

Present English for Construction Answer Key and Transcripts

Unit 1 – pp. 4-7

1

1 Yes 2 Yes 3 Yes 4 Yes 5 Yes 6 Yes

2

1 C 2 B 3 A

3

Biology	Geography	Geology	Chemistry
living organisms	lands	minerals, rocks	atoms
cells	rivers	history of the Earth	chemical bonds

4



1

Interviewer Mr Hale, could you tell us something (1) **about ecology and its sub-disciplines?**

Mr Hale Well, as you know ecology has a great number of sub-disciplines. Some are more complex than others. For example, physiological and (2) **behavioural ecology** focuses on the adaptations of the individual to his environment; population ecology examines (3) **the dynamics of population** of a single species; community ecology studies the interactions between species in an ecological community. Ecosystem and landscape ecology are even more complex.

Interviewer Can ecology be studied (4) **at different levels?**

Mr Hale Yes, of course. If you study the population level, you focus on individuals of the same species, but (5) **you can also examine communities of species**, ecosystem or biosphere levels.

Interviewer Can you explain how the outer layer of the planet Earth can be divided?

Mr Hale Yes, there are basically three compartments: the hydrosphere is (6) **the sphere of water**, the lithosphere is the sphere of soil and rocks and the atmosphere is (7) **the sphere of air**.

Interviewer And what about the biosphere?

Mr Hale Well, that's the sphere of life. In short, it is the part of our planet occupied by life.

5

1 F 2 T 3 T 4 F 5 F 6 T 7 F

6

- Ecology is subdivided into physiological and behavioural ecology, population ecology, community ecology, ecosystem and landscape ecology.
- Community ecology studies the interaction between species in an ecological community.
- You focus on individuals of the same species.
- The outer layer of the planet Earth can be divided into the hydrosphere, the lithosphere and the atmosphere.
- The lithosphere is the sphere of soil and rocks.
- The atmosphere is the sphere of air.
- The biosphere is the sphere of life.

7-8

Personal answers

9

1 e 2 d 3 c 4 a 5 b

10

Sample answer:

In this ecosystem there is interaction between the sun, the rain and the soil which feeds the producers (plants and grass). The producers feed the primary consumers, which in turn feed the secondary consumers. These die, decompose and return to the atmosphere, thus restarting the cycle.

11

First paragraph: C Are human beings different?

Second paragraph: A Human beings and the ecosystem

Third paragraph: B What human ecology is about

12

- Because they are conscious beings and can contaminate the world that surrounds them.
- The main difference is that human beings are conscious and can impact heavily on the biosphere.
- We are influenced by our society, culture, communities and by our ideals and aims in relation to nature. As a consequence, the cooperation and conflict between individuals and groups contribute to those interactions having an impact on our biosphere.
- Human ecology deals with the influence of human beings on their environment and with the effect of the environment on human behaviour. It investigates humans' strategies to adapt to different situations.

13

Personal answer

Unit 2 – pp. 8-9

1-2

Personal answers

3

1 d 2 e 3 b 4 a 5 f 6 c

4

radioactive contamination, light pollution, noise pollution

5

Type of pollution	Examples
air pollution	carbon <i>monoxide</i> , sulphur dioxide, nitrogen oxides, hydrocarbons
water pollution	industrial waste, agricultural drainage and sewage
soil contamination	heavy metals, hydrocarbons, herbicides, pesticides
noise pollution	roadway, aircraft and industrial noise and high-intensity sonars
light pollution	light trespass and over-illumination
visual pollution	overhead power lines, motorway billboards or open storage of junk and municipal solid waste
radioactive contamination	Accidents in nuclear power stations and production and use of nuclear weapons

6

Personal answer

Unit 3 – pp. 10-13

1

- 1 bricks
- 2 cement
- 3 timber
- 4 stones

2

- 1 d 2 c 3 a 4 e 5 b

3

- 1 Cedar is durable, free of knots and easy to work with.
- 2 They use larger timbers.
- 3 Timber framing uses mortice and tenon or wooden pegs, whilst conventional wood framing uses nails or other mechanical fasteners.
- 4 Timber structures surrounded in manufactured panels. They are made up of two rigid wooden-based composite materials with a foamed insulating material inside.
- 5 The advantages are: the structures are easier to build and they provide more efficient heat insulation.

4



There are several advantages to timber frame construction but there are also disadvantages that you should be aware of before deciding if it meets your needs.

Wood is a porous and very combustible material, susceptible to water, fire and bugs. Water can be absorbed into the material, causing it to rot and mould, which can compromise the strength and cause adverse health effects. This can be a major problem in humid or damp climates.

Wood is also very flammable, which makes the material a fire hazard. Ants and termites eat wood framing, with serious effects on the strength of the construction.

Logging for timber framing can have a major environmental impact. Producing boards and beams for timber frame construction requires cutting down trees. Large, old-growth forests are sometimes clear cut to produce wood for timber construction, which can lead to other problems such as soil erosion and destruction of wildlife habitats.

Wood is an excellent transmitter of sound waves so any noise inside or outside is easily heard throughout the home. This can be a major problem if there are several people living in the house or if it is located near a noisy street as sounds are transmitted very clearly.

Timber frames are quite strong up and down but not as strong as other materials horizontally. So if your building design has a large room with a long span, it will be difficult for timber frame construction to handle the weight. You may need to have a post in the middle to absorb some of the weight.

water	Water can be absorbed into the material causing it to rot and mould.
fire	Wood is very flammable .
buges	Ants and termites eat wood framing .
environmental impact	Producing boards and beams for timber frame construction requires cutting down trees.
sound	Wood is an excellent transmitter of sound waves so any noise inside or outside is easily heard.
strenght	Timber frames are quite strong up and down but not as strong as other materials horizontally .

2

5

Advantages	Disadvantages
<i>affordable price</i> , accessibility of raw material, long durability, strong insulating properties (increased comfort in the heat or in the cold), perfect for load-bearing, small size makes it easy to use, no painting needed, good fire protection	extreme weather condition such as frost can damage the surface, structure must have a firm foundation to prevent settling and cracking, it is heavy therefore higher structural requirements are needed

6



The most common type of cement is Portland cement, which is the basic (1) **ingredient** of concrete and mortar. It is made of Portland cement clinker (calcium silicates, aluminium and other compounds) and other minor constituents.

Portland cement clinker is produced by heating a mixture of raw (2) **materials** up to 1450° C in a kiln.

There are three production stages: preparation of the raw mixture, production of the clinker, preparation of the (3) **concrete**.

Limestone is the main raw material for the production of clinker, followed by sand, shale, iron ore, bauxite, fly ash and slag. About 2% gypsum is also added and then the (4) **mixture** is pulverised. The resulting powder will react when water is added.

Portland cement is commonly used to produce (5) **concrete**, which is made of gravel, sand, cement and water.

Blocks of cinder concrete, ordinary concrete and hollow tile are known as Concrete Masonry Units (CMU). They are larger than ordinary (6) **bricks** and used for applications where appearance is not very important, such as in factory walls, garages and industrial buildings. One of the advantages of concrete (7) **blocks** is that they can be reinforced, grouting the voids, inserting rebar or using grout, so that they are stronger than typical masonry (8) **walls**.

7

- 1 concrete
- 2 limestone
- 3 concrete
- 4 bricks
- 5 reinforced
- 6 walls

8

- 1b 2 e 3 a 4 d 5 c

9

Personal answer

10

	Stone	Timber	Brick	Cement and Concrete
Advantages	cheap, resistant	low environmental impact, easy to put up, practical and adaptable design, versatile material, energy-efficient, cheap, quite strong up and down	affordable price, accessibility of raw material, long durability, strong insulating properties (increased comfort in the heat or in the cold), perfect for load-bearing, small size makes it easy to use, no painting needed, good fire protection	very strong, concrete can be reinforced with rebar or grout, quite cheap
Disadvantages	long and labour-intensive method of construction	ruined by water or bugs, inflammable, no insulation against noises, not very strong horizontally	extreme weather condition such as frost can damage the surface, structure must have a firm foundation to prevent settling and cracking, it is a heavy therefore higher structural requirements are needed	high environmental impact, pollutant

Unit 4 – pp. 14-17

1

- 1 infrastructure
- 2 resistant
- 3 lifetime
- 4 cheaper, conventional
- 5 distances
- 6 columns

2

- 1 c 2 f 3 a 4 e 5 b 6 d

3

- 1 B 2 C 3 A

4

- 1 T 2 F 3 T 4 F 5 F 6 T

5

- 1 c 2 a 3 e 4 b 5 d

6

- 1 C 2 C 3 A 4 B 5 C 6 A

7

- 1 Plastic products save resources, have a low maintenance cost, can be recycled, contribute to saving energy, are useful for noise protection and insulation.
- 2 Plastic can save energy because plastic foams are used for thermal insulation in many applications.
- 3 Plastic insulation is useful for noise protection.
- 4 The main fields of application of plastic are pipes, insulation, wall covering, flooring and window frames.
- 5 PVC stands for Polyvinyl Chloride.
- 6 PVC pipes are used to drain waste, for natural gas distribution, for electrical and communications wiring, for municipal water.

8

	Steel	Glass and Metals	Plastic
Advantages	resistant to corrosion, rusting and general deterioration, it helps stability, long lifetime, endurance, less harm to the environment, cheap, flexible, high strength-to-weight ratio	glass can reflect some of the unwanted sunshine outwards; can be heated electrically; can be used to make the inside light more natural; aluminium is light, resistant to corrosion and easy to work; stainless steel has got good fire resistance and is easy to keep	it saves resources, has a low maintenance cost and can be recycled, saves energy and protects from noise; good chemical resistance to corrosive fluids
Disadvantages		glass is structurally unsafe because of its brittleness; aluminium has got high thermal expansion and conductivity and low elastic modulus and fire resistance; stainless steel has a high price	it damages the environment because it takes a long time to decompose and can kill animals

9

- 1 They have been growing very quickly.
- 2 The increase in volume and variety of the materials used and an increase in transport distances.
- 3 The aim of eco-design is to create buildings with low ecological impact, where people can live in a comfortable, healthy way.
- 4 Timber from forests that have been certified to a third-party standard; straw or bamboo; brick, stone, clay and cork; natural paints, waxes and varnishes; and also some waste materials.

10

Personal answers

Unit 5 – pp. 18-23

1

- 1 They explain differences in elevation...
- 2 ... offer cultural information about countries
- 3 ... specific subjects such as population density
- 4 ... because they offer a great amount
- 5 ... images taken from different elevated positions.

2

- 1 Physical maps show landforms, mountains, deserts and lake. They explain differences in elevation.
- 2 Political maps offer cultural information about countries.
- 3 Thematic maps offer specific information such as population density.
- 4 Photogrammetry is a measurement technology that can determine the three-dimensional coordinates of points of an object using different photographic images from different elevated positions.
- 5 It is used in different fields, such as topographic mapping, engineering, architecture, police investigation, geology and archaeology and also movie post-production.

3

- 1 e 2 d 3 b 4 c 5 a

4

- 1 T 2 T 3 F 4 T 5 T 6 F

5

- 1 stage
- 2 checked
- 3 price
- 4 format
- 5 documents
- 6 most recent, latest
- 7 needed, important
- 8 guesswork

6

- 1 What do you do during this stage?
- 2 Why is the working drawing the most demanding stage?
- 3 What are the formats used to describe buildings?
- 4 What do working drawings consist of?
- 5 Why is the engineering graphic so important?
- 6 What software did the AutoCAD replace years ago?

7

- 1 CAD stands for Computer-Aided Design.
- 2 CAD is software which allows the use of computer technology for the development of design and design documentation. It is used to design curves and figures in two-dimensional space or curves, surfaces and solids in 3D objects.
- 3 At the beginning of the 1980s.
- 4 The consequence was that students in universities stopped

learning drafting techniques and learnt computer-aided design instead.

- 5 CAD has a great number of applications: automotive, shipbuilding and aerospace industries, industrial and architectural design, prosthetics and also computer animation for special effects in movies, advertising and technical manuals. It is also used for the creation of photo simulations often required in the preparation of Environmental Impact Reports.
- 6 No special hardware is required for most CAD software (except for some systems that do graphically and computationally-intensive tasks and require a modern graphics card).
- 7 The human-machine interface is usually via a computer mouse or a pen and a digitising or graphics tablet.
- 8 The advantages of CAD are lower product development costs and a greatly shortened design cycle.

8  4

CAD is the designer use of computer technology for the design of objects. These objects can be either real or virtual. This two-dimensional graphic is generally used by product designers, engineers, architects and interior decorators. CAD is mainly used for the detailed engineering of physical components, both 3-dimensional models or 2-dimensional drawings. It is also used for the whole of the engineering process, from theoretical design to the layout of products and it can be used to design objects. CAD allows the designs to be viewed from any angle and it can be quite helpful as texture and colours can be easily manipulated. No special hardware is required for most CAD software. One of the advantages of CAD systems is that they can do graphically and computationally-expensive tasks.

- 1 technology
- 2 interior
- 3 components
- 4 process
- 5 designs
- 6 software

9

- 1 Rendering is an engineered program used by architectural illustrators.
- 2 Architectural illustrators use rendering to create two-dimensional images or animations.
- 3 This software is used for presentations, marketing and design analysis.
- 4 It can be used for experimenting with building design.
- 5 Pre-rendering is used in the film industry.
- 6 For the production of 3D video games real-time rendering is used.

10

- 1 T 2 F 3 F 4 T 5 T 6 F

11

Planning implies decisions about transport, facilities, the development of new shops, schools, parks, etc. Planners develop affordable housing, regenerate deprived areas, requalify historic buildings, deal with policies to manage the traffic and improve energy efficiency.

12  5

Some of earliest examples of (1) **planned** towns and cities in history are in ancient Egypt, usually along the banks of the Nile river. Here, (2) **archaeologists** have found evidence of two planned settlements, both built to house the workers who built the pyramids.

4

At el-Lahun, a village was built with mud-brick walls on three sides. In the western part of the village, the workmen's dwellings were laid out in a (3) **grid** pattern along paved streets. The small, single-room houses were built back-to-back and were all of the same dimensions. Stone (4) **drainage** channels were built, which took dirty water away from the houses. In the eastern part of the settlement, the homes were bigger and there were (5) **public** buildings. It is possible that the king stayed here when he visited the region.

A walled village has also been (6) **excavated** at Deir el-Medina. In this village, houses were built along a central main street. It is thought that this road may have been (7) **covered** to protect residents from the intense sun. All houses were constructed in the same manner: they were made of mud bricks, and built on top of a stone (8) **foundation**. The walls were covered in a layer of mud and painted white.

Archaeological excavations at el-Lahun and Deir el-Medina have provided a great deal of information about the lives of the early Egyptians.

13

1 T 2 F 3 F 4 T 5 F 6 T

14

- 1 A Master Plan is written by city planners and various experts.
- 2 This document includes current and future development proposals and identifies the themes, aspirations and structures for an integrated approach to design through analysis and consultation.
- 3 The aims of a Master Plan are to create a structure for the best quality City Centre; to create the best possible environment for all users; to find key problem areas; to treat improvements as priorities; to create an attractive area for businesses; to develop existing resources.
- 4 The process of city planning involves a series of surveys and studies, development of a land-use and transportation plan, preparation of a budget, and the approval of a unified Master Plan by various agencies or legislative bodies.
- 5 City planners have to tackle problems of traffic, pollution, the availability of police, fire and sanitation services, limitations created by zoning and other regulations, and the problems of funding.
- 6 In recent years, residents of many communities have demanded greater participation in the planning of their own neighbourhoods, so planners have worked closely with community groups during various stages of the planning process.

15

- 1 expert
- 2 examining
- 3 organised
- 4 proposals
- 5 improvements
- 6 limitations

Unit 6 – pp. 24-26

1

- 1 Foundations are structures that transfer weights from walls and columns to the ground. There are two types of foundations: shallow foundations and deep foundations.
- 2 Shallow foundations are usually embedded a metre into the soil.
- 3 Deep foundations are embedded more in depth. They can be made of timber, steel and reinforced or pretensioned concrete.
- 4 Geotechnical engineers design foundations to ensure that they have an adequate load capacity with limited settlement.

5 Scour and frost water must be considered.

6 Scour is when flowing water removes supporting soil from around a foundation. Frost heave is when water in the ground freezes and forms ice lenses.

2

1 T 2 T 3 T 4 F 5 F

3 6

Floor structure contributes to the general (1) **strength** of the building system. It is formed of a steel I-beam frame with a horizontal upper (2) **surface** to which a number of adjacent composite floor panels is fastened firmly.

Floors consist of a subfloor for support and a floor (3) **covering** used to give a good walking surface. In modern buildings the subfloor often has (4) **electrical** wiring, plumbing, and may provide other services built in, like (5) **underfloor** heating.

There is a wide variety of floor covering materials: carpet, ceramic tiles, (6) **wood** flooring, laminated wood or stone.

4

1 T 2 T 3 F 4 F

5

A wide B straight C L' stairs D return

6

Personal answers, for example:
I would choose 'L' stairs because they use up little space, look easy to climb, and you can build a cupboard under them.

7

Personal answers

Unit 7 – pp. 27-28

1

A digging machines B concrete mixer C tower crane

2

- 1 A tower crane is used to build tall buildings. It works with a short arm carrying concrete blocks and a long arm carrying lifting gear.
- 2 An operator can control the crane either sitting in a cabin at the top of the tower just below the horizontal boom or by radio remote control from the ground.
- 3 Digging machines are used for digging trenches for subterranean utility lines, storm sewers, etc.
- 4 The rotary digging instruments use a rotating structure that is rotated along an elongated path.
- 5 A concrete mixer (or cement mixer) mixes cement aggregate (such as cement or gravel) and water to form concrete.
- 6 Portable concrete mixers are used for smaller volume work.

3

- 1 operator
- 2 bucket-style backhoe
- 3 sewer
- 4 elongated
- 5 portable

4

1 B 2 H 3 A 4 C 5 E 6 D 7 F 8 G 9 I

5

1 Managers, supervisors and workers should be taught site safety procedures, such as construction and maintenance

- of safety facilities, installation of safety signs, testing of lifting machinery, emergency and evacuation plans.
- The materials, equipment and tools on the site should also meet some safety standards.
 - The main aim is to avoid accidents and ill health by eliminating potential dangers.
 - Every work platform must be provided with safe access and have enough strength to bear the load placed on it. It must be secured to a building to avoid separation from the supporting structure to which it is attached.
 - Scaffolds must be assembled with the vertical members plumb. Their bases must have bearing plates resting on a solid surface and strong enough to support their weight.
 - A scaffold must be grounded if it is situated near a high voltage source.

Unit 8 – pp. 29-33

- 1
- A plumbing system consists of pipes and fixtures and it carries out the distribution of tap water and the removal of waterborne waste in a building.
 - Water systems of ancient times used pipes or channels made of clay, lead or stone.
 - Today water supply systems use high pressure pumps and pipes made of non-toxic materials, such as copper, brass, steel, cast iron and plastic.

- 2
- 1 F 2 T 3 F 4 T 5 T

- 3
- Radiant skirting board heaters
 - Radiant ceiling or floor systems
 - Electric heat pumps
 - Portable space heaters
 - Hydronic heating
 - Central heating system

4

Your demands	What can you use?
1 I want a freestanding heater.	a portable space heater
2 I have a cool room downstairs.	a radiant skirting board heater, a radiant floor system, hydronic heating
3 I want to install heating in the ceiling.	a radiant ceiling system, hydronic heating
4 I need to move heat from one place to another.	a portable space heater
5 I want to install a radiant element in the floor.	a radiant floor system, hydronic heating
6 I need an extra heating device.	a portable space heater
7 I want to use my heater as an air conditioner too.	an electric heat pump

- 5
- Personal answers, for example:
My house has got gas central heating, with pipes taking hot water to radiators, a thermostat to measure the temperature of the coldest room and an electric clock device to activate the system. There are many advantages: the radiators can be set for high or low heating and can be switched off individually, you can set the time when the heating comes on and goes off, you can warm one room more than another, and you get hot water at the same time as heating, depending on how you set the controls.
The disadvantages are that if the electric power fails, or any other fault develops, there is no alternative method of heating the house or the water.

6

- 6
- photovoltaic system
 - thermal system

7 7

Solar energy is the electricity produced from the sun's rays and captured by means of solar panels, which are becoming increasingly (1) **common** nowadays. The two types of solar panel systems are solar photovoltaic systems and solar thermal system.

In the solar photovoltaic systems the solar thermal panels contain cells whose semiconductors react with (2) **sunlight**. Electricity is produced when sunlight hits them. This kind of technology is still quite expensive and its disadvantage nowadays is the problem of (3) **storing** energy. In the solar thermal system solar energy is used for water heating. The panels are positioned either on the (4) **roof** or a wall facing the sun and contain flowing water. When the thermal collectors in the panel are exposed to the sun, they heat the water (stored in a hot water cylinder) that is either pumped or driven by natural convection through it. The storage (5) **tank** is mounted immediately above or below the solar collectors on the roof. This system is not very expensive and offers a number of advantages, including being renewable, creating less environmental (6) **pollution**, reducing costs and maintenance and saving resources. Hot water can be produced for most of the year. A conventional boiler can be used to make the water hotter, or to provide hot water when solar energy is not available.

- 8
- 1 f 2 a 3 h 4 b 5 g 6 d 7 e 8 c

- 9
- Electricity can be produced by capturing the sun's energy by means of solar panels.
 - Solar thermal panels contain cells whose semiconductors react with sunlight.
 - Electricity is created when sunlight hits the solar panels.
 - The two main disadvantages are: it is still quite expensive, storing energy is a problem.
 - Solar energy is also used for water heating.
 - When the thermal collectors in the panel are exposed to the sun, they heat the water (stored in a hot water cylinder).
 - Some of the advantages are: it is not very expensive, it is renewable, it creates less environmental pollution, it reduces costs and maintenance, it saves resources.
 - A conventional boiler can be used to make the water hotter, or to provide hot water when solar energy is not available.

- 10
- Spot ventilation
 - Natural ventilation
 - Whole-house ventilation

- 11
- Ventilation is important to reduce indoor moisture, odours and other pollutants.
 - Excess moisture needs to be removed before high humidity levels lead to physical damage to the inside of the house.
 - The disadvantage is that natural ventilation is uncontrollable.
 - Spot ventilation means using localised fans in the rooms where contaminant substances are generated (for example kitchen extractor fans and bath fans).
 - Whole-house ventilation is a system that works thanks

to fan and duct system to exhaust stale air and supply fresh air to the house.

12  8

Interviewer Why is ventilation important in our houses?
Mr Young Ventilation is important to get rid of pollution, water vapour and unwanted smells and to replace them with fresh air. But it is also important to control and direct it where we need it.
Interviewer What does the necessary ventilation depend on?
Mr Young Mainly on the number of people in a room and the quantity and type of pollution sources.
Interviewer Are permanent ventilators really necessary?
Mr Young A permanent ventilator should be a must if we have heating appliances which need air from inside a room, because toxic products from combustion can be very dangerous. Modern appliances usually have fittings which draw in and expel air, but in old houses this can be attained thanks to a purpose-built duct that brings air to the appliance.
Interviewer What can you tell us about heat exchangers?
Mr Young They are designed to recuperate the heat lost through controlled ventilation thanks to hollow tubes and fins which heat the incoming air.
Interviewer What can you do if you want to create a ventilation strategy?
Mr Young Well, first of all you need to understand which problems each room of your house has (e.g. too much humidity) and to choose the strategy which is more suitable for how you use your house. The most energy efficient solution is to have a heat exchanger with ducts to different parts of your home installed. Alternatively you can fit controllable trickle ventilators in every room, to allow cross ventilation. Mechanical extractor fans in kitchens and bathrooms can be another alternative. They are controlled by a moisture control switch. Or you can have mechanical or biological air cleaning equipment installed.

- 1 smells
- 2 sources
- 3 appliances
- 4 exchangers
- 5 ventilation
- 6 moisture

13
1 F 2 F 3 F 4 T 5 T

- 14
- 1 trend
 - 2 device
 - 3 adapted
 - 4 facade
 - 5 absorb
 - 6 combination

Unit 9 – pp. 34-37

1
Personal answer

2
1 T 2 T 3 F 4 F 5 F

3
Brick and stone. They should be biodegradable and recyclable; they should not be dangerous for our health and should contribute to a more sustainable environmental future.

4
1 B 2 C 3 A

- 5
- 1 The objective of new building is searching for environmentally-friendly solutions by finding different sources of energy production and paying more attention to the materials used.
 - 2 The stages are: manufacturing, use and disposal.
 - 3 Local materials are less expensive, their transport cost is lower and CO2 emissions are also limited.
 - 4 Renewable and unlimited sources of energy and passive energy system are always considered.

- 6
- A solar water heating
 - B double glazing
 - C insulation
 - D low-flow tap aerator

- 7
- 1 An efficient way to reduce the use of energy is having good insulation in walls, floors and ceilings and energy efficient windows with double glazing.
 - 2 They can orient walls and windows in order to make the most of the use of natural light (decreasing the use of electric lighting when daylight is available) and they can place trees and sun shelters in effective positions to provide shade in summer.
 - 3 It can be reduced through the use of solar water heating.
 - 4 It can be attained through facilities that improve the collection, purification and reuse of water.
 - 5 It can be improved during the design and construction processes by choosing construction materials and interior finish products with zero or low VOC emissions.
 - 6 The control of moisture is important for the health of those living in a building.

8
1 T 2 T 3 F 4 F

9
Personal answer

10  9

The (1) **aim** of environmentally-friendly buildings is to decrease the (2) **quantity** of waste material. If a building is designed well, the amount of waste produced by the people living in it will be (3) **lower** thanks to on-site solutions such as compost bins. (4) **Moreover**, a building is usually demolished at the (5) **end** of its life and most of the waste is taken to landfills, but now, thanks to (6) **deconstruction**, some material is kept and used again, with (7) **two** advantages: recycling materials that are still usable (for example (8) **wood**) and reducing waste. Also wastewater from dishwashing or washing machines can be used again, for (9) **example** for irrigation and rainwater can be collected for a number of useful purposes. Converting waste and wastewater into fertiliser is a good (10) **idea** for cutting down costs: liquid fertiliser can be created collecting human and other (11) **biological** waste.

11

Personal answer

Unit 10 – pp. 38-41

1

- 1 Bridges are built for providing passage over a gap or physical obstacles such as valleys, rivers and roads.
- 2 The first bridges were probably fallen tree trunks and bridges made of long ropes across rivers or valley. The first great bridge builders were the Ancient Romans.
- 3 The design of a bridge depends on its purpose, the kind of ground it is built on and the material used to build it.
- 4 It was designed to look like sand dunes in the desert.

2

- 1 The first roads were trails made by animals or created by humans who followed animals. The first stone and brick-paved roads were created in the Middle East and India.
- 2 The Ancient Romans used stone and gravel and included gutters for drainage.
- 3 The first stages are planning, designing and approval of the project. After deciding where to move gas, water, sewer, electricity and phone lines and compensating and relocating landowners, construction can start.

3  10

Schools have a very special importance in everyone's (1) **lives** and consequently architects should think carefully and sensitively when (2) **designing** them.

In old times, boys in the Middle East were educated at *madrasas* (secondary schools); these were constructed as part of mosque complexes. School buildings were built around a central (3) **courtyard**; the madrasa was often decorated with stained glass, calligraphy, gilding and stone carvings. Tuition took place in the courtyard; students sat in a circle and listened to the teacher and memorised his words. The buildings around the courtyard contained the students' living spaces. Madrasas also contained extensive (4) **libraries** full of priceless manuscripts.

School design today often favours function over beauty. New schools are places full of (5) **light**, with multi-purpose spaces. School architects have to consider a series of important aspects, such as creating increasingly friendly, comfortable, stimulating buildings, with spaces such as gyms, laboratories, computer areas and (6) **green** areas. More recently, schools have become buildings where the environment is more and more (7) **stimulating** and where solutions are found to meet practical demands, such as health, (8) **safety** and financial concerns.

4-5

- 1 c 2 e 3 a 4 b 5 d

6

- 1 Usually you can find both natural and man-made materials in parks: trees, grass, flowers and landscape features such as fountains, benches, picnic areas, statues, pathways and ponds.
- 2 Active recreation parks have a high level of development and include playgrounds, ball fields and skateparks, whereas passive recreation parks focus on the open-space characteristics of the place and offer trails and picnic areas.
- 3 The most important consideration in any garden design is how the garden will be used, followed closely by the desired stylistic genre and the way the garden space will connect the other structures in the surrounding areas.
- 4 It was opened in 1857 as an area to escape from the chaotic life of the city.

- 5 There are artificial lakes and ponds, lawns and grassy areas, playgrounds, walking-tracks, ice-skating rinks, a zoo, a conservatory garden, an area of natural woods, a running track, an outdoor amphitheatre and many other indoor structures.

7

- 1 Tunnels are long and narrow underground passages with an opening on each end. They are built for pedestrian or vehicular traffic and for canals.
- 2 Before building a tunnel it is important to examine the conditions and type of ground and groundwater.
- 3 The main techniques are: explosive if the rock is hard, whereas if the ground is softer, tunnel shields are pushed into the ground to dig out the earth.

8  11

The idea of building a tunnel under the English Channel to join Continental Europe and England was first suggested in the time of Napoleon. However, the 50.5 km long Channel Tunnel (also called Chunnel) did not open until 1994. Today it is considered one of the Seven Wonders of the Modern World. It is one of the longest tunnels in the world and the tunnel with the longest undersea portion. At its lowest point it is 75 metres deep. Its design and construction were carried out by ten construction companies and work started in 1988. It is only used for trains (some of which can carry cars). Today if you travel on High Speed 1 trains (at 300 km/h), the journey between London and Paris takes only two hours and 15 minutes.

- 1 1994
- 2 longest, undersea
- 3 trains.
- 4 two hours and 15 minutes.

9

Personal answer

Unit 11 – pp. 42-47

1

- 1 b 2 c 3 a

2

- 1 Doric columns are heavy; Ionic columns are delicate and less sturdy.
- 2 In the British Museum, London.
- 3 They built channels, dams and water storage facilities.
- 4 Because its buildings are made of pink rock.
- 5 Roman Emperor Hadrian decided to build a wall across the northern border.
- 6 They built a series of small forts called 'milecastles'.

3

- 1 B 2 A 3 B 4 C 5 A 6 B

4

- 1 Norman architecture in England had defensive purpose.
- 2 They built strong castles made of stone and wood.
- 3 They chose strategic positions for their castles, so that they could defend themselves from the attacks of the natives.
- 4 These castles developed into manor halls and their defensive aim was gradually replaced by residential and entertainment functions.

5 12

In 1350 King Edward III demolished most of the existing castle and rebuilt it increasing the fortifications. In 1390 restoration work on St. George's Chapel began. After the Wars of the Roses, the role of the castle changed from bastion to royal palace.

Elizabeth I (who reigned 1558-1603) spent a lot of time at Windsor Castle because she considered it the safest place in her kingdom. It became one of her favourite locations and she made several transformations to the castle, using it as a royal court. After Charles I, it became a military headquarters and a prison. The following king, Charles II, restored much of the castle after the damage caused by the Civil War. However, after his death, it was left in a state of abandon. In 1804 the next king, Charles III, returned to use it as a royal residence. Queen Victoria made this castle her main royal residence and changed the surrounding parkland. During the second half of the 20th century, Windsor Castle became one of the most important tourist attractions in the UK. Today, Queen Elizabeth II uses it as a royal palace as well as her weekend home. It is used for state banquets and official entertaining.

1 c 2 e 3 a 4 d 5 b 6 f

6

- 1 The Renaissance style started in Italy in the middle of the 16th century.
- 2 It would be symmetrical.
- 3 Columns, arches and domes.
- 4 The Pitti Palace in Florence, Italy.

7

Mughal architecture is characterised by domes, minarets and large gateways. Buildings are often heavily decorated. Mughal gardens are surrounded by walls and often feature fountains and pools.

8

- 1 The Neoclassical style was influenced by ancient Greek and Roman architecture.
- 2 The main features are geometrical forms, straight lines and Greek columns.
- 3 It was built between 1792 and 1800.
- 4 It has straight lines and columns; it is symmetrical, with a residential section in the middle and office wings on both sides.

9

- A Villa Savoye
- B Fallingwater
- C Sydney Opera House
- D Pompidou Centre
- E Bank of China Tower
- F Burj Al Arab

10 13

Born in Switzerland, Charles-Édouard Jeanneret, known as (1) **Le Corbusier** was an architect famous for his contributions to what is now called Modernism and for providing better living conditions for citizens in crowded cities. His Villa Savoye (1929–1931) was the one that best summarised his five main ideas about architecture which are:

- reinforced concrete stilts or pillars;
- a free-façade with no supporting walls;
- an open floor plan without any supporting walls;

- long strips of horizontal ribbon windows on the second floor;
- a ramp joining the ground to the roof garden level.

One of the most influential American architects of the first half of the 20th century was (2) **Frank Lloyd Wright**. His works are based on the idea of organic architecture, which gives great importance to the relationship between the site, the building and the client's requirements. One of his most famous works is Fallingwater, completed in 1937 in Pennsylvania, USA. Built as a private home, Fallingwater sits above a waterfall; the influence of Japanese architecture is easily seen in the house's clean lines and connection with nature.

Danish architect (3) **Jørn Utzon** is the genius behind the design of the Sydney Opera House, which opened in 1973. He beat 232 other architects in a competition to design the building, though a political controversy led to his return to Denmark before the building was completed. The best-known feature of this modern structure is the roof, which features two sets of pre-cast concrete shells designed to look like the sails of a ship. These shells are covered with over a million tiles in two complementary shades of white. The entire structure is supported on 588 concrete piers. Over 1,500 performances are held each year in the building.

(4) **Richard Rogers** is one of the most significant British architects of our time and the winner of a great number of prizes and awards. His ideas of prefabrication, structural simplicity and energy-efficient buildings are typical of his modernist and functionalist designs. In 1971 he started a partnership with Italian architect (5) **Renzo Piano**. In that same year, they won the design competition for the Pompidou Centre in Paris, a futuristic building which houses the French national modern art museum. This project, opened in 1977, made him world-famous for his characteristic high-tech styling: water, heating and ventilation ducts and stairs, typical elements of the interior, are exposed in a new inside-out style.

The Bank of China Tower, designed by Chinese-American architect (6) **I. M. Pei**, was opened in 1990. Working with only a small area of land, the architect was forced to design a tall building; until 1992, the 72-storey Tower was the tallest building in Asia. The influence of Chinese culture is clearly seen in the design of the Tower; the various sections of the building are designed to resemble growing bamboo shoots, which symbolize prosperity in Chinese culture. The structure is supported with five steel columns, and the sections are covered with reflective glass, a trademark of the architect.

When a company in the United Arab Emirates wanted a building that would become as iconic as the Sydney Opera House or the Eiffel Tower, they turned to British architect (7) **Tom Wright**. The result was the luxury Burj Al Arab hotel, located on a man-made island in Dubai and connected to the mainland by a private bridge. The hotel was designed to resemble a traditional Arabian boat called a *dhow*. Construction of the hotel was a feat of engineering: land had to be reclaimed from the sea and a solid foundation to be created with rocks and concrete posts. The result is a hotel that a British journalist once called 'the only seven-star hotel in the world.'

11

Personal answer

12

Personal answer