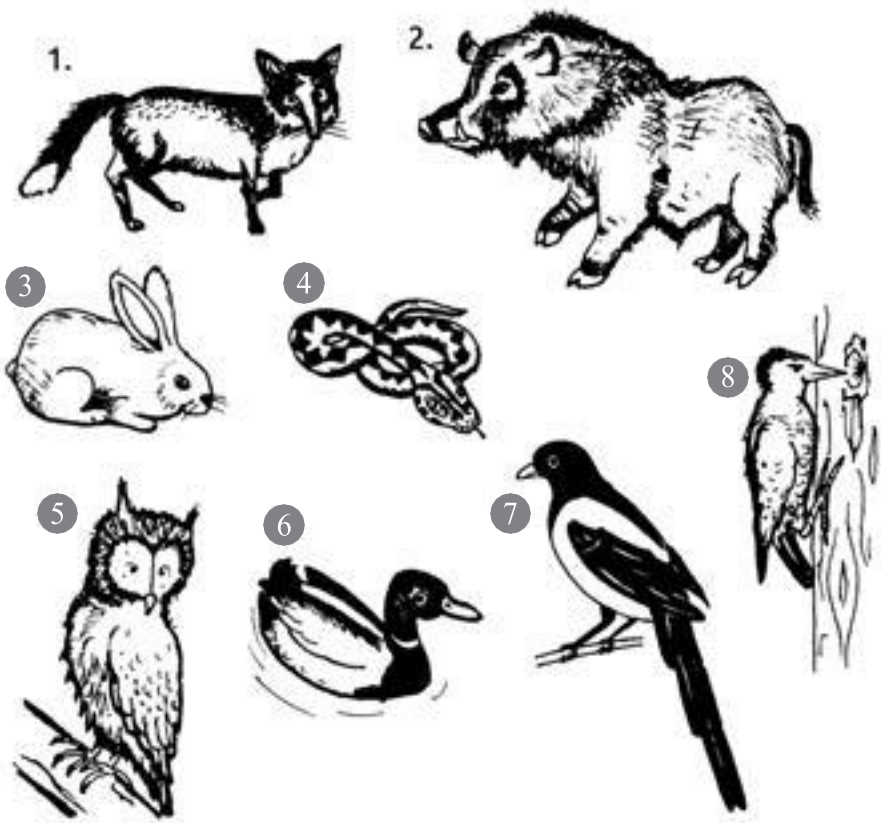
GLOSSARY

<ul style="list-style-type: none"> • marmot • chamois • hedgehog • herbivorous • arnivorous • omnivorous • fox • horn • woodpecker • partridge • resident birds • nocturnal • migrant birds • owl • noiselessly • feather • down • beaver • rodent • lynx 	<ul style="list-style-type: none"> • бабак • серна • їжак • травоїдний • хижий • всеїдний • лисиця • рiг • дятел • курiпка • осiлi птахи • нiчний спосiб життя • перелiтнi птахи • сова • безшумно • перо • вниз • бобер • гризун • рись
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II. What do antlers and *Canidae* mean in Ukrainian?

III. Look at the pictures and name the animals. Use the words from the box. Next, translate the words into Ukrainian.

<p>magpie owl rabbit wild boar woodpecker adder fox</p> <p>duck</p>



12. HUNTING

I. Read.

Forest animals can be killed illegally (poaching) or legally (hunting). Animals that are hunted, e.g. deer, wild boar, are called game.

Hunting can be carried out only during the open season. During the closed sea- son hunting is not allowed because it is the time when animals reproduce and take care of their young.

There are several reasons why forest animals are killed. Firstly, when animals are weak, ill or injured. Secondly, despite protests, when hunting is treated as sport. Thirdly, when there are too many of them

living in a certain area and when they can cause damage. Their number cannot be reduced in other ways because there are not enough natural enemies. Finally, some forest animals are hunted for their meat, fur and the like.

GLOSSARY

<ul style="list-style-type: none"> • illegally • legally • deer • wild boar • reproduce • take care • firstly • weak • ranny 	<ul style="list-style-type: none"> • незаконно • законно • олень • кабан • відтворювати • піклуватися • по-перше • слабкий • рідкий
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READING COMPREHENSION

I. Find the words in the text that mean:

1. killing animals when such an action is against law
2. killing animals legally
3. animals hunted for their meat, fur
4. the time when killing animals is not forbidden
5. the time when killing animals is forbidden

II. Translate the words from exercise I into Ukrainian

FOLLOW-UP: RELATED VOCABULARY

H. Look at the pictures and name the animals :

- partridge,
 - pheasant,
 - hare,
 - goose,
 - roe,
 - deer
-

1.



2.



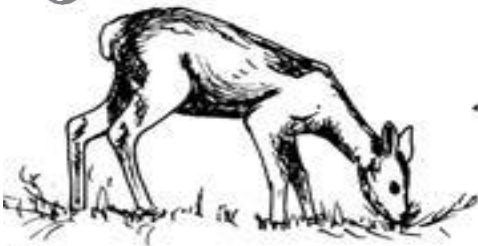
3.



4.



5.



6.



13. A FOOD CHAIN

I. Read.

A food chain explains which part of a forest community produces food and which one eats it. The ones that produce food are called producers and those which eat food – consumers. Finally, there are those which take care of dead producers and consumers. Such organisms are known as decomposers.

Plants are producers in forest ecosystems. They get energy from the sun, water from the soil or other source and produce glucose in the process called photosynthesis. The chemical reaction that takes place during photosynthesis can be explained by the following equation:



It means that plants use carbon dioxide and water to produce glucose and oxygen.

Consumers cannot produce their own food. There are different types of consumers. Primary consumers eat plants and are called herbivores. Secondary consumers feed on primary ones. They are called carnivores because they eat meat. Finally, there are tertiary consumers that are also carnivores and kill other carnivores. When a plant or animal dies organic matter in their bodies is broken down by decomposers and nutrients are released and returned to the ecosystem for plants to use them again. The most common decomposers are bacteria, fungi or some animals, e.g. earthworms, flies and other insects.

GLOSSARY

<ul style="list-style-type: none">• food chain• explain• food• source• take place• equation• carbon dioxide• oxygen	<ul style="list-style-type: none">• харчовий ланцюг• пояснити• харчування• джерело• відбуватися• рівняння• вуглекислий газ• кисень
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<ul style="list-style-type: none"> • primary consumer • herbivore • secondary consumer • feed on • carnivore • tertiary consumer • organic matter • break down • nutrient • release • earthworm • fly 	<ul style="list-style-type: none"> • первинний споживач • травоїдна тварина • вторинний споживач • харчуватися • хижак • третинний споживач • органічна матерія • зламатися • поживна речовина • вивільнювати • дощовий черв'як • муха
---	--

READING COMPREHENSION

I. Answer the questions.

1. What is a 'food chain'?
2. What is the difference between producers and consumers?
3. What do plants need to produce food?
4. What is produced in the process of photosynthesis?
5. What do primary consumers eat?
6. What do secondary and tertiary consumers feed on?
7. What happens to dead plants and animals?
8. What happens to nutrients that are released during decomposition?
9. What organisms break down organic matter?

FOLLOW-UP: RELATED VOCABULARY

A food chain is a simplified model describing relationships between plants and animals and how energy is transferred within ecosystems. What exists in real life is not a food chain but rather a food web, because animals can turn to different diet at times.

In order to describe how a food web works it is good to know some more terms connected with the topic. Important words include: a scavenger, carrion, prey, a predator.

GLOSSARY

<ul style="list-style-type: none">• simplified• relationship• transfer• in order to• term• connected with	<ul style="list-style-type: none">• спрощений• відносини• передача• щоб• термін• пов'язаний з
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I. Read the definitions and match them with the words from the box.

scavenger	carrion	prey	predator
-----------	---------	------	----------

1. an animal that eats dead animals
2. an animal that kills other animals
3. an animal which is killed
4. a dead animal

REVISION III

Choose the correct answer.

1. Polish reptiles include:
 - a. lizards and snakes
 - b. beavers and frogs
 - c. toads and lizards
2. 'Game' means:
 - a. controlling the number of animals in the forest
 - b. animals hunted for sport or food
 - c. the same as poaching
3. During the closed season animals:
 - a. are hunted
 - b. reproduce and take care of their young
 - c. migrate
4. Ticks:
 - a. are related to bees
 - b. are beneficial

- c. feed on blood
- 5. The European spruce bark beetle:
 - a. transmits *Borrelia burgdorferi*
 - b. prefers wet, grassy areas
 - c. is a forest pest
- 6. Bats and beavers:
 - a. are mammals
 - b. can swim
 - c. can fly
- 7. Deer:
 - a. are small reptiles
 - b. hibernate
 - c. are game
- 8. Plants absorb in the process of photosynthesis:
 - a. oxygen
 - b. carbon dioxide
 - c. nutrients
- 9. Secondary consumers eat:
 - a. herbivores
 - b. carnivores
 - c. plants

II. What animals:

- A. have four pairs of legs and build webs?
- B. cause Lyme disease?
- C. are represented by snakes and lizards?
- D. have antennae on their heads?
- E. are omnivorous and have shells?
- F. have skin that can easily dry out?
- G. feed their young on milk?

III. Decide whether the following statements are true or false.

- 1. Hunting means illegal poaching.
- 2. Herbivores prefer meat in their diet.
- 3. Ticks are arachnids.
- 4. Mosquitoes are agricultural pests.
- 5. Amphibians have thin skin.

6. Bears hibernate.
7. Aphids are beneficial.
8. Omnivores feed only on meat.
9. Decomposers break down organic matter.
10. Lizard skin is covered by scales.
11. Frogs are reptiles.
12. Bats can fly.
13. A fly is an insect.
14. Deer is carnivorous.
15. A wild boar is smaller than a beaver.
16. Mice are small rodents.
17. Bats are mammals.
18. Fructose is produced in the process of photosynthesis.

IV. Match the words on the right with their antonyms on the left.

- | | |
|----------------|------------------|
| 1. open season | A. carnivore |
| 2. beneficial | B. poaching |
| 3. predator | C. closed season |
| 4. herbivore | D. harmful |
| 5. hunting | E. prey |

14. WHAT DESTROYS FORESTS

I. Read.

The most dangerous forest enemies are people because they are responsible for air and water pollution. What is more, they cause fires and destroy forest ecosystems by improper use of forests. Finally, they are to blame for the introduction of invasive alien species.

Air pollution damages leaves and makes trees weaker. It also changes soil quality by lowering its pH. The most dangerous pollutants for trees are: sulphur dioxide (SO₂), nitrogen dioxide (NO₂), fluorine (F₂), hydrogen fluoride (HF), ammonia (NH₃) and oxidants, e.g. ozone (O₃).

People are responsible for 90 per cent of forest fires which are caused by burning pastures, irresponsible tourist behaviour or arson.

Improper use of forests is dangerous for forest ecosystems because it includes: poaching, wood theft, artificial regeneration preferring single-species and even-aged plantation, harmful harvesting practice, e.g. clearcutting.

People are also to blame for the introduction of invasive alien species which often have no natural enemies, reduce the number of or may even replace native species, e.g. the eastern grey squirrel (*Sciurus carolinensis*) or black cherry (*Prunus serotina*).

Finally, forests around cities are treated as rubbish dumps. What is more, people visiting forests often destroy plants or drive vehicles which make noise and frighten animals.

GLOSSARY

<ul style="list-style-type: none"> • destroy • enemy • responsible for • pollution • what is more • cause • fire • improper • blame for • damage • lower • burn • pasture • irresponsible • behaviour • arson • wood theft • artificial • regeneration • clearcutting • introduction • invasive alien species • replace • native • eastern grey squirrel 	<ul style="list-style-type: none"> • знищити • ворог • відповідальний за • забруднення • більш того • причина • вогонь • неналежний • звинувачувати у • пошкодження • нижче • спалювати • пасовище • безвідповідальний • поведінка • підпал • крадіжка деревини • штучні • регенерація • суцільні рубки • вступ • інвазивні чужорідні види • замінити • рідний • білка східна сіра
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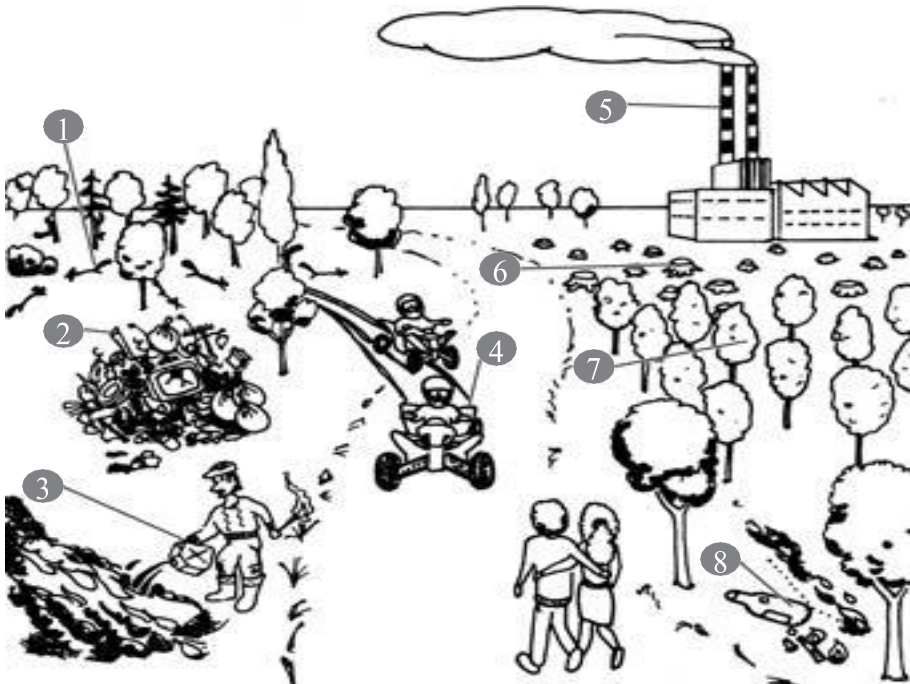
<ul style="list-style-type: none"> • black cherry • treat as • rubbish dump • vehicle • frighten 	<ul style="list-style-type: none"> • Чорна вишня • розглядати як • звалище • транспортний засіб • налякати
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READING COMPREHENSION

I. Answer the questions.

1. Why is air pollution dangerous for forests?
2. What are pollutants? Name those most harmful for trees.
3. Who is responsible for the majority of forest fires?
4. What are their reasons?
5. What does improper use of forests include?
6. Why are invasive alien species dangerous for native flora and fauna?
7. What harmful practices happen in forests around cities?

II. Look at the pictures and name factors that destroy forests.



I. Read.

Apart from people, forests are also damaged by unfavourable weather conditions or by different harmful living organisms.

Weather conditions such as rain, snow, hail, drought, flood, strong wind, frost, changing temperatures or lightning can damage the whole tree or its parts such as buds, leaves, twigs, branches, trunks, bark or even roots. Strong wind or avalanche can uproot the whole tree or break it.

The most dangerous organisms for forests are bacteria and fungi because they cause numerous tree diseases, and insects which are the most common forest pests. Additionally, trees are also damaged by bigger animals such as: deer which destroy bark or young plants, beavers that fell trees and flood the area, or wild boars that dig along streams and contribute to soil erosion.

GLOSSARY

<ul style="list-style-type: none">• unfavourable• condition• hail• drought• frost• lightning• avalanche• uproot• numerous• flood• dig• stream• contribute• soil	<ul style="list-style-type: none">• несприятливий• хвороба• град• посуха• мороз• блискавка• лавина• викорчувати• численні• повінь• копати• потік• сприяти• ґрунт
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READING COMPREHENSION

I. Answer the questions.

1. What weather conditions are unfavourable for trees?
2. What parts of a tree can weather conditions damage?
3. What causes tree diseases?
4. What forest pests are the most dangerous?
5. What damage may avalanche or strong wind cause?
6. Why are deer, wild boars and beavers considered forest pests?

II. In the text find the words that mean:

1. a weather condition when temperature falls below 0°C
2. a lot of snow falling quickly down the slope of a mountain
3. small ice balls falling from the sky
4. a tree illness
5. an area covered by water as a result of heavy rains
6. an animal that destroys trees or other plants
7. a period of time when there is not enough rain, the soil is dry and plants suffer from lack of water
8. animals that are famous for building dams
9. big herbivores with antlers
10. a strong light produced by electricity which moves between clouds and the earth surface

GLOSSARY

<ul style="list-style-type: none">• fall• slope mountain• illness• as a result of• soil• dry• lack of• famous for• dam• move	<ul style="list-style-type: none">• падіння• схил гори• захворювання• як результат• ґрунт• сухий• відсутність• відомий за• дамба• рухатися
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<ul style="list-style-type: none"> • cloud • surface • earth 	<ul style="list-style-type: none"> • хмара • поверхня • земля
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FOLLOW-UP: RELATED VOCABULARY

I. Find the Ukrainian equivalents.

1. sleet
2. blizzard
3. rime
4. gale
5. drizzle
6. glaze

REVISION IV

I. Fill in the blanks with the words from the box.

squirrel	clearcutting	even-aged	pollution
arson	invasive alien	wood theft	frighten
dumps	burning	pollutants	fires

The most dangerous forest enemies are people because they are responsible for air and water **1**.....What is more, they cause **2**.....and destroy forest ecosystems by improper use of forests. Finally, they are to blame for introduction of **3**.....species.

Air pollution damages leaves and makes trees weaker. It also changes soil quality by lowering its pH. The most dangerous **4**.for trees are: sulphur dioxide, nitrogen dioxide, fluorine, hydrogen fluoride, ammonia and oxidants, e.g. ozone.

People are responsible for 90 per cent of forest fires which are caused by **5**. pastures, irresponsible tourist behaviour or **6**.

Improper use of forests is dangerous for forest ecosystems because it includes: poaching, 7., artificial regeneration preferring single-species and 8. plantation, harmful harvesting practice, e.g. 9.

People are also to blame for introduction of invasive alien species which often have no natural enemies, reduce the number of or may even replace native species, e.g. the eastern grey 10. (*Sciurus carolinensis*) or black cherry (*Prunus serotina*).

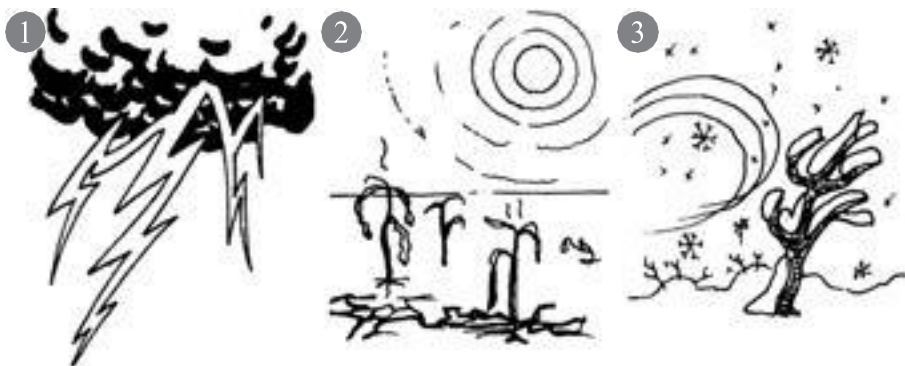
Finally, forests around cities are treated as rubbish 11.....What is more, people visiting forests often destroy plants or drive vehicles which make noise and 12. animals.

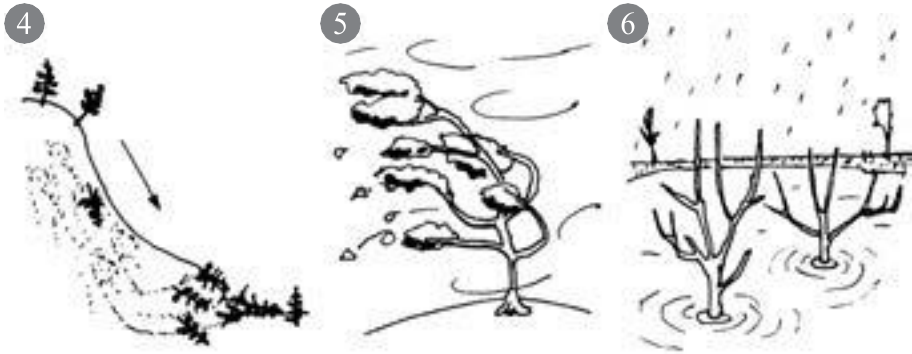
II. Match the following chemical elements or compounds with their symbols or formulae from the box.

NH_3	O_3	HF	NO_2	SO_2	F_2
--------	-------	----	--------	--------	-------

1. fluorine
2. nitrogen dioxide
3. ammonia
4. sulphur dioxide
5. ozone
6. hydrogen fluoride

III. Look at the pictures and name abiotic factors that can damage trees.





IV. Put the words from the box into different categories.

blizzard	sleet	rime	drizzle	gale	avalanche	glaze
----------	-------	------	---------	------	-----------	-------

- ice
- snow
- rain
- rain + snow
- wind

15. THE FOREST BIOLOGICAL CLOCK

I. Read.

Foresters take care of living organisms and so they observe nature carefully. Their work is planned according to biological changes in forests which are modified by weather conditions.

Phenology is the study of such changes and gives information about leaf development, plant flowering, fruition, animal breeding and migration. It also helps to choose the best time for planting, collecting seeds or logging. Observing weather conditions and their influence on plants is also useful in predicting fire risks.

There are eight phenological seasons that can be observed in Poland. Each season is characterised by different biological changes that take place in forest ecosystems. The seasons are as follows:

1. very early spring
Blooming of: windflower (*Anemone nemorosa*), snowdrop (*Galanthus nivalis*), hazel (*Corylus avellana*), Cornelian cherry (*Cornus mas*), poplar (*Populus sp.*), aspen (*Populus tremula*).
2. early spring
Beech (*Fagus sylvatica*) and bird cherry (*Padus avium*) are in flower.
3. spring
Common hawthorn (*Crataegus oxyacantha*) and rowan (*Sorbus aucuparia*)
bloom, after coming into leaf.
4. early summer
Blooming of: black elder (*Sambucus nigra*), raspberry, dogwood (*Cornus sanguinea*).
5. summer
Lindens bloom, raspberry and black elder fruits appear.
6. early autumn
Other fruits ripen.
7. autumn
Leaves of deciduous trees turn yellow, red or brown, ripening of acorns, beechnuts.
8. winter
Plants stay dormant.

GLOSSARY

<ul style="list-style-type: none"> • according to • change • phenology • development • flowering • fruition • breed • plant • collect seeds • log • influence 	<ul style="list-style-type: none"> • відповідно до • зміна • фенологія • розвитку • цвітіння • плодоношення • порода • рослина • збирати насіння • колода • вплив
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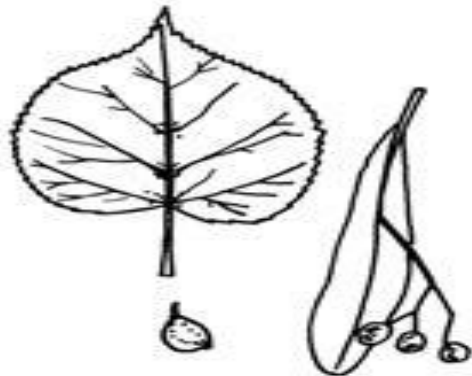
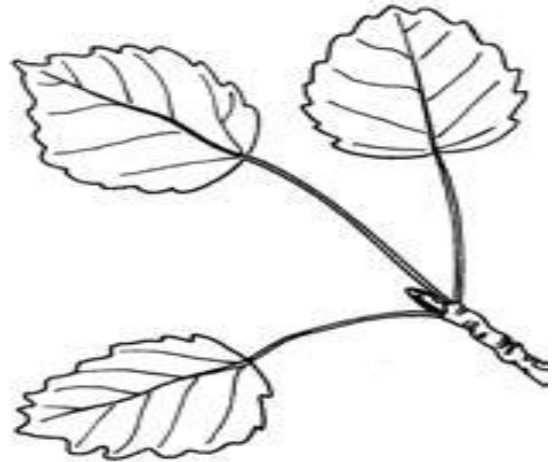
<ul style="list-style-type: none"> • predict • season • bloom • windflower • snowdrop • hazel • Cornelian cherry • poplar • beech • bird cherry • be in flower • come into leaf • rowan • black elder • raspberry • dogwood • linden/lime • appear • ripen • larch • turn yellow • acorn • beechnut • dormant 	<ul style="list-style-type: none"> • передбачити • сезон • цвітіння • вітроцвіт • підсніжник • ліщина • кизил • тополя • бук • черемха • бути в цвіту • прийти в листок • горобина • бузина чорна • малина • кизил • липа • з'являтися • дозрівають • модрина • жовтіти • жолудь • буковий горіх • сплячий
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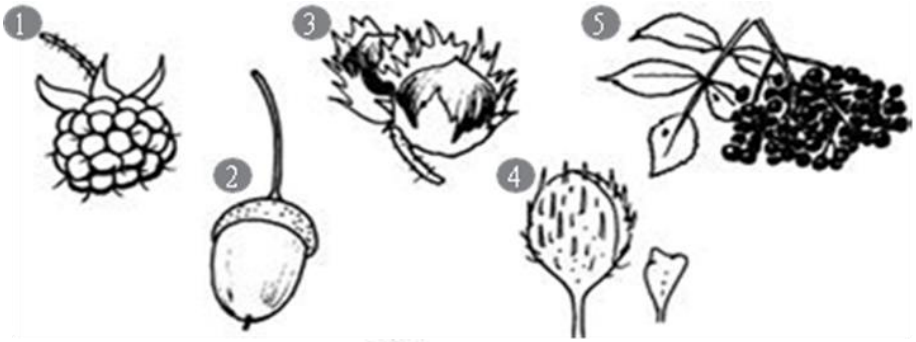
READING COMPREHENSION

I. Answer the questions.

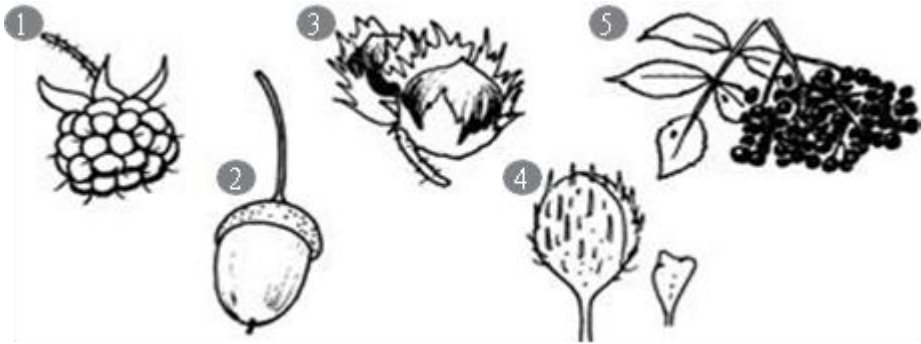
1. Why is observing nature so important for foresters?
2. What is phenology?
3. How many phenological seasons are there in Poland?
4. Which plants bloom earliest and which ones latest?
5. What happens in autumn and winter?

II. Look at the drawings and name the plants.





III. Look at the drawings and name the fruits.



16. TREE DISEASES

I. Read.

Tree pathogens include viruses, bacteria and fungi. However, they do not have the same impact on tree health. For instance, viral and bacterial diseases are not very numerous. The most dangerous are fungi because they cause the majority of tree diseases. Diseases weaken plants and, as a result, trees grow slower or even die. What is more, commercial wood value is lowered.

Viruses, bacteria and fungi can damage all parts of a tree: leaves, shoots, bark or roots. Pathogens can attack seedlings and older trees, living or dead plant tissues and damage stored wood.

Pathogens can cause, for example, spots on leaves, their yellowing, necrosis, wilting, shoot dieback, trunk rot or deformation of different parts of a tree. Fungi are also to blame for vascular diseases. For example, *Ophiostoma ulmi*, which causes Dutch elm disease, blocks vascular tissues. As a result, plants do not get enough water so they wilt and die.

Trees can be also weakened by parasitic flowering plants, e.g. European dodder (*Cuscuta europaea*) and mistletoe (*Viscum album*).

GLOSSARY

<ul style="list-style-type: none">• disease• pathogen• however• impact• viral• bacterial• numerous• majority• weaken• commercial value• lower• tissue• store• spot• wilt• dieback• rot• are to blame for• vascular• cause• Dutch elm disease• parasitic• flowering• European dodder• mistletoe	<ul style="list-style-type: none">• захворювання• збудник• проте• вплив• вірусний• бактеріальний• численні• більшість• слабшають• комерційна вартість• нижче• тканина• зберігати• пляма• в'яне• відмирання• гниль• винні в• судинний• причина• голландська хвороба в'яза• паразитичний• цвітіння• Європейська повилика• омела
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READING COMPREHENSION

I. Answer the questions.

1. What organisms cause plant diseases?
2. How do pathogens affect trees?
3. What damage can they cause?
4. What are vascular diseases?
5. Name some parasitic flowering plants.

FACTS ABOUT MISTLETOE

- Mistletoe attaches itself to a tree and takes water and nutrients from the host plant.
- The plant can be seen in the crowns of poplars, alders, willows, firs and other trees.
- Its leaves have some chlorophyll so mistletoe photosynthesises some of its food.
- Mistletoe seeds are dispersed by birds.
- The plant has medicinal properties. It lowers blood pressure, improves blood circulation and stops bleeding.
- Mistletoe is a symbol of peace, joy and Christmas.
- Mistletoe was believed to protect houses from ghosts and bring good luck.
- In the past, when a woman stood under a mistletoe she could not refuse to be kissed.
- When a man kissed a woman under a mistletoe it meant that he wanted to marry her.

GLOSSARY

<ul style="list-style-type: none">• attach• host• disperse• medicinal properties• blood pressure• improve• circulation• bleeding• joy• was believed• protect• ghost• good luck• refuse	<ul style="list-style-type: none">• прикріпити• хазяїн• розносити• лікувальні властивості• кров'яний тиск• покращити• обіг• кровотечі• радість• вірили• захистити• привид• удача• відмовити
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17. TREE PESTS

I. Read.

There are many animals that can damage trees but the most dangerous are insect pests because they are the most numerous.

Tree insect pests can attack healthy trees (primary pests) or ill, damaged or weakened plants (secondary pests). Some insects prefer only one species of plant they feed on (monophages), others more than one, but closely related (oligophages). Finally, there are those which eat different plant species (polyphages).

Insect pests can damage all parts of trees. For example, defoliating insects, known also as defoliators, feed on leaves and needles. Others can also damage inner bark, wood, roots, cones and seeds.

There are usually four developmental insect stages: eggs, larvae, pupae and adults. The most dangerous for forests are adults and larvae because they move and eat a lot.

GLOSSARY

<ul style="list-style-type: none">• pest• insect• numerous• primary pest• weakened• secondary pest• prefer• feed on• monophage• oligophage• species• polyphage needle• inner• cone• seed• developmental• stage• egg• larva / larvae	<ul style="list-style-type: none">• шкідник• комаха• численні• первинний шкідник• ослаблені• вторинний шкідник• віддають перевагу• харчуватися• монофаг• олігофаг• видів• поліфагова голка• внутрішній• шишка• насіння• розвивальна• етап• яйце• личинка / личинки
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<ul style="list-style-type: none"> • pupa / pupae • adult 	<ul style="list-style-type: none"> • лялечка / лялечка • дорослий
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READING COMPREHENSION

I. Answer the questions.

1. Which tree pests are the most dangerous and why?
2. What is the difference between primary and secondary pests?
3. What do oligophages eat?
4. What do defoliators damage?
5. Which insect developmental stages are the most dangerous and why?

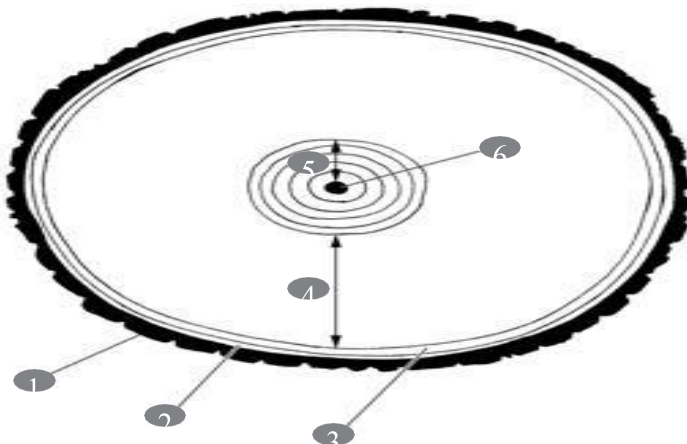
FOLLOW-UP: RELATED VOCABULARY

I. What do the following insects eat? Match the insect types (1–4) with the food they prefer (A–D).

- | | |
|----------------|------------|
| 1. rhizophage | A. cambium |
| 2. foliophage | B. wood |
| 3. xylophage | C. leaves |
| 4. cambiophage | D. roots |

II. Look at the trunk cross-section. Name its parts. Use the words from the box.

cambium	heartwood	inner bark (phloem)
sapwood	outer bark	pith



GLOSSARY

<ul style="list-style-type: none">• trunk• cross-section• cambium• heartwood• phloem• sapwood• outer• pith	<ul style="list-style-type: none">• стовбур• поперечний переріз• камбій• серцевина• флоема• заболонь• зовнішній• серцевина
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18. HOW TO CONTROL FOREST PESTS AND DISEASES

I. Read.

Forests are constantly being weakened by anthropogenic and abiotic factors. Anthropogenic damage is caused by people whereas abiotic refers to unfavourable weather conditions. As a result, trees are not as strong as they should be to resist diseases and pest attack.

Forest management today is aimed at creating the best conditions for trees to grow and the worst for pests and diseases to develop. It means, for example, preferring uneven-aged, mixed stands, conserving biological diversity, removing ill trees, choosing tree species that grow the best in the local climate and soil conditions, protecting natural enemies of forest pests (biological control).

Chemical control (pesticide application) is used in forests when other methods of fighting pests and diseases fail. Pesticides are substances that are used against harmful organisms for plants such as fungi, insects or weeds. Pesticides are not used in forests as often as in gardening because they reduce biological diversity. They fight not only pests and diseases but other organisms, e.g. beneficial ones or natural enemies that help to reduce pest population. What is more, pesticides may poison animals, edible mushrooms, fruit and herbs that are picked in forests. That is why their use in forests is limited.

Foresters know that using one method is not enough to control forest pests and diseases. They use as many different methods as possible

because one method complements the other and together they are more effective. Such a way of controlling pests and diseases is called integrated pest and disease management.

GLOSSARY

<ul style="list-style-type: none"> • constantly • anthropogenic • abiotic • refer to • unfavourable • resist • forest management • aimed at • develop • conserve • biological diversity • remove • protect • enemy • application • fail • pesticide • against • harmful • weed • poison • herb • pick • complement • integrated 	<ul style="list-style-type: none"> • постійно • антропогенний • абіотичний • відноситься до • несприятливий • чинити опір • лісовпорядкування • спрямовані на • розвиватися • захищати • біологічне різноманіття • видалити • захистити • ворог • додаток • провал • пестицид • проти • шкідливий • бур'ян • отрута • трава • вибрати • доповнюють • інтегрований
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READING COMPREHENSION

I. Answer the questions.

1. How do abiotic and anthropogenic factors affect tree health?
2. What is forest management based on today?

3. When is chemical control used?
4. What are pesticides?
5. Why are pesticides not often used in forestry?
6. What is integrated pest and disease management?

FACTS ABOUT PESTICIDES

- Some plants are able to produce natural insecticides e.g.
 - pyrethrum – obtained from *Chrysanthemum cinerariaefolium*
 - rotenone – extracted *Derris* roots
 - nicotine – derived from tobacco
 - sabadilla – from *Schoenocaulon officinale* (*Liliaceae*).
- Pesticides started to be used on a massive scale after the Second World War.
- Pesticides can be divided into: herbicides (against weeds), fungicides (against fungi), insecticides (against insects), rodenticides (against rodents) and nema- ticides (against nematodes).
- The era of manufactured pesticides started with the production of DDT.
- DDT was invented in 1939. It killed insects, was very cheap and effective. It was used against lice and malaria during the Second World War.
- DDT was banned in the USA in 1972 because it was persistent, non-selective, accumulated in food chains and transported for long distances which means it is present nowadays where it was not used in the past, e.g. in Antarctica.

GLOSSARY

<ul style="list-style-type: none"> ● obtain ● extract ● derive from ● on a massive scale ● nematode ● manufacture ● louse / lice ● discover ● ban 	<ul style="list-style-type: none"> ● отримати ● екстракт ● впливають з ● у масовому масштабі ● нематода ● виробництво ● воша / воші ● виявити ● заборона
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<ul style="list-style-type: none"> • persistent • distance • nowadays 	<ul style="list-style-type: none"> • стійкий • відстань • в наші дні
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REVISION V

I. Match English names (1–8) of plants with their Latin ones (A–H).

- | | |
|----------------|----------------------------|
| 1. aspen | A. <i>Sambucus nigra</i> |
| 2. rowan | B. <i>Tilia</i> |
| 3. hazel | C. <i>Populus</i> |
| 4. black elder | D. <i>Sorbus aucuparia</i> |
| 5. poplar | E. <i>Populus tremula</i> |
| 6. hawthorn | F. <i>Fagus sylvatica</i> |
| 7. beech | G. <i>Corylus avellana</i> |
| 8. linden | H. <i>Crataegus</i> |

II. Fill in the blanks with the words from the box.

flowering	adults	pests	viruses
wood	eggs	leaves	pupae
parasitic	fungi	larvae	bacteria

1. There are four insect developmental stages:,
, and

2. Plant pathogens include:,

 and

3. Xylophages eat whereas foliophages

4. Insects are the most dangerous tree
5. The European dodder and mistletoe are

plants.

III. Match the words on the left (1–5) with their antonyms on the right(A–E).

- | | |
|---------------------|-----------------------|
| 1. secondary pests | A. biotic |
| 2. polyphage | B. biological control |
| 3. harmful | C. primary pests |
| 4. abiotic | D. beneficial |
| 5. chemical control | E. Monophage |

IV. True or false?

1. Oligophages prefer only one species of plant they feed on.
2. Phenology helps to choose the best time for planting, collecting seeds or log-ging.
3. Biological control means the same as pesticide application.
4. Defoliators eat the same as foliophages.
5. Mistletoe weakens trees.
6. Phenology is the science of food chains.
7. Forest diseases are caused by insects and other animals.
8. Fungi and insects cause extensive biotic damage in forests.
9. Secondary insect pests attack healthy trees.
10. Insect developmental stages include: eggs, larvae, pupae and adults.
11. Rhizophages eat wood.
12. Pupa is a mobile insect stage.
13. Abiotic factors include, for example, frost, wind or hail.
14. Larva is a mobile insect stage.
15. Abiotic damage in forests can be caused by: weather conditions, pathogens and pests.
16. Natural enemies are helpful in biological control.
17. Nematicides kill weeds.
18. Pesticides are substances used against harmful organisms.
19. Forest pests do not damage cones.
20. Anthropogenic damage is caused by people.

V. Match the words on the right with the ones on the left.

Translate the expressions into Ukrainian.

- | | |
|------------------|----------------|
| 1. anthropogenic | A. mushrooms |
| 2. biological | B. application |
| 3. edible | C. disease |
| 4. natural | D. insects |
| 5. pesticide | E. factors |
| 6. forest | F. conditions |
| 7. beneficial | G. enemies |
| 8. vascular | H. risk |
| 9. weather | I. diversity |
| 10. fire | J. Pests |

19. NATURAL AND ARTIFICIAL REGENERATION

I. Read.

Forest regeneration describes a process when a forest begins to grow. The process can be natural or artificial (planned and controlled by foresters).

In natural regeneration forests are left to themselves. New trees that start to grow germinate from seeds that have been carried out by wind or animals, or are the result of natural vegetative reproduction (stump sprouts or root suckers). The number of new trees and their distribution are difficult to predict. On the other hand, such a method of forest regeneration preserves ecotypes well adapted to local conditions. What is more, it is not expensive and results in mixed, uneven-aged and multi-storey stands.

Artificial regeneration is based on sowing seeds or planting seedlings. In contrast to natural regeneration, artificial can be planned and controlled. Foresters decide about species composition, arrangement of plants, seed quality and quantity. Artificial regeneration allows more plants to survive and develop (especially in the case of planting) and the process is quicker than in natural regeneration but more expensive because the site must be prepared carefully and the costs of planting seedlings and taking care of them afterwards are high.

GLOSSARY

<ul style="list-style-type: none">• regeneration• artificial• germinate• seed• carried out• reproduction• stump sprout• root sucker• distribution• predict• on the other hand• preserve• adapted• mixed• uneven-aged• multi-storey• based on• stand• sow• plant• in contrast to• species composition• plant arrangement• quality• quantity• allow• survive• in the case of• prepare• take care of• afterwards	<ul style="list-style-type: none">• регенерація• штучні• проростати• насіння• здійснюється• відтворення• пеньовий паросток• кореневий пагон• розподіл• передбачити• з іншого боку• зберегти• адаптований• змішаний• різновікові• багатоповерховий• на основі• насадження• сіяти• рослина• на відміну від• видовий склад• розташування рослин• якість• кількість• дозволяють• вижити• у випадку• підготувати• піклуватися про• згодом
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FOLLOW-UP:

1. Name two types of forest regeneration.
2. How are seeds dispersed in natural regeneration?

3. What are the pluses and minuses of natural regeneration?
4. What is the difference between natural and artificial regeneration?
5. What do foresters control in artificial regeneration?
6. Why is artificial regeneration more expensive?

20. REFORESTATION AND AFFORESTATION

I. Read.

Natural and artificial regeneration refer to the method of forest establishment whereas reforestation and afforestation to the place where a forest starts to grow. If a forest regenerates on an area where it has existed before the process is called reforestation. If it starts to grow on other non-forest land it is known as afforestation. Treeless areas in forests appear as a result of fire, strong wind, snow, pests and diseases as well as pollution. Trees can also be removed from a site by logging. Such sites are used by foresters to grow new trees because forest soils are tree-friendly. They are covered by litter, which protects soil from erosion. They are usually rich in mycorrhizal fungi, and not changed by agriculture (lack of plough pan and pesticides).

Forests are also planted on wasteland, farmland, areas degraded by industry or wetland. Such sites need careful preparation because they are not suitable for trees. They are usually too dry or too wet, covered by weeds. The soil does not have proper structure or a typical profile. It is often degraded and contaminated by heavy metals, pesticides or other chemicals. Another problem is soil salinity. Degraded soils also lack proper soil organisms and enough organic matter.

GLOSSARY

<ul style="list-style-type: none"> • reforestation afforestation establishment • whereas • area 	<ul style="list-style-type: none"> • лесовосстановление лісонасадження • тоді як • область
--	---

<ul style="list-style-type: none"> • exist • appear • fire • pollution • remove • site • log • soil • covered by • litter • rich in • plough • wasteland • degraded • industry • suitable for • dry • wet • weed • proper • soil profile • contaminated • salinity • lack • organic matter 	<ul style="list-style-type: none"> • існують • з'являтися • вогонь • забруднення • видалити • місце • колода • ґрунт • вкритий • підстилка • багатий на • орало • пустка • деградували • промисловість • підходить для • сухий • мокрий • бур'ян • належне • ґрунтовий профіль • забруднені • солоність • відсутність • органічна матерія
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1. Which terms refer to the method of forest regeneration and which ones to the area where trees start to grow?
2. What is the difference between afforestation and reforestation?
3. What areas are reforested? Give examples.
4. Why do trees grow better on former forest land?
5. What areas are afforested?
6. Why are they usually not suitable for trees?

FOLLOW-UP: SOILS

I. Put the layers of a soil profile in the proper order. Use the words from the box.

subsoil	parent rock	topsoil
---------	-------------	---------

II. Read the definitions. What do they refer to? Use the words from the box.

organic matter	pH	soil	nutrients
subsoil	topsoil	litter	

1. covers forest soils and consists of organic matter in different stages of decomposition
2. consists of mineral material, e.g. sand, clay and organic matter. It forms pores that are filled with air or water
3. contains minerals and organic matter (humus)
4. decomposed plants and animals
5. a layer that is above the parent rock
6. minerals that plants absorb from the soil
7. tells us if the soil is acidic, alkaline or neutral

GLOSSARY

<ul style="list-style-type: none">• cover• consist of• stage• decomposition• sand• clay• filled with decomposed• layer• acidic	<ul style="list-style-type: none">• покривати• складається з• етап• розкладання• пісок• глина• заповнений розкладеним• шар• кислий
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<ul style="list-style-type: none"> • alkaline • neutral 	<ul style="list-style-type: none"> • лужний
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21.AFFORESTATION OF FARMLAND

I. Read.

More and more farmers in Poland plant trees on poor soils because such actions are encouraged by the government and subsidised by the European Union. Farm-ers can get money not only for trees and their planting, but also for building fences protecting young trees from animals. European afforestation subsidies pay for taking care of plants afterwards and lack of income from afforested areas as well.

Afforestation of farmland is a long process and it is not always successful be- cause soils used for agricultural production are not suitable for trees. Firstly, they have a plough pan – a hard layer of soil which results from using heavy agricultural equipment. Such a layer does not allow proper water penetration and deep develop- ment of roots.

Secondly, farmland soils have slightly higher pH than trees prefer and improper N:P ratio (too much nitrogen). What is more, the soil structure is also damaged because of constant use of agricultural equipment.

Thirdly, such soils lack typical forest soil organisms, mycorrhizal fungi included. Trees cannot form a symbiotic relationship with fungi (mycorrhiza), which makes them more resistant to diseases. As a result, trees planted on farmland often suffer from root and leaf diseases and may even die.

Finally, farmland soils are not covered by litter which protects them from ero- sion. Farmland is also an area where there is too much sunshine for many tree species. What is more, such areas lack typical forest microclimate which protects seedlings and saplings from strong winds and temperature extremes.

GLOSSARY

<ul style="list-style-type: none"> • plant • poor soil • encourage 	<ul style="list-style-type: none"> • рослина • бідний ґрунт • сприяти
---	--

<ul style="list-style-type: none"> • subsidise • fence • take care • lack of • suitable for • plough • layer • allow • proper • development • slightly • prefer • improper • nitrogen • constant • include • relationship 	<ul style="list-style-type: none"> • допомагати • паркан • піклуватися • відсутність • підходить для • орало • шар • дозволяти • належний • розвиток • злегка • віддають перевагу • неналежний • азот • постійний • включати • відносини
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I. In the text find the words that mean:

1. people who control a country
2. money given to somebody to encourage him to do something
3. money you get for doing your job or from other source
4. machines used for preparing soil for sowing or planting
5. proportion of two things
6. does not suffer from diseases, does not fall ill
7. organic matter covering forest soils
8. a young tree

II. Match the words from exercise I with their Polish equivalents. Use the words from the box.

odporny	sprzęt rolniczy	ściółka	rząd
dotacja	młode drzewko	dochód	stosunek

III. Answer the questions.

1. Why is afforestation of farmland popular in Poland?

2. Why do farmers build fences around afforested areas?
3. Why is afforestation of farmland not easy?
4. What is a 'plough pan'?
5. What problems can be observed when a plough pan is present?
6. What farmland chemical soil properties are not suitable for tree growth?
7. Why are mycorrhizal fungi so important for trees?
8. What is forest microclimate like?

22. FAST-GROWING TREE PLANTATIONS

I. Read.

Tree plantations have been known since ancient times. The first plantations consisted of purple/red osier (*Salix purpurea*), which provided wicker used for making baskets and shields.

Nowadays plantations are not restricted to red osier only. They may be the first step in afforestation or, very rarely, a part of reforestation. In both cases the final tree species composition in a planned forest is different from that of a plantation, which usually forms single-species and even-aged stands typical for monocultures.

Plantations consist of fast-growing tree species such as poplar, willow, birch, larch or, sometimes, black alder and spruce. The choice of species and the way they are planted depend not only on local environmental conditions but buyer requirements as well.

Plantations produce wood in a comparatively short time. Trees in plantations grow from 2 to even 60 years and provide different types of products for commercial purposes. The longer growing plantations are a source of timber and related products, e.g. veneer, sawnwood. The shorter growing supply wood for the paper industry or production of panel products such as fibreboard, particleboard. Fuelwood is usually obtained from coppicing, which is grown for 2 to 10 years. Finally, there are also Christmas tree plantations whose aim is to grow trees of a proper size and shape and which do not shed their needles fast in unfavourable indoor conditions.

GLOSSARY

<ul style="list-style-type: none">• fast-growing• ancient• consist of• purple/red osier• wicker• basket• shield• restrict• depend on• requirements• provide• commercial• purpose• timber• veneer• sawnwood supply• fibreboard• particleboard• fuelwood• obtain• coppice• shed	<ul style="list-style-type: none">• швидкозростаючий• давній• складається з• фіолетова/червона іва• лоза• кошик• щит• обмежувати• залежати від• вимоги• забезпечити• комерційний• мета• деревина• шпон• постачання пиломатеріалів• ДВП• ДСП• дрова паливні• отримати• поросль• скидати
--	---

I. Answer the questions.

1. What roles do plantations play?
2. What stands do they usually form?
3. What species are planted in fast-growing tree plantations?
4. How long do trees in plantations grow?
5. How is plantation wood used?

FOLLOW-UP: WICKER QUIZ

I. Answer the questions.

1. Wicker is mainly obtained from:

- a. one *Salix* species
 - b. two *Salix* species
 - c. three *Salix* species
2. The majority of wicker is obtained from:
 - a. *Salix americana* and *Salix viminalis*
 - b. *Salix purpurea*
 - c. *Salix amygdalina* and *Salix purpurea*
 3. Shoots that are harvested are:
 - a. one year old
 - b. four or five years old
 - c. one, two or three years old
 4. Shoots are harvested between:
 - a. March and June, when they grow fast
 - b. November and early March, when they are dormant
 - c. July and November, when intensive growth stops
 5. Wicker colour depends on:
 - a. species only
 - b. processing
 - c. the time when shoots are harvested
 6. *Salix* species from which wicker is obtained:
 - a. can grow on all types of soils
 - b. prefer only fertile soils
 - c. have different soil requirements

GLOSSARY

<ul style="list-style-type: none"> • obtain • majority • harvest • dormant • fertile • requirements 	<ul style="list-style-type: none"> • отримати • більшість • урожай • сплячий • родючі • вимоги
---	--

REVISION VI

I. What is the difference between natural and artificial regeneration? Read the statements and fill in the table.

- A. It is more expensive.
- B. New trees grow from seeds that are carried out by wind or animals.
- C. It is planned and controlled.
- D. The method is based on sowing seeds or planting seedlings.
- E. The number of new trees and their distribution are difficult to predict.
- F. Foresters decide about species composition and arrangement of plants.
- G. This method of forest regeneration preserves ecotypes well adapted to local conditions.
- H. It is labour-intensive.
- I. It is cheaper.
- J. It results in mixed, uneven-aged and multi-storey stands.
- K. Foresters decide about seed quality and quantity.
- L. Foresters do not decide about seed quality and quantity.

natural regeneration	artificial regeneration

II. Match the beginnings of the definitions with their ends. What do they refer to?

- | | |
|---|---|
| <ul style="list-style-type: none"> 1. a hard layer of soil 2. covers forest soils and consists of organic matter 3. a symbiotic relationship between 4. consists of fast-growing tree species 5. money paid for planting trees | <ul style="list-style-type: none"> A. such as poplar, willow, birch or larch B. by the European Union C. which results from using heavy agricultural equipment D. tree roots and fungi E. in different stages of decomposition |
|---|---|

III. Match the words from the box with their definitions from exercise II.

afforestation subsidies	mycorrhiza	litter
plough pan	plantation	

IV. Fill in the blanks with the words from the box.

pollution	logging	afforestation
non-forest	pests	plough pan
reforestation	litter	mycorrhizal

Natural and artificial regeneration refer to the method of forest establishment whereas reforestation and afforestation to the place where it starts to grow. If a forest regenerates on an area where it has existed before the process is called **1.** If it starts to grow on other **2.** land it is known as **3.**

Treeless areas in forests may appear as a result of fire, strong wind, snow, **4.** and diseases, as well as **5.** Trees can also be removed from a site by **6.** Such sites are used by forest-ers to grow new trees because forest soils are tree-friendly. They are covered by **7.**, which protects soil from erosion. They are usually rich in **8.** fungi, and not changed by agriculture (lack of **9.**and pesticides).

V. Choose the correct answer a, b or c.

1. Farmland soils have:
 - a. proper pH for trees but improper N:P ratio
 - b. slightly higher pH than trees prefer but proper N:P ratio
 - c. slightly higher pH than trees prefer and improper N:P ratio
2. Plantations usually form:
 - a. single-species and uneven-aged stands
 - b. single-species and even-aged stands
 - c. mixed and uneven-aged stands
3. Plantation fuelwood is usually obtained from:

- a. coppicing
 - b. sapling stands
 - c. nurseries
4. Fibreboard and particleboard are examples of:
- a. veneer
 - b. sawnwood
 - c. panel products
5. Sawnwood is produced in:
- a. sawmills
 - b. jigsaws
 - c. hacksaws

23. DIRECT SEEDING VERSUS PLANTING

I. Read.

Sowing seeds and planting seedlings are two methods used in artificial regeneration. Each method has its pluses and minuses which will be discussed briefly in this text.

Direct seeding is not often used in Poland because the result of such regeneration is difficult to predict. What is more, many forests in Poland grow on soils which do not guarantee germination success, e.g. sandy soils or those which are too wet or too heavy.

Sowing seeds needs careful site preparation which means removing weeds or other vegetation and exposing mineral soil mainly by ploughing. Next, seeds are sown and the amount that is needed per hectare is much higher than in other regeneration methods. Another disadvantage is the fact that seeds are often damaged or eaten by birds, mice or other animals.

Direct seeding is usually used for trees that produce a lot of seeds every year. It is also important for species whose seeds are difficult to store or those which lose their viability quickly. Species that are regenerated by sowing seeds include: pine, spruce, fir, oak and beech.

In comparison to planting seedlings sowing seeds is cheaper and less labour- and time-consuming. What is more, seedlings have a well-developed root system and do not suffer from transplant shock.

Planting seedlings is the most common forest regeneration method in

Poland. It also requires careful site preparation. It is more expensive, more labour- and time- consuming but more reliable and therefore more often used.

GLOSSARY

<ul style="list-style-type: none"> • versus • briefly • direct seeding • predict • guarantee • germination • too wet • too heavy • sow seeds • remove • weed • expose • mainly • plough • amount • disadvantage • store • viability • in comparison to • labour • time-consuming • transplant • common • require • reliable 	<ul style="list-style-type: none"> • проти • коротко • прямий посів • передбачити • гарантія • проростання • занадто мокрий • занадто важкий • сіяти насіння • видалити • бур'ян • викрити • в основному • орало • сума • недолік • зберігати • життєздатність • у порівнянні з • праці • трудомісткий • пересадка • поширений • вимагати • надійний
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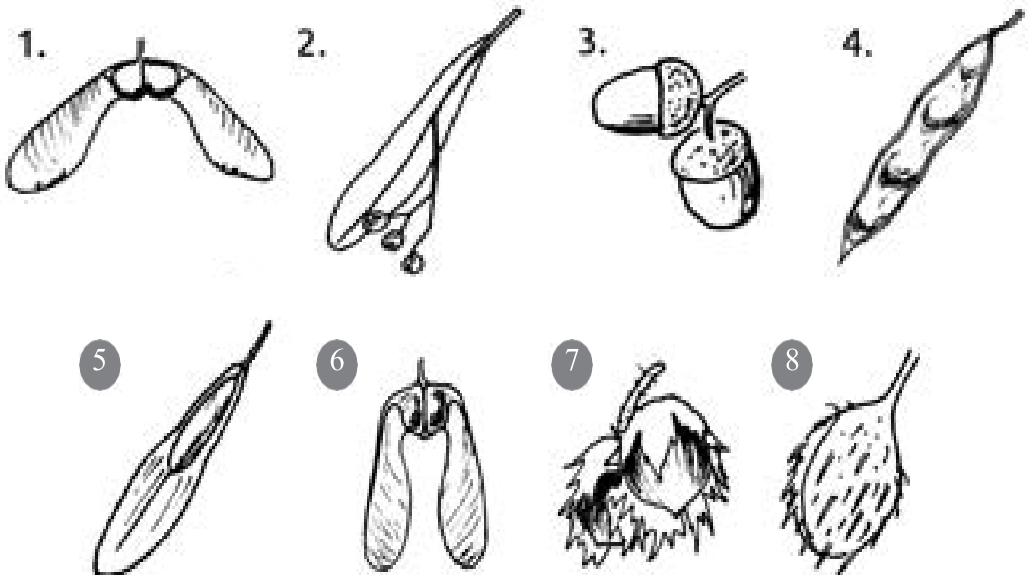
1. Why is sowing seeds not often used in forest regeneration in Poland?
2. How is the site prepared for sowing ?
3. Why do foresters need a lot of seeds in direct sowing?
4. When is direct seeding used?

5. What are the advantages of sowing seeds?
6. Why is planting seedlings more often used in forest regeneration?

FOLLOW-UP: FRUIT TYPES

I. Look at the forest fruit and name the species. Use the words from the box.

- black locust
- beech
- ash
- oak
- hazel
- maple
- linden
- sycamore



II. Match the species from exercise I with the fruit names and translate them into Ukrainian. Use the words from the box.

- **samara**
- **hazelnut**
- **beechnut/beechmast**
- **acorn**
- **pod/legume**
- **nutlet**

24. PLANTING SEEDLINGS

I. Read.

Choice of species

Only those species which are best adapted to local conditions are planted. Properly chosen tree species grow best in a regenerated area. What is more, they may prevent soil degradation, help to reduce air pollution and promote water conservation and biodiversity.

Seedling types

Seedlings produced in nurseries are either bare-root or containerised. Bare-root ones are cheaper but their survival rate is lower. Seedlings in containers are more expensive but they can be planted all year round except winter. They are recommended when the growing season is short, e.g. in the mountains or for the areas that do not create favourable conditions for trees to grow, e.g. poor or degraded soils.

Age

As a planting material one-year-old seedlings can be used, e.g. pine, oak, beech, larch. Species like fir, spruce or ash need longer to produce seedlings proper for planting.

Time

Early spring, when seedlings are still dormant or autumn after they have shed their leaves, is the best time for planting. However, when at that time the temperature is too high, the soil is still frozen or too dry, the day is windy or sunny it is not a good idea to plant seedlings. Seedlings should be planted as soon as possible after they have been transported from a nursery. It prevents a seedling drying out, which may be the reason of regeneration failure.

Planting time depends not only on weather but also on local conditions as well as species characteristics. For example, not all tree species break their dormancy at the same time. The ones that do it first, e.g. birch, larch, aspen, should be planted earliest.

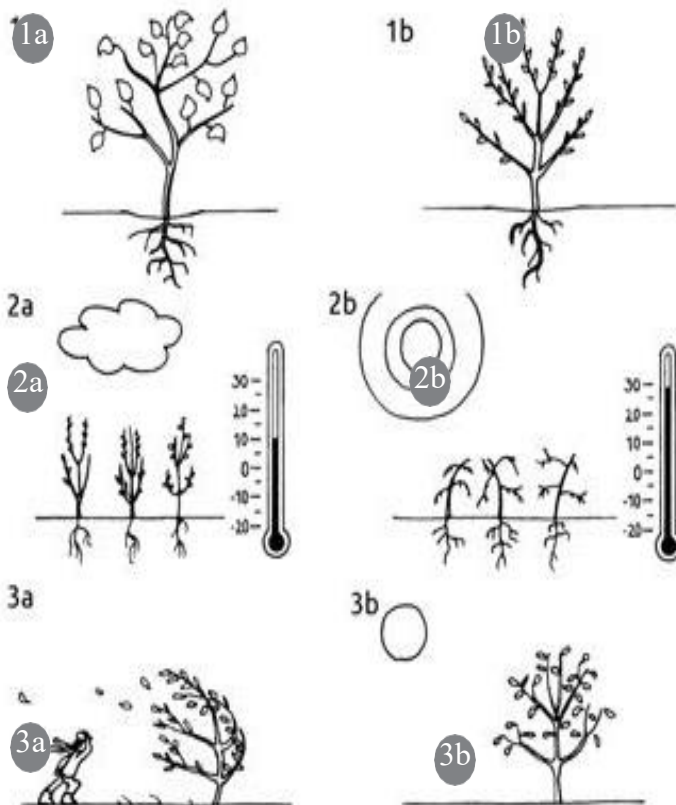
GLOSSARY

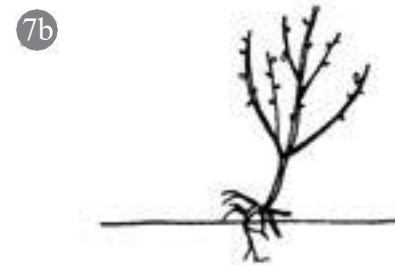
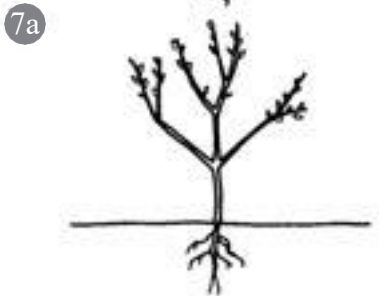
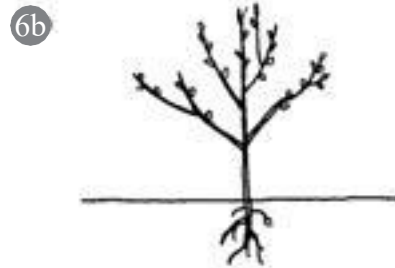
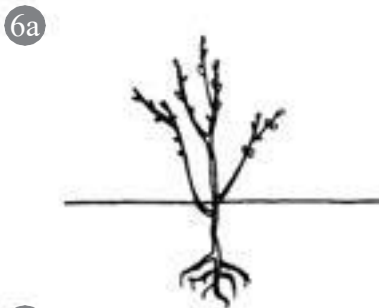
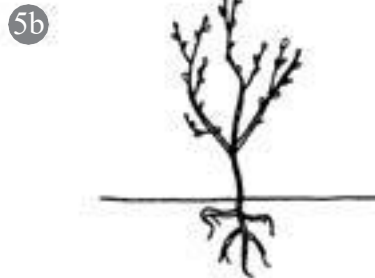
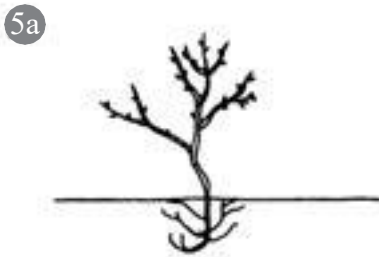
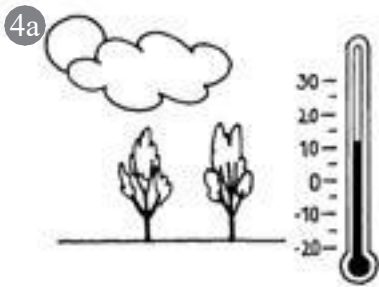
<ul style="list-style-type: none">• choice• properly• prevent• conservation• biodiversity• growing season• bare-root• container• all year round• survival• dormant• shed• dry out	<ul style="list-style-type: none">• вибір• належним чином• запобігти• збереження• біорізноманіття• період вегетації• голокореневий• контейнер• цілий рік• виживання• сплячий• скидати• підсохнути
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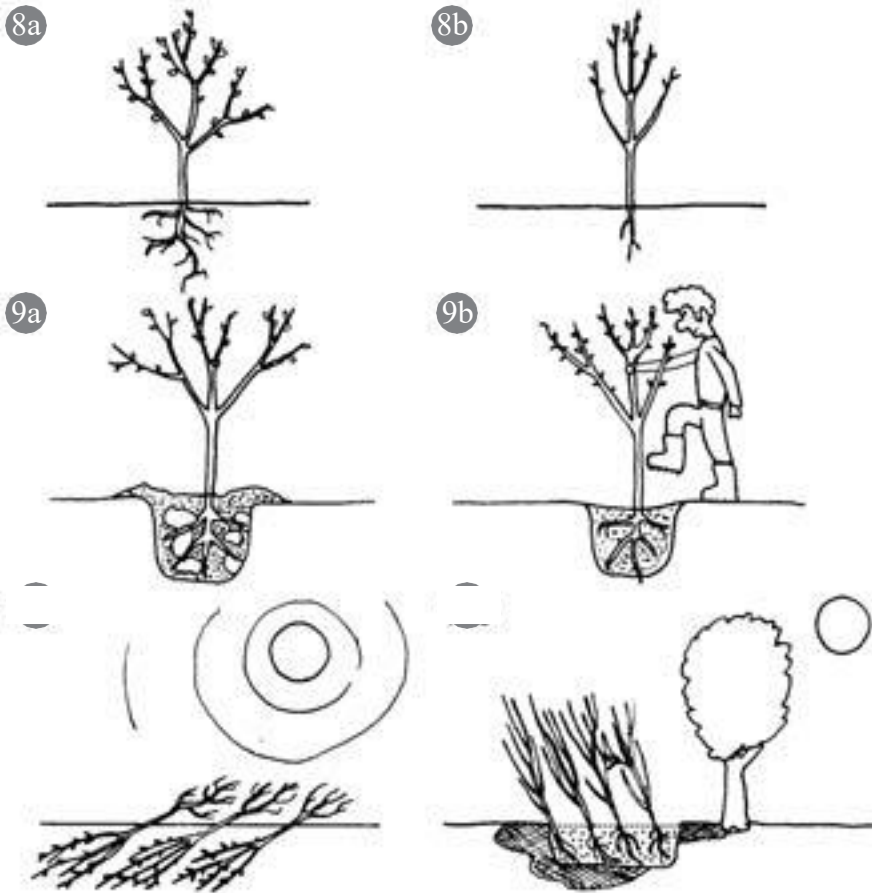
1. What tree species are planted in a given area?
2. What types of seedlings are produced in nurseries?
3. When is planting containerised seedlings recommended?
4. How old is planting material?
5. When should seedlings be planted?
6. Which species are planted first in spring and why?

FOLLOW-UP: HOW TO PLANT A TREE

I. Look at the pictures. Which planting methods are correct and which conditions are favourable for planting? Which ones are not and why?







II. Look at the problems and match them with the picture in exercise I.

- A. Roots are not protected from drying out.
- B. It's too hot for planting.
- C. Roots are bent upwards.
- D. Air pockets are present.
- E. It's too cold for planting.
- F. Seedlings are not dormant.
- G. Seedlings are planted too shallow.
- H. It's too windy for planting.
- I. Lack of a well developed root system.
- J. Seedlings are planted too deep.

25. SEEDLING PRODUCTION

I. Read.

Seedling production takes place in nurseries. Young plants are either grown from seeds or reproduced asexually, e.g. rooted shoot cuttings. Seedling production may take place outdoors or indoors in a plastic tunnel or greenhouse. Growing plants under cover allows for modification and control of light, temperature and moisture and lengthening the growing season. As a result, seedlings produced this way are larger and stronger than those produced outdoors.

Seeds are sown in spring or in autumn. Spring sowing should take place as early as possible because then seedlings have more time to grow before winter. Seeds should be sown when the soil is not frozen but still moist after winter. In contrast to the spring sowing, the autumn one should take place as late as possible to avoid germination because young, delicate plants are easily damaged by frost and may not survive winter.

When seeds are sown outdoors they are often covered with different types of material, e.g. branches, in order to protect them from birds and unfavourable weather conditions. Covering seedbeds also reduces evaporation and cooling off of the soil. After germination the cover is removed.

Taking care of young seedlings involves: protecting them from seed predators, pests, diseases, very strong wind, frost and sunshine, keeping soil moist and free of weeds, providing nutrients in the form of fertilisers.

GLOSSARY

<ul style="list-style-type: none">• take place• reproduce• asexually• rooted• shoot cutting• outdoors• indoors• greenhouse• cover• moisture	<ul style="list-style-type: none">• відбуватися• відтворювати• безстатевим шляхом• вкорінений• нарізка пагонів• на відкритому повітрі• в приміщенні• теплиця• покривати• вологи
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<ul style="list-style-type: none"> • lengthen • growing season • sow • avoid • germination • survive • in order to evaporation • cool off • remove • involve • protect • frost • moist • weed • provide nutrient fertiliser 	<ul style="list-style-type: none"> • подовжити • період вегетації • сіяти • уникати • проростання • вижити • з метою випаровування • остигати • видалити • залучати • захистити • мороз • вологий • бур'ян • забезпечити поживними добривами
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READING COMPREHENSION

I. Answer the questions.

1. What is grown in forest nurseries?
2. Where can seedlings be produced?
3. What is the difference between seedlings at the same age produced outdoors and indoors?
4. Where can seedlings be sown?
5. Why should seedlings be sown as late as possible in autumn?
6. Why are seeds sown outdoors covered?
7. What does taking care of seedlings involve?

II. In the text find the words that mean:

1. a place where seedlings are produced (paragraph 1)
2. opposite of outdoors (paragraph 1)
3. a construction in a garden or in a nursery that is covered by plastic. It protects young plants from unfavourable weather conditions (paragraph 1)
4. a glass building where plants are produced (paragraph 1)
5. time when plants are not dormant (paragraph 1)

6. to put seeds in soil (paragraph 2)
7. opposite of dry (paragraph 2)
8. development of a plant from a seed (paragraph 2)
9. animals that damage seeds (paragraph 4)
10. plants that grow in gardens and compete with cultivated plants for light, nutrients and the like. They are removed or destroyed
11. N, P, K are examples of plant
12. substances added to soil that provide nutrients

FACTS ABOUT GERMINATION

- Temperature, oxygen, water and, in some cases, light are factors which influence germination. Water dissolves nutrients in endosperm making them available to the embryo. Oxygen is needed in metabolic processes.
- Optimal germination temperatures differ depending on individual species requirements.
- Some trees such as alder, hornbeam, ash and yew germinate better in lower temperatures whereas pine or spruce prefer higher ones. There are also such species that tolerate a wide range of temperature during germination, e.g. elm, larch.

26. SEEDLING LIFTING AND OUTPLANTING

I. Read.

Seedlings are grown in nurseries either outdoors or indoors. Those grown indoors need some time to adapt to unfavourable outdoor conditions. The process, called hardening off, usually takes two weeks during which plants are exposed to lower temperatures and moisture as well as wind and direct sunshine. At the beginning the time spent in such conditions is short but later it is slowly lengthened. At the end of the second week seedlings are prepared for outdoor conditions and are ready to be outplanted.

Lifting takes place in autumn or spring when the soil is not frozen but seedlings are still dormant. Seedlings should be lifted with care to avoid mechanical damage of young plants, and especially, their roots. Roots must be also kept moist during lifting and transporting. If planting does not follow lifting immediately seedlings should be stored in such a way that protects roots from drying out.

Inoculation with mycorrhizal fungi also helps seedlings to adapt to unfavourable conditions outside nurseries. It can take place either in nurseries (before or during sowing seeds or sometimes after germination) or be applied to seedling roots before outplanting.

GLOSSARY

<ul style="list-style-type: none"> • lifting • outplanting • adapt • hardening off • expose to • moisture • direct • lengthen • dormant • avoid • moist • follow • immediately • store • protect • dry out • inoculation • apply • concern 	<ul style="list-style-type: none"> • підйом • висадка • адаптуватися • затвердіння • піддаватися • вологість • прямий • подовжити • сплячий • уникати • вологий • слідувати • негайно • зберігати • захистити • підсохнути • щеплення • застосувати • занепокоєння
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READING COMPREHENSION

I. Answer the questions.

1. Where are seedlings grown?
2. Why do seedlings grown indoors have to be hardened off?
3. When are seedlings lifted?
4. Why should seedlings be lifted with care?
5. Why should roots be kept moist?
6. Why is inoculation with mycorrhizal fungi beneficial for seedlings?

FOLLOW-UP: SEEDLING STORAGE

I. Match the words and expression with their Polish equivalents.

- | | |
|-------------------------|----------------------------------|
| 1. short-term storage | A. dołowanie |
| 2. long-term storage | B. przechowywanie krótkookresowe |
| 3. heeling-in | C. przechowywanie w chłodniach |
| 4. refrigerated storage | D. przechowywanie długookresowe |

II. Match the beginnings of the definitions (1–4) with their ends (A–D). What storage methods from exercise I do they refer to?

1. Storing seedlings in controlled
 2. Storing seedlings when they are lifted but not planted
 3. This type of storage takes place when lifting and
 4. Seedlings are placed in the shade, in the field
- A. where their roots are covered with soil.
B. planting take place in the same season.
C. in the same season, e.g. they are lifted in autumn and are stored till spring planting.
D. temperature and moisture.

III. Fill in the blanks with the words from the box.

controlled lifting	long-term refrigerated	shaded Short-term	dormant heeling-in
-----------------------	---------------------------	----------------------	-----------------------

1. storage takes place when 2.....and planting take place in the same season. Seedlings are usually placed in a 3..... area outdoors in moist containers or in the field where their roots are covered with soil. This type of storing is called 4. It can be both short or 5.

When seedlings are lifted in autumn they are stored till spring planting. During storage seedlings must remain 6..... until planting time. Long-term storage includes the previously mentioned heeling-in as well as 7. storage where temperature is 8.

REVISION VII

I. Choose the correct answer a, b or c.

1. Direct seeding in artificial regeneration is used:
 - a. mainly on sandy soils
 - b. for species that produce a lot of seeds every year
 - c. for trees whose seeds are not eaten by birds
2. In comparison to planting seedlings, sowing seeds is:
 - a. more common in forest regeneration
 - b. less time-consuming and labour-intensive
 - c. more reliable but more expensive
3. Planted seedlings in Poland are mainly:
 - a. bare-root
 - b. containerised
 - c. produced in greenhouses
4. Bare-root seedlings:
 - a. can be planted all year long
 - b. have a lower survival rate than containerised ones
 - c. should be planted mainly in mountains

5. Bare-root seedlings are planted:
 - a. in summer
 - b. when they are dormant
 - c. two weeks after they have been lifted
6. Planted seedlings are:
 - a. at different ages depending on tree species
 - b. always one-year old
 - c. always two-year old no matter what species they belong to
7. Which tree species should be planted first in spring?
 - a. those that break their dormancy the earliest
 - b. it does not matter because planting time does not depend on species
 - c. beech, oak and hornbeam
8. The best time for planting is:
 - a. in summer when the temperature is about 25°C or more
 - b. when it is not too hot but it is windy and the soil is still frozen
 - c. when it is cloudy, not too hot and the soil is moist
9. Indoor seedling production:
 - a. is called heeling in
 - b. is called hardening off
 - c. takes place in greenhouses or plastic tunnels
10. Seedlings produced indoors are:
 - a. larger and stronger than those produced outdoors
 - b. are smaller because they grow in unfavourable weather conditions
 - c. are not used in forestry
11. Seed predators are:
 - a. chemicals protecting seeds from birds
 - b. branches covering seedbeds and protecting seeds from birds
 - c. animals that damage and eat seeds
12. Hardening off means:
 - a. storing seeds for a long time
 - b. adaptation of seedlings grown indoors to outdoor conditions
 - c. growing seedlings in greenhouses
13. Inoculation with mycorrhizal fungi:
 - a. is a part of hardening off
 - b. provides fungi that form a symbiotic relationship with tree roots

c. can be harmful for trees and cause diseases

II. Match the beginnings (1–10) of the expressions with their endings(A–J).

- | | |
|---------------------|-----------------------|
| 1. hardening | A. storage |
| 2. heeling- | B. mycorrhizal fungi |
| 3. containerised | C. seedlings |
| 4. long-term | D. outdoor conditions |
| 5. moist | E. seedlings |
| 6. inoculation with | F. seeds |
| 7. adapt to | G. sowing |
| 8. planting | H. off |
| 9. spring | I. soil |
| 10. sowing | J. in |

III. Give the words of the opposite meaning.

1. outdoor
2. containerised seedlings
3. natural regeneration
4. long-term storage
5. moist soil

27. FROM SEEDLINGS TO MATURE TREES

I. Read.

Between a seedling stage and mature trees plants are carefully monitored by foresters who try to improve the quality of the stand as a whole and create the best conditions for trees to grow. All practices taking place during that time are known as forest stand improvement, tending the forest or intermediate treatments. They usually include: planting additional seedlings in the areas when they have not survived, creating favourable conditions for seedling growth and later on for desirable trees, improving species composition, fighting pests, diseases and the like.

When trees start to grow gradual reduction of stand density is observed. It is a natural process which results in production of healthy, straight, tall, mature trees and is caused by tree competition for light, water and nutrients. Only the strongest trees survive.

Foresters also contribute to gradual reduction of stand density by removing from the stand trees damaged by biotic and abiotic factors, plants of improper form, representing undesirable species or those which hinder the growth of the desirable ones. Removal of damaged trees from a stand is called sanitation cutting. It prevents the spread of pests and diseases.

After many years seedlings become mature trees. There are different types of tree maturity. The term can refer either to the tree's ability to produce seeds or the moment when a process of natural death starts. It may also mean the time when trees produce wood of adequate quality and are of proper size or age for logging. Foresters usually do not let mature trees grow longer because the older they get the more often they are attacked by pests and diseases and damaged by abiotic factors such as wind, snow and the like.

GLOSSARY

<ul style="list-style-type: none"> • mature • improve • quality • stand • forest stand improvement • survive • desirable • species composition • gradual • straight • contribute to • improper • undesirable • hinder • removal • sanitation cutting • spread • maturity 	<ul style="list-style-type: none"> • зрілий • покращити • якість • насаджання • поліпшення лісових насаджень • вижити • бажано • видовий склад • поступовий • прямо • зробити внесок у • неналежний • небажано • перешкоджати • видалення • санітарна рубка • поширення
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<ul style="list-style-type: none"> • log 	<ul style="list-style-type: none"> • зрілість • колода
---	--

1. How are practices between a seedling stage and mature trees called?
2. What do they include?
3. How does stand density change when trees grow?
4. What is it caused by?
5. What is ‘sanitation cutting’?
6. How can the term ‘tree maturity’ be understood?

FOLLOW-UP: TREE DESCRIPTION

I. The word ‘mature’ is one of many words that can describe a tree. Look at other words in the box and put them into the following categories that refer to tree height, size, origin, function, parts, leaves, old trees and trees in winter.

evergreen	huge	hollow	native	stump	tall
ornamental	trunk	massive	branch	exotic	bark
Christmas	low	tropical	canopy	small	bare
deciduous	high	gnarled	leafless	large	fruit

tree height	tree size	tree origin	tree function
tree parts	tree leaves	old trees	trees in winter

28. TIMBER HARVESTING SYSTEMS

I. Read.

The way in which a forest regenerates influences harvesting methods which consist of stages such as: cutting down trees, removing branches and tree tops, transferring logs to the roadside landing, wood classification, short-term storing and transporting them to sawmills or other processing factories. Branches and tree tops are usually left in the forest in order to decompose.

While planning harvesting operations foresters take into account the number of trees that are logged at the same time and the interval between felling called the cutting interval. The choice of a harvesting method depends not only on the way a forest regenerates but also its influence on local habitat, tree health included. Environmental, ecological and other multifunctional roles forests play are taken into account as well. There are many harvesting systems and their modifications. Basic ones include: clearcutting, shelterwood system and selection system.

Clearcutting

Clearcutting is the most radical. It means felling all trees in a certain area. It is often used when stands are seriously damaged by wind, fire, insects or diseases. It may create favourable conditions for artificial regeneration of light-demanding species such as pine or birch and results in even-aged stands.

Selection system

It promotes biodiversity and growth of uneven-aged stands because it is based on felling single trees or their small groups over the whole forest area. The process is gradual and lasts for many years.

The selection method is not often used in forest management because it is more complicated, time-consuming and expensive than other systems. It also means using small equipment and manual labour.

Shelterwood system

Shelterwood system is a method that can be placed between the harvesting systems mentioned above. Mature trees of desirable qualities are left on the site to produce seeds and the young trees grow under the canopy of older ones. The system is used for regeneration of shadebearing species.

GLOSSARY

<ul style="list-style-type: none">• timber harvesting• cut down• log• roadside landing• sawmill• process decompose• interval• cutting interval• clearcutting• shelterwood system• selection system• light demanding• gradual• equipment• manual labour• desirable qualities• canopy• shadebearing	<ul style="list-style-type: none">• заготівля деревини• обрізати• колода• придорожня посадка• пилорама• процес розкладання• інтервал• інтервал різання• суцільні рубки• система shelterwood• система відбору• вимогливість до світла• поступовий• обладнання• ручна праця• бажані якості• навіс• тіньоносний
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1. What stages does felling trees include?
2. Name three basic harvesting methods.
3. What is 'cutting interval'?
4. What is clearcutting based on?
5. When is it recommended?
6. Why is selection system not often used?
7. What is shelterwood system based on?
8. When is it recommended?

II. In the text find the words that mean:

1. the process of gathering timber or any other crop
2. a cut down tree trunk, without branches and the top
3. putting things into different categories, groups or classes
4. a place where wood is sawn into planks
5. to rot or break down

6. cutting down all trees in a certain area
7. the same as logging trees
8. an adjective describing plants that do not grow well in the shade
9. an adjective describing something that takes a lot of time
10. an adjective describing plants that tolerate growing in the shade

FOLLOW-UP: RELATED VOCABULARY

A. HARVESTING EQUIPMENT AND OPERATIONS

I. Match the following terms (A–F) with their definitions (1–6).

- | | |
|---------------|--|
| A. bucking | 1. removing branches from a log |
| B. skidder | 2. a machine that lifts trees from the ground and transfers them into another area |
| C. forwarder | 3. removing tree tops |
| D. harvester | 4. cutting felled trees into shorter parts |
| E. delimiting | 5. a machine that transports trees by dragging |
| F. topping | 6. a machine that cuts down trees, delimits and bucks them |

II. Look at the pictures and name logging tools and equipment. Use the words from the box.

axe

saw

wedge

chainsaw

hooker

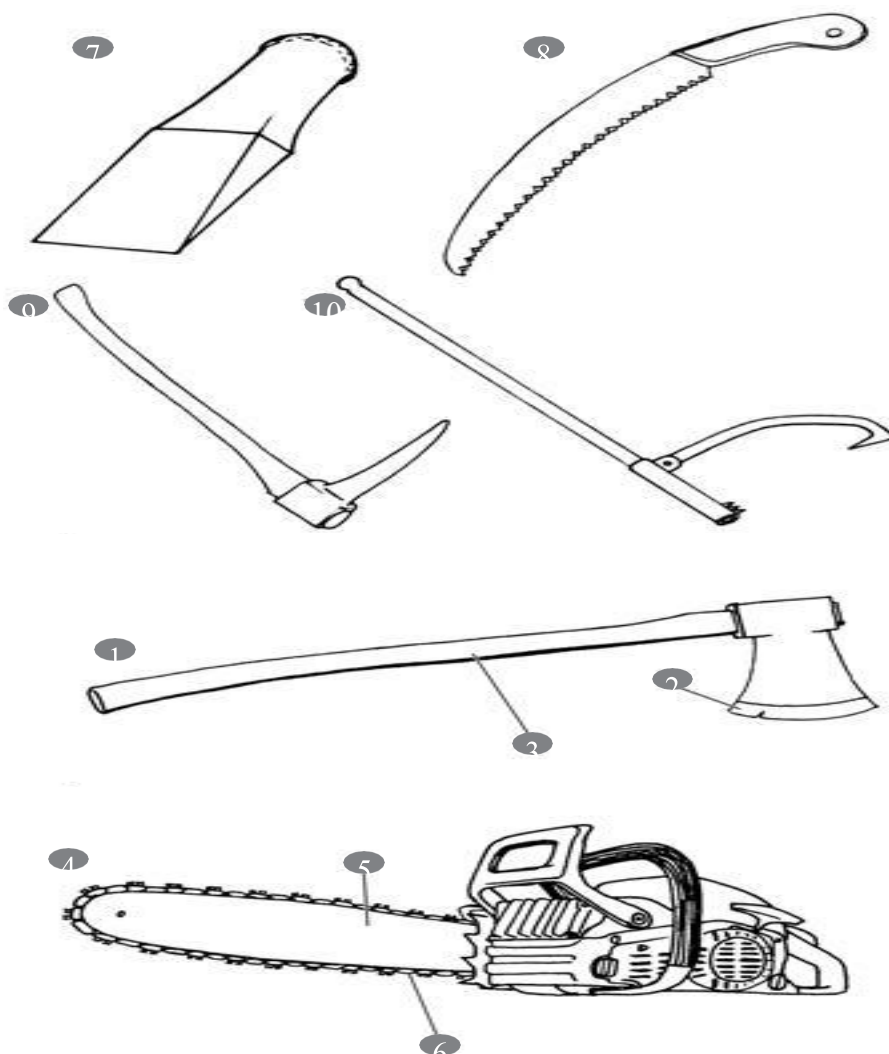
chain

handle

cutting edge

saw guide

cant hook



III. Translate the English words from exercise II into Ukrainian

B. PROTECTIVE CLOTHING

H. Look at the pictures and match them with the words from the box.

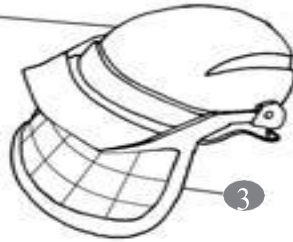
I.

- J. high visibility safety vest
- K. ear muffs
- L. protective gloves
- M. visor
- N. Wellington boots
- O. hard hat
- P. work boots

1



2



4



5



6



7

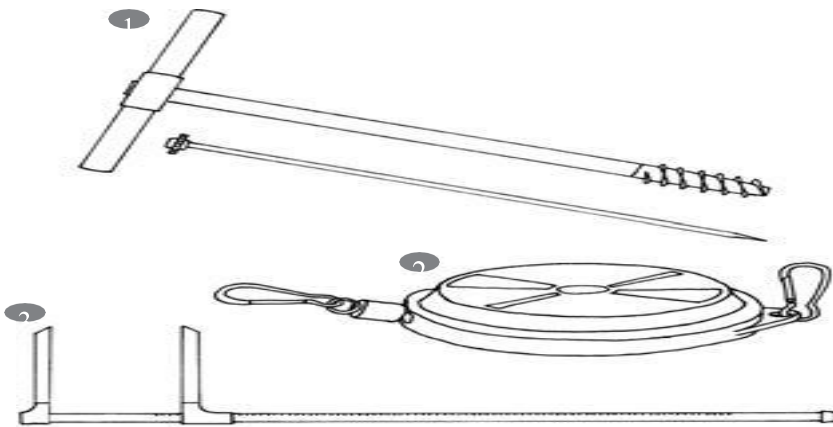


C. FOREST MEASURING EQUIPMENT AND TOOLS

I. Match measuring tools and equipment with their functions.

- | | |
|--------------------|--------------------------------------|
| 1. caliper | A. measures tree growth and age |
| 2. clinometer | B. measures length of cut down trees |
| 3. increment borer | C. measures tree moisture |
| 4. moisture meter | D. measures tree height |
| 5. tape | E. measures tree diameter |

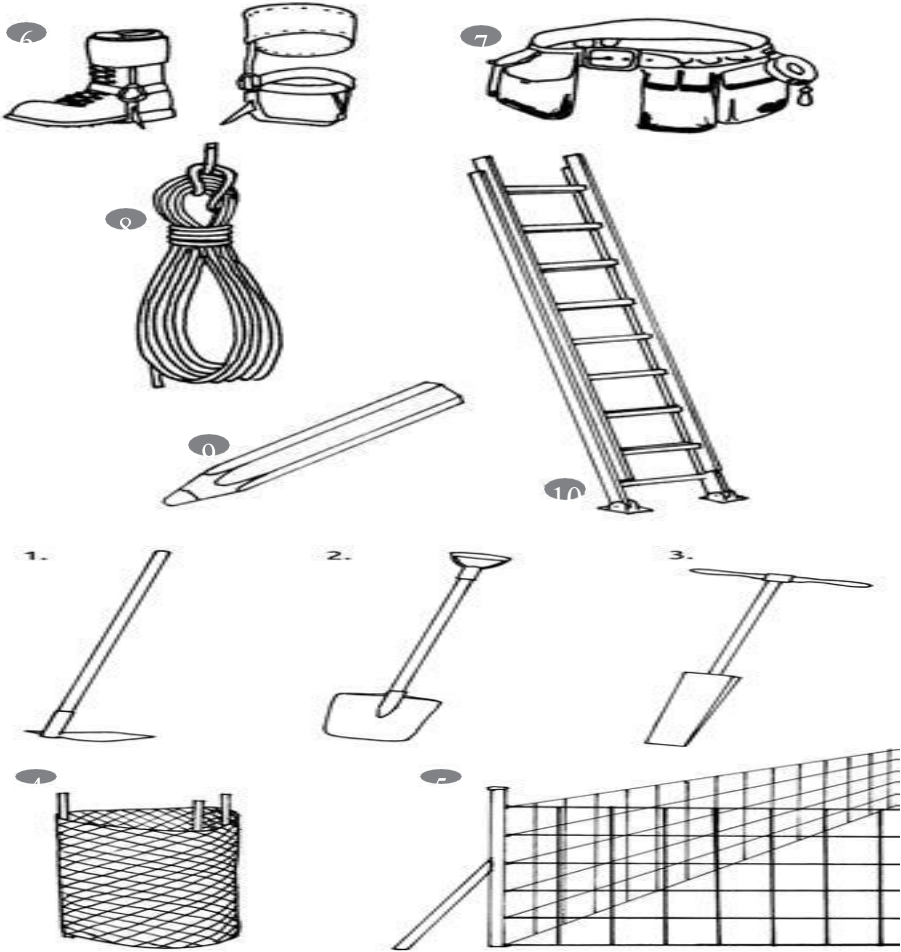
II. Which tools are shown in the pictures?



D. OTHER FOREST TOOLS AND ACCESSORIES

I. Look at the pictures and name forest tools and accessories. Use the words from the box.

extension ladder	climbing	tool	tree	lumber crayon
steel spurs	linemesh	belt	guard	planting bar
	fence	hoe	shovel	



II. Translate the English words from exercise I into Ukrainian

29. FOREST PRODUCTS

I. Read.

Forest products include: wood, bark, coniferous litter, resin, tree sap (usually birch or maple), essential oils, edible plants and others that have ornamental or medicinal properties. They can also include venison.

Forest products can be divided into two categories: wood-based and non-timber ones (NTFPs). However, the definition of forest products as well as their classification vary in different countries.

The most important and profitable forest product is wood. It is a universal, eco-friendly material used in the construction industry, production of furniture, musical instruments, household goods or packaging.

Small parts of wood are no longer seen as a waste material but have application as fuelwood (when compressed) or to produce particleboard or fibreboard.

Wood can also be subjected to chemical treatment. The end products of chemical processing include paper, cardboard, cellophane and rayon cloth to mention but a few. Other products such as resin and tannin are obtained from wood by extraction while charcoal is produced by heating wood up to 1,000°C in the absence of air. This method is called pyrolysis.

GLOSSARY

<ul style="list-style-type: none">• litter• coniferous litter• tree sap• birch sap• essential oils• ornamental• medicinal properties• venison• non-timber products• profitable• construction industry• packaging• household goods	<ul style="list-style-type: none">• підстилка• хвойна підстилка• деревний сік• березовий сік• ефірні масла• декоративні• лікувальні властивості• оленина• недеревні вироби• прибутковий• будівельна галузь• упаковка• побутові товари
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<ul style="list-style-type: none"> • waste • application • fuelwood • particleboard • fibreboard • subject treatment • process cardboard • obtain from • charcoal 	<ul style="list-style-type: none"> • відходи • додаток • дрова паливні • ДСП • ДВП • предмет лікування • обробити картон • отримати від • деревне вугілля
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READING COMPREHENSION

I. Answer the questions.

1. Give examples of forest products.
2. How can forest products be divided?
3. Why is wood the most important forest product?
4. How is it used?
5. How are small parts of wood used?
6. Name products that are the result of wood chemical treatment.
7. What is produced during pyrolysis?

II. In the text find the words that mean:

1. a layer of coniferous needles covering forest soil
2. juice obtained from trees
3. a sticky substance produced by trees
4. an adjective describing fruit or mushrooms which are eaten
5. game meat
6. wood used for heating
7. a board produced from wood fibres. Wood is first subjected to pulping, laterboards are formed
8. a board made of small pieces of wood glued together
9. a thick, stiff piece of paper
10. coal produced from wood
11. the process in which charcoal is produced

GLOSSARY

<ul style="list-style-type: none">• layer• needle• cover• soil• juice• obtain from• sticky• game• heating board• manufacture• glue• fibre• thick• stiff• pulping	<ul style="list-style-type: none">• шар• голка• кришка• ґрунт• сік• отримати від• липкий• м'ясо диких тварин• нагрівальна дошка• виробництво• клей• клітковина• товстий• жорсткий• варіння целюлози
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30.FORESTS FEED, FORESTS CURE

I. Read.

Apart from wood, forests are a source of edible products, such as fruits or mushrooms as well as those which have medicinal properties, e.g. herbs. In many countries venison is also considered a forest product.

Fruits

The most common edible forest fruits belong to two families: the *Ericaceae* (bilberry, cranberry) and the *Rosaceae* (blackberry, wild strawberry and raspberry). Edible fruit can be eaten raw, dried or processed into juice, jam or alcohol. However, edible fruits are not the only ones picked in forests. Hawthorn, elder, juniper, rowan, rose, barberry or sea buckthorn fruit are also important forest products used as food, medicine or in cosmetology.

Mushrooms

Mushrooms that grow in forests can be divided into edible, inedible and poisonous. Poisonous mushrooms are very dangerous for our health because they may damage the kidneys, the liver or the heart. What is more, symptoms may sometimes develop even two weeks after eating and then it is too late to save that person's life.

Forest plants' medicinal properties

Many forest trees and shrubs have medicinal properties, e.g. pine, birch, linden, rowan, oak, blackthorn, alder buckthorn, guelder rose, dog rose. The list also includes such plants as: lily of the valley, asarabacca, nettle and buckbean. What is more, many fruits have application in curing illnesses.

Venison

'Game' means animals hunted for their meat such as deer, wild boar, hare or pheasant. Game can be hunted only during the open season. During the closed season hunting is forbidden.

GLOSSARY

<ul style="list-style-type: none">• cure• edible• herbs• venison• considered• bilberry• cranberry• blackberry• wild strawberry• raspberry• raw• pick• hawthorn elder• juniper• barberry• sea buckthorn• spice• inedible	<ul style="list-style-type: none">• вилікувати• їстівні• трави• оленина• розглядається• чорниця• ;уравлина• ожина• лісова суниця• малина• сирої• вибрати• глід бузина• ялівець• барбарис• обліпіха• спеції• неїстівні
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<ul style="list-style-type: none"> • poisonous • kidney • liver • heart • save life • blackthorn • alder buckthorn • guelder rose • dog rose • lily of the valley • asarabacca • nettle • buckbean • application • game • hunt • deer • wild boar • hare • pheasant • open season • closed season 	<ul style="list-style-type: none"> • отруйні • нирка • печінка • серце • врятувати життя • терен • вільха крушина • калина • шипшина • конвалія • асарабакка • кропива • бобовий • додаток • м'ясо диких звірів • полювати • олень • кабан • заєць • фазан • відкритий сезон • закритий сезон
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READING COMPREHENSION

I. Answer the questions.

1. Name groups of edible forest products.
2. Which families do edible fruits belong to?
3. What other fruits are picked in forests?
4. What is their application?
5. What organs do poisonous mushrooms damage?
6. When may symptoms develop?

7. Name three trees and three shrubs that have medicinal properties.
8. What is 'game'?
9. When can game be hunted?

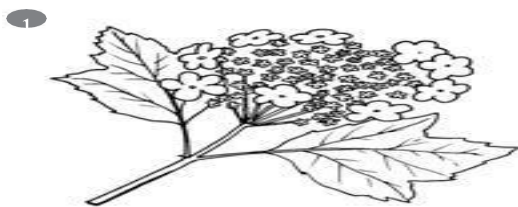
II. In the text find the words that mean:

1. something that you can eat safely
2. small plants that have medicinal properties or used as spice
3. a plant with red fruits belonging to the *Ericaceae* family
4. not cooked or processed
5. something put in food to give it flavour
6. opposite to 'edible'
7. something that you shouldn't eat because it is dangerous for your health or can even cause death
8. a small forest plant that produces white, fragrant flowers in May
9. a small forest plant whose leaves are covered by stinging hairs
10. a forest animal that has antlers

GLOSSARY

<ul style="list-style-type: none"> • flavour • fragrant • sting • antlers 	<ul style="list-style-type: none"> • аромат • ароматный • жало • панти
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III. Name the following plants.





REVISION VIII

I. Match the words on the left (1–6) with the words of the opposite meaning on the right (A–F).

- | | |
|------------------------|-------------------------------|
| 1. edible | A. light demanding |
| 2. open season | B. non-timber forest products |
| 3. shadebearing | C. cut down |
| 4. seedling | D. inedible |
| 5. wood-based products | E. mature tree |
| 6. plant trees | F. closed season |

II. Choose the correct answer a, b or c.

- Young trees start to grow under the canopy of older ones in:
 - shelterwood cutting
 - clearcutting
 - both
- ‘Cutting interval’ means:
 - the number of trees that are cut down
 - the time between cutting down next trees
 - a type of harvesting system
- The most radical timber harvesting system is:
 - selection system
 - shelterwood system
 - clearcutting
- To ‘cut down’ trees means the same as:
 - to fell
 - to prevent
 - to spread
- Cardboard is a type of:
 - board
 - paper
 - cloth
- ‘Game’ is:
 - an animal hunted for meat, fur and the like
 - the same as venison
 - a type of fibreboard
- Which plant has black fruit?
 - cranberry
 - raspberry

c. elder

**III. Match the words on the left with those on the right.
Then translate them into Ukrainian.**

- | | |
|----------------------|----------------|
| 1. forest stand | A. cutting |
| 2. species | B. interval |
| 3. dog | C. buckthorn |
| 4. sanitation | D. cutting |
| 5. timber harvesting | E. qualities |
| 6. manual | F. properties |
| 7. guelder | G. composition |
| 8. cutting | H. rose |
| 9. desirable | I. boar |
| 10. helterwood | J. mushrooms |
| 11. medicinal | K. improvement |
| 12. alder | L. systems |
| 13. poisonous | M. rose |
| 14. wild | N. labour |

IV. Put the harvesting stages in the proper order.

- A. transporting logs to sawmills or other processing factories
- B. sorting/ wood classification
- C. cutting down trees
- D. removing branches and tree tops
- E. short-term storing
- F. transferring logs to the roadside landing
- G.

V. Match the English names with the Latin ones.

- | | |
|-----------------------|-----------------------------------|
| 1. lily of the valley | A. <i>Viburnum opulus</i> |
| 2. cranberry | B. <i>Vaccinium myrtillus</i> |
| 3. blackthorn | C. <i>Convallaria majalis</i> |
| 4. blackberry | D. <i>Fragaria vesca</i> |
| 5. guelder rose | E. <i>Rubus fruticosus</i> |
| 6. wild strawberry | F. <i>Prunus spinosa</i> |
| 7. black elder | G. <i>Oxycoccus quadripetalus</i> |
| 8. raspberry | H. <i>Crataegus</i> sp. |

- 9. bilberry
- 10. hawthorn

- I. *Rubus idaeus*
- J. *Sambucus nigra*

VI. Which plants have red or orange fruit and which ones black or darkblue?

.....

TEST TASKS

WHERE TREES COME FROM

1. Fill in the blanks.

Trees grow from 1. A young plant that has just germinated from its seed is called a seedling. Next, a 2. grows for some time, is bigger and stronger and becomes a sapling. Such a young tree, after many years depending on species, is mature enough and ready to be 3.The described above method of tree reproduction from seeds is very common in forestry. Such a way of plant propagation is called 4. because it requires gamete formation and fertilisation. In contrast, asexual reproduction known also as 5. does not require gamete formation because a young plant is a part of the 6. plant, e.g. shoot cuttings.

PARTS OF A TREE

1. Fill in the blanks with the words from the box.

- A. root hairs
- B. nutrients
- C. mycorrhiza
- D. symbiotic
- E. buds
- F. root system
- G. species
- H. branches
- I. taproot
- J. trunk

Each tree consists of a 1., a trunk and a crown. A root system may have different size and shape depending on tree 2., soil and climate conditions. There are several types of roots forming a root system. A 3. is the main root of a tree. It grows downwards. Lateral roots are the ones that grow from the taproot. 4. are the smallest parts of a root system. Some species, e.g. pine does not usually have root hairs but their roots form a 5. relationship with fungi instead. Such symbiosis is known as 6. A 7. is the heaviest and the most valuable part of a tree. It is covered by bark. A trunk transports water and 8. upwards (from roots to leaves) and photosynthesis products downwards. A crown consists of 9., twigs and leaves that take part in photosynthesis. Other parts of a crown include: flowers, fruit and 10.

FACTORS AFFECTING A TREE'S APPEARANCE

1. Fill in the blanks.

1. Factors which influence a tree's appearance include: of a tree, species, and the where a tree grows.
2. Sapling bark is, more delicate, or sometimes it is even not of the same colour, e.g.
3. Spruce has thinner branches than
4. The place where a tree grows means also its, e.g. soil type and nutrients, precipitation and the like.

CONIFEROUS TREES

I. Match the two parts of a sentence.

- A. Cones consist of
- B. In Poland coniferous trees are represented by
- C. Pine leaves grow in groups
- D. Spruce is often attacked by
- E. Fir is a
- F. Larch sheds its leaves
- G. Douglas fir is a tree

1. in autumn.
2. native to North America.
3. scales and seeds.
4. pine, spruce, fir, larch and Douglas fir.

5. called fascicles.
6. shade-tolerant tree species.
7. the European spruce bark beetles.

DECIDUOUS TREES

I. Fill in the blanks.

Deciduous trees are not as numerous in Europe as 1. ones. Deciduous trees do not have 2. in winter. They come into leaf in spring. In autumn leaves turn yellow, red or 3. and trees shed their leaves. Deciduous trees do not produce 4. but different types of fruit. The most common deciduous species in our country include: 5., birch, alder, beech and poplar.

BASIC FOREST TREE CHARACTERISTICS

I. Fill in the blanks.

1. Basic species characteristics include: longevity, growth rate, shade tolerance, and water requirements, and hardness.
2. Some species are, e.g. willow and poplar, others are long-living, e.g. oak or fir which can live as long as 700 years.
3. Fast-growing species include: poplar, larch, pine, and spruce.
4. Pine, birch or larch need more light to grow than fir or beech which are
5. Pine grows well on most soils, fir and beech prefer fertile ones, and spruce does not tolerate lack of water because of its shallow system.

TREE TYPES

I. True or false?

1. Saplings are younger than small poles.
2. Poles can be divided into high poles and mature trees.
3. Codominant trees are the tallest in a stand.
4. Trees that cannot develop properly because they get not enough sunlight are called suppressed.
 1. A snag is a dominant tree in a stand.

FOREST STANDS

I. Fill in the blanks with 1–3 words.

- A. A forest stand is a part of a forest. It consists of a relatively uniform group of trees that grow 1. together and cover a particular area. There are several ways a stand can be described.
- B. The basic characteristics include: 2., species composition, stratification, stand density and stand origin. Stand age can be described in many ways.
- C. The most common is based on 3.
- D. Twenty years is a usual period of time limiting one class so typical age classes include trees 4. old, 21–40, 41–60 and so on.
- E. If trees in a stand belong to one age class such a stand is called even-aged. When they belong to 5. – uneven-aged.
- F. Species composition tells us if the stand is single-species or mixed. In mixed stands there are dominant tree species and admixture, which in Polish forests usually constitute 6.
- G. Stratification refers to the numbers of tree layers from the forest floor to tree tops. Stands can be divided into single-storey and multi-storey.
- H. Stand density depends on a number of trees per hectare, their sizes (height and diameter) as well as canopy closure which tells us 7. the crowns of
- I. neighbouring trees are. Stand origin tells us if the stand regenerated naturally or artificially (was planted or sown).

FOREST FLORA

Revise the words:

fern, lichen, fungi, alder buckhorn, lily of the valley

I. Choose the correct answer a, b or c.

- 1. The amount of light reaching the forest floor
 - a. is always the same all year round
 - b. is bigger in spring
 - c. depends on species forming a tree canopy
- 2. Ferns grow best
 - a. on sandy soils

- b. in the shade
- c. in the sun
- 3. Lichens
 - a. may cover tree bark
 - b. grow in polluted areas
 - c. consist of mosses and fungi
- 4. Fungi
 - a. don't form symbiotic relationships
 - b. are forest pests
 - c. can be both harmful and beneficial
- 5. Alder buckhorn is a
 - a. shrub
 - b. plant disease
 - c. type of fungi
- 6. Lily of the valley produces
 - a. tasty fruit
 - b. cones
 - c. sweet-smelling flowers

FOREST ANIMAL KINGDOM

I. Fill in the blanks.

1. Spiders are because they build to catch insects.
2. Ticks prefer, areas.
3. are beneficial insects.
4. and the European spruce beetle are forests pests.
5. Snails and slugs are and clean the forest floor.

II. True or false?

1. Toads and frogs are amphibians.
2. Reptiles live close to water because their skin can dry out easily.
3. Lizards are reptiles.
4. Reptiles help in seed dispersal.
5. Beavers can fly.
6. The deer is a big mammal.

HUNTING

I. Choose the correct answer: a, b or c. What is the Ukrainian for 'poaching', 'game' and 'the open season'?

1. Poaching means:
 - a. taking care of forest animals
 - b. killing forest animals illegally
 - c. the same as hunting
2. Animals that are hunted are called:
 - a. poachers
 - b. game
 - c. the injured
3. Animals can be hunted:
 - a. during the open season
 - b. during the closed season
 - c. all year round
4. Animals are hunted when they are weak, or injured.
 - a. old
 - b. young
 - c. ill
5. Some animals are hunted for their or fur.
 - a. meat
 - b. mates
 - c. meatloaf

A FOOD CHAIN

I. Fill in the blanks with 1–2 words.

1. A food chain consists of, and
2. Plants use carbon dioxide and to produce and oxygen.
3. Primary consumers eat and are called herbivores.
4. Secondary consumers are carnivores because they eat
5. Nutrients are released in the decomposition process and returned to the ecosystem for plants to again.

II. What is the Ukrainian for 'food chain', 'carbon dioxide', 'oxygen', 'herbivore', 'carnivore' and 'nutrients'?

WHAT DESTROYS FORESTS

I Fill in the blanks.

1. Air pollution: damages, changes quality, lowers its
2. Forest fires are caused by: burning, irresponsible behaviour or
3. Improper use of forest includes:, wood theft, artificial regeneration preferring and even-aged plantation, harmful harvesting practice, e.g. clearcutting.
4. Invasive alien species: often have no enemies, reduce the number of or may even replace species.
5. Forests around cities are treated as dumps. What is more, people visiting forests often destroy plants or drive vehicles which make and frighten animals.

II. Fill in the blanks.

Weather conditions such as 1., snow, hail, drought, flood, strong 2., frost, changing temperatures or lightning can damage the whole tree or its parts such as 3., leaves, twigs, branches, trunks, 4. or even roots. Strong wind or avalanche can uproot the whole tree or 5. it.

Most dangerous for forest organisms are bacteria and 6. because they cause numerous tree diseases, and insects which are the most common forest 7.

.Apart from these, trees are also damaged by bigger animals such as: 8. which destroy bark or young plants, 9. that fell trees and flood the area, or wild boars that dig along streams and contribute to soil 10.

THE FOREST BIOLOGICAL CLOCK

I. True or false?

1. Phenology is the study of periodical, biological changes.
2. There are nine phenological seasons in Poland.
3. Hazel blooms in the same season as snowdrop.
4. Beech blooms in very early spring.
5. Dogwood blooms in early summer.
6. Linden blooms earlier than black elder.

- 7. Plants are dormant in early autumn.
- 8. Beechnuts ripen in autumn.

TREE DISEASES

I. Fill in the blanks.

Tree pathogens include viruses, bacteria and 1. However, they do not have the same impact on tree health. For instance, viral and bacterial diseases are not very numerous. The most dangerous are fungi because they cause the majority of tree 2. Diseases weaken plants and, as a result, trees grow slower or even die. What is more, commercial wood value is lowered.

Viruses, bacteria and fungi can damage all parts of a tree: leaves, shoots, bark or roots. Pathogens can attack 3. and older trees, living or dead plant tissues and damage stored 4.

Pathogens can cause, for example, spots on leaves, their 5., necrosis, wilting, shoot dieback, 6. rot or deformation of different parts of a tree. Fungi are also to blame for vascular diseases. For example, *Ophiostoma ulmi*, which causes Dutch 7. disease, blocks vascular tissues. As a result, plants do not get enough water so they wilt and die.

Trees can be also weakened by parasitic 8. plants, e.g. European dodder (*Cuscuta europaea*) and mistletoe (*Viscum album*).

TREE PESTS

I. Choose the correct answer a, b or c.

1. Tree insect pests are:
 - a. not numerous
 - b. the main pests attacking trees
 - c. less numerous than other pests
2. Oligophages:
 - a. eat everything
 - b. attack the same species as monophages
 - c. feed on fewer species than polyphages
3. Primary pests attack:
 - a. healthy trees
 - b. weakened or dead trees
 - c. healthy, weakened and ill
4. Defoliators eat:

- a. inner bark
- b. leaves
- c. wood

5. The most dangerous for forest trees are:

- a. pupae and adults
- b. pupae and larvae
- c. larvae and adults

HOW TO CONTROL FOREST PESTS AND DISEASES

I. Fill in the blanks with 1–2 words.

Forests are constantly being weakened by anthropogenic and abiotic factors. Anthropogenic damage is caused by people whereas 1. refers to unfavourable weather conditions. As a result, trees are not as strong as they should be to resist diseases and pest attack.

2. today is aimed at creating the best conditions for trees to grow and 3. for pests and diseases to develop. It means, for example, preferring uneven-aged stands, conserving biological diversity, removing ill trees, choosing tree species that grow the best in the local climate and soil conditions, protecting 4. of forest pests (biological control).

5. (pesticide application) is used in forests when other methods of fighting pests and diseases fail. Pesticides are substances that are used against 6. organisms for plants such as fungi, insects, weeds.

Pesticides are not used in forests as often as in gardening because they reduce 7. population. They fight not only pests and diseases but other organisms, e.g. beneficial ones or natural enemies that help to reduce 8. population. What is more, pesticides may 9. animals, edible mushrooms, fruit and herbs that are picked in forests. That is why their use in forests is limited.

Foresters know that using one method is not enough to control forest pests and diseases. They use as many different methods as possible because one method complements the other and together they are more effective. Such a way of controlling pests and diseases is called 10. pest and disease management.

NATURAL AND ARTIFICIAL REGENERATION

I. Fill in the blanks with 1–3 words.

NATURAL REGENERATION

1. New trees start to grow from, and

-
2. Foresters control and plan
 3. Pluses of this method: preserves to local conditions,, results in, uneven-aged and stands.

ARTIFICIAL REGENERATION

1. New trees start to grow from and
2. Foresters control and plan, arrangement of plants, quality and quantity.
3. Pluses of this method: more plants

REFORESTATION AND AFFORESTATION

I. Choose the correct answer a, b or c.

1. Forest establishment on former forest land is called:
 - a. afforestation
 - b. reforestation
 - c. deforestation
2. Forest establishment on non-forest land is called:
 - a. deforestation
 - b. reforestation
 - c. afforestation
3. A plough pan:
 - a. stimulates the growth of trees
 - b. can be observed in soils in agricultural use
 - c. does not influence the growth of trees
4. Afforestation may take place:
 - a. on wasteland, farmland, areas degraded by industry or wetland
 - b. only on areas degraded by industry
 - c. is not allowed on farmland
5. Soils are contaminated :
 - a. by pesticides, heavy metals and other chemicals
 - b. by soil salinity, organic matter and soil organisms
 - c. only in post-industrial areas

AFFORESTATION OF FARMLAND

I. True or false?

1. The European Union gives farmers money to plant trees.
2. Subsidies are given only for trees and their planting.

3. Trees grow well on farmland.
4. A plough pan is a soil characteristic that is not typical for forest soils.
5. Forest soils have a little lower pH than soils used for growing agricultural crops.
6. Mycorrhizal fungi cause fungal diseases.

II. What is the Ukrainian for: ‘subsidy’, ‘plough pan’, ‘mycorrhizal fungi’ and ‘fungal diseases’?

FAST-GROWING TREE PLANTATIONS

I. Fill in the blanks with 1–2 words.

1. Tree plantations have been known since times.
2. They provided wicker used for making and shields.
3. Plantation usually form single-species and even-aged stands typical for
4. Plantations consist of tree species such as poplar, willow, birch, larch or, sometimes, and spruce.
5. Trees in plantations grow from to even years.
6. is usually obtained from coppicing, which is grown for 2–10 years.

DIRECT SEEDING VERSUS PLANTING

I. True or false?

1. Direct seeding is a very common method of forest regeneration in Poland.
2. Ploughing is very important in preparing soil for sowing seeds.
3. The amount of seeds needed to regenerate one hectare of forest is the same in all regeneration methods.
4. Direct seeding is used for oak and beech.
5. Planted seedlings do not suffer from transplant shock.
6. Planting seedlings is not as reliable as sowing seeds.

PLANTING SEEDLINGS

I. Fill in the blanks with 1 or 2 words.

1. Only such species are planted which are best adapted to
2. Seedlings produced in nurseries are either or
3. As a planting material one-year-old seedlings can be used, e.g. pine,

.....,

.....,

4. Species like fir, spruce or ash need to produce seedlings proper for planting.

5. Seedlings should be planted as soon as possible after they have been transported from a

6. Species that break their dormancy first, e.g.,,, should be planted the earliest.

SEEDLING PRODUCTION

I. Fill in the blanks with 1–2 words.

Seedling production may take place outdoors or indoors in plastic tunnel or 1. Growing plants under cover allows modification and control of light, 2. and moisture and lengthening the 3. As a result, seedlings produced this way are larger and stronger than those produced 4.

Seeds are sown in spring or in autumn. The spring sowing should take place as 5. as possible because then seedlings have more time to grow before winter. Seeds should be sown when soil is not frozen but still 6. after winter. In contrast to the spring sowing, the autumn one should take place as 7. as possible to avoid germination because young, delicate plants are easily damaged by 8. and may not survive winter.

When seeds are sown outdoors they are often covered with different types of material, e.g. 9., in order to protect them from 10. and unfavourable weather conditions. Covering seedbeds also reduces evaporation and cooling off of the soil. After 11. the cover is removed. Taking care of young seedlings involves: protecting them from seed predators, pests, diseases, very strong wind, frost and sunshine, keeping soil moist and free of 12., providing nutrients in the form of fertilisers.

SEEDLING LIFTING AND OUTPLANTING

I. Choose the correct answer a, b or c.

1. Seedlings are grown in nurseries:

a. outdoors

b. outdoors or indoors

c. indoors

2. During hardening off plants:
 - a. spend more and more time outdoors
 - b. are protected from lower temperatures, moisture, wind and direct sunshine
 - c. adapt to plastic tunnel conditions
3. Lifting takes place when:
 - a. soil is not frozen
 - b. soil is frozen and covered by snow
 - c. in summer
4. After lifting:
 - a. seedlings are kept on seedbeds for 1–2 weeks
 - b. seedlings are sown
 - c. seedling roots are kept moist
5. Inoculation with mycorrhizal fungi means:
 - a. application of fungi to seedling leaves
 - b. using fungicides
 - c. application of fungi to forest soil nurseries or to seedling roots before outplanting

FROM SEEDLINGS TO MATURE TREES

- I. Choose the correct answer a, b or c.
 1. Practices between a seedling stage and mature trees are called:
 - a. forest intermediate improvement
 - b. tending improvement
 - c. forest stand improvement
 2. Foresters try to improve the quality of the stand as a whole by:
 - a. logging
 - b. creating the best conditions for tree growth
 - c. removing additional seedlings
 3. Gradual reduction of stand density is caused by:
 - a. foresters
 - b. tree competition for light, nutrients and the like
 - c. both
 4. Sanitation cutting means removing from the stand trees:
 - a. attacked by pests or diseases or dead ones
 - b. which are too tall
 - c. representing undesirable species
 5. Tree maturity refers to:
 - a. tree age when a tree starts to die
 - b. ability to produce seeds and wood
 - c. ability to produce seeds, wood of proper quality or the beginning of natural

gradual tree death

TIMBER HARVESTING SYSTEMS

I. Fill in the blanks with 1–2 words.

1. All harvesting systems consist of: trees, removing and tree tops, transferring logs to the roadside landing,, short-term storing and transporting them to sawmills or other processing
2. Basic harvesting systems include: clearcutting, shelterwood system and system.
3. Clearcutting is the most It results in stands.
4. Selection system promotes and growth of stands because it is based on felling single trees or their small groups over the whole forest area.
5. Shelterwood cutting is a method that can be placed between the mentioned above harvesting systems. trees of desirable qualities are left on the site to produce and the young trees grow under the of older ones.

FOREST PRODUCTS

I. Fill in the blanks (1–10).

Forest products include: 1., bark, coniferous 2., resin, tree sap (usually birch or maple one), essential oils, edible plants and others that have ornamental or 3. properties. They can also include venison. Forest products can be divided into two categories: 4. and non-timber ones (NTFPs).

The most important and profitable forest product is wood. It is a universal, eco-friendly material used in 5. industry, production of furniture, 6. instruments, packaging or household goods. Small parts of wood are no longer seen as a waste material but have application as 7. (when compressed) or to produce plywood, particleboard or fibreboard.

Wood can also be subjected to chemical treatment. The end products of chemical processing include paper, 8., cellophane, rayon cloth to mention but a few. Other products such as resin and tannin are obtained from wood by 9. while charcoal is produced by heating wood up to 10. in the absence of air. This method is called pyrolysis.

FORESTS FEED, FORESTS CURE

I. True or false?

1. Edible products include fruits, mushrooms and venison.
2. Bilberry and blackberry belong to the Ericaceae family.
3. Raspberry belongs to the Rosaceae family.
4. Only edible fruits are picked in forests.
5. There are edible, inedible and poisonous mushrooms in forests.
6. Guelder rose and asarabacca can be used to cure diseases.
7. Game is hunted during the closed season

GRAMMAR REVISION.

1. Complete the sentences using the verbs in correct forms.

1. I (learn) English for seven years now.
2. But last year I (not / work) hard enough for English, that's why my marks (not / be) really that good then.
3. As I (pass / want) my English exam successfully next year, I (study) harder this term.
4. During my last summer holidays, my parents (send) me on a language course to London.
5. It (be) great and I (think) I (learn) a lot.
6. Before I (go) to London, I (not / enjoy) learning English.
7. But while I (do) the language course, I (meet) lots of young people from all over the world.
8. There I (notice) how important it (be) to speak foreign languages nowadays.
9. Now I (have) much more fun learning English than I (have) before the course.
10. At the moment I (revise) English grammar.
11. And I (begin / already) to read the texts in my English textbooks again.
12. I (think) I (do) one unit every week.
13. My exam (be) on 15 May, so there (not / be) any time to be lost.
14. If I (pass) my exams successfully, I (start) an apprenticeship in September.
15. And after my apprenticeship, maybe I (go) back to London to work there for a while.
16. As you (see / can), I (become) a real London fan already.

2. Complete the sentences using the verbs in correct forms.

- 1) We _____ TV when it started to rain. (to watch)
- 2) I _____ to visit you yesterday, but you _____ not at home. (to want) (to be)
- 3) Look! It _____, so we can't _____ to the beach. (to rain) (to go)
- 4) There are a lot of clouds! It _____ soon. (to rain)
- 5) The sun _____ in the East. (to rise)
- 6) Since 2003 they _____ their son every year. (to visit)

- 7) While the doctor _____ Mr Jones, his son _____ outside this morning. (to examine) (to wait)
- 8) I _____ for my girlfriend for two hours. (to wait)
- 9) After Larry _____ the film on TV, he decided to buy the book. (to see)
- 10) Wait a minute, I _____ this box for you. (to carry)

3. Change the sentences using them in the given tenses.

1. Do you like the film? (past simple)
_____ the film?
2. My father loves seafood. (past simple)
My father _____ seafood.
3. He speaks four languages. (past simple)
He _____ four languages.
4. My sister doesn't have a job. (past simple)
My sister _____ a job.
5. He reads a lot of books in his spare time. (simple)
He _____ a lot of books in his spare time.
6. I saw a great film. (present perfect simple)
I _____ a great film.
7. Elizabeth isn't at home. (past simple)
Elizabeth _____ at home.
8. He liked his job. (present simple)
He _____ his job.
9. He liked the job. (future simple)
He _____ the job.
10. Are they here? (future simple)
_____ here?

4. Choose the correct variant .

1. Who _____ food in your family when your Mom is away?
- cooks
 - is cooking
 - has been cooking
 - cooked
2. Where is John? - He _____ his car in the garage.
- repairs
 - is repairing
 - has repaired
 - repaired
3. Anna is my best friend. I _____ her for twenty-five years. (

- know
 - have known
 - knew
 - had known
4. My son had a great time at the summer camp last year. They _____ a lot of interesting things there.
- did
 - were doing
 - had done
 - had been doing
5. She _____ the living room when she heard a strange noise in the kitchen.
- cleaned
 - was cleaning
 - has cleaned
 - has been cleaning
6. Mr. Smith, could I leave at 5:30 today? I _____ to the concert and don't want to be late.
- go
 - am going
 - will go
 - will be going
7. You arrived 2 days ago. You are going to leave next Sunday. By the time you leave, you _____ 9 days here.
- spend
 - will spend
 - have spent
 - will have spent
8. Where have you been? I _____ for you since 3 o'clock!
- am waiting
 - have been waiting
 - was waiting
 - had been waiting
9. I went to Belgium last month. I _____ there before. It's a beautiful country.
- have never been
 - had never been
 - never was
 - never were

5. Complete the sentences using the verbs in correct forms.

1. The British explorer James Cook was born in the village of Marton,

Yorkshire, on 27 October, 1728. But his family soon (move) to another village, called Great Ayton, where Cook (spend) most of his childhood.

2. As a teenager James Cook (develop) a fascination for the sea and (travel) to Whitby where he (find) employment on a coal ship.

3. While he (serve) in the Royal Navy during the Seven Years' War (1756-1763), Cook (have) the command of a ship.

4. After the war (end), Cook (take) command of the vessel Grenville and (go) to Newfoundland to survey the coasts there.

5. While he (map) the coasts of Newfoundland, he (observe) a solar eclipse off the North American coast.

6. Cook (send) the details to the Royal Society, England's leading scientific organisation, and (win) their attention.

7. After Cook (publish) his observations of the solar eclipse, the Royal Society (ask) him to lead a scientific expedition to Tahiti and (put) him in command of the HMS Endeavour.

8. From Tahiti Cook then (go on) to explore the South Pacific.

9. He also (reach) New Zealand, which only the Dutchman Abel Tasman (visit) before Cook.

10. After Cook (map) New Zealand's complete coastline, he (sail) to Australia's east coast.

11. Cook (name) the area New South Wales as it (remind) him of the south coast of Wales in Great Britain.

12. In 1772, one year after Cook (return) from his first voyage to the Pacific, the Royal Society (hire) him for another expedition to find the mythical Terra Australis.

13. On his journey, Cook (discover) several islands and almost (go) as far as the continent of Antarctica.

14. He (make) maps of the South Pacific and (prove) that Terra Australis (exist / not).

15. His third and last voyage for the Royal Society (take) him to the west coast of North America where he (try) to find a passage between the Atlantic and Pacific.

16. He (not / can / pass) the Bering Strait, however; the ice (force) him to return to Hawaii, which he (discover) earlier.

17. While he and his crew (rest) in Hawaii, some Hawaiians (steal) one of his boats.

18. When Cook and his men (try) to get the boat back from the natives, a violent fight (break out) in which the natives (stab) James Cook to death.

6. Choose the correct variant .

1. Jane drives _____ car to work on Saturdays.
(a) my (b) her (c) their
2. This painting is _____ than his last one.
(a) best (b) good (c) better
3. I understand _____ you want to learn English.
(a) but (b) because (c) that
4. Jane would like _____ to the cinema.
(a) going (b) go (c) to go
5. "I'm a doctor. And _____ do you do?"
(a) how (b) what (c) who
6. _____ book is by Hemingway.
(a) Those (b) These (c) This
7. We're hungry! Are there _____ sandwiches left?
(a) a lot (b) any (c) some
8. I go to the mountains _____ in the summer.
(a) a lot of (b) many (c) very often
9. They're the books _____ the table.
(a) on (b) in (c) in front
10. They want to visit England _____ they like British culture.
(a) but (b) because (c) that
11. Can I have _____ fruit, please?
(a) a lot (b) any (c) some

7. Choose the correct variant .

1. I _____ TV when the telephone rang.
watched
was watching
are watching
have watched
2. I'm afraid I'm not hungry. I've _____ eaten lunch.
yet
still
already
ever
3. Would you like _____ chicken?
any
a
some
one
4. He has _____ friends in Chicago.

few
few of
a lot
much

5. She _____ lunch by the time we arrived.

had finished
finished
have finished
finishing

6. What shall we do tonight? How about _____ a film?

to see
see
seeing
going

7. If I _____ you, I would wait a while to begin investing.

was
am
were
would be

8. I think San Francisco is _____ exciting _____ New York.

as ... as
so ... than
as ... than
so ... as

9. If she _____ that he was coming, she would have prepared the guest room.

knew
has known
had known
knows

10. I'm hungry! Just a moment, I _____ make you a sandwich.

'm going to
'll
'm
should

11. _____, we won't have much to talk about.

If he not comes
Unless he comes
If he didn't come
If he came

12. Oh, look at those clouds! It _____ rain.

's going to
won't
sure will
shall

13. Jack told her that he _____ come the next day.

is going to
will come
wants
was going to
14. If you want to be healthy, you _____ smoke.
needn't
couldn't
shouldn't
mustn't to

15. I missed the train, so I _____ take the next one.

musted
must
had to
had

16. Why are your hands so dirty? - Well, I _____ in the garden for the last two hours.

have worked
worked
am working
have been working

17. Yes, we have bought the tickets to the concert and we _____ next Friday. I'm so excited.

will go
won't go
shall be going
are going

8. 1-10 Complete the sentences using the verbs in correct forms. 11-15 Answer the questions.

1. When Carol (call) last night, I (watch) y favorite show on television.

2. I (work) for this company for more than thirty years, and I intend to stay here until I retire!

3. Sharon (love) to travel. She (go) abroad almost every summer. Next year, she plans to go to Peru.

4. Thomas is an author. He (write) mystery novels and travel memoirs. He (write) since he was twenty-eight. Altogether, he (write) seven novels, three collections of short stories and a book of poetry.

5. We were late because we had some car problems. By the time we (get) to the train station, Susan (wait) for us for more than two hours.

6. Sam (try) to change a light bulb when he (slip) and (fell).

7. Everyday I (wake) up at 6 o'clock, (eat) breakfast at 7 o'clock and (leave) for work at 8 o'clock. However, this morning I (get) up at 6:30, (skip) breakfast and (leave) for work late because I (forget) to set my alarm.

8. Right now, Jim (read) the newspaper and Kathy (make) dinner. Last night at this time, they (do) the same thing. She (cook) and he (read) the newspaper. Tomorrow at this time, they (do, also) the same thing. She (prepare) dinner and he (read). They are very predictable people!

9. By this time next summer, you (complete) your studies and (find) a job. I, on the other hand, (accomplish, not) anything. I (study, still) and you (work) in some new high paying job.

10. The students (be, usually) taught by Mrs. Monty. However, this week they (be) taught by Mr. Tanzer.

* * * * *

11.
Jane talks on the phone.
Bob has been talking on the phone for an hour.
Mary is talking on the phone.

Who is not necessarily on the phone now? _____

12.
I'm going to make dinner for Frank.
I'm making dinner for Judy.
I'll make dinner for Mary.
I make dinner for Ted.

I will be making dinner for Tony.

Who are you offering to make dinner for? _____

13.

Jane left when Tim arrived.

Bob left when Tim had arrived.

Tim arrived when Mary was leaving.

John had left when Tim arrived.

After Tim arrived, Frank left.

Who did not run into Tim? _____

14.

Jane is talking in class.

Bob always talks in class.

Mary is always talking in class.

Whose action bothers you? _____

15.

Jane never left Jamestown.

Bob has never left Jamestown.

Who is still alive? _____

9. Complete the questions with suitable words and answer them.

1. How often do you go.....?
2. How often do you do.....?
3. How often do you watch.....?
4. How often do you eat.....?
5. How often do you meet.....?
6. What is your favorite.....?
7. Who is your best.....?
8. What is your least favorite.....?
9. What was the best.....?
10. What was the worst.....?

11. What was the longest.....?
12. Who is the prettiest.....?
13. What do you usually.....?
14. What do you often.....?
15. What do you rarely.....?
16. What do you never.....?
17. What time do you.....?
18. What time do you?
19. When do you.....?
20. Why do you.....?
21. Who do you.....?
22. How do you.....?
23. How long do you.....?
24. When did you last go.....?
25. When did you last do.....?
26. When did you last see.....?
27. When did you last have.....?
28. When did you last meet.....?
29. When did you last ask.....?
30. When did you last feel.....?
31. Have you ever been.....?
32. Have you ever eaten.....?
33. Have you ever wanted.....?
34. Have you ever drunk.....?
35. Can you.....?
36. Can you.....?
37. Can you.....?
38. Do you have to.....?
39. Do you have to.....?
40. Do you have to.....?
41. What will you do if.....?
42. What will you do if.....?
43. What will you do if.....?
44. What will you do if.....?
45. What would you do if.....?
46. What would you do if.....?
47. What would you do if.....?
48. What would you do if.....?
49. Is there?
50. Is there?
51. Is there?
52. Are there.....?

53. Is there
54. Should people.....?
55. Should students.....?
56. Should children.....?
57.in.....?
58.at.....?
59.on.....?
60.to.....?
61.since.....?
62.during.....?
63.for.....?
64.from...to.....?
65. Will you.....?
66. Will you.....?
67. What are you going to.....?
68. What are you going to.....?
69.this year?
70.next year?
71.last year?
72.today?
73.yesterday?
74.tomorrow?
75. What.....?
76. Who.....?
77. When.....?
78. Why.....?
79. Where.....?
80. What kind of.....?
81. How.....?

10. Complete the sentences using correct articles and the following words.

Bicycle, capital, cigarette, play, difficult language, kitchen, nice day, next train, roof, small hotel.

1. Rome is _____ of Italy.
2. When we were in London, we stayed at _____.
3. Can you ride _____?
4. What's that man doing on _____ of that house? Is he repairing something?

5. We went to the theatre last night but _____ wasn't very good.
6. Do you think English is _____ for people to learn?
7. "Would you like _____?" "No, thanks. I don't smoke".
8. "Where is Jack?" "He's in _____. He's cooking something."
9. Excuse me, what time is _____ to London?
10. It's _____ today. Let's go out.

11. Fill in some or any.

1. There's chocolate in the cupboard.
2. Do you have brothers or sisters?
3. Did you make mistakes?
4. Would you like cake?
5. I am going to buy fruit and vegetables.
6. I would like white paper, please.
7. And do you have envelopes?
8. I found money this week.
9. Do you have of his records?
10. Do you know of her friends?
11. I don't have sisters but I have one brother.
12. She hadn't money, so I left her
13. We don't have coffee today but we have tea.
14. I am going out to send letters.
15. Can you make us lunch while I finish this work?
16. Did you have problems with the exam?
17. I don't know good restaurants in our town.
18. Do you have more questions or is that everything?
19. He can't help us. He hasn't free time.
20. She doesn't like of his friends. Not one.
21. The teacher gave us homework.
22. He didn't pass of the exams, even though of them were easy.

12. Choose the correct variant.

1. There are ___ French students in The Language Project at the moment.
2. We only have ___ time between the first and second lesson - not enough to drink coffee.
3. We've got ___ homework to do tonight. We have to write five essays and read two chapters of the book.
4. I haven't got ___ money to go to the cinema tonight.
5. There's ___ crime in this part of Bristol but the City Centre is quite dangerous.

6. I live in a quiet part of the city so there ____ to do in the evening.
7. You need to take ____ with you on the trip to London, to pay for lunch.
8. At five o'clock every evening, there are ____ cars on Whiteladies road. It's the rush hour.
9. If you travel to work at six o'clock in the morning ____ traffic on the road and you can get there quickly.
10. We don't have ____ students in this class to make a football team.
11. How ____ pairs of shoes do you take when you go on a business trip.
12. Our teacher doesn't drink a lot of alcohol but he has ____ wine on Saturday nights - usually about half a glass.

1. A much B a lot of C too much D little
2. A a few B few C a little D not many
3. A not enough B too much C too many D many
4. A too much B too many C much D enough
5. A a few B not much C not enough D too much
6. A isn't much B isn't any C aren't enough D aren't any
7. A not much pounds B much money C a few pounds D little pounds
8. A too much B not much C little D too many
9. A there is not much B there are few C there are not enough D there are too few
10. A many B much C enough D too many
11. A much B many C few D enough
12. A too few B not enough C a few D a little

13. Finish the following sentences.

1. I have too many.....
2. I have too much.....
3. There are enough.....
4. There are not enough.....
5. A few years ago.....
6. In a few days.....
7. I need a little.....
8. Only few people.....
9. I want to.....some.....
10. If you have little money.....
11. If you have little time.....
12. I don't like any.....
13. I.....very much.
14. I don't know many.....

14. Choose the correct variant.

- 1.) _____ watch on my wrist says it is noon. (These, This)
- 2.) _____ cat across the street has a striped tail. (That, Those)
- 3.) Whose skates are _____ by the stairs? (this, those)
- 4.) I don't know why I'm wearing my hair _____ way. (this, those)
- 5.) Did you eat _____ cookies on the table? (those, that)
- 6.) _____ tests on my desk don't have names on them. (these, this)
- 7.) Remember _____ movie we watched yesterday? (that, those)
- 8.) _____ trees are going to grow very tall. (These, This)
- 9.) _____ storm we had last night kept me awake. (Those, That)
- 10.) Did you buy _____ grapes at the market? (that, those)
- 11.) Ask _____ policeman for directions. (that, those)
- 12.) How many of _____ napkins here do you need? (these, this)

15. Fill in: somebody, anybody, nobody, something, anything, nothing, somewhere, anywhere or nowhere.

1. I know _____ about this issue that you may find interesting, but if I tell you, you must promise to keep a secret.
2. _____ lives here. There is no water.
3. I spent the night _____ near the beach.
4. _____ could have jumped over this wall, and stole your rake. It's very low.
5. _____ scares him. He's very brave.
6. There is _____ to park here. Let's go _____ else to park.
7. Would you like _____ to wash your hands?.
8. May I have _____ for dessert, please?
9. They took him _____ in London, and he never returned.
10. Please don't leave _____ behind at home. We'll be away for a fortnight.

11. She needs _____ to love. She's very lonely.
12. They will not sing _____ in this city. They said that they would never come back.
13. There isn't _____ you can do to help them. _____ can help them.
14. We do not need _____ else to run this department. We can do it ourselves.
15. _____ is ringing the bell. Go and see who it is.
16. _____ phoned while we were out, but they did not leave a message.
17. _____ tells me that there is _____ fishy going on .
18. They are looking for _____ to settle down and have children. They want to find a quiet place to lead a quiet life.
19. "Where would you like to stay?"
- " _____ will do provided it is a clean place."
20. "Is there _____ at home?"
- "I don't think there is _____. Mum and dad must have gone out."

GLOSSARY OF FORESTRY TERMS

- Acre

An area of land measuring 43,560 square feet. A square 1-acre plot measures 209 feet by 209 feet; a circular acre has a radius of 117.75 feet.

- Amphibian

Any of a class of vertebrates that regulate their body temperature externally; lay shell-less eggs in wet areas; live in water during early development and live both in water and on land as adults; and use lungs, gills and their skin for breathing. Most have four legs and smooth, moist skin without scales.

- Angiosperm

A plant that has true flowers and bears its seeds in fruits. In temperate zones, many angiosperms are deciduous trees, while in tropical zones, many are evergreen trees. Examples include oaks, willows, maples and birches.

- Annual Ring

The combination of one earlywood layer (light colored) and one latewood layer (dark colored) seen in a cross-section of a tree. One annual ring usually represents one year of growth.

- Artificial Regeneration

The growth of new trees through seeding and planting.

- Bark

The tough exterior covering of a woody root or stem that protects the tree from injury caused by insects and other animals, by other plants, by disease and by fire.

Best Management Practices

Procedures employed during harvesting and/or timber stand improvement activities that reduce erosion and prevent or control water pollution.

Biltmore Stick

A stick similar to a yardstick in appearance, but usually about 25 inches long. One side is scaled to read a tree's diameter by holding the stick horizontally at arm's length and against the tree at breast height. A Merritt hypsometer runs along one edge of the stick and is scaled to read a tree's height from 66 feet away from the tree's base. These two measurements are then used to find the tree's volume according to the volume table printed on one face of the stick.

Biodiversity

The variety of life forms in a given area; can be categorized in terms of number of species, variety of plant and animal communities, genetic variability or some combination of these categories.

Bird

Any of a class of vertebrates that regulate their body temperature internally, have bodies that are covered almost entirely with feathers and have forelimbs modified as wings that enable most to fly.

Board Foot

A unit of measure equal to a board that is 1 inch thick, 12 inches long and 12 inches wide, or 144 cubic inches.

Bole

The main trunk of a tree.

Broadleaf

A class of trees that have broad, flat leaves of many different shapes; most are deciduous; also called hardwood because most broad-leaved trees have harder wood than do conifers. Examples include oak, hickory, maple and ash.

Buffer Strip

A narrow zone or strip of land, trees or vegetation bordering an area. Common examples include visual buffers, which screen the view along roads, and streamside buffers, which are used to protect water quality. Buffers may also be used to prevent the spread of forest pests.

Cambium

A thin layer of specialized cells within a tree's trunk that divide to produce new inner bark cells to the outside and new sapwood cells to the inside. The narrow band of cells that is responsible for the tree's growth in circumference.

Canopy

The "roof" of the forest formed by the crowns of the tallest trees.

Carrying Capacity

The maximum number of healthy wildlife that a given habitat or area can support without degradation of the habitat.

Cellulose

The scientific name for wood fiber.

Chain

A distance of 66 feet.

Clearcut

A harvesting and regeneration method that removes all trees within a given area. Most commonly used in pine and hardwood forests that require full sunlight to regenerate and grow efficiently.

Clinometer

An instrument that is held at eye level to read stump height and merchantable or total height when standing 50 and 66 feet from the base of the tree. The difference between the two readings yields the height.

Competition

The struggle between trees to obtain sunlight, nutrients, water and growing space. Every part of the tree, from the roots to the crown, competes for space and food.

Conifer

A class of trees that are evergreen, have needle or scalelike foliage and conelike fruit; often called softwood. Examples include pine, hemlock, cedar and cypress.

Conservation

Planned management and wise use of natural resources for present and future generations.

Cord

A standard unit of measure equivalent to 128 cubic feet of round or split wood. A standard cord measures 4 feet by 4 feet by 8 feet. A face cord or short cord is 4 feet by 8 feet by any length of wood under 4 feet.

Cover

- (a) Any plant that intercepts rain drops before they reach the soil or that holds soil in place;
- (b) a hiding place or vegetative shelter for wildlife from predators or inclement weather.

Crown

The branches and foliage at the top of a tree.

Cruise

A survey or inventory of forestland to locate timber and estimate its quantity by species, products, size, quality or other characteristics.

Deciduous

A group of trees that lose all of their leaves every year.

Decomposition

The process by which organic material such as leaves and branches are broken down by bacteria, fungi, protozoans and the many different kinds of animals that live in the soil.

Dendrology

The study of trees; tree identification.

Diameter at Breast Height (DBH)

Tree diameter measured at 4.5 feet above ground level.

Diameter Tape

A steel measuring tape that has a scale calibrated to read a tree's diameter when wrapped around the tree's circumference.

Earlywood

Wood cells produced at the beginning of a tree's growing season that are generally light in color. Also called springwood.

Ecology

The science or study of the relationships between organisms and their environment.

Ecological Succession

The gradual change of plant and animal communities over time.

Ecosystem

A loosely defined area consisting of numerous habitats.

Edge

The transition between two different types or ages of vegetation.

Endangered Species

Any species that has been classified by the U.S. Fish and Wildlife Service or a

state wildlife agency as being in danger of extinction throughout all or a significant portion of its range. A species is endangered when the total number of remaining members may not be sufficient to reproduce enough offspring to ensure survival of the species.

Environment

The sum of all external living and non-living conditions and influences that affect the development and survival of an organism.

Erosion

The wearing away or removal of land or soil by the action of wind, water, ice or gravity.

Even-Aged Management

A forest management method used to produce stands that are all the same age or nearly the same age by harvesting all trees in an area at one time or in several cuttings over a short time. This management method is commonly applied to shade-intolerant conifers and hardwoods.

Evergreen

A group of trees that do not lose all of their leaves every year but go through a gradual replacement by dropping only their oldest leaves each year. Instead of being bare in winter, these trees have leaves all year.

Foliage

The leaves of a tree or other plant.

Forage

Vegetation such as leaves, stems, buds and some types of bark, that can be eaten for food and energy.

Forb

Any herb other than grass.

Forest Floor

The lowest level of the forest that is made up of tree seedlings, dead leaves and needles, grasses, ferns, flowers, fungi, and decaying plants and logs.

Forest Management

Caring for a forest so that it stays healthy and vigorous and provides the products and values the landowner desires.

Forest Stewardship Plan

A written document listing activities that enhance or improve forest resources (wildlife, timber, soil, water, recreation and aesthetics) on private land over a five-year period.

Forest Type

A designation or name given to a forest based on the most abundant tree type or types in the stand; groups of tree species commonly growing in the same stand because their environmental requirements are similar. Examples of North Carolina forest types include (a) pine; (b) mixed hardwood; (c) cypress, tupelo and black gum; and (d) oak and hickory.

Forestry

The art and science of managing forests to produce various products and benefits including timber, wildlife habitat, clean water, biodiversity and recreation.

Fuel Loading

A buildup of easily ignited leaves, pine straw, branches and trees on the forest floor.

Group Selection

- (a) The removal of small groups of trees to regenerate shade-intolerant trees in the opening (usually at least 1/4 acre);
- (b) a specific type of selective cutting.

Gymnosperm

A plant whose seeds are not enclosed in flowers. Most gymnosperms produce their seeds on the surface of the scales of female cones and are pollinated by wind. Conifers are the most common type of gymnosperm.

Habitat

An area in which a specific plant or animal naturally lives, grows and reproduces; the area that provides a plant or animal with adequate food, water, shelter and living space.

Hardwoods

Trees with broad, flat leaves as opposed to coniferous or needled trees. Wood hardness varies among the hardwood species, and some are actually softer than some softwoods.

Heartwood

The central core of a tree, which is made up of dense, dead wood and provides strength to the tree.

High-Grading

A harvesting technique that removes only the biggest and most valuable trees from a stand and provides high returns at the expense of future growth potential. Poor quality, shade-loving trees tend to dominate in continually high-graded sites.

Hypsometer

Any device used for measuring tree height.

Increment Borer

A hollow auger-like tool with a screw bit used to remove core samples from trees.

Latewood

Wood cells produced at the end of the growing season that make up the darker section of an annual ring. Also called summerwood.

Limiting Factor

Any requirement for wildlife survival that is in limited supply.

Mammal

Any of a class of higher vertebrates whose bodies are covered with hair, who give birth to live young, nourish their young with milk from mammary glands, regulate their body temperature internally, have four types of well-developed teeth and typically have four well-developed legs with toes that have nails, claws or hoofs.

Mast

Fruits or nuts used as a food source by wildlife. Soft mast includes most fruits with fleshy coverings, such as persimmon, dogwood seed or black gum seed. Hard mast refers to nuts such as acorns and beech, pecan and hickory nuts.

Merritt Hypsometer

A scale that measures the number of 16-foot logs in a tree.

Multiple-Use Management

The management of land or forest for more than one purpose, such as wood production, water quality, wildlife, recreation, aesthetics and clean air.

Natural Regeneration

The growth of new trees in one of the following ways without human assistance: (a) from seeds carried by wind or animals, (b) from seeds stored on the forest floor, or (c) from stumps that sprout.

Naval Stores

Products such as turpentine, pitch and rosin that come from pine trees and are used in the construction and maintenance of wooden sailing vessels.

Phloem

The part of a tree that carries sap from the leaves to the rest of the tree. Also called inner bark.

Photosynthesis

The process by which a plant or tree combines water and carbon dioxide with energy from the sun to make glucose and oxygen.

Plant Succession

The progression of plants from bare ground to mature forest.

Prescribed Burning

The practice of using regulated fires to reduce or eliminate material on the forest floor, for seedbed preparation or to control competing vegetation. Prescribed burning simulates one of the most common natural disturbances. Also called controlled burning.

Pulpwood

Wood used in the manufacture of paper, fiberboard or other wood fiber products. Pulpwood-sized trees are usually a minimum of 4 inches in diameter.

Reforestation

Reestablishing a forest by planting or seeding an area from which forest vegetation has been removed.

Release

To free a tree from competition with its immediate neighbors by removing the surrounding trees. This occurs naturally and artificially.

Renewable Resource

A naturally occurring raw material or form of energy that has the capacity to replenish itself through ecological cycles and sound management practices.

Reptile

Any of a class of vertebrates that regulates its body temperature externally, has dry, glandless skin covered with scales, breathes through lungs and lays large eggs that develop on land.

Resin

A group of sticky liquid substances secreted by plants that appear on the plant's external surface after a wound.

Roots

The underground portion of a tree that helps anchor the tree in the ground and absorbs water and nutrients from the soil.

Rotation

The number of years required to establish and grow trees to a specified size, product or condition of maturity. A pine rotation may range from as short as 20 years for pulpwood to more than 60 years for sawtimber.

Salvage Cut

The harvesting of dead or damaged trees, or the harvesting of trees in danger of being killed by insects, disease, flooding or other factors in order to save their economic value.

Sawtimber

Wood of large enough size to be used to produce lumber for construction and furniture.

Sedimentation

The deposition or settling of soil particles suspended in water.

Seed Tree Cut

A harvesting method in which a few scattered trees are left in the area to provide seeds for a new forest stand. Selection of seed trees is based on growth rate, form, seeding ability, wind firmness and future marketability. This harvesting method produces an even-aged forest.

Selective Cutting

The periodic removal of individual trees or groups of trees to improve or regenerate a stand.

Shade-Intolerant Species

Trees that require full sunlight to thrive and cannot grow in the shade of larger

trees.

Shade-Tolerant Species

Trees that have the ability to grow in the shade of other trees and in competition with them.

Shelterwood Cut

Removing trees in the harvest area in a series of two or more cuttings so that new seedlings can grow from the seeds of older trees. This method produces an even-aged forest.

Silviculture

The art, science and practice of establishing, tending and reproducing forest stands of desired characteristics. It is based on knowledge of species' characteristics and environmental requirements.

Site Index

A relative measure of forest site quality based on the height (in feet) of the dominant trees at a specific age (usually 25 or 50 years, depending on rotation length). Site index information helps estimate future returns and land productivity for timber and wildlife.

Snag

A standing dead or dying tree.

Softwood

A tree belonging to the order Coniferales. Softwood trees are usually evergreen, bear cones and have needles or scalelike leaves. Examples include pines, spruces, firs and cedars. See conifer.

Species

A group of related organisms having common characteristics and capable of interbreeding. Loblolly and Virginia pine are common tree species that can interbreed.

Springwood

See earlywood.

Stand

A group of trees that are sufficiently the same in species composition and arrangement of age classes and condition so that they can be managed as a unit.

Streamside Management Zone (SMZ)

An area adjacent to a stream in which vegetation is maintained or managed to protect water quality.

Summerwood

See latewood.

Suppression

The process by which a tree loses its vigor due to inadequate light, water and nutrients.

Thinning

A tree removal practice that reduces tree density and competition between trees in a stand. Thinning concentrates growth on fewer, high-quality trees, provides periodic income and generally enhances tree vigor. Heavy thinning can benefit wildlife through the increased growth of ground vegetation.

Threatened Species

Any species that has been classified by the U.S. Fish and Wildlife Service or a state wildlife agency as likely to become endangered within the foreseeable future throughout all or a significant portion of its range. A threatened species has declining or dangerously low populations but still has enough members to maintain or increase numbers.

Transpiration

The loss of water through leaves.

Tree Caliper

A metal or wooden device consisting of an arm and two prongs, one of which is free to slide along a graduated scale on the arm. The prongs are placed against opposite sides of a tree to read its diameter on the scale.

Turpentine

A distilled chemical produced from tapping into a living pine and harvesting the sap.

Understory

The area below the forest canopy that comprises shrubs, snags and small tree. Because the understory receives little light, many of the plants at this level tolerate shade and will remain part of the understory. Others will grow and replace older trees that fall.

Wildlife

A broad term that includes nondomesticated vertebrates, especially mammals, birds and fish.

Wood

The solid interior of a tree.

Wood Chemicals

Chemicals that are found naturally in the various parts of a tree.

Xylem

The part of a tree that transports water and nutrients up from the roots to the leaves. Older xylem cells become part of the heartwood. Also called sapwood.

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