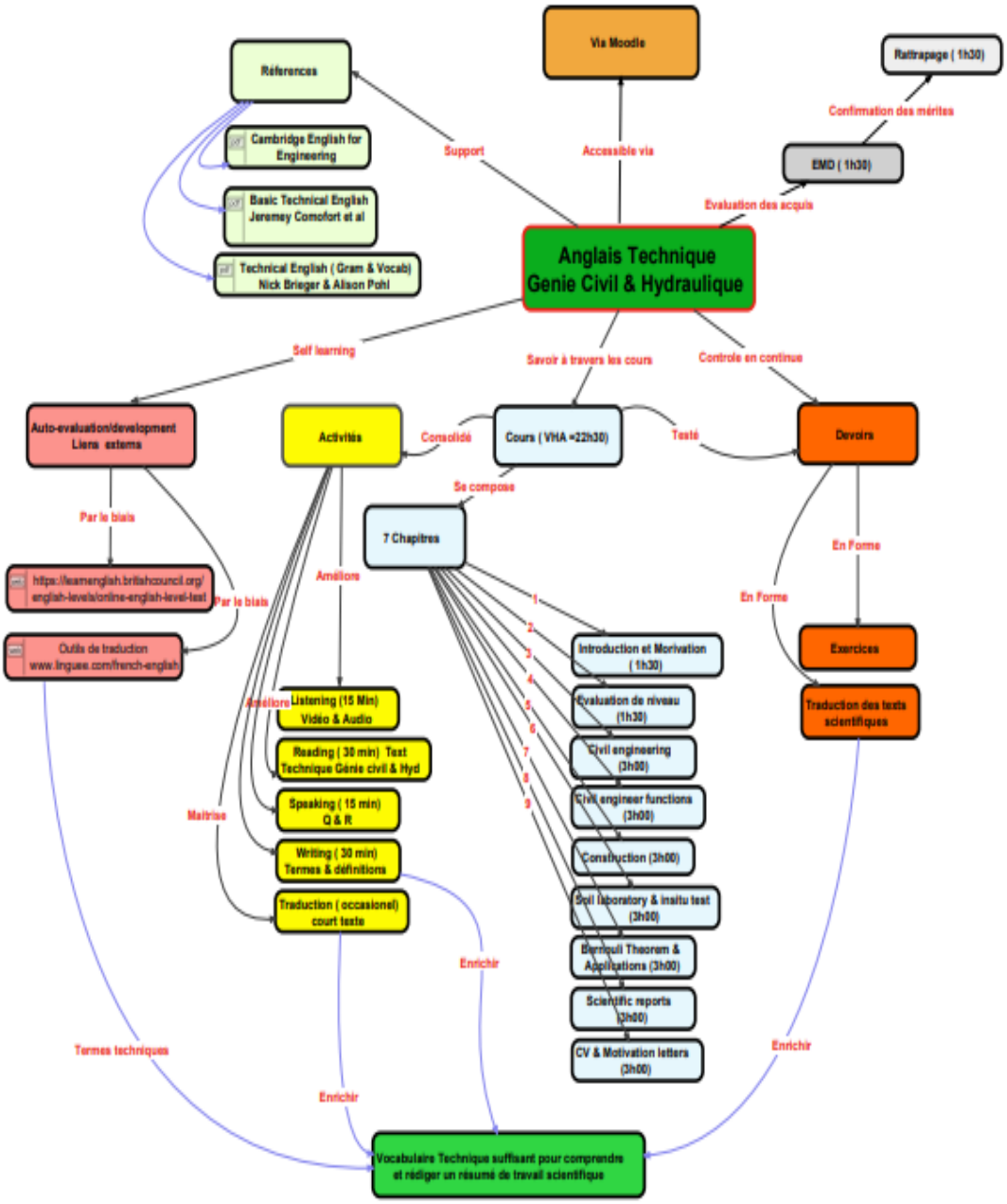
Prerequisites: This course is designed for 2nd year students in civil engineering and hydraulics discipline (Licence and Engineers). They will deal with scientific texts and publications in English in their university life and will prepare them for advanced research stages or professional life in multinational environment. Each chapter will end generally by a homework to practice and master translation at home. Speaking skills will be improved during the class time. This is an entry level course which need basic language and will promote the vocabulary to master technical jargon, student needs a language proficiency **level A2** and above. Students must have preliminary knowledge of scientific terminology of his discipline in French. No pre-test required; what to learn is easy, it is from common courses and activities. Note in the below course map there is a little change for some units added and some removed but the course heart remain the same.



Unit 01 Civil Engineering

Unit 01: Civil Engineering

Civil engineering is changing life since the beginning of the age, without it we would not have safe homes, reliable road systems or hospitals. By becoming a civil engineer, you will be able to positively impact society and shaping the world for a better well-being. You should know what is civil work and what make it engineering.

Listening

Watch and listen very well to this video about civil engineering

https://www.youtube.com/watch?v=LCyZFTEyNoo

Questions:

1. What science is needed for a civil engineer to be successful?
2. Give example of what a civil engineer calculate.
3. In which science Knowledge can improve/help the understanding of the behavior of construction material.
4. Give 3 sub-discipline of civil engineering.
5. To whom civil engineer is mainly collaborating.

Solution

1➔ Math& Physics

2➔ Load & Stress

3 ➔ Chemistry & Geology

4 ➔ Structural engineering, Geotechnical engineering, Water resources engineering.

5➔ Contractors & Architect.

Reading

What is civil engineering?

"The civil engineering describes engineering work performed by civilians for non-military purposes. In general, it describes the profession of **designing** and **executing structural works** for the general public and the communal environment. Civil engineering covers different **areas of engineering** including, **roads**, bridges, canals, **railway** lines, airports, **water supply systems**, **dams**, **irrigation**, **harbor, docks aqueducts**, and tunnels"

"The civil engineering needs a thorough knowledge of **surveying** of the **properties** and mechanics of construction materials, of the mechanics of structures and **soils**, and of hydraulics and fluid mechanics. Today civil engineering includes the production and distribution of energy, the development of aircrafts and airports, the construction of **chemical process plants** and nuclear stations, and water desalination". Brieger, N & Pohl, Technical English Vocabulary & Grammar. Oxford: Summertown, 2002. P.44

Writing

Task 1: Vocabulary

Expression	Meaning	French	Arabic
Designing	To make drawings for the construction or creation of something.	Conception	تصميم
Executing	Put (a plan, order, or course of action) into effect.	Execution	تنفيذ
Structural works	Any works required to the property where the Goods are to be installed	Travaux structural	أعمال بنيوية
Areas of engineering	Domains/fields of engineering	Domains de l'ingénieurie	مجالات الهندسة
Road	a wide way leading from one place to another which vehicles can use	Route	طريق
Railway	A line or track typically consisting of a pair of iron or steel rails	Chemin de fer	سكة حديدية
Water supply systems	The provision of water usually via a system of pumps and pipes.	Systeme d' Approvisionnement en eau	إمدادات المياه
Dam	A barrier constructed to hold back water	Barrage d'eau	سد المياه
Irrigation	The supply of water to land to help growth	Irrigation	سقي
Harbor	A place of shelter for ships/boats.	Petit port	ميناء صغير
Dock	An enclosed area of water in a port for the loading, unloading, and repair of ships/boats.	Quais	رصيف ميناء
Aqueducts	An artificial channel for conveying/ transporting water, typically in the form of a bridge.	Aqueducs	القنوات المائية
Surveying	To measure an area of land, and to record the details of it.	Arpentage, sondage, levé topographique	**المسح**
Properties	A quality or trait belonging and to an individual or thing.	Propriétés	خصائص
Soil	The upper layer of earth in which plants grow.	Sol	تربة
chemical process plants	An industrial environment where chemicals can be manufactured.	Usine de traitement chimique.	مصانع المعالجة الكيميائية
water desalination	The removal of salts	Déssalement de l'eau	تحلية المياه

Task 2:

Give a range of civil engineering tools and equipment that is used in the construction of roads, bridges, and waterways.

Roads: pavement, pedestrian crossing, tarmac, soft shoulder.

Bridges: arch, span, cable.

Tools and equipment: bulldozer, back-loader, scrapper, front loader.

Task 3:

What is being described here ? , choose from the following by matchning the right word to the right definition.

Well, dam, road roller, desalination, bulldozer.

1. This structure is built across a river to hold back the water to produce power, improve navigation or control flooding.
2. A deep hole in the ground where people can get water.
3. This large powerful vehicle uses a large blade to move earth and rocks.
4. This machine is used for rolling tarmac or asphalt flat on a road surface.
5. This is the process of removing salt from salt water.

Solution:

1 →Dam
2 → Well
3 → Buldozer
4 → Road roller
5 → Desalination

Task 4: Home work

Here is a text describing the civil engineering specialty in reputable university translate into French language. Do not use Google translate it will give bad results.

"Civil engineering course enables our students at EPFL to acquire the knowledge needed to develop large-scale projects and to manage and implement them. The first three years of study in the bachelor's degree programme focus on acquiring the basic skills needed to understand concepts, master construction techniques, evaluate these techniques and integrate them into our natural and built environment. The two years of study in the Master's programme allow our students to perfect their fundamental knowledge, while specialising in one of the four programmes offered: Structural Engineering, Hydraulics and Energy, Geotechnics or Transport and Mobility."

Ref: https://www.epfl.ch/schools/enac/education/civil-engineering/

French version :

La formation en génie civil de l'EPFL permet à nos étudiantes et étudiants d'acquérir les connaissances nécessaires à l'élaboration de projets de grande envergure mais également à leur direction et à leur réalisation. Les trois premières années d'études en bachelor privilégient l'acquisition des bases indispensables à la compréhension des concepts, à la maîtrise des techniques de construction, à l'évaluation de ces techniques et à leur intégration dans notre environnement naturel et construit. Les deux années d'études en master amènent nos étudiantes et étudiants à parfaire leurs connaissances fondamentales, tout en se spécialisant dans l'un des quatre programmes proposés : Ingénierie structurale, Hydraulique et énergie, Géotechnique ou Transport et mobilité.

Unit 2 Civil Engineer Functions

Department of Civil Engineering and Hydraulics
Licence & Eng, 2024/ 2025

University of Jijel
By Salah Eddine BOUHENICHE

Unit 2: Civil Engineer Functions

Introduction: Students already select the civil engineering, as discipline of their domain of study should know more about the civil engineer functions. This will be highly beneficial once known in details; it provides them with foundational knowledge and explain the requirement to get the right degree. Learning about civil engineer functions will provide students with interdisciplinary perspectives and opportunities for collaboration, such in environmental science, structural engineering urban planning…etc.

Defining and clarifying these functions motivate and aspire students to deliver their best in learning and have the essential knowledge and skills for future academic and career pursuits.

Civil engineer functions

The functions of civil engineers fall into three categories:

1. Before construction (**feasibility studies**, **site investigations**, and design).
2. During construction (dealing with **clients**, consulting engineers, and **contractors).**
3. After construction (**maintenance**)

Any major civil engineering project start with a **feasibility study** to assess both financial and engineering aspect. During the feasibility study, a preliminary **site investigation** is carried out. Once a scheme has been approved, a more extensive investigation is usually necessary to evaluate the **load-bearing** qualities and stability of the ground. This field is called **soil mechanics**. The design of engineering works may require the application of principles of **hydraulics, thermodynamics** and nuclear physics**.** During the construction phase, a consulting engineer is often employed to be responsible for design of the works, supplying specifications**, drawings,** and legal documents to get competitive **tender** prices. In a **turnkey** or package contract the **building contractor** undertakes to finance, design, specify, construct, and **commission** the whole project. **Maintenance** is normally carried out by the contractor as part of the agreement, if there are maintenance problems, it is the responsibility of the contractor to pay for any necessary work.

Comprehension questions:

Task 1:

What are the essential duties and responsibilities of a civil engineer?

Solution:

The essential duties and responsibilities of a civil engineer are:

1. Conducting feasibility studies, site investigations;

2. Dealing with clients and contractors;
3. Commissioning and maintenance.

.

Writing: Vocabulary

Vocabulary

Expression	Meaning	French	Arabic
Feasibility study	It is simply an assessment of the practicality of a proposed project plan or method, It is a preliminary exploration.	Etude de faisabilité	دراسة الجدوى
Site investigation	Site survey. It is the process of collecting information and assessment of the data related to the site.	Visite et investigation du site.	إستكشاف الموقع
Client	The owner (person, organization, company) who receives services.	Client, Maitre d'ouvrage	صاحب المشروع
Contractor	a person or firm that undertakes a contract to provide materials or labour to perform a service or do a job.	Maitre d'oeuvre	متعهد , مقاول
Maintenance	The process of preserving a condition or situation or the state of being preserved.	Maintenanc, entretien	الصيانة
Load-bearing	Physical supports or supporting the weight of something.	Charge portante	رفع الحمولة
Soil mechanics	A branch of soil physics and applied mechanics that describes the behavior of soils.	Mecanique des sols.	ميكانيكا التربة
Hydraulics	A branch of science concerned with the practical applications of fluids, primarily liquids.	Hydraulique	الري
Thermodynamics	It describe how the energy in a system changes and whether the system can perform useful work on its surroundings.	Thermodynamique	الديناميكا الحرارية
Drawings	In engineering used to communicate design ideas and technical information to engineers and other professionals throughout the design process	Les plans d'ingenierie	رسم هندسي
Tender	To give or offer; to make a bid for something	Appel d'offre	مناقصة
Turnkey	Complete and ready to be used; just turn the key and start use/drive.	Marché clés en main.	مناقصة المفتاح في اليد

Building contractor	Construction person or company who is hired to perform work or to provide goods at a certain price or within a certain time	Entrepreneur de construction	**مقاول بناء**
Commission	To make (a ship) officially active and ready for use	Mise en service	دخول الخدمة

Task 2: Match the following words and phrases with the appropriate definition.

N°	Term (A)	Definition (B)
1	Feasibility study	building or installation which is built, supplied, or installed complete and ready to operate.
2	Site investigation	activities carried out after the project to ensure problems are solved.
3	Maintenance	detailed plan of proposed structures.
4	Soil mechanics	dimension and measurements
5	Specifications	extensive investigation to evaluate the load-bearing qualities and stability of the ground.
6	Technical drawing	investigation to asses both financial and engineering aspects of a project
7	Commission a project	offer of a bid for an engineering contract .
8	Costing system	procedure to monitor the costs of a project so that management can get information on development.
9	Tender	study of the proposed location to assess geology of the area to order a plan to be carried out.
10	Turkey project	to order a plan to be carried out.

Solution: A1➔B6, A2➔B9, A3➔B2, A4➔B5, A5➔ B4, A6➔B3, A7➔B10, A8➔B8, A9➔ B7 , A10➔B1

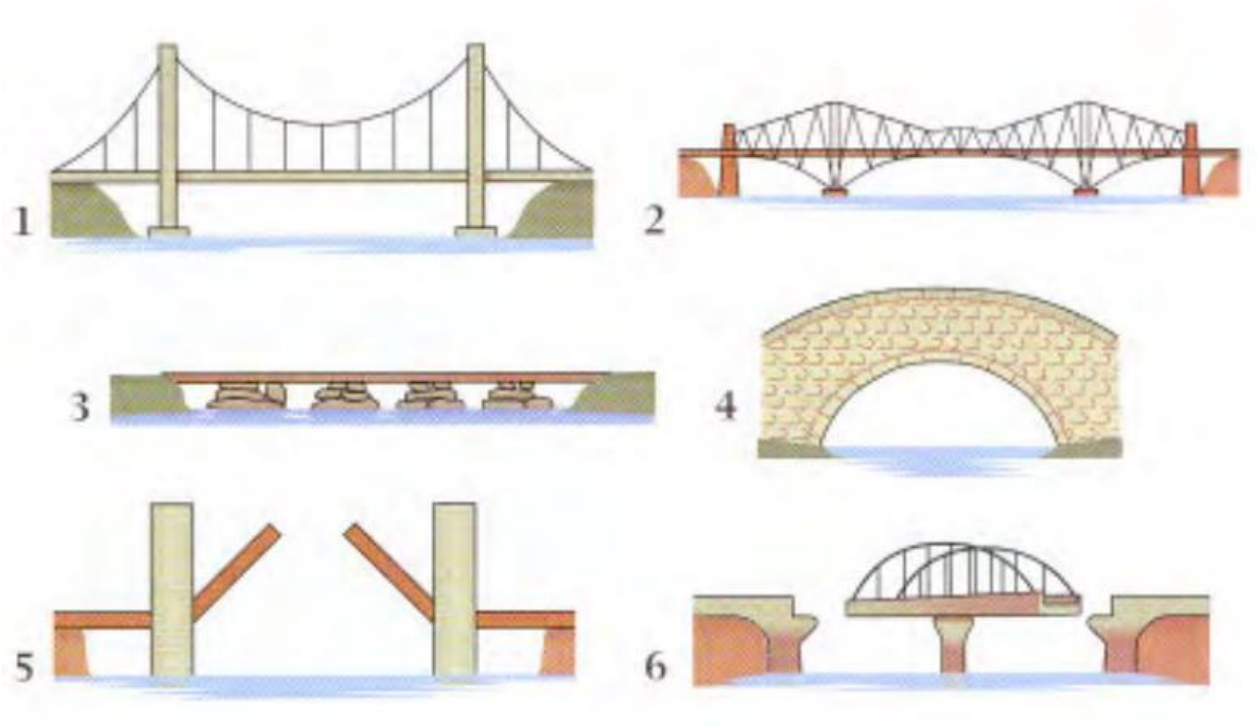
Task 3: Put the following tasks/duties into the 3 appropriate phase of construction.

a) Consulting engineer communications with client.
b) Extensive site investigation.
c) Consulting engineer contact with contractors.
d) Feasibility study.
e) Detailed design maintenance.
f) Employment of consulting engineer.
g) Preliminary site investigation.

Phase	Tasks
Before construction	g, d, b
During construction	f,c,a
After construction	E

Task 4: Select the right name from the following pictures for the below bridges types.

a)Masonry arch, b) cantilever, c) swing, d) suspension, e) clapper, f) bascule.



Solution: 1➔d, 2➔b, 3➔e, 4➔a, 5➔f, 6➔c.

Task 5: Complete the extract by unscrambling the letters in brackets.

This is an extract from a letter written by a qualified civil engineer in response to a job advertisement.

I am writing in connection with the job advertisement for a (a)……(livci, renigene), which appeared in today's *Civil Engineering*.

I have a degree in (b)……(rnlutiasid) engineering. After graduation, I worked for four years at Locke Engineers in the field of (c)……(onscorutitcn) consulting. During my time there, I specialized in (d) ……..(ilamsc) preparation and construction (e) ……..(ehdnsgulic). I am particularly interested in the opportunities to further develop my skills, especially in the following areas:

- Development of (f)……..(tdfar) work plans.
- (g) ……(etis) investigations.
- Preparation of (h) ……..(nictel) communications.

Solution: (a) Civil engineer, (b) industrial, (c) construction, (d) claims, (e) scheduling, (f) draft, g (site), (h) client.

Unit 3 Basic Maths and Physics terminology (1)

Department of Civil Engineering and Hydraulics
Licence & Eng, 2024/ 2025

University of Jijel
By Salah Eddine BOUHENICHE

Unit 03 Basic Maths and Physics terminology (1)

As a future master or engineer in civil engineering and hydraulics, it's essential to have a good grasp of the mathematical terms used in the English language which will be used in your daily life. In this lesson, we've compiled some of essential English mathematical terms that help you read scientific papers and documents.

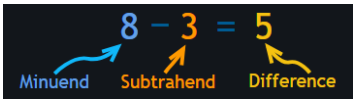
Basic terminology in maths:

Operations and operators

+	Addition, Add, Sum, Plus, Increase, Total
−	Subtraction, Subtract, Minus, Less, Difference, Decrease, Take Away, Deduct
×	Multiplication, Multiply, Product, By, Times
÷	Division, Divide, Quotient, How Many Times

Addition: bringing two or more numbers (or things) together to make a new total. The numbers to be added together are called the "Addends" and the result is called **Sum.**

Substraction: taking one number away from another.

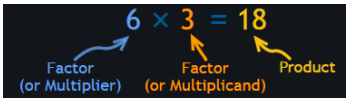


Multiplication: (in its simplest form) repeated addition. Here we see that 6+6+6 (three 6s) make 18.

6 X 3= 18 ➔ Six multiply Three equal Eighteen

6 X 3= 18 ➔ Six by Three equal Eighteen

6 X 3= 18 ➔ Six times Three equal Eighteen



Important: But we can also multiply by fractions or decimals, which goes beyond the simple idea of repeated addition.

Division: Splitting into equal parts or groups. It is the result of "fair sharing" but sometimes there is a remainder if you are not looking for fractioning.

Fraction: is a part of a whole. examples: ½ Half, ¾ Three quarter

Decimal Number: a number that contains a Decimal Point.

Equations: They are statements that shows the equality of two expressions by joining them with an equals sign. We can have ordinary equations and differential equations. In the ordinary equations we can have also linear equations that contains two variables and can be plotted on a graph as a straight line.

$X^2+ 3X-7=0$ ➔ X square plus three multiply X minus seven equal zero.

$4X^3+2X+\sqrt{3}=0$ ➔ Four multiply X power three plus two multiply X plus root three equal zero.

$\frac{\partial x}{\partial t} + \frac{\partial y}{\partial t} = a$ ➔ The partial derivative of x by t (with respect to t) plus partial derivative of y by t (with respect to t) equal a.

Or partial d x by d t plus partial d y by d t equal a.

Average (Mean): We calculate the average by adding up all the values, then divide by how many values (the count).

Example: What is the average of 9, 2, 12 and 5?

Add up all the values: 9 + 2 + 12 + 5 = 28, divide by how many values (there are four of them):
28 ÷ 4 = 7. So the average is 7.

Geometry Basics:

Type	Shape	Type	Shape
Strait line		Curved line or curve	
Circle		Square	
Rectangle		Triangle with right angle	
Pentagon		Hexagon	
Cylinder		Trapeze	

Basic terminology in physics:

Term	French term	Meaning
Force	Force	an action that changes or maintains the motion of a body or object.
Pressure	Pression	Pressure is defined as the physical force exerted on an object. This force applied perpendicularly to the surface of the objects per unit area. The basic formula for pressure is F/A (Force per unit area)
Buoyancy	Poussé d'archimed	the ability or tendency of something to float in water or other fluid.
Shear force	Force de cisaillement	a force acting in a direction that's parallel to a surface or cross section of a body.
Discharge/Flow	Débit	allow (a liquid, gas, or other substance) to flow out from where it has been confined.
Density	Densité	the degree of compactness of a substance.
Speed	Vitesse	The ratio of the distance traveled by an object (regardless of its direction) to the time required to travel that distance

Reading and comprehension

Presenting data

After collecting and **recording data**, scientists often put their data into a **graph** or a **chart**. This shows the data in a useful way and helps them to reach conclusions. The most common ways of presenting data in science are line graphs, **bar charts** and **pie charts**. A line graph should be used when the independent and dependent variables are continuous. A bar chart should be used if the independent variable is categoric.

Discrete or categoric data can also be shown on a pie chart. Pie charts are often used when using percentages of data to draw a graph.

Questions:

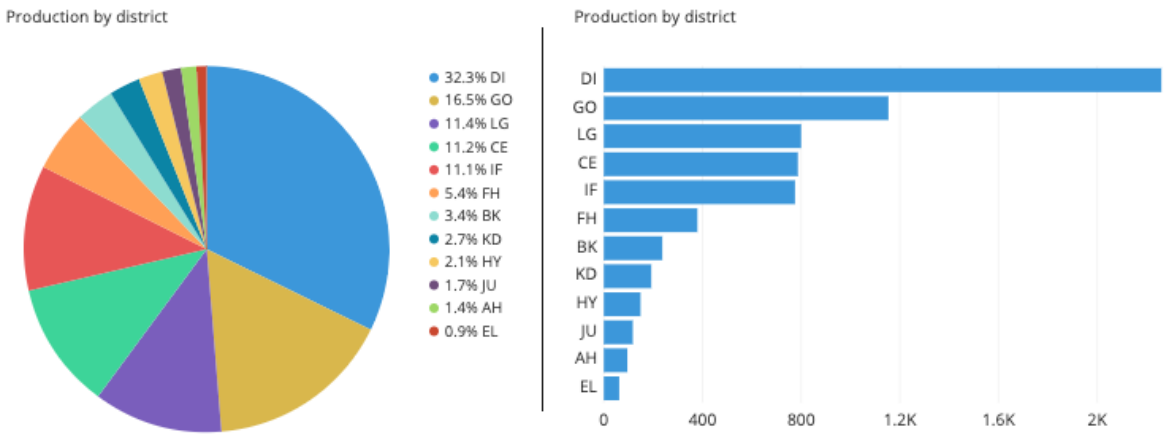
- 1. What are needed to present results from experiments? Cite the ones described here in above text.
- 2. Is it easier to see patterns in data from a graph than a table?
- 3. What compulsory condition should have met to represent data in a line graph?

Answer:

1. The types and charts needed to present results from experiments are: graphs and charts; line graph, bar chart and pie chart.
2. It is easier to see patterns and reach conclusion from a graph.
3. The compulsory condition to represent data in a line graph is that the independent and dependent variables should be continuous.

Explanation of difficult terms:

Term	Meaning	French translation	Arabic translation
Recording data	Documenting data in a way that is accurate and organized (written, audio, video, computer software…).	Enregistrement des données	تسجيل البيانات
Graph	diagram or curve showing the relation between variable quantities, typically of two variables, each measured along one of a pair of axes.	Graphe, courbe	رسم بياني
Chart	Is a graphical representation for data visualization, in which "the data is represented by symbols, such as bars in a bar chart, lines in a line chart, or slices in a pie chart".	Graphique	رسم تخطيطي
Bar chart	a chart or graph that presents categorical data with rectangular bars with heights or lengths proportional to the values that they represent. The bars can be plotted vertically or horizontally.	Graphique/ diagramme à barres	مخطط شريطي
Pie chart	is a circular statistical graphic which is divided into slices to illustrate numerical proportion.	Diagramme /graphique circulaire	مخطط دائري



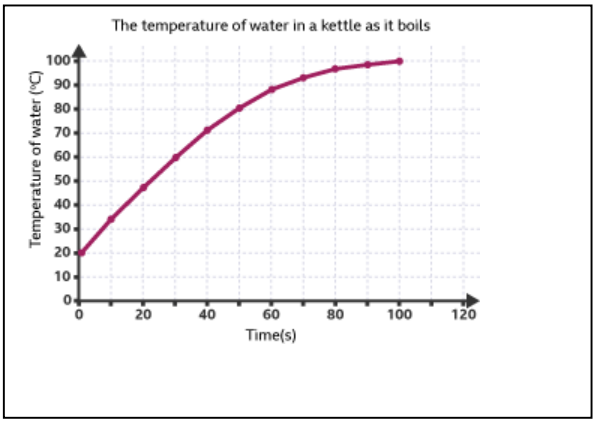
Pie chart (left) Versus Bar chart to represent production by district

Unit 4 Basic Maths and Physics terminology (2)

Unit 4: Basic Maths and Physics terminology (2)

I) Reading

Analysing data



Finding **patterns** in data on a graph or chart is known as 'interpreting relationships'. **Plotting** a chart or graph helps to show a pattern in the data - how the **dependent variable** depends on the independent variable.
Once points have been plotted for a line graph, draw a ***line of best fit***. The line should be drawn through as many points as possible, with equal numbers of points above and below the line. If there is no **link** between variables, then there will be no clear pattern of points and a line of best fit would not be drawn.
If there is a link, then draw a line of best fit. The line could be a curve, or a **straight line**, depending on the positions of the points plotted. Either way, make sure the line goes through as many points as possible with equal numbers of points above and below the line.
If one variable increases at the same **rate** each time as the other increases and the line of best fit passes through the origin, then the relationship is described as directly proportional. If there are any ***outliers*** then these should be ignored when drawing the line of best fit because if they are included then they will alter how the line of best fit looks.

Once the graph has been analysed, write a conclusion. Support a conclusion by saying what the graph shows, such as if there is a relationship between the two variables. A good way of describing the relationship is to say what happens to one variable as the other one increases or decreases. For example, the longer a kettle is left **to boil**, the hotter the water gets until it reaches 100°C.

Exercise 1:

1- How to show pattern in data?
2- What should be ignored when drawing the line of best fit?
3- When the line of best fit cannot be drawn?
4- When the relationship is described as directly proportional?

Solution: answers

1- Plotting a chart or graph (drawing).
2- The Ooutliers should be ignored when drawing the line of best fit.
3- The best fit line cannot be drawn if there will be no clear pattern of points.
4- The relationship is described as directly proportional, If a variable increase at the same rate each time as the other increases and the line of best fit passes through the origin.

Exercise 2: Give synonyms or explanation in English of the words marked in bold in the above text, then translate it into French and Arabic.

Example:

Term/ Expression	Synonym/Meaning/definition	French	Arabic
Dependent variable	A dependent variable is the variable that changes as a result of the independent variable manipulation/variation.	Variable dependant	المتغير التابع

Solution:

Term/ Expression	Synonym/Meaning/definition	French	Arabic
Patterns	a particular way in which something is done, is organized, or happens	Models, motifs	أنماط
Plotting	is a graphical technique for representing a data set, usually as a graph showing the relationship between two or more variables.	Traçage	رسم النقاط على معلم
Line of best fit	It is also known as a trend line or line of regression; it depicts the trend of the given scattered data plots on a graph	La ligne la plus adéquate.	الخط الأنسب / المنحنى
Link	a relationship between two things or situations, especially where one affects the other.	Lien	رابط وصل
Straight line	usually abbreviated line, is an infinitely long object with no width, depth, or curvature	Ligne droite	خط مستقيم
Rate	a measure, quantity, typically one measured against another quantity or measure. It is a value to (something) according to a particular scale.	Taux	قدر معدل نسبة
Outliers	a data point that differs significantly from other observations	Valeur aberrante	قيمة ناشزة شاذة
To boil	to change from a liquid to a gaseous state. Water boil at 100°c	Faire bouillir	يغلي

II) Writing

II.1 Graphs and curves description techniques: Three basic steps are unavoidable when it comes to describe graphs and curves.

Introduce the graph

Give an overview

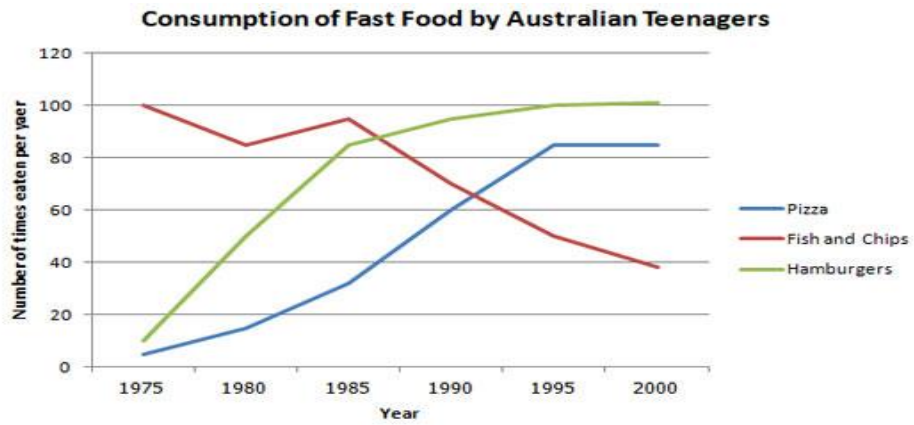
Give the detail

1. **Introduce the graph:** You have to start with one or two sentences that state what this graph shows. To do this, **paraphrase** the title of the graph/curve, making sure you put in a time frame if there is one. As a result, you should say the same thing as the title, but in a different way.
2. **Give an overview:** Here you should expose the main trend or trends in the graph. No details is needed here, you are just looking for something that describes what is happening **overall**. You should cover the main changes that took place over the whole period.
3. **Give the detail:** here is the body paragraph of the description text, so specific detail is required. You have to **group data** together where there are **patterns**.

   To do this you need to identify any **similarities** and **differences**. As we you have already identified in the overview/trends it is easy find them. You the focus on a variable or may be more than one. This does not mean you should not mention the others, but you should still make comparisons of the data as the questions asks. Reserve a second paragraph to describe the rest of your graph if it is versus time and the rest of your curves if it shows differences and discrepancies.

Example:

The line graph below shows changes in the amount and type of fast food consumed by Australian teenagers from 1975 to 2000.



Summarize the information by selecting and reporting the main features and make comparisons where relevant.

Write at least 150 words.

Solution:

1. Introduce the graph The line graph compares the fast food consumption of teenagers in Australia between 1975 and 2000, a period of 25 years.

2. Give an overview Overall, the consumption of fish and chips declined over the period, whereas the amount of pizza and hamburgers that were eaten increased.

3. Group data Check for differences and similarities; generally, it is two main body paragraph that shows two different patterns. Focus change from one to another

See the model answer below:

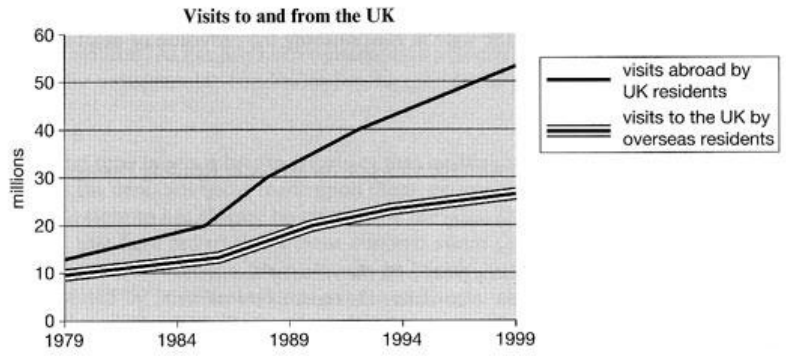
The line graph compares the fast food consumption of teenagers in Australia between 1975 and 2000, a period of 25 years. **Overall,** the consumption of fish and chips declined over the period, whereas the amount of pizza and hamburgers that were eaten increased.

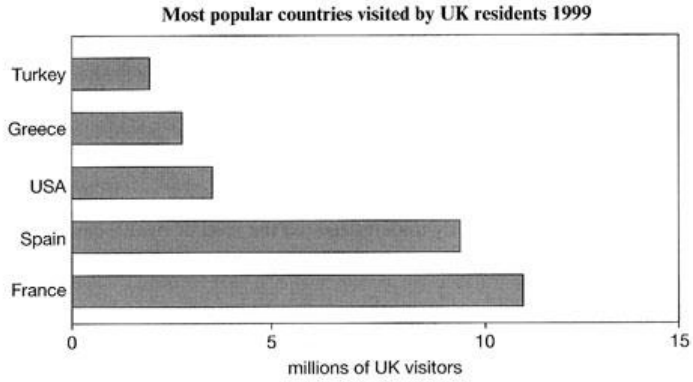
In 1975, the most popular fast food with Australian teenagers was fish and chips, being eaten 100 times a year. This was far higher than Pizza and hamburgers, which were consumed approximately 5 times a year. However, apart from a brief rise again from 1980 to 1985, the consumption of fish and chips gradually declined over the 25 years timescale to finish at just under 40.

In sharp contrast to this, teenagers ate the other two fast foods at much higher levels. Pizza consumption increased gradually until it overtook the consumption of fish and chips in 1990. It then levelled off from 1995 to 2000. The biggest rise was seen in hamburgers as the occasions they were eaten increased sharply throughout the 1970's and 1980's, exceeding that of fish and chips in 1985. It finished at the same level that fish and chips began, with consumption at 100 times a year.

Exercise 3: The line graph below shows visits to and from the UK (United Kingdom) from 1979 to 1999, and the bar graph shows the most popular countries visited by UK residents in 1999.

Summarise the information by selecting and reporting the main features and make comparisons where relevant from this chart and graphs, at least 150 words.





Solution:

The line graph illustrates the number of visitors in millions from the UK who went abroad and those that came to the UK between 1979 and 1999, while the bar chart shows which countries were the most popular for UK residents to visit in 1999. Overall, it can be seen that visits to and from the UK increased, and that France was the most popular country to go to.

To begin, the number of visits abroad by UK residents was higher than for those that came to the UK, and this remained so throughout the period. The figures started at a similar amount, around 10 million, but visits abroad increased significantly to over 50 million, whereas the number of overseas residents rose steadily to reach just under 30 million.

By far the most popular countries to visit in 1999 were France at approximately 11 million visitors, followed by Spain at 9 million. The USA, Greece, and Turkey were far less popular at around 4, 3 and 2 million visitors respectively.

II.2) Useful language for graph description:

In general cases you need to report the information changes. You could describe the increase, decrease or fluctuation of data. So, you have to use a specific vocabulary in addition to paraphrasing.

Here is a sample for introductory:

1. The graph illustrates...
2. The diagram depicts...
3. The figures demonstrate...
4. The data portrays...
5. The visual representation delineates...
6. The illustration outlines...
7. The graphic presents...
8. The statistics reveal...
9. The diagram exhibits...
10. The chart exemplifies…

For describing changes you the right terminology, below is a table of word to use in your analysis.

Adjectives	Nouns	Verbs	Adverbs
A considerable	Variation (in)	To vary	Slightly
A gradual	Fluctuation (of)	To soar	Considerably
A sharp	Fall (of)	To rise	Suddenly
A moderate	Rise (in)	To decline	Dramatically
An abrupt	Drop (in)	To fluctuate	Steadily

References:

https://www.ieltsbuddy.com/useful-language-for-ielts-graphs.html

Unit 5 Soil Laboratory and In Situ Testing

Department of Civil Engineering and Hydraulics
Licence & Eng, 2024/ 2025

University of Jijel
By Salah Eddine BOUHENICHE

Unit 5:

Soil Laboratory and In Situ Testing

In all geotechnical engineering problems, performance **prediction** requires determination of the properties of the soil or rock mass under consideration, and their appropriate use employing soil mechanics theories. For the determination of the soil properties to be used in design, geotechnical engineers can follow two, often complementary, approaches: obtain soil samples from the field and subsequently perform laboratory tests on these samples, or make use of in situ tests. Laboratory tests are performed under well-defined and controlled boundary and testing conditions (e.g., drainage, stress **path**, **strain rate**) and have the benefits of isolating specific engineering properties. However, their use is limited by the variable and often not completely understood effects of **sample disturbance** and by generally long testing times and high costs. In addition, because testing involves relatively **small specimens**, **extrapolation** of the measured properties to the entire site is often challenging.

In contrast, in situ tests, provide the response of a much larger soil mass under natural, in situ conditions (e.g., stresses, **void ratio**, saturation, temperature) often through approximately continuous records. They are often used in conjunction with laboratory testing to obtain information on the spatial variation of properties measured in the laboratory.

In situ tests also have limitations, namely poorly defined **boundary conditions**, non-uniform and high strain rates imposed during testing, inability to control drainage conditions, and effects of installation that are hard to quantify (in the case of some tests). For these reasons, most in situ tests do not provide a way to measure directly the fundamental properties of the soil.

Extracted from: (P1003), CHEN, Wai-Fah et LIEW, JY Richard (ed.). *The civil engineering handbook*. Crc Press, 2002.

Exercise 1:

1- Give an example of geotechnical problems?
2- What are the methods/approaches to get the soil properties?
3- What are the advantages/disadvantages of the laboratory tests?
4- Can any method alone measure directly the properties of the soil?
5- What the limitations of In situ tests?

Solution: Answers

1- An example of geotechnical problems is performance prediction of soil or rock.
2- The methods/approaches to get the soil properties are:
   a) obtain soil samples from the field and subsequently perform laboratory tests on these samples.
   b) in situ tests

3- Advantage of laboratory tests are: They are performed under well-defined and controlled boundary and testing conditions.

Disadvantage are: long testing times and high costs.

3- No method can measure directly the properties of the soil, they are complementary.
4- In situ test limitations are: non-uniform and high strain rates imposed during testing, inability to control drainage conditions, and effects of installation that are hard to quantify (in the case of some tests).

Exercise 2: Give synonym or explanation for the words marked in Bold, translate it into French and Arabic.

Expression/Term	Meaning/definition	French	Arabic
Prediction	a statement that says what you think will happe. Forecasting	Prévision	التنبؤ
Path	a way or track that is built or is made by the action of people walking	Chemin	درب
sample disturbance			
small specimens	a small amount of something that shows what the rest of it is like	Petits échantillons	عينات صغيرة
Extrapolation	The action of estimating or concluding something by assuming that existing trends will continue or a current method will remain applicable. Mathematic: the extension of a graph, curve, or range of values.	Extrapolation	الاستكمال الخارجي أو التقدير الاستقرائي أو الاستقراء الخارجي
In contrast	If one thing is in contrast to another, it is very different from it.	en revanche	بالتباين ,في المقابل
void ratio	Empty ratio	Taux de vide	نسبة الفراغ
boundary conditions	Boundary conditions are constraints necessary for the solution of a boundary value problem. A boundary value problem is a differential equation (or system of differential equations)	Conditions aux limites.	الشروط الحدية

Exercise 3: fill in the gaps by unscrambling the letters in brackets.

Karl von Terzaghi (October 2, 1883 – October 25, 1963) was an Austrian mechanical engineer, geotechnical engineer, and geologist known as the "father of soil mechanics and…….(lcntieeghoa) engineering. In 1900. He entered the Technical……(tnusyvrie) in Graz (Austria) to study mechanical engineering, where he also

developed an interest in…… (ltaciteehro) mechanics. He was nearly ……. (lxdeeple) at one point but ended up graduating with honors in 1904. He began a …….(rrgouosi) study of the properties of soils in an engineering context. Both his …….(mmeetanssrue) and his analysis of the force on retaining walls were first published in English in 1919, and they were quickly ……(gdzrnecoie) as an important new contribution to the scientific understanding of the fundamental …….(rboiehav) of soils. In 1924 he…… (dpuibeslh) Erdbaumechanik auf Bodenphysikalischer Grundlage (The Mechanics of Earth Construction Based on Soil Physics) which would have a profound ……(mapcit) on the field.[6] That resulted in a job offer from (**MIT**) which he accepted.

Solution:

Geotechnical, University, Theoretical, expelled, rigorous, measurements, recognized, behavior, published, impact.

Exercise 4: Translate into French the below text.

Karl von Terzaghi first job was as a junior design engineer for the firm Adolph von Pittel, Vienna. The firm was becoming more involved in the relatively new field of hydroelectric power generation, and Karl became involved in the geological problems the firm faced. His responsibilities quickly increased, and by 1908, he was managing a construction site, workers, and the design and construction of steel-reinforced structures. He embarked on a project to construct a hydroelectric dam in Croatia.

For six months in Russia, he developed some novel graphical methods for the design of industrial tanks, which he submitted as a thesis for his PhD at the university.

Solution :

La première fonction de Karl von Terzaghi comme un junior ingénieur concepteur chez l'entreprise Adolph von Pittel, Vienna. L'entreprise s'impliquait davantage dans le nouveau champ de génération de l'énergie hydro-électrique, Karl s'est impliqué dans les problèmes géologiques que l'entreprise a fait face. Ses responsabilités ont rapidement accrues, et en 1908, il a dirigé un chantier de construction, travailleurs, la conception et la construction des structures d'acier renforcées. Il a embarqué à un projet pour construire un barrage hydro-électrique en Croatie.

Pour six mois en Russie, il a développé quelques nouvelles méthodes pour la conception des réservoirs industriels, laquelle il a soumis comme une thèse pour son Doctrat (PhD : Philose doctor) à l'université.

Unit 6 Construction

Department of Civil Engineering and Hydraulics
Licence & Eng, 2024/ 2025

University of Jijel
By Salah Eddine BOUHENICHE

Unit 6 Construction

Construction

Construction means the **erection** or **assembly** of large structures, primary those which provide **shelter,** such as commercial and residential buildings. It also includes majors works such as, ships, aircraft, and public work such as roads, dams, and bridges.

The major element of a building include:

- The **foundation**, which **supports** building and gives its **stability**.
- The **structure**, which supports all the imposed loads and transmit them to the foundation.
- The **exterior walls**, which may or may not be part of the primary supporting structure.
- The **interior partitions**, which also may or may not be part of the primary structure.
- The **environmental-control** systems, including the **heating**, **ventilating, air conditioning, lighting** and **acoustical** systems.
- The power, water supply and **disposal systems**.

Jobs in construction are many and varied, ranging from architects to painters. However, every building needs a solid foundation on which the structured can be erected, paying special attention to the exterior walls which will need to withstand the elements. (Nick Brieger & Alison Pohl , 2007)

Reading & comprehension:

For what the structures are built?

What the construction covers/comprises?

Is the waste management systems included in a building design/construction?

Exercice 2: As exemple of the 12 basic components building structure the list below:

Expression/Term	Meaning/definition	French	Arabic
Roof	The roof forms the topmost component of a building structure. It covers the top face of the building. Roofs can be either flat or sloped based on the location and weather conditions of the area.	Toiture	سقف
Parapet	They are short walls extended above the roof slab. Parapets are installed	Parapet	حاجز الشرفة

	for flat roofs. It acts as a safety wall for people using the roof.		
Lintels	They are constructed above the wall openings like doors, windows, etc. These structures support the weight of the wall coming over the opening. Normally, lintels are constructed by reinforced cement concrete.	Lintaux	الأعتاب,السواكف عتبة الباب العلوية
Beams and slabs	They form the horizontal members in a building. For a single storey building, the top slab forms the roof. In case of a multi-storey building, the beam transfers the load coming from the floor above the slab which is in turn transferred to the columns. Beams and slabs are constructed by reinforced cement concrete (R.C.C).	Poutres et dalles	(الحزم والسقف)
Columns	Columns are vertical members constructed above the ground level. Columns can be of two types: Architectural columns and structural columns. Architectural columns are constructed to improve the building's aesthetics while a structural column takes the load coming from the slab above and transfers safely to the foundation.	Colonnes/poteaux	الأعمدة
Damp proof course (DPC)	DPC is a layer of waterproofing material applied on the basement level to prevent the rise of surface water into the walls. The walls are constructed over the DPC.	Barrière anti-humidité. (Etanchéité de la base)	دورة مقاومة للرطوبة
Walls	Walls are vertical elements which support the roof. It can be made from stones, bricks, concrete blocks, etc. Walls provide an enclosure and protect against wind, sunshine, rain etc. Openings are provided in the walls for ventilation and access to the building.	Murs	الجدران
Floor	The floor is the surface laid on the plinth level. Flooring can be done by a variety of materials like tiles, granites, marbles, concrete, etc. Before flooring, the ground has to be properly compacted and leveled.	Etage	طابق
Stairs	A stair is a sequence of steps that connects different floors in a building	Escalier	سلالم

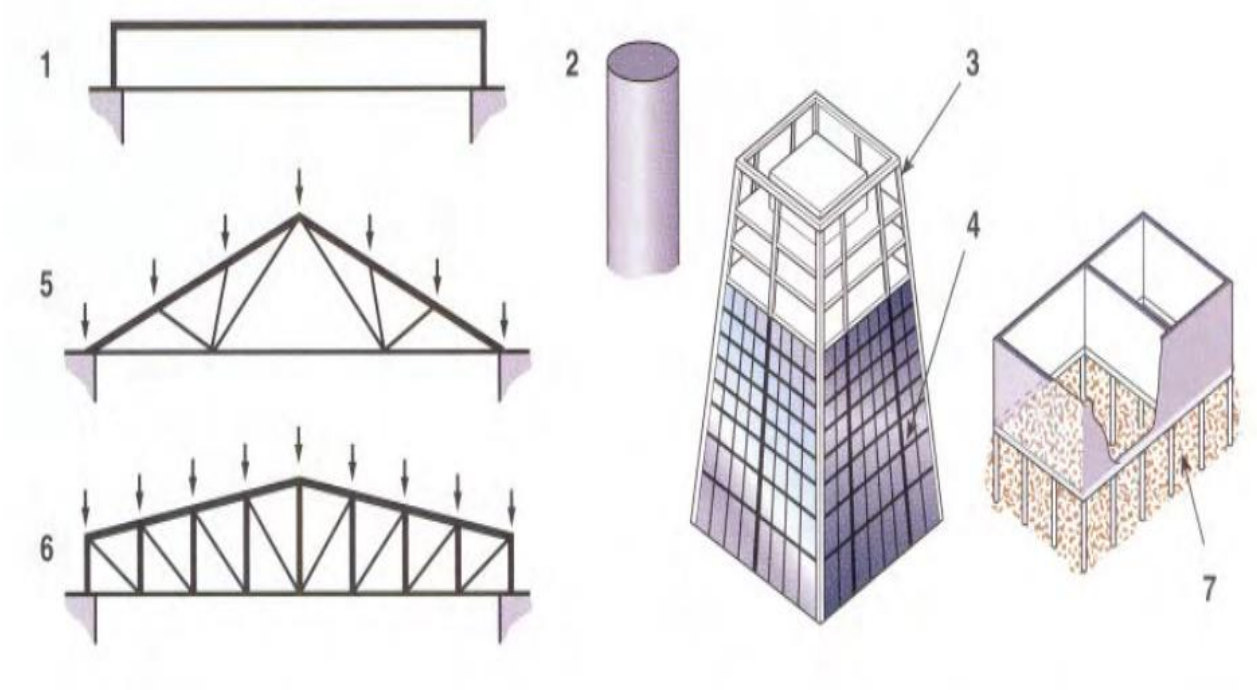
	structure. The space occupied by a stair is called as the stairway. There are different types of stairs like a wooden stair, R.C.C stair etc.		
Plinth	The plinth is constructed above the ground level. It is a cement-mortar layer lying between the substructure and the superstructure.	Socle	القاع
Plinth Beam	Plinth beam is a beam structure constructed either at or above the ground level to take up the load of the wall coming over it.	Poutre de socle	حزام القاع
Foundation	The Foundation is a structural unit that uniformly distributes the load from the superstructure to the underlying soil. This is the first structural unit to be constructed for any building construction. A good foundation prevents **settlement of the building.**	Fondation **tassement du bâtiment**	أساس

Ref: https://theconstructor.org/building/12-basic-components-building-structure/34024/

Exercice 3:

Label the following diagrams using the words below?

a) Pile foundations, b) steel girder, c) beam, d) Lattice girder, e) curtain wall, f)roof truss, g) columns



Solution: a➔7, b➔3, c➔1, d➔6, e➔4, f➔5, g➔2

Unit 7 Bernoulli's Theorem and its applications

Department of Civil Engineering and Hydraulics
Licence & Eng, 2024/ 2025

University of Jijel
By Salah Eddine BOUHENICHE

Unit 07

Introduction: In the field of civil engineering, hydraulics is applied in the design and construction of infrastructures like bridges, dams, canals, and sewage systems. It is used in managing water resources, including storage, control, transport, and measurement for domestic and industrial use. It is has a wide application for agriculture and other purposes, it has been applied to ease various aspects of everyday life. One of the best principle in hydraulics is given by Bernoulli's theorem, which will see in the following text.

Bernoulli's Theorem and its applications

Energy presents in the form of pressure, **velocity**, and elevation in fluids with no energy exchange due to viscous **dissipation**, **heat** transfer, or **shaft** work (pump or some other device). The relationship among these three forms of energy was first stated by Daniel Bernoulli (1700-1782), based upon the **conservation** of energy principle. Bernoulli's theorem pertaining to a **flow streamline** is based on three **assumptions**: **steady flow**, incompressible fluid, and no **losses** from the **fluid friction**.

Bernoulli's theorem provides a mathematical means to understanding the mechanics of fluids. It has many real-world applications, **ranging** from understanding the aerodynamics of an airplane; calculating **wind load** on buildings; designing water supply and sewer networks; measuring flow using devices such as **weirs**, **Parshall flumes**, and **venturi-meters**; and estimating **seepage** through soil, etc. Although the expression for Bernoulli's theorem is simple, the principle involved in the equation plays vital roles in the technological advancements designed to improve the quality of human life.

Extracted from "Applied Fluid Mechanics, Habib Ahmari & Shah Md Imran Kabir, 2023"

Exercise 1:

6- Cite 2 types of fluids energy.
7- What conservation law Bernoulli used to develop his theorem?
8- Based on what hypothesis Bernoulli built his theorem?
9- Cite 3 applications of Bernoulli's theorem.

Solution

1. The 2 types of fluids energy can be : Pressure energy and velocity energy.
2. The conservation law Bernoulli used to develop his theorem is the energy conservation law.
3. Bernoulli built his theorem based on three assumptions: steady flow, incompressible fluid, and no losses from the fluid friction.
4. The 3 applications of Bernoulli's theorem can be :
- calculating wind load on buildings ;
- designing water supply and sewer networks ;

-measuring flow using devices such as weirs.

Exercise 2: Give synonym or explanation for the words marked in bold, translate it into French and Arabic.

Expression/Term	Meaning/definition	French	Arabic
Velocity	Velocity is basically speeding in a specific direction. It is a vector quantity, which means we need both magnitude (speed) and direction to define velocity.	Vecteur de vitesse	شعاع السرعة
Dissipation	The process of disappearing or of making something disappear.	Dissipation	تبديد
Heat	The quality of being hot; high temperature. Heat transfer	Chaleur, Transfer de chaleur	حرارة
Shaft	a long, narrow part or section forming the handle of a tool or club, the body of a spear or arrow, or similar.	Arbre de transmission de mouvement.	محور ناقل الحركة, عَمود
Conservation Law	a conservation law is a statement that a certain quantity does not change over time.	Lois de conservation	قانون الانحفاظ
Streamline	design or provide with a form that presents very little resistance to a flow of air or water, increasing speed and ease of movement.	Ruisselle, coule	انسيابية
Assumptions	a thing that is accepted as true or as certain to happen, without proof.	Suppositions	الافتراضات
Steady flow	Stationary flow; flow without changing in time	Ecoulement stationnaire	تدفق مستقر
Losses	the fact or process of losing something or someone	Pertes	فقدان,خسائر
Fluid friction	Fluid resistance to flow	Frotement du fluide	احتكاك الماءبع
Ranging	Vary or extend between specified limits	Allant de… à	تتراوح
Weirs	a low dam built across a river to raise the level of	Deversoir	هدار

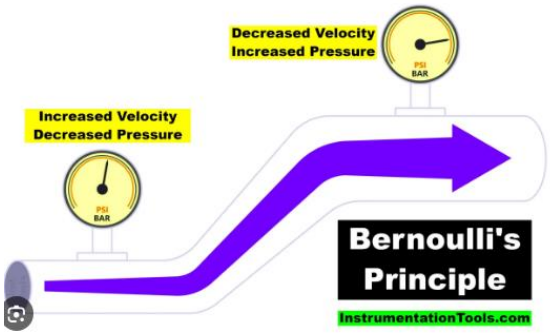
	water upstream or regulate its flow.		
Parshall flumes	an artificial channel conveying water	Canaux Parshall	مجرى برشال
Venturi-meters	are flow measurement instruments which use a converging section of pipe to give an increase in the flow velocity and a corresponding pressure	Giovanni Battista Venturi (Italian)	مقياس فانتوري
Seepage	Leakage, infiltration	Infiltration	تسرب

Exercise 3: describe terms of Bernoulli's theorem.

This is the Bernoulli's theorem expressed as follows for any two points located on the same streamline in the flow:

$$\frac{P_1}{\rho g} + \frac{v_1^2}{2g} + z_1 = \frac{P_2}{\rho g} + \frac{v_2^2}{2g} + z_2$$

1) What are the following parameters; give the definition of each symbol P, g,v,and z.
2) What kind of energy represent each term?
3) From the below figure 1, what type of conservation indicate Bernoulli equation?



Bernoulli's principle

Solution:

1) P: Pressure, g: gravity, v: velocity, z: elevation
2) The terms represent the following:
   First term: Pressure energy

   Second term: kinetic energy

   Third term: Elevetaion energy

3) Bernoulli theorem describe the energy conservation between 2 points of the streamline.

Exercise 4: Home work

Translate into French the below text.

Another important aspect of Daniel Bernoulli's work that proved important in the development of mathematical physics was his acceptance of many of Newton's theories and his use of these together with the more powerful calculus of Leibniz. Daniel worked on mechanics and again used the principle of conservation of energy, which gave an integral of Newton's basic equations. He also studied the movement of bodies in a resisting medium using Newton's methods.

Solution :

Un autre aspect important du travail de Daniel Bernoulli qui a montré l'importance dans le développement du physique mathématique est son acceptation de plusieurs théories de Newton et leurs usages conjointement avec les plus puissants calculs de Leibniz. Daniel a travaillé en mécanique et il a utilisé encore les principes de conservation d'énergie, qui a donné une intégrale des équations de base de Newton. Il a étudié aussi le mouvement des corps dans un milieu résistant en utilisant la méthode de Newton.