LESSON PLAN
Computers / Mecatronics

High School	Colegiul Tehnic Arad
Level	Intermediate
Area	Constructions/ Buildings
Time	50 min per lesson

LESSONS DEVELOPED BY GROUP 1

Members: Diana Crisan, Alina Dehelean, Melinda Jager, Attila Laszlo, Alin Nagy

1. Write down as many words related to the structure of a building as you can think of in one minute.

2. In pairs, discuss about the importance of the foundation.

Focus on content:

Piles are used primarily in areas where near-surface soil conditions are poor. They are made of timber, concrete, or steel and are located in clusters. The piles are driven down to strong soil or rock at a predetermined depth, and each cluster is then covered by a cop of reinforced concrete. A pile may support its load either at the lower end or by skin friction along its entire length. The number of piles in each cluster is determined by the structural load and the average load-carrying capacity of each pile in the cluster. A timber pile is simply the trunk of a tree stripped of its branches and is thus limited in height.

A concrete pile, on the other hand, may be of any reasonable length and may extend below groundwater level as well. For extremely heavy or tall buildings, steel piles, known as H-piles because of their shape, are used. H-piles are driven through to bedrock, often as far as 30 m (100 ft) below the surface. H-piles can be driven to great depths more easily than piles by diagonal bracing or rigid connections between columns, girders, and beams. (Encarta On-line)

1. Try to find a suitable title for the text. Work in pairs.

2. Read the text above in order to decide whether the following sentences are true or false. Work in pairs.

a) Piles are used in areas where the soil conditions are poor.
b) Piles can be made of wood.
c) Timber piles and concrete piles have the same length.
d) Steel piles are also known as H-piles.
e) H-piles are used for two-story buildings.
f) H-piles can be driven as far as 50 m below the surface.

3. In groups, create 5 questions about the text and exchange them with another group. Answer the questions you have received.

III. Focus on language:

1. Fill in the gaps:

a) Piles are made of .....
b) The piles are driven down to ..... or ..... depth.
c) A pile may support .....
d) A ..... pile is simply the trunk of its branches and is thus ..... in height.
e) A ..... pile may be of any reasonable length.

2. Match the following definitions with words from the text:

a) beam driven into the ground to support some superstructure (line 1)
b) wood suitable for building purposes (line 2)
c) a knot (line 3)
d) a long wooden tube (line 8)
e) a main beam supporting a superstructure (line 16)

IV. Interpretation:

Role-play:

1. (Student A) Imagine you were a constructor and you have to explain to a 10-year old child what piles are.

2. (Student B) You are a 10-year old child visiting a construction site as part of an extracurricular activity. You have to ask questions and summarize what student A tells about piles.

V. Interpretation:
Work in groups. Make the plan of a foundation. Label each part and mention the material it is made of. Bring arguments to support your choices.

LESSONS DEVELOPED BY GROUP 2

Members: Silviu Chirila, Norbert Kovalik, Marius Nagy, Andrei Robos, Daniel Ungur

Access to text
I. Discuss in groups about living in sky scrapers. Would you like to live or work in a sky scraper? Argue your answer.

Focus on content

For building over 40 stories, typically steel was considered the most appropriate material. However, recent advantages in the development of high-strength concretes have made concrete competitive with steel. Tall buildings often require more sophisticated structural solutions to resist lateral loads, such as wind, and earthquake forces.

One of the more popular structural systems is the exterior structural tube, which was used in the construction of the skyscrapers in New York City. Here, closely spaced columns connected rigidly to the horizontal spandrel beams on the perimeter of the building provide sufficient strength to resist loads and the stiffness to minimize lateral deflections. The structural tube has now been used with concrete and with composite construction consisting of structural steel members encased in reinforced concrete. (Encarta On-line)

II. Read the text above and circle the correct answer for each of the following questions. Some of the answers are not to be found in the text.

1. What are the materials used for buildings over 40 stories?
    a) concrete
    b) steel
    c) aluminum
    d) wood

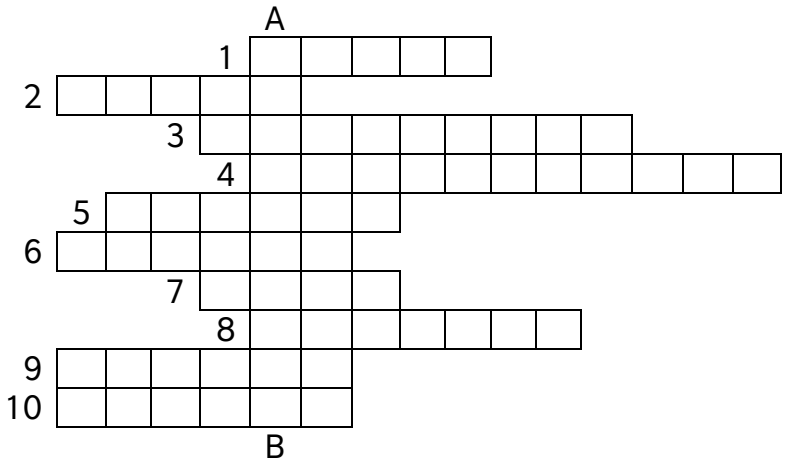
2. Are sophisticated structures required by lateral loads?
    a) yes
    b) no

3. The country with the largest number of skyscrapers is:
    a) USA
    b) Canada
    c) Japan
    d) China

Living high

Focus on language

III. Complete the crossword by answering the following questions and find out the word in A-B.



1. The most common metal used for the piles is.....
2. The most common material used for ordinary buildings
3. What kind of a material is polyester?
4. The tallest building in Chicago is.....
5. Workers are caring sand and other things in..... (plural)
6. What's the synonym for levels?
7. I have a painting on the.....
8. If you have a leaking pipe in the house, you call a.....
9. 
10. You find them between levels

Interpretation

IV. Work in groups and discuss with your partners on the following topic:
"Why can't we see such tall skyscrapers in Europe as in the USA?"

Response

V. Write a 200-word opinion essay with the title "Working in a skyscraper"

LESSONS DEVELOPED BY GROUP 3

Timea Barany, Simona Cotoara, Bianca Daniel, Florina Iancu, Paul Moldoveanu

LOW BUILDINGS

With low buildings the variety of possible shapes is much greater than with taller buildings. In addition to the familiar box shapes, which is also used in very tall buildings, low buildings may use cathedral-like forms, vault, or domes. A simple single-story structure might consist of a reinforced-concrete slab laid directly on the ground , exterior manor walls supported by the slab (or by a spread footing cast continuously around the perimeter of the building), and a roof. For low building, the use of interior columns between masonry load-bearing walls is still the most common construction method. Spaced columns supported by the slab or by individual spread footing may be used, however; in that case the exterior walls can be supported by or hung between the columns. If the roof span is short, abutting planking made of wood, steel, concrete, or other material can be used to form the roof structure.
Each structural material has a particular weight-to-strength ratio, cost and durability. As a general rule, the greater the roof span, the more complicated the structure supporting the roof becomes and the narrower the range of suitable materials. Depending on the length of the span, the roof may have one-way framing beams or two-way framing (beams supported on larger girders spanning the largest dimension). Trusses can be substituted for either method. Trusses, which can be less than 30 cm (12 in) or more than 9 m (30 ft) deep, are formed by assembling tension and compression members in various triangular patterns.

They are usually made of timber or steel, but reinforced concrete may be used.
The structure of a simple one-story building may also consist of the wall and roof framing combined by being either fastened together or shaped in one piece . The possible structural shapes are almost infinite and include the three sides of a rectangle fastened together into a unit called a bent, the familiar church form of vertical sides and sloping roof , the parabola and the semicircle or dome .
The supporting structure and exterior walls , floor, and roof may also be made as a unified whole, much like a rectangular pipe with closed or open ends. These may be cast in reinforced plastic.

Access to text
Would you like to live in a low building or in a tall one? Why? What shape would you like your building to have?

Focus on content

Read the text and answer the following questions:
a) What is the main idea of the text?
b) Which are the shapes a law building can have?
c) What consequences does the choice of a large roof have?

Focus on language

1. Fill in the following blank spaces with fragments taken from the text:
   a) With low buildings the.....of possible shapes is much greater than with ..... buildings.
   b) In addition to the .....box shape, which is also used in very tall....., low buildings may use cathedral-like forms, ... or ..... .
   c) Trusses, which can be less than ..... or more than ..... deep ,are formed by assembling tension and..... members in various ..... patterns.

2. Work with a dictionary and give the definitions of the following words:
   a) trusses.....
   b) slab .....
   c) beam .....
   d) masonry .....
   e) footing .....

Interpretation
Work in groups of 4-5 students. Create a role-play between a teacher and his students. One of the students is the teacher and the other students are giving a license exam. The teacher asks questions about the structure of low buildings.

Response
Make an opinion essay about: 'How will low buildings be in the future?'

LESSONS DEVELOPED BY GROUP 4
Members: Diana Buniov, Stefania Okros, Luciana Nastur, Adriana Valea

BUILDING LOADS

Access to text
What does the title mean and what do you think you'll learn in this lesson?

Focus on content

1. a) Work in groups. Read the following text and give it a title:

The loads impose on a building are classified as either „dead or live". Dead loads include the weight of the building itself and all major items of fixed equipment. Dead loads always act directly downward, act constantly, and are additive from the top of the building down. Live loads include wind pressure, seismic forces, vibrations caused by machinery, movable furniture, stored goods and equipment, occupants, and forces caused by temperature changes.

Live loads are temporary and can produce pulsing, vibratory, or impact stresses. In general, the design of a building must accommodate all possible dead and live loads to prevent the building from settling or collapsing and to prevent any permanent distortion, excessive motion, discomfort to occupants, or rupture at any point.

b) Read again the text to find out which of the following building loads are the heaviest and give reasons:

- live ***- dead***

2. Read the text again to be able to match the words with their definition:

dead loads *live loads*

- include the weight of the building itself and all major items of fixed equipment
- include wind pressure, seismic, forces vibration caused by machinery, movable furniture
- act. directly downward, act constantly and are not additive from the bottom of the building
- cannot modify pulsing, vibratory or impact stresses

Focus on language

Read the text and find five words which contain suffixes and prefixes.

Interpretation

Work in pairs and make a dialogue using the vocabulary you have just learned (extract words from the text). The dialogue must be between an engineer and a client who wants to buy a field and to build a hotel.

Response

What kind of foundation would you recommend in the following situation? Give arguments referring to the type of loads that appear.

- Japan (earthquakes), a hotel with 30 story building
- India (flooding), a Manson with 2 story building
- The Alps ,a caban
- Antartica (ice, avalanche),a house

Give your opinion on what would happen with buildings if there were an earthquake and say what can be done about it?

DICTIONARY OF SPECIAL TERMS

- aluminum - aluminiu;
- attic - mansarda;
- barrow - roaba;
- basis foundation - talpa de fundatie;
- beam - grinda;
- bedrock - roca de la baza unui zacamant, teren stancos;
- bent - palee, capra, ferma usoara de constructie;
- board - scandura;
- brick - caramida;
- cement - ciment;
- cluster- grup de piloti;
- column - coloana, stalp, pilastru;
- composite construction - amestec de mortare;
- cop - teava de fir/de batatura;
- crane - macara;
- cross wall - perete despartitor, sicana;
- deflection - sageata de incovoiere;
- dome - acoperis, cupola, bolta;
- electrical wiring - instsalatie electrica;
- (to) encase - a cofra;
- (to) erect - a asambla, a construi;
- escalator - scara rulanta, escalator;
- floor - podea;
- footing - fundatie, baza, reazem, sprijin;
- foundation - fundatie; *deep* ~ fundatie indirecta; ~ *mat* radier; *monolithic* ~ fundatie monolita; *prefabricated* ~ fundatie prefabricata; *shallow* ~ fundatie directa;
- girder - grinda, barna, bara;
- heating - incalzire termica;
- helmet - casca;
- high strength - cu rezistenta mare;
- intercommunication - interfon, intercomunicare telefonica;
- knot - nod, aglomerari;
- load - sarcina, incarcatura, solicitare;
- magnitude - marime, dimensiune, amplitudine;
- masonry - zidarie;
- mortar - tencuiala;
- parquet - parchet;
- perimeter - perimetru;
- pile - pilot, palplansa, stalp;
- pipe - burlan, teava, conducta;

- plumbing - lucrari de instalatie de apa si canal, tevarie;
- porch - veranda;
- reinforced concrete - beton armat;
- roebuck - caprior;
- roof - acoperis;
- roof framing - sarpanta de acoperis;
- single story shed - sed cu un singur nivel;
- skin friction - frecare superficiala/de suprafata;
- skyscraper - zgarie-nor;
- slab - placa;
- span - deschidere (a unui pod);
- steel - otel;
- story - etaj, cat;
- structural frame - schela de constructie;
- structural tube - structura tubulara (circulara);
- structure - structura, constructie;
- subsurface - subsol subteran;
- superstructure - suprastructura;
- terrace - terasa;
- tile - tigla;
- timber - lemn;
- trunk - fus de coloana;
- truss - ferma de acoperis, grinda cu zabrele;
- vault - pivnita, subsol, galerie subterana;
- water supply - alimenatre cu apa, distributie a apei prin conducte;

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