Unit 3: PROPERTIES OF MATERIALS

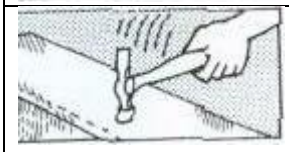
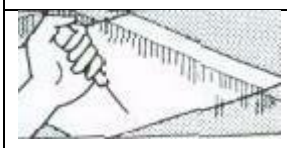
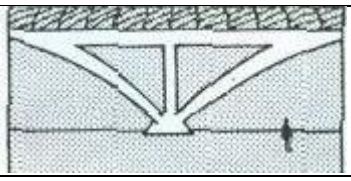
1. What materials do you know?
In about one minute, write down names of as many materials as you can think of. Compare the list with your partner. Discuss the use of the listed materials and their advantages/disadvantages.
(http://www.bbc.co.uk/learningzone/clips/2483.html)

2. Can you guess which material is described below?
1. _____ is made by melting sand and other minerals together at very high temperatures. It is normally transparent and can be made into many different shapes.

2. _____ come from rocks called ores. They are strong**,** hard and shiny materials that can be hammered into different shapes without breaking. Many _____ are good conductors of heat and electricity.

3. _____ are materials made from chemicals and are not found in nature. They are strong and waterproof, and can be made into any shape by applying heat. They are good electrical insulators as they do not conduct heat or electricity.

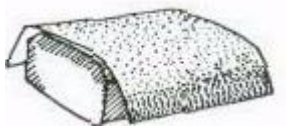
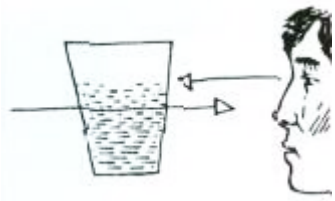
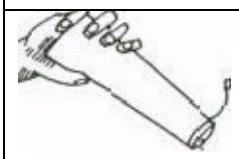
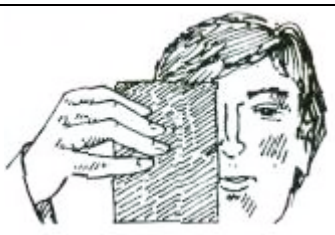
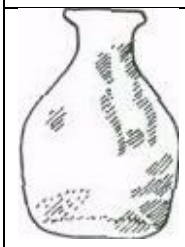
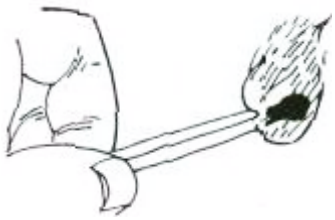
3. Read the following adjectives describing properties and give more examples of materials or things with this property. Form nouns from the adjectives:[1]

	A *brittle* material or thing breaks easily; e.g. glass, egg,. . **noun:**		A soft material is easy to scratch e.g. chalk **noun:**
	A *tough* material / thing does not *break* easily; e.g. steel,. . . **noun:**		A *flexible* material *bends* easily: e.g. rubber, .. **noun:**
	A *hard* material is difficult to *scratch.* *e*.g. glass, .. . **noun:**		A *rigid* material does not *bend* easily; e.g. concrete,... **noun:**

4. Now ask and answer these questions in pairs:

a) ***Example:*** *Why does a glass break if you drop it? Because it is brittle.*
b) Why doesn't a plastic glass break?
c) Why is butter easy to cut?
d) Why can a diamond cut glass?
e) Why do the branches of a tree bend in the wind?
f) Why don't the walls of a house bend in the wind?
g) What are the different properties of green wood (on a tree) and dry wood?

5. Now complete these:

	Some materials have a *smooth* surface; they produce little *friction* when they are rubbed; e.g. ice,... noun:		You can see through *transparent* materials; e.g. water,. … noun:
	Some materials have a *rough* surface and produce a lot of friction; e.g. sandpaper, . .. noun:		You cannot see through *translucent* materials but the light passes through them; e.g. dirty water, . . . noun:
	*Soluble* materials dissolve easily; e.g. salt,… noun:		You cannot see through *opaque* materials and the light cannot pass through them; e.g. metal,. . . noun:
	Materials which are *insoluble* do not *dissolve*; e.g. glass,... noun:		*Combustible* materials *burn* easily e.g. wood,... noun:

6. Complete the sentences below with appropriate words from exercises 3 and 5

a. The carbonates and phosphates of all metals are _____ in water but _____ in dilute acids.

b. The pale pink colour of quartz, which can range from _____ to translucent, is known as rose quartz.

c. Some colloids are _____ because of the Tyndal effect, which is the scattering of light by particles in the colloids.

d. _____ materials are liable to catch fire very easily and burn.

e. _____ is an important property of steel.

f. This PVC tubing offers excellent wear resistance and rubber-like _____.

g. A _____ substance or object is stiff and does not bend, stretch or twist easily.

7. Some other properties of materials. Form adjectives from these nouns.

Czech translation	Noun	Adjective
a) pružnost	***elasticity***	***elastic***
b) křehkost	fragility	
c) tažnost	malleability	
d) kujnost	ductility	
e) vodivost	conductivity	
f) žáruvzdornost	heat-resistance	
g) zápalnost	flammability	
h) jedovatost, toxicita	toxicity	
i) reaktivita	reactivity	
j) netečnost	inertness	
k) lehkost	lightness	
l) těžkost	heaviness	
m) savost, absorpčnost	absorbency	
n) viskozita, lepkavost	viscosity	
o) hustota	density	
p) trvanlivost, odolnost	durability	
q) odolnost proti korozi	corrosion resistance	
r) síla	strength	

8. Choose the right word in a sentence:

a) A conductive / conductivity material can be used to conduct electricity.
b) If a material is easy to stretch under stress, we call it elastic / elasticity.
c) If you want to improve durable / durability of a machine, clean it regularly.
d) Hard / hardness is an important property of steel.
e) Concrete is used for building because it is strong / strength.

Now choose one noun and one adjective from the table in Exercise 7 and use them in a sentence. Read the sentences to your neighbour.

9. Speaking:

Work in pairs. One student describes something, using as many adjectives as he or she can. The second one asks questions. You should guess what it is. You can describe the colour, size, shape, origin, appearance, use etc. Then swap roles.

a) Describe two materials.
b) Now choose two objects from this room.

Useful phrases:

The object	is	slightly relatively quite extremely very	small soluble in water hot silvery old

The	colour shape durability	of	the object	is	blue circular high

10. Video: Advanced Materials Safety
Listen and complete the gaps in the summarising sentences:
(https://www.youtube.com/watch?v=nP2bERhM7d4)

1. Over the past hundred years we have discovered how the arrangement of atoms in materials influences how those materials _____ .
2. The combination of new knowledge, tools and techniques is enabling scientists to create _____ that were unimaginable a few years ago.
3. Our knowledge is still quite _____ in some areas.
4. Scientists are creating materials that are lighter, stronger and _____ than before; materials that generate, bend and _____ light in unusual ways; materials that _____ sunlight to electricity.
5. Scientists are creating materials that enable faster, more _____ computers.
6. Soon we will see more and more _____ materials being developed – like materials that _____ to their surroundings and change their behaviour accordingly and _____ materials that combine different advanced materials into super-advanced materials, even materials that _____ the boundaries between living systems and everything else.
7. Now we are only limited by the laws of physics and our _____ .

11. GRAMMAR REVISION: tenses

I. Put verbs in brackets into the correct form and tense

Glass 1 _____ (have) many useful properties, but it 2_____ (be) not a tough material, in fact it 3 _____ (be) very brittle. However, for many years already car producers 4 _____ (use) specially tough glass, with which they 5 _____ (make) car windows. Wood is a good building material but it is combustible. In the past people 6_____ (build) mainly wooden houses and now we can observe that this kind of lodging 7 _____ (become) more and more popular. People like the cosy atmosphere and the nice smell that such material 8 _____(produce). Who 9_____ (know), maybe in the future, with yet another kind of modern technology we 10 _____ (be able) to live in fir but non-combustible cottages?

Adapted from: [1]Jirků, Dana et al. *English for Future Engineers.* Praha: ČVUT, 2007.