



CHAIRMAN'S CORNER



A year has passed since the publication of the first issue of the CES Newsletter in January 2008. This is the third installment of what we trust will become

a regular forum to update our students, alumni and friends on the latest news of the CEE Department and to share our ambitions and plans for the future. In this respect, 2009 is a pivotal year. In the coming months, we will be completing a number of "firsts": The new BS Program in Construction Engineering will accept its first batch of students in the fall of 2009 as pioneers in a new undertaking which we hope will grow in numbers, strengths and achievements over the coming years. Also in the coming fall, the CEE Department will be visited by the ABET accreditation team. I am pleased to report that the process of preparing for that first visit is well under way and we have full confidence in a positive outcome. In addition to setting the ground works for these two firsts, the CEE Department is continuing to sustain its current course and addressing a number of challenges and opportunities: Our PhD Program is now in its second year with a current

total of 8 active students in both the Civil Engineering (CE) and Environmental and Water Resources Engineering (EWRE) sequences. Given the very high demand on the field, our undergraduate enrollment numbers have practically doubled in the past five years, all while the cut-off scores for acceptance into the program have seen a sharp increase in the same period. Catering for the current levels of undergraduate students is presenting significant challenges to the faculty and straining our resources. Partly in an attempt to respond to this challenge, we are currently recruiting new faculty members in the areas of Structural Engineering and Construction Engineering. Some of the potential short listed candidates will be visiting us shortly for formal interviews and presentations.

All of us in the CEE Department, faculty and students continue to feel that we are members of a special group of individuals, joined together by a long standing tradition and pride, and a continued commitment to each other and to the institution. In these very hard times of political and economic instability and tragedies around us, such a bond is as valuable as it is reassuring. With my best wishes of safety, continued success and prosperity to all,

Salah Sadek

ABET VISIT SCHEDULED FOR NEXT YEAR

amirsalam Representatives from the Accreditation Board of Engineering & Technology (ABET) will be visiting the Civil & Environmental Engineering (CEE) department next year.

ABET is a non-profit organization that accredits post-secondary (college and university) programs in the United States and internationally; it certifies that the programs meet the quality standards set for the profession. ABET has been recognized by the Council for Higher Education Accreditation (CHEA) since 1997.

ABET is composed of 28 professional and technical member societies that own and operate the association. These societies set the quality standards that programs must meet to be ABET-accredited.

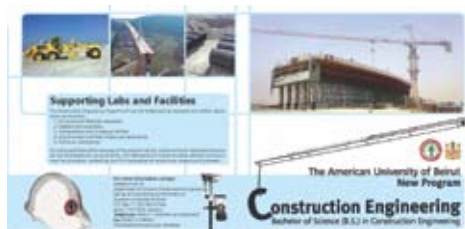
Member societies include professional organizations such as ASCE, ASME, IEEE, AAEE, ACSM, AIAA, AIChE, ANS...

Accreditation is a voluntary process which is instigated by the institution or program seeking the recognition. It is valuable not only because it helps students and parents choose, and employers recruit from quality programs, but also because it provides a

NEW BS DEGREE IN CONSTRUCTION ENGINEERING

maysamkamar Following the significant population growth rates in the world and the region and the rising need for infrastructure development, Civil Engineering has recently become the most sought after field in engineering. The Department of Civil & Environmental Engineering (CEE) at the American University of Beirut (AUB) has offered the major for many decades now. However, many students opt for civil engineering with only one of its

branches in mind: Construction. This is in part why the CEE department at AUB has decided to offer a new three-year BS program in Construction Engineering. As of Fall 2009, AUB will be the first college to introduce Construction Engineering to the region. The degree is already offered in several universities overseas. The main focus of the program will be construction; it will not deliver as thorough a design background in transportation, environmental, geotechnical and structural engineering as the current civil engineering curriculum does; it will nonetheless provide the admitted students with a broader understanding of the factors that govern construction. Those include, among others, construction materials, equip-



CONTINUED ON P.3

SALAH SADEK NAMED DEPARTMENT CHAIR

amirsalam Professor Salah Sadek has been named department head of the department of Civil & Environmental Engineering at the American University of Beirut starting fall 2008-2009. Dr. Sadek joined AUB in 1980 as an undergraduate student in Civil & Environmental Engineering and graduated 4 years later in 1984. He then left to pursue graduate studies in the US which culminated in a Ph.D. in Geotechnical Engineering from the University of California at Berkeley. It is during these years that Dr. Sadek found his career interest: "It was during my graduate years that I found out that I was interested in a career in academia and teaching and that I could be good at it. I developed during those years an ability to convey ideas and concepts to colleagues and interested faculty". He then joined the CEE department at AUB in September 1993. During his years at AUB, Prof. Sadek has expanded his research interests to include work on: Fundamental characteristics of clays and clay minerals, alternative landfill cover systems, shear strength characteristics of solid wastes and their evaluation, the use of GIS in siting landfills and other infrastructure systems, seismic hazard evaluation, geotechnical earthquake engineering and ground improvement techniques. Immediate challenges facing Prof. Sadek and the CEE Department are the imminent launching of the Construction Engineering BS degree and the ABET accreditation endeavor,

both of which are scheduled for next fall. When asked about recommendations to students to prepare for a career, Dr. Sadek stated: "I think you have to have an open mind; to plan but not over-plan. Life in a way brings certain opportunities that you have to be ready to take"; "Do not be a one-dimensional person, explore things that you may not have a chance to be involved in later on" he adds. And when asked about what he sees as prerequisites of success, he replied: "I don't think there is a single recipe for success; there are clear recipes for failure. There is a measure of luck associated with success but luck favors the prepared". Professor Sadek, like most of the faculty members, considers our program to be one of the best programs worldwide. He sees many reasons for that, most important of which are the existence of a very good pool of undergraduate students, highly qualified faculty members, the availability of necessary facilities, and the simple fact that the program is a thorough and rigorous 4-year program with summers. "When you take all these things together, and look at what comes out of the system, the product, in this case the graduating students, is very well prepared to either enter the job market or continue onto graduate studies contributing almost immediately upon graduation". We all wish Prof. Sadek a fruitful 3 year chairmanship at the department.

DR. PASCAL SAIKALY JOINS THE CEE DEPARTMENT

lilianmalaeb Dr. Pascal Saikaly has recently joined the Civil and Environmental Engineering department at AUB as an Assistant Professor in the field of Environmental Engineering. Dr. Saikaly earned his Bachelor's degree in Biology from AUB in 1997 and received his M.S. in Environmental Technology in 2001. He earned his Ph.D. from the University of Cincinnati, Ohio; His doctoral research lead to the development of a novel ecological approach to mitigate toxic loads in activated sludge. As a professor at AUB, Dr. Saikaly describes his experience as rewarding. Comparing the two experiences he has had at AUB and at the University of Cincinnati, Dr. Saikaly notes that the same courses that are being taught at UC are being taught at AUB: "Given the smaller number of professors at AUB, our teaching load is greater than that of colleagues at UC; We hope that our numbers will grow in the near future, particularly given that we have now started with the PhD program." He also adds that the quality of students at AUB is the same and even better than UC. The University of Cincinnati is a research institute, as such the main focus of professors there is on research. On the other hand, professors at AUB try to maintain a good balance between research and teaching. With the start of the PhD program, he is nevertheless optimistic that AUB will become more competitive in the field of research. Dr. Saikaly's research interests lie at the interface of microbial ecology and environmental biotechnology. Specific areas of interest include: Bioremediation of Emerging Contaminants,



Biological Wastewater Treatment, Public Health Microbiology, Environmental Sustainability, and Microbial Ecology of Engineered and Natural Systems. The research trend in Environmental Engineering both at AUB and abroad is now more directed towards Environmental Sustainability (i.e. bio-energy and renewable energy resources).

When asked about the reasons for choosing to return to AUB, Dr. Saikaly stated that "in order to succeed in academia you have to find your niche and AUB has always been my niche". The start of a PhD program in Environmental Engineering is another reason for coming back, and loving to serve people is yet a third reason and "there is no better place to do this than AUB".

GO GREEN Improving your fuel economy

- Blow up your car: keeping your car's tires properly inflated can improve your gas mileage by up to 3%
- Take the load off: emptying out unnecessary items makes the vehicle lighter and hence more fuel-efficient
- Driving at 100kph instead of 120kph can improve fuel economy by up to 15%
- Don't drive aggressively, think steady and smooth!
- Think twice before you ventilate: turning on the air-conditioner causes your car to consume more fuel.
- Replacing a clogged air filter can raise fuel efficiency by as much as 10%

ABET VISIT SCHEDULED FOR NEXT YEAR

mechanism to evaluate and continually improve the program. Until around a decade ago, the criteria were primarily focused on the program itself (curricula, faculty, facilities...) rather than its students. After adopting Engineering Criteria 2000 (EC2000) in 1997, there has been a shift of emphasis. The new criteria now focus on the final product: the students and what they are learning rather than what they are being taught. The CEE faculty sought accreditation almost 4 years ago but the ABET review team was not able to visit AUB due to the security concerns and the US Department of State travel advisory in effect at the time. Nonetheless, the accreditation process of our program is once again moving ahead making this the 1st time the program goes through the entire process and most likely gets accredited. When asked about the reasons for seeking accreditation, Prof. Sadek stated that "the accreditation is not a goal on its own; there is significant value in the process itself. The accreditation requirements mandate that a process is put in place that allows the implementation of quality control and quality assurance measures. In fact, we are required to state clear goals, indicate how we plan to achieve those goals, and to show through a number of assessment indicators that we have actually reached the set objectives. The process involves seeking feedback and suggestions from students, alumni, and employers". As part of the accreditation process, representatives from ABET will be visiting the CEE program next year, supposedly in the fall of 2009. During their campus visit, the evaluation panel will, in addition to going through course material, student projects, and sample assignments, interview faculty, students, and administrators to verify whether the specified criteria are met. The primary objectives of the campus visit are to make a qualitative evaluation of educational attributes that cannot be documented in a written questionnaire, and to conduct a detailed examination of the materials compiled by the program. Let us all contribute to the success of this endeavor.

NEW BS DEGREE IN CONSTRUCTION ENGINEERING

ment and technologies used in the discipline, economics, cost analysis and control, and management and logistics. Because the Construction industry in the Arab Gulf region is estimated to be worth close to one trillion dollars in active projects: "The Department of Civil and Environmental Engineering believes the Construction Engineering Program will help FEA attract outstanding students and contribute even more to the development of Lebanon and the region". The 110-credits BS degree is designed to be completed within three years (beyond the freshman level). For Lebanese students, this however will not be enough to join the local Order of Engineers. To do so, interested graduates of the program will need to seek a graduate degree in the same or a related field. The CEE Department plans to have an MS program in Construction Engineering up and running within two to three years. Twenty to twenty five students are expected to join the program in its first year. Finally, since construction engineers fall under the same job category as their fellow engineers (civil, mechanical, electrical and communications), the tuition for the BS degree will be the same as that of other fields offered in the faculty. Interested? More information about the new program can be found on the CEE website: <http://webfea.fea.aub.edu.lb/fea/cee>

MR. HELMI EL KHATIB: RECIPIENT OF THE AUB SERVICE EXCELLENCE AWARD 2008

lorislikhanian "It is a thank you for performing not only your duties, but also excelling in services that enhance AUB's academic reputation". With these words, Mr. Helmi El-Khatib described the meaning of the Service Excellence award he received. "It gives you a feeling that there are people who appreciate your efforts beyond the simple job description or requirements, which pushes you to go even further". Mr. Khatib graduated from Toledo, Ohio in 1988 and returned to AUB as an Instructor. He was later chosen to be the Supervisor of the Civil Engineering labs, and in 2005, he was promoted to manager and nominated for the award for the first time. The nomination and election procedure is reserved to on-campus staff, and is based on the opinions of the academic body, clients who have direct business with the nominees, and medical notes in the case of AUH staff. When asked about what motivates him and keeps him going, he replied: "I teach the courses I like as an extra service in a truly great department in which staff members cooperate as equals". As a final word, Mr. Khatib had the following to say: "I view all students as my own kids who are capable of continuously improving even though there may be some who



have a tendency to misbehave". Mr. Khatib also admits that he misses the old days at AUB, most notably when students and professors were a more homogenous body, organizing regular activities together (weekly dinners and sports events).

SUMMER VOLUNTEERING CAMP: AN ONGOING SUCCESS

catherineshadarevian The Civil Volunteering Camp was introduced by the Civil Engineering Society (CES) in 2006. The inaugural edition of the camp consisted of 15 students, and has had increasing success ever since. The following year, the camp had almost grown threefold into a group of 40 participants. The AUB Summer Camp 2008 camp was extended to 10 days and had for the first time 60 participating students from all engineering and architecture departments as well as the department of Landscape Design and Ecosystem Management (LDEM).

This year's camp was organized by the CES in conjunction with the Center for Civic Engagement and Community Service (CCECS) at AUB directed by CEE professor Mounir Mabsout, Mr. Rabih Shibli, director of Beit bil- Jnoub, and Mr. Khaled Joujou, ECE department labs manager. Funds and logistics were provided by the following institutions and departments:

- Center for Civic Engagement and Community Service (CCECS) at AUB.
- Task Force for Reconstruction and Community Service (TFRCS) at AUB.
- Faculty of Engineering and Architecture (FEA) Dean's Office.
- Beit bil- Jnoub Initiative.
- UN-Habitat, Lebanon.

The camp aims at promoting team work amongst students, whilst providing them with an opportunity to apply the knowledge they have acquired in real life. The camp also provides the participants with the chance to discover the benefits of volunteer work and community service in a pleasant environment, while getting a chance to know some of their professors better.

The main location for this year's camp was in the cazas of Sour, Bint Jbeil, Marjeyoun, and Nabatiyye in South Lebanon. Students were divided into several groups based on their majors and were each assigned a specific task in different villages. Their day would start at 7:00AM with breakfast, and then it is off to work in the various units until the late afternoon.

A group of Civil Engineering (CE) and Architecture students surveyed the old district of the Jibbein village and assessed the condition of its historic stone houses. The students produced needed detailed maps of the area, in addition to identifying the houses that were in need of significant rehabilitation. Meanwhile, in the war ravaged village of Qlaile, a group of other CE students were engaged in re-construction work on several of the many construction sites across the village. Together with some extra-departmental students with curiosity for construction work, they supervised the sites, prepared steel reinforcement, poured concrete, and did some finish-



ing works. Beit bil- Jnoub provided the logistical support for these activities.

A group composed of Computer, Electrical, and Mechanical Engineering students, installed computers and offered daily computer literacy lessons to the children in the village and to municipality employees in the villages of Aitaroun, Markaba, Qlaile, and Tayr Harfa, in coordination with UN-Habitat. Students from the LDEM department were mostly active in the villages of Zawtar and Deir Qanoun. The municipalities of these villages extended a request for a design of a playground and a public central space. In compliance with this request, the students surveyed the areas, met with the villagers concerned with the projects and eventually produced a design that was met with the approval of the municipalities. The proposed design will be implemented in the very near future. Apart from the various engineering and landscape tasks, all students were engaged in community service around the villages of Aytaroun, Ainata, Markaba, and others. The services provided ranged from planting trees to cleaning roads, and challenging village kids to a hearty game of volley-ball or football.

The participants of this year's camp were put up at Victory Village Hotel in Sour, which was booked in its entirety by the 60-person group. The camp got bigger when the chairs of both the CEE and ECE departments, Prof. Salah Sadek and Prof. Karim Kaban respectively, showed up on a surprise visit; they stayed and worked side by side with their students and shared some pleasant and enjoyable evenings getting to know them better. Every work day lasted from 07:00 to 18:00 and at the end of it, the participants would hold meetings to discuss the progress that each group had attained. Anytime outside the working hours was "free time". The students kept themselves busy during such downtime with activities ranging from DOTA tournaments to taking a midnight swim in the sea nearby. All in all, the camp was described as a fun and useful experience which offered a chance to learn, forge friendships, contribute to the society, and simply have a good time.

ALUMNI

We want to hear from you!
Send us your news (recent publications, honors, promotions...) with photos to civilnews@aub.edu.lb



THE CIVIL ENGINEERING SOCIETY

ramseynasr The Civil Engineering Society (CES) represents the link between the civil engineering student body and the faculty at AUB. The society and its cabinet are in a way the student representatives in issues concerning academia. While the CES agenda aims at improving and facilitating students' academic experiences, it also seeks to improve student-student and student-instructor ties by organizing events such as periodic dinners and the CES summer camp. When students are faced with any particular problem or have any suggestions or requests, the CES takes it on itself to try and facilitate solutions that please all parties involved. An example of such a case would be the introduction of extracurricular AutoCAD sessions for any interested civil engineering students. Other such sessions

and academic events are in the works and will be made available to all CES members in the near future. The society's two-term former President, Nadim Azar, told us how when he took office the society was less than it is today; the membership in the society was low at that time and it initially offered very little to its members. During his two years as president, Azar and the cabinet made a lot of considerable changes; they introduced the annual summer camp as well as the traditional dinners and galas, which have been gaining increasing success over time. Today, the membership toll stands at 184. Upon his graduation and departure from AUB, Azar received two awards symbolizing the appreciation of students and faculty alike for his services. With regards to CES' news forum, the CES newsletter, last year's editor in chief, Narine Bolghourjian, spoke to us

about her experience within the society both as the CES secretary in 2006 and the editor-in-chief of the newsletter last year. Narine participated actively in many events and provided key contributions to the organization of the 2006 summer camp and the introduction of the AutoCAD sessions. Upon graduation, she received the Distinguished Graduate Award after demonstrating high academic achievement and outstanding character and contribution to the department. This year's eight member cabinet was elected on Monday December 22nd, and saw elections for the second and third year seats only. With the cabinet's mission now well-known to the reader, it will be the cabinet's duty to adhere to it in order to serve the civil engineering student body at AUB in the best way possible.

CHRISTMAS DINNER AT HOLIDAY INN

ramseynasr The annual Christmas Dinner this year was held at the Holiday Inn, Verdun, and included for the first time students from all engineering branches, as all five societies joined efforts in order to make it a successful event. Tickets sold out, and then oversold, as students were eager to attend the dinner and have a good time. The atmosphere was a warm and joyous warm-up for the upcoming big occasion that was Christmas. The hotel provided a buffet type of menu, and for drinks, opened its bar for students. The dinner was a huge success not only in terms of ticket sales, but in terms of meeting the expectations of those who attended. A tombola competition was also held with valuable prizes being distributed at the end of the evening. Merry Christmas!



CEE ALUMNUS LETTER: THE AUB/CEE EXPERIENCE



I was fortunate to join AUB after the long and painful civil war. At the time, student campus involvement and activities were on the rise, dreams were big

and unbounded, and people had hope and faith in a prosperous bright future for the country.

After completing a Bachelor degree in Civil Engineering in 1996, and a Master of Engineering Management in 1998, I worked at Dar Al-Handasah Consultants, the Council for Development and Reconstruction (CDR), and was later appointed project manager at Ayman Sanyoura Architecture & Management firm. After much thought and deliberation, I decided to pursue graduate education at

the University of Michigan in Ann Arbor where I have so far completed a Master in Civil Engineering, and am currently working towards my PhD degree.

In the contemporary era of global challenges, unknowns, uncertainties, and stagnant economies, the valuable asset that we all cherish, our AUB/CEE experience, keeps increasing in value. One needs only to look at the number, quality, and background of incoming CEE students to see that the department's exceptional standard of education is highly desired, and is in no way affected by the increasing number of educational institutions in Lebanon and the region. The recent addition of the undergraduate program in construction engineering, as well as the long-awaited re-launching of PhD programs are a testament to the CEE department's vision and ability to quickly and wisely react to

the needs of the global markets. Another asset of the CEE department is having teachers of exceptional character, professional conduct, and profound knowledge in their field. Having taken courses at a major US university, visited other campuses, and attended professional conferences, I can confidently say that the CEE faculty at AUB are amongst the best that there is. With all the benefits we have gained from spending hours in the classrooms of the Bechtel building, one must take a moment to think about giving back. Financial contribution is very important, but I do encourage all alumni and friends to keep an ongoing relationship with the current department leadership and faculty. Moreover, I believe we should all try to play a role in supporting incoming CEE students to keep our tradition of excellence alive.

Mustafa Saadi

THE FINANCIAL CRISIS AND CIVIL ENGINEERING

zakariaelmir Toyota, the mother company in the automobile sector is expected to announce its first loss in over 70 years. A USD17 billion bailout plan may be insufficient to rescue GMC, Ford and Chrysler from bankruptcy. Latin American countries are apprehensively preparing for their lowest expected economic growth rates in over 6 years; and the list goes on. The question to ask then is where does "civil engineering" stand in the ongoing economic crisis? Will increasing unemployment rates and recent lay-offs affect the construction and development sectors? Recent events suggest that it already has. Thousands of workers, including civil engineers, are being laid off as of the coming fiscal year.; Al-Shafar General Contracting, as well as the well-known Emaar and Nakheel are among those developers downsizing based on a modest 2009 performance forecast. Let us, however, review some statistical data regarding this matter before perhaps doubting the chosen path into the field of civil engineering.

According to MEED, the Middle East's primary business intelligence source, the amounts per month in billions of dollars of contracts awarded in the Middle East and North Africa are as summarized in table 1.

Table 1: Values of Contracts Awarded across the Middle East per month

2007		2008	
January	USD 6 billion	January	USD 15.4 billion
February	USD 8 billion	February	USD 9 billion
March	USD 9 billion	March	USD 12 billion
April	USD 12 billion	April	USD 12 billion
May	USD 5 billion	May	USD 22 billion
June	USD 5 billion	June	USD 6 billion
July	USD 8 billion	July	USD 17 billion
August	USD 6 billion	August	USD 3.5 billion
September	USD 6 billion	September	USD 11.4 billion
October	USD 6 billion	October	USD 2.5 billion
November	USD 2.4 billion	November	USD 7.7 billion
December	USD 10 billion	December (until Dec10)	USD 3.5 billion
Total	USD 83.4 billion		USD 122 billion

These numbers include projects pertaining to construction (transportation, environmental, and real estate) as well as communication and other fields. Note, however, that contracting and construction form the bulk of contracts in the region. Clearly, the boom is obvious. Furthermore, when considering that most ongoing projects have delivery dates that extend beyond 2010-2012, our mind can be set at ease; even with the recent layoffs, the common expectation is that there will be no critical decline in the demand for civil engineers anytime soon. For instance, a USD 1.5 billion railway expansion project is well underway in Algeria. Roads and highway construction contracts are being awarded on a monthly basis in just about every country in the region not to mention the financial centers, technology parks and industrial regions that are emerging in Saudi Arabia at an extremely fast pace. That is to say the future still looks bright for the field of civil engineering. With the highest demographic growth rates in the world, and a serious lack of infrastructure, civil engineers in the Middle East are no way near facing the same magnitude of decline that other fields have suffered from the economic crisis.

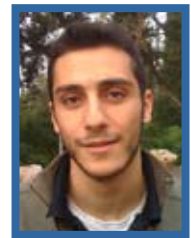
ARE YOU WORRIED THAT THE CURRENT ECONOMIC CRISIS WILL AFFECT THE EMPLOYMENT OPPORTUNITIES OF CIVIL ENGINEERS IN THE NEAR FUTURE?

Here is what some CEE students and one of their Professors had to say about the issue.



Caline Nassar, 3rd Yr :
"No. Even if the number of jobs decline in the Gulf, I'm sure I'll find a job in Lebanon since it hasn't shown signs of the crisis...or perhaps Europe."

Rami Debs, 3rd Yr:
"Somewhat. We have seen many layoffs in the Gulf recently. If one is unsuccessful, however, in finding a job over there, one could always work in Lebanon until things get better."



Karim Taleb, 4th Yr:
"No. Employment chances in the Gulf might be minimized but there's no need to worry. There's Jordan, Qatar or Europe to consider...or pursue a Masters Deg. while riding out the crisis."

Prof. M. Harajli: "No. There is an effect on the job market, but I'm optimistic...there is no 'big problem' here for civil engineers. With a new US president, things will change to the better sooner rather than later."



SKYSCRAPERS

zakariaelmir

Megaprojects are perhaps the most exciting challenges civil engineers face in their professional life. In 1889, the Eiffel Tower was the world's tallest structure with its 324 m. Four decades later, in 1931, New York's Empire State Building surpassed it and earned the 'tallest structure' title with a height of 384 m.

Today, after the Sears tower in Chicago, the PETRONAS towers in Malaysia, the Taipei 101 in Taiwan and several other iconic skyscrapers, it is Dubai's turn to hold the trophy: Burj Dubai, still 150 m shy of its final height, is already the world's tallest building standing at over 710 m.

Figure 1, provides a comparison of the heights of several of the world's high rise buildings.

The construction of the four billion dollar project began in September 2004. Designed by the American architecture firm Skidmore, Owings and Merrill, the contractors are Belgian Besix, Emirati Arabtec and Korean Samsung Engineering and Construction. The expected completion date is around mid-2009. The American Turner Construction Company is responsible for managing the construction process.

Structurally, the tower's foundation lies on a set of 192 piles with depths greater than 50 meters. Around 40 thousand tons of steel and 330 thousand tons of concrete will have been used in the building once it is complete. Grades 35 and 80 are used for slabs and vertical shear walls, respectively. Three cranes are used for lifting materials to the top of the

skyscraper, each with a capacity of 25 tons, of which 8 tons are used by the 900 meter cables alone. There are currently over 7000 workers on the project.

The tower was designed to stand for a century, unlike the usual 40 years average for reinforced concrete structures. Among the records held by the project is the concrete pumping height: 601 meters is the current record, achieved by the combination of two concrete pumps manufactured in Germany, with pressures reaching as high as 320 bars.

The interior of Burj Dubai will be designed by designers at Giorgio Armani who will also own the lower 37 out of the 160 available floors, where they will open an Armani hotel, the first of its kind.

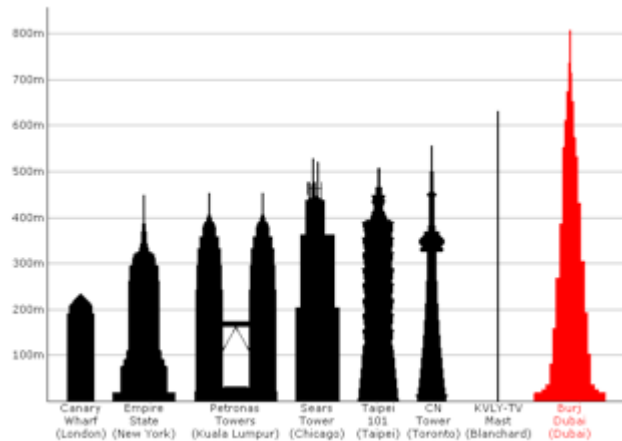


Figure 1: Height comparison of several structures with Burj Dubai

Ethics Corner

Mary discovers that her plant is discharging a substance into a local river. The substance is not regulated by the government. She decides to do some reading about the substance and finds that some studies suggest it is a carcinogen. As an engineer, she believes she has an obligation to protect the public, but she also wants to be a loyal employee. The substance will probably be expensive to remove, and her boss says, "Forget about it until the government makes us do something. Then all the other plants will have to spend money too, and we will not be at a competitive disadvantage." What should Mary do?

Source: *Engineering Ethics, Concepts & Cases, 3rd Edition*

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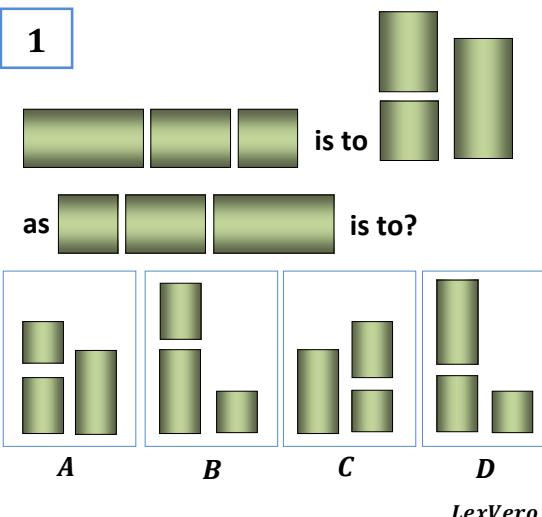
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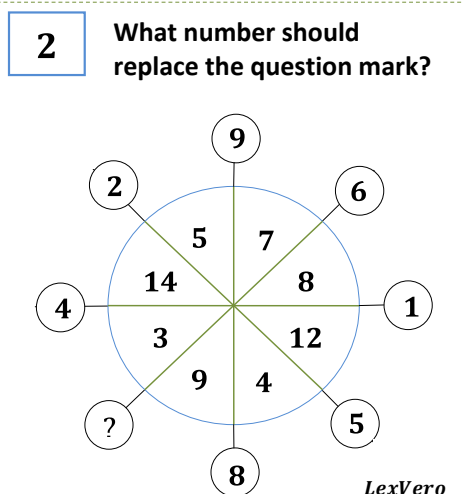
Brain Gymnastics

1



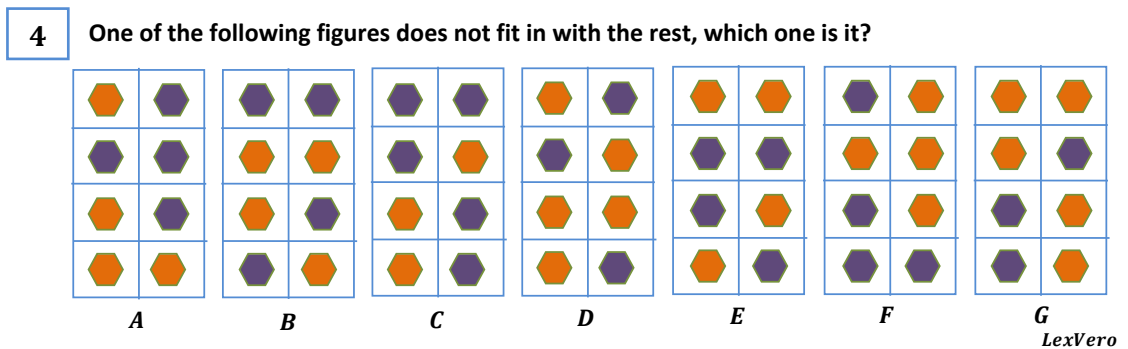
LexVero

2 What number should replace the question mark?



LexVero

4 One of the following figures does not fit in with the rest, which one is it?



LexVero

3 What are A, B and C?

3	A	6
C	4	B
B 2 B A		

LexVero

1 B: Boxes are rotated vertically. The left one is placed to the right and the two others, placed on top of each other left of it.

2 9: Every set-up of three numbers (2 circle num. and the segment in between) add up to 21.

3 A=7, B=1 and C=8. This is an addition operation.

4 D: A has same pattern as F, only the orange and purple dots have switched places. The same with B and E, and C and G.

Key