

LESSON 1: ENERGY**I. LEAD IN.****1. Find answers to these questions, then exchange this information with your partner:**

- a) At what time of the day do you have most energy? In the morning / in the evening? At what time of the day do you prefer to study for the exams?
- b) Do you wake up early or do you prefer to sleep long? Do you usually get enough sleep?
- c) What is your favourite time of the year (summer / winter...)? Why?
- d) What makes you happy? When do you feel full of energy? What are some things that make you angry? What makes you bored and tired?
- e) Do you exercise? Do you do any sport / outdoor activity? Which ones? How much time do you spend outdoors?
- f) Do you dance / draw pictures / write poems / play a musical instrument or do any other creative activity?
- g) Do you care about what you eat? What is your favourite meal? How often do you go to a pub?

2. Match the strips of paper, so that you have the right picture with the right description.**II. READING****1. Vocabulary: Do you know these words? If not, look them up in a dictionary**

to release energy (v+n)

to produce energy (v+n)

to heat the substance (v+n)

to store energy (v+n)

electric charge (adj+n)

including

New vocabulary:

ability (n) – schopnost

spring is wound (n+v) – pružina je natažena

to strike (v)– udeřit, uhodit

spark plug (n+n) – zážehová svíčka (v autě)

to exert a force (v+n)– vyvinout sílu

to propell forward (v+prep) – pohánět

therefore – a proto, a tak, a tudíž

related to – vztahující se k

2. Read the text about energy and underline as many definitions related to energy as you can find (Example: Par.3 – Definition of chemical energy)**THE MANY FORMS OF ENERGY**

- 1 Energy is the ability to do work. When a hammer strikes a nail, it exerts a force on the nail that causes it to move. The movement of the hammer has the ability to do work and therefore has a form of energy that we call kinetic energy. Kinetic energy is the energy of motion.
- 2 An object may have energy not only because of its motion but also because of its position or shape. For example, when a watch spring is wound, it is storing energy. When this energy is released, it will do the work of moving the hands of the watch. This form of energy is called potential energy.
- 3 There are many types of kinetic and potential energy, including chemical, thermal, mechanical, electrical, and nuclear energy. Chemical energy is potential energy that is stored in gasoline, food, and oil. Just as the watch spring needs to be released to do work of moving the hands, the energy stored in food molecules needs to be released by enzymes or substances in the body, and the energy stored in gasoline must be released by the spark plug to do its work of propelling the car forward.
- 4 Thermal energy may be defined as the kinetic energy of molecules. When a substance is heated, the molecules move faster. This causes the substance to feel hot. Mechanical energy is the energy that is related to the movements of objects.

5 Electrical energy is energy that is produced by electric charges. Nuclear energy is the energy that is stored in the nucleus of certain kinds of atoms, like uranium.

3. Now write all the definitions from the text into this table. Sort them according to grammar.

Term =	Class	+ Characteristics	GRAMMAR
a) Example: Chemical energy is	potential energy	who/that/which... that is stored in gasoline, food, and oil.	defining relative clause (who/that/which)
b)			
c)			
d)			
e)		of...	prepositional phrase (of + noun)
f)			
g)		to ...	verb phrase (to + verb)

III. Join the words together. Then form a sentence. Use: *who, which, by which, that, where*. Example: Bronze - an alloy - produced from copper and tin.
Bronze is an alloy *which/that is produced from copper and tin*.

Term =	Class	+ Characteristics
a) Evaporation	a place	study animals and plants living in the sea
b) Marine biologists	the process	essential to life and required for combustion
c) A laboratory	an element	liquid changes into a gas
d) Oxygen	a machine	converts kinetic energy to electricity
e) A generator	scientists	experiments are performed

HOW TO WRITE A GOOD DEFINITION?

- structure: term=class+characteristics
- correct grammar: relative clauses, present simple tense
- meaning: include all necessary information and details, cut all unnecessary examples
- make it simple, clear, specific – it should not be too complicated

Structure of a definition:

Term		Class	+Characteristics		
Physics	my be defined as	a science	which	studies	matter, energy, motion, and force.

X	is/are	instrument/ device	which/that	is	Y
	is/may be defined as	machine		studies	
	describes	process	who/that	is concerned with	
	means	substance/object/thing		deals with	
		study / science		relates to	
		person / someone		involves	
		place	where		
		a kind / part / piece of...			

IV. Correcting definitions. Say what is wrong with the following definitions and correct them.

Example:

An apple is red. – too short, no class word, not enough details

Correct: *An apple may be defined as kind of fruit which is usually red, green or yellow.*

- Radium is an element.
- A unicorn is not a real animal.
- Acoustics is a science.
- An ear is an auditory appendage of Homo sapiens and other species.

V. Complete the sentences below with an appropriate relative pronoun: (1 & 10: Oreska et al, 2006, *English for Chemists*)

- Elements are substances _____ cannot be broken down by chemical methods any further.
- Understanding electromagnetism and nuclear physics led to the development of products _____ have transformed modern society.
- Kampus is the part of Masaryk University _____ seminar rooms are equipped with modern audio-visual systems.
- The laws of classical physics describe systems _____ important length scales are greater than the atomic scale.
- Our teacher is the person _____ instructions we must obey.
- Geomagnetism is the branch of physics _____ deals with the study of earth's magnetic field.
- Newton was the scientist _____ discovered and unified the different laws of motion.
- _____ of you can describe Lagrangian mechanics?
- _____ knows the symbols of all the chemical elements?
- Destructive distillation is a method _____ involves separating a mixture of several components of different boiling points.

VI. LISTENING. Before you listen to the recording about sustainable energy projects in Africa have a look at the sentences below and try to predict the right answer (source: <http://www.esolcourses.com>)

- 1• In Namibia, the UN is helping to fund projects that will increase the use of...?
 1. hydro power
 2. solar energy

- 2• What type of energy is used in the capital of Namibia?
 1. a coal burning power plant
 2. Hydro electric

- 3• What type of health problems can be caused by using wood and kerosine for energy?
 1. lung problems
 2. skin problems

- 4• How many homes in central Kenya will benefit from electric power when the hydro electric project is complete?
 1. about 150
 2. about 50

- 5• What is the maximum capacity of the hydro power turbine they are using in central Kenya?
 1. 20 kilowatts
 2. 40 kilowatts

- 6• How many Kenyan homes in the video are supplied with electric power now?
 1. 150 homes
 2. 56 homes

- 7• The community in central Kenya has set up....?
 1. A hydro powered turban
 2. A hydro powered turbine

- 8• What type of sustainable energy are the people in central Kenya using?
 1. Hydro Power
 2. Wind Power

VII. Energy effects. Fill in the gaps with one of the four alternatives.

Finally, in all but a very few chemical reactions, energy is either absorbed or (1)..... . It is often evolved as heat, as in combustion, but also in other forms, such as electrical energy during the chemical reaction in a battery when it is (2)..... to operate a flashlight or portable radio. The amount of energy evolved depends on the mass of the products formed. For twice the mass of product formed, in two otherwise identical chemical reactions, exactly twice (3).....,..... energy is evolved. The same relationship (4)..... to reactions during which energy is absorbed rather than evolved.

A chemical reaction can now (5)..... more explicitly as a process of change in which the substances originally present, called (6)....., are changed into substances with other properties, called (7)....., in such a way that, first, there is no observable change in the total mass; second, whenever the same product is formed by a different process of (8)....., that product exhibits the same mass ratio of components; and, third, almost always, energy is (9)..... absorbed or evolved in an amount that is directly related to the mass of the products formed.

These facts have two important (10)..... . First, they can be used to infer universally applicable, theoretical principles to account for the reasons that chemical reactions occur and for some of the details of the process, thereby (11)..... understanding of the material universe. Second, these facts and the related uncertain but usable theories can be used to (12)..... man's environment for either his benefit or his detriment. Examples abound. The chemical industry manufactures (13)..... substances, such as polymeric fibres (e.g., nylon) and elastomers (synthetic rubber), dyes, other polymers (plastics), metallic (14)....., fertilizers, paints, insecticides, drugs, ceramics, and fuels; but these manufactures also cause (15)..... effects upon man's ecological system, creating problems that demand further application of chemistry as well as other branches of knowledge.

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|--------------------|------------------|-------------------|------------------|
| 1. a)emerged | b)designed | c)grown | d) evolved |
| 2. a)switched on | b)started | c)buttoned up | d) fixed |
| 3. a)as much as | b)as much | c)as many | d) as then |
| 4. a)includes | b)applies | c)counts | d) reckons |
| 5. a)be classified | b)be defined | c) be compared to | d) be contrasted |
| 6. a) operators | b)factors | c)reagents | d) coagents |
| 7. a) products | b) makes | c)outputs | d)goods |
| 8. a) variations | b) exchange | c)turn | d)change |
| 9. a) neither | b) either | c)as | d) even |
| 10. a)causes | b) prerequisites | c) consequences | d)examples |
| 11. a) increasing | b) lowering | c) decreasing | d) commencing |
| 12. a) turn | b) alter | c) exchange | d) become |

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|------------------|--------------|-------------|---------------|
| 13. a) kind | b) blessing | c) rightful | d) beneficial |
| 14. a) mixtures | b) confounds | c) alloys | d) things |
| 15. a) undesired | b) welcome | c) expected | d) inspiring |