English for electrical engineering
Part One

This material is for the first semester of Automation Technology, Computer Engineering and Communication and Media Technology students. The compulsory course comprises two semesters. At the end of each semester a written test needs to be passed. Additionally a presentation should be given in the second semester that allows for bonus scores.

Overview – complete course

unit	content	skills	notes
1. Course of study	place of study, structure of course, courses, graduation	reading, talking	a taste of structure - nouns
2. History of electrical engineering	development, famous scientists, technical English	reading, taking notes, dictionaries, poly-semantic words	a taste of structure - verbs
3. Language of mathematics and graphs	basic maths terms, distribution and equations,	describing graphs in speaking and writing	a taste of structure – adjectives, conditionals
4. Computers and IT	hardware components, networks, simple software	describing computer configurations, reading	a taste of structure – relative clauses
5. All about circuits	circuits, components, laws, electrical field	presentations – structures, visuals, audience	defining and describing
6. Engineering materials	conductors, semiconductors, insulators	body language, dealing with questions	
7. Instruments and tools	mechanical tools, software tools, p-spice	reading and writing instruction manuals, technical components	
8. Measurement and physical / technical units	measuring errors, uncertainties, shapes	describing, defining, analysing	
9. Laboratories and experiments	lab instruments and experimentation, technical documentation	reporting	

UNIT ONE – STUDYING IN JENA

1 Studying at the University of Applied Sciences Jena

The University of Applied Sciences Jena was ______(1) on 1st October 1991 as one of the first educational institutions of its kind in the new federal states. In the intervening period it has evolved to become a key component of higher ______(2) in Thuringia and beyond. Around two thirds of _______ (3) come from Thuringia. In addition to students from the neighbouring *Länder* or federal states of Saxony, Saxony-Anhalt and Hesse, the University of ______ (4) Sciences Jena is also attracting a growing number of foreign students. There are many reasons why prospective students choose to ______ (5) at the University of Applied Sciences Jena

Fill the blanks with a suitable word.

One reason is the city itself, with its student life and high-tech, and its attractive location in the Saale valley. Another reason is the practical, science-based courses offered by the UAS Jena. The University of Applied Sciences Jena currently offers 24 study programmes in eight disciplines, including 13 diploma courses, three dual courses, six bachelor and two master degree courses. As part of the restructuring of the range of courses on offer, in the next few years further bachelor and master programmes will be added to those already on offer at the UAS Jena.

Why do so many students choose to come to the UAS Jena?
What has changed since this text was written?

The University of Applied Sciences Jena has its own attractive and modern campus situated on Carl- Zeiss-Promenade; it comprises five buildings with spacious lecture theatres, seminar and meeting rooms, computer pools, laboratories, a specialist library with over 260,000 books, a sports hall, fitness rooms, a cafeteria and a refectory. At the moment, some of the departments are still housed in leased space on the Carl Zeiss Jena GmbH site next door. When the final building phase is completed, the campus of the UAS Jena will have 28,000 m^2 of useable space at its disposal.

List 6 facilities that the students can use.

In the interests of providing_______(1) , practice-oriented education and training, the UAS Jena cooperates with _______ (2) education institutions and businesses worldwide. This collaboration is not restricted to an exchange of students and______(3), but also extends to joint ______ (4) projects, practical training and final degree projects. For example, students of the UAS Jena can complete their periods of practical training in ______ (5) global companies such as Zeiss, Jenoptik, Siemens, Bosch and IBM or in major research institutes such as the Jena-based Institut für Molekulare Biotechnologie (Institute for Molecular Biotechnology), one of the contributors to the ______ (6) project.

Write the words in correct spelling.

1 brɔ:d
2 'haiə
3 'saiəntɪsts
4 rɪ'sɜ:tʃ
5 'meidʒə
6 'dʒi:nəʊm

Teaching and research at the UAS Jena are particularly influenced by the many regional cooperation programmes with companies and research institutions in Jena and East Thuringia. In addition to many bilateral contracts, cooperation in the field of engineering science and technology increasingly

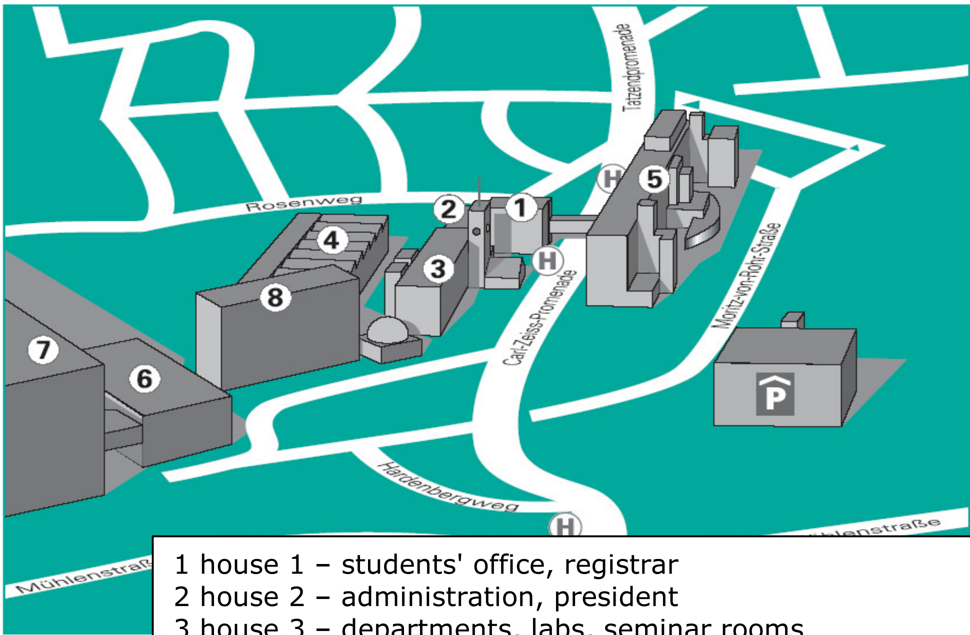
What is English for ....

a) besonders
b) Forschungseinrich tungen
c) Vertrag

involves embedding the UAS Jena in various branch and/or technology-specific networks and centres of competence. These regional networks bring the University of Applied Sciences Jena and the Friedrich-Schiller- Universität Jena together with a number of research institutes based in the region, numerous companies, financial service providers and local government institutions. Students benefit from this situation in a multitude of ways. Thanks to the UAS Jena's participation in networked research projects, the newest findings in the relevant technical fields at national and international level are incorporated into the students' education. Networking also initiates new courses and opportunities at the UAS Jena. These relate closely to the future needs of the economy and thereby guarantee our graduates excellent opportunities for starting and advancing in their chosen career.

d) einbeziehen, einbetten
e) Kompetenzzentru m
f) Geldgeber
g) Nutzen ziehen, profitieren
h) Bedürfnisse, Anforderungen
i) Absolvent

Taken and adapted from www.fh-jena.de



1 house 1 – students' office, registrar
2 house 2 – administration, president
3 house 3 – departments, labs, seminar rooms
4 house 4 – under construction, future labs, lecture halls, departments
5 house 5 – library, lecture halls, cafeteria, departments,

Student's Life

2 Read the text "British Universities" as an introduction.

2.1 Underline all words that are connected with studying and the student's life.

2.2 Form five questions according to the answers given below:

.... ?	97 universities.
.... ?	A grant
.... ?	To supplement their grants.
.... ?	No, they can't.
.... ?	3 years.

FACT FILE: British Universities - Did you know...?

- There are 97 universities in Britain, including the Open University. 31 former Polytechnics were given university status in 1992, as part of a government campaign to increase the number of graduates.
- Students may receive a grant from their Local Education Authority to help pay for books, accommodation, transport and food. This grant depends on parental income.
- Most students live away from home, in shared flats or hall of residence.
- Students don't usually have a job during term time because the lessons, called lectures, seminars, classes or tutorials (small groups), are full time. However, many students now have to work in the evenings to supplement their grants.
- Students do a wide range of summer jobs and holiday jobs at Christmas or Easter.
- Students cannot usually repeat a year. Failing exams is very serious.
- The social life is excellent with a lot of clubs, parties, concerts, bars ...
- Most degree courses last 3 years, languages 4 years (including a year spent abroad). Medicine and dentistry courses are longer (5-7 years).
- University life is considered 'an experience'; the exams are competitive but social life and living away from home are also important.

3 Role Play - Work in pairs. One of you is a student of the University of Applied Sciences Jena, the other one is an English speaking guest from another country.

You may use the following facts:

Thuringia - the Green Heart of Germany, Weimar, Erfurt, Carl Zeiss, Friedrich Schiller

6-7 semesters, enrol for different courses of studies, about 4,800 students, 1991, new campus by the year 2008, student's advisory office, Registrar

Courses of studies:
Social Work Studies (+ Nursing)
Biotechnology
Business Administration
Electrical Engineering
Process Integrated Environmental Protection
Industrial Engineering
Materials Engineering
Mechanical Engineering
Mechatronics
Medical Engineering
Optometry
Physical Technology
Precision Engineering
....

4 Information

What is different in the United States? Read the following passage and find it out.

School, College, & University

In the United States, the word "school" describes any place where people learn. You can call a college a "school." You can even call a university a "school." You can use the word "school" for any English language Institute, **graduate program**, or secondary ("high") school.

College or university follows after high school, or secondary school. A college in the U.S.A. is not a **high school or secondary school**. College and university programs begin in the thirteenth year of school, when a Student is 17 or 18 years old or older. A two-year college offers an Associate's Degree. A four-year college or university offers a **Bachelor's Degree**. Programs that offer these degrees are called "**undergraduate**" schools.

A "university" is a group of schools for studies after secondary school. At least one of these schools is a college where students receive a Bachelor's Degree. The other schools in a university are "graduate" (also known as "postgraduate") schools where students receive advanced degrees. Therefore, a university offers both the Bachelor's Degree and graduate degrees such as the Masters **(M.A.)** and Doctorate **(Ph.D.).**

You can earn a Bachelor's Degree at either a college or a university. However, students in the U.S.A. prefer to use the word "college" rather than the word "university" when they talk about the four-year undergraduate program and the Bachelor's Degree. They say "going to college" and "a college degree" when they talk about undergraduate programs at either a college or a university.

Most "colleges" are separate schools. They are not located in a university. Some colleges are part of a university and are located at the university campus. (The "campus" is the school buildings and surrounding area.) A few colleges offer graduate programs in selected subjects. Usually, however, it is universities that offer graduate programs. So, Americans use the word "university" and not "college" when they talk about graduate study.

5 Skills

5.1 Writing

Write a short newspaper article for a students' magazine about your current situation as a student.

Where do you live? Do you live in a hall of residence?
How many terms/semesters do your studies consist of?
Which courses do you have to take?
Which lectures do you attend?
Which courses may you take?
How many placements do you have to complete?
Have you selected a project?
When do your classes start?
Where do you have lunch?
When do you have to take exams?
When do you have to write your thesis?
What is the student's life like?
Do you get a grant?

5 You may use the following phrases to answer the questions above:

study at ....
attend courses in ...../ seminars on ...../ lectures on ......
basic course, main course
take a course/ take an exam
pass an exam/ fail an exam
complete/do a placement/ an internship
The lecture on ..... begins at 7.45 a.m./ finishes at ....; cafeteria/ dining hall/ refectory

5.2. A taste of structures

5.2.1 Sounds and Stress

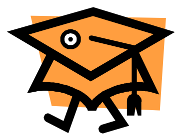
5.2.1.1 ***Match the words to the sound symbols. Refer to the underlined letter.***

[æ] ,
[Ə]
[ð]
[dʒ]
[θ]
[ɜ:]

first, this, other, university, ant, worth, ,
think, refectory, version, method,
master, can, bachelor, engineering,
black, joke, thing, age, jeans,
sandwich, weather, refer, thanks,
emergency, number, giant, thin,
challenge, hand, gene

5.2.1.2 ***Mark the correct stress of the words. Sometimes you have more than one chance. Mind the difference.***

- student, research, science, applied, dormitory, catastrophe, increase, equipment, available, alternative, interesting, idea, postgraduate, unhappy, illegal, afternoon



5.2.1.3 ***Fill in the words in correct English spelling.***

Undergraduates at Oxford

One of the many əd'vɑ:ntɪdʒɪz _____________ of studying at Oxford is the opportunity to ɪn'dʒɔɪ _________ the benefits of a lɑ:dʒ _____________ international University whilst living in ə _____ smaller college community. Your college will be ðə _____ focus of your ˌækə'demɪk_____________ life, where you will ə'tend__________ weekly meetings, called tjʊ:'tɔ:rɪəls_____________ , for most of your taim_____________ in Oxford. Your college will also provide jʊ: __________ with əˌkɔmə'deiʃn_____________ and food æt _______ reasonable prices, as well as being the 'sentə ________ for your social life, offering ˌentə'teɪnmənt _____________, sports, music and 'drɑ:mə _____________ facilities and events. Even in 'lɑ:dʒə_____________ colleges, friends are meɪd_____________ quickly and there are 'menɪ_____________ opportunities to be involved in college life in a və'raiətɪ _____________ of ways. (adapted from: www.ox.ac.co.uk)

5.2.2. Nouns

2.1 Decide which word needs to be written with a capital letter. Mark the letter.

1. The most exciting place I've ever visited was africa.
2. We went to see my mother for the easter holidays.
3. It was monday when i met john.
4. Does she speak french?
5. When did you start to study biochemistry?
6. Mount everest is the highest mountain in the world.
7. On Tuesday we had maths, english and german literature.
8. Next year tim is going to spend christmas in paris.
9. Queen victoria is still popular today.
10. From february to july she stayed in europe.

5.2.2.2 Gender

Fill in a correct pronoun.

11. Have you seen the Jaguar? ____ is really fantastic.
12. The Lupo is a very small car, but ___ is very economical.
13. Did you see the Millers? No, ___ had gone out.
14. Have you ever been stopped by the police? Yes, ___ caught me once.
15. Are you pleased with your new computer? Oh no, ___ causes me a headache.
16. I have been studying at this university for three months. ___ is a good place to study.
17. Jim got a new DVD-player. ___ was really expensive.

5.2.2.3 Plurals

Check the sentences and mark the plural forms. Correct when false.

18. Engineering has always been a field for men.
19. Hardly ever you find womens in these jobs.
20. People don't even wonder, they accept it.
21. Among the great scientist in the world you find a lot of female researchers, too.
22. Marie Curie's analysises brought a new development in physics.
23. She had to consider a lot of criterias in her investigations.
24. Many people feel that animals are treated badly by researchers and they feel sorry for all those mice, rats, sheeps, and guinea pigs in the laboratorys.

5.2.2.4 Count vs Uncount

Tick the correct sentences:

25. The professor gave me some good advices.
26. The professor gave me a good advice.
27. The professor gave me some good advice.

40. My hair grows fast.
41. My hair grow fast.
42. My hairs grow fast.
43. The jeans is expensive.
44. The jeans are expensive.
45. The jeans' are expensive.

28. The news was really bad yesterday.
29. The news were really bad yesterday.
30. The piece of news was really bad yesterday.
31. I haven't got much money.
32. I haven't got many money.
33. I haven't got much moneys.
34. The student made a lot of progresses.
35. The student made a progress.
36. The student made progress.
37. Genetics is very important today.
38. Genetics are very important today.
39. Genetic is very important.
46. My data is stored on a CD.
47. My data are stored on a CD.
48. My datas are stored on a CD.
49. You need a compasses to draw a circle.
50. You need compasses to draw a circle.
51. You need a pair of compasses to draw a circle.
52. The PC can process a lot of information.
53. The PC can process information.
54. The PC can process a lot of informations.

5.2.*2.5 Fill in: much - many - few - little - more - a lot of - fewer - less*.

55. The professor asked the students ______ questions.
56. Only a _____ students failed the exams.
57. Some of them need to spend ____ time on their preparation.
58. He earned only _______ money for his patent.
59. When I start my courses I'll have even ____ time than now.
60. Wait. It'll take a _____ minutes.
61. She had _____ jobs before she found the right one.
62. That was only ___ help!
63. Despite his efforts he got even _____ information from the clerk than he had expected.

5.2.*2.6 The Possessive (Genitive) Forms*

Rewrite the sentences replacing the of- phrase and following the example.

64. The official birthday of the Queen is celebrated in June.

==> The Queen's official birthday is ....

65. The experience of Tim Smith is invaluable.
66. The engineer checked the security system of the lab.
67. I may use the car of my parents.
68. The observations of the physicist will be published soon.
69. They enjoyed listening to the songs of the children.
70. By the way, this is the house of my brother-in-law.
71. The headquarters of the company are in Munich.
72. The results of last year were much better.

5.2.2.7 much, many, little, few, etc...

Complete the sentences:

73. One positive thing about the meeting was that we had ______ opportunities to say something.
74. Thankfully, there is ______ danger of an earthquake in Germany.
75. The experiment will be over within a _____ minutes.
76. There are not _____ elephants left on our globe.
77. How ____ energy does the system consume in one hour?

5.2.2.8 *Odd man out* ...Which word does not fit to the other in the line.

78. Few things engines informations subjects
79. Less data energy memory hour
80. Much work water computer space
81. Fewer employees courses trainings labs

Word list ***(****to be completed by yourself with all unknown words, translations, hints, etc)*

accommodation
attend (courses)
beyond
complete (a placement)
course of study
degree, bachelor's degree
dormitory
embed
examination, take an ~, sit an ~
fail
graduate
graduation
grant
hall of residence
institution
internship [AmE]
lab session
lecture
lecture hall, lecture theatre
lecturer
pass
placement, industrial placement [BE]
practice-oriented
refectory
research
science
seminar
study
supplement
thesis, pl. theses
university of applied sciences, Jena University of Applied Sciences

Unit 2 History of electrical engineering

2.1 Read and answer the following questions. Short answers will do.

1. Is it true that the Ancient Greeks used rubber gum to produce electricity?
2. How was the effect of electricity visible to them?
3. Which machine did Otto von Guericke invent?
4. When was the Bennet's doubler developed?
5. Name three inventions of the 19^{th} century.
6. Who built the first real electric supply network?
7. Which university offered the first real course for electrical engineering?
8. What was the contribution of Nicola Tesla to power distribution?

2.2 History of electrical engineering

Ancient developments

According to Thales of Miletus, writing at around 600 BC, a form of electricity was known to the Ancient Greeks who found that rubbing fur on various substances, such as amber, would cause a particular attraction between the two. The Greeks noted that the amber buttons could attract light objects such as hair and that if they rubbed the amber for long enough they could even get a spark to jump. An object found in Iraq in 1938, dated to about 250 BC and called the Baghdad Battery, resembles a galvanic cell and is believed to have been used for electroplating.

Early developments

Electricity has been a subject of scientific interest since at least the 17th century. A friction machine was constructed at about 1663 by Otto von Guericke, using a rotating sulphur globe rubbed by hand. Isaac Newton suggested the use of a glass globe instead of a sulphur one In the latter part of the 18th Century, Benjamin Franklin, Ewald Jürgen Georg von Kleist, and Pieter van Musschenbroek (the last two the inventors of the Leyden jar) made several important discoveries concerning electrostatic machines. The first suggestion of an influence machine appears to have grown out of the invention of Alessandro Volta's electrophorus. "Doublers" were the first rotating influence machines. Abraham Bennet, the inventor of the gold leaf electroscope, described a "doubler" or "machine for multiplying electric charges" (Phil. Trans., 1787). The Bennet's doubler was developed in 1787.

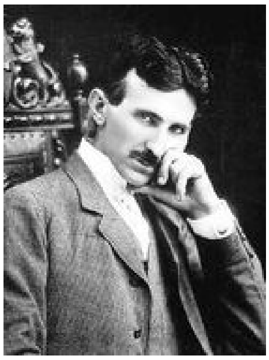
19th century developments

In the 19th century, the subject of electrical engineering, with the tools of modern research techniques, started to intensify. Notable developments in this century include the work of Georg Ohm, who in 1827 quantified the relationship between the electric current and potential difference in a conductor, Michael Faraday, the discoverer of electromagnetic induction in 1831, and James Clerk Maxwell, who in 1873 published a unified theory of electricity and magnetism in his treatise on *Electricity and Magnetism*. [1] In the 1830s, Georg Ohm also constructed an early electrostatic machine. The homopolar generator was developed first by Michael Faraday during his memorable experiments in 1831. It was the beginning of modern dynamos — i.e. electrical generators which operate using a magnetic field.

In 1878, the British inventor James Wimshurst developed an apparatus that had two glass disks mounted on two shafts (*ed.* it was not till 1883 that the Wimshurst machine was more fully reported to the scientific community).

Thomas Edison built the world's first large-scale electrical supply network.

During the latter part of the 1800s, the study of electricity was largely considered to be a subfield of physics. It was not until the late 19th century that universities started to offer degrees in electrical engineering. In 1883 Cornell University introduced the world's first course of study in electrical engineering and in 1885 the University College London founded the first chair of electrical engineering in the United Kingdom.[1] The University of Missouri subsequently established the first department of electrical engineering in the United States in 1886. [2]



Nikola Tesla made long-distance electrical transmission networks. During this period work in the area increased dramatically. In 1882 Edison switched on the world's first large-scale electrical supply network that provided 110 volts direct current to fifty-nine customers in lower Manhattan. In 1887 Nikola Tesla filed a number of patents related to a competing form of power distribution known as alternating current. In the following years a bitter rivalry between Tesla and Edison, known as the "War of Currents", took place over the preferred method of distribution. AC eventually replaced DC for generation and power distribution, enormously extending the range and improving the safety and efficiency of power distribution.
The efforts of the two did much to further electrical engineering—Tesla's work on induction motors and polyphase systems influenced the field for years to come, while Edison's work on telegraphy and his development of the stock ticker proved lucrative for his company, which ultimately became General Electric. However, by the end of the 19th century, other key figures in the progress of electrical engineering were beginning to emerge. [3] Charles Proteus Steinmetz' help fostered the development of alternating current that enabled the expansion of the electric power industry in the United States, formulating mathematical theories for engineers.
Taken and slightly adapted from the free encyclopedia wikipedia.com

References

1. "Ohm, Georg Simon", "Faraday, Michael" and "Maxwell, James Clerk". In *Encyclopædia Britannica* (11). (1911).
2. Ryder, John and Fink, Donald; (1984). *Engineers and Electrons*. IEEE Press. ISBN 087942172X.
3. History. *National Fire Protection Association*. Retrieved on January 19, 2006. *(published 1996 in the NFPA Journal)*

2.3 Vocabulary

2.3.1 Find verbs to the nouns given:

attraction		discovery	
construction		induction	
invention		operation	
research		supply	
switch		distribution	
transmission		concern	

☝ *Note that some nouns are "verbed", i.e. they have the same form as the verb.*

***2.3.2. What is the difference? Think about it and explain the different meaning in your own words*.**

discovery	invention
direct current	alternating current
light (objects)	light colours
long-distance	large-scale
provide	supply

2.3.3. Power

Consult your dictionary and write down the meanings of POWER. Do you find any combinations?

2.3.4. Pronunciation - *Consult your dictionary*

patent efficiency magnetism effort figure emerge

2.3.5 electricity - power - current - electrical energy - voltage - *All the same or is it?*

(a) by definition the flow of electric charge, measured in ampere

(b) defined as the amount of work done by an electric current in a unit time.

(c) a property of matter that results from the presence or movement of electric charge.

(d) the energy stored in an electric field or the potential energy of a charged particle in an electric field or the energy used by electricity

(e) the difference of electrical potential between two points of an electrical network

3 *Technical English - a special language?*

Technical English is often said to be difficult to understand. There is a common tendency for it to be regarded as some sort of language of its own. At first sight this may seem true as far as vocabulary is concerned. But this is not the problem that really matters. There are many reasons why technical texts seem to be rather difficult.
The English used for technical purposes is not so very different from the everyday phrases and sentences. The familiar patterns of everyday English are the basis of all technical writing, although there is a difference in the frequency with which certain grammatical items occur.
In order to master technical English you must first acquire a thorough knowledge of everyday English with its grammar, vocabulary and rules of word formation. Then it will be easy for you to learn the peculiarities of technical English.
Scientific and technical writing is usually about things, matter, natural processes, and is impersonal in style. This impersonal attitude of the scientist or engineer towards his subject has a considerable influence on the language he uses in writing and to some extent, in speaking.
The passive forms of verbs are used with great frequency, and the first person singular is not generally used. In written texts simple sentences are not very often used, for isolated facts or events are seldom dealt with. The scientist or engineer has to show what the connection is, not only what happens, but also how it happens, when it happens, why it happens.

Scientists, in trying to define things accurately, have been making up technical terms for hundreds of years. A great number of words are constantly needed and new fields of science and technology open up and new discoveries are made. Often the same item serves as a noun, adjective, adverb and sometimes even as a verb.
Each branch of science and technology has its separate vocabulary. The engineer or scientist will not have so many problems to keep them in mind because he knows about the things he is dealing with.
Very often parts of the body (eye, face etc.) and names of clothes (jacket) are used to describe objects in technical texts. Sometimes so-called semi-technical words, such as movement, power, roll, charge, stress or strain cause some difficulty to the user of technical English. All those words have been borrowed from everyday English, but when they are used in a technical text their meaning is different. Since they occur in almost any scientific or technical text it is extremely useful to master those words that are frequently used in one's special field of language.
More than half of all the vocabulary of science and technology comes from the Graeco-Latin group of languages, and is therefore quite likely to be international. The only difficulty in English is to pronounce words of Greek or Latin origin correctly.

key ♬ ?

3.1 Work in groups.

Group 1:
Read lines 1-15 and answer the following question.
What makes technical English different from everyday English?
Group 2:
Read lines 15 - 27 and answer the following question.
Which peculiarities of technical English does the text mention?
Group 3:
Read lines 28 - 40 and answer the following question.
Identify and explain the 3 groups of words which make up the vocabulary of technical English.

3.2 Vocabulary

As you have seen, parts of the body and names of clothes are sometimes used to describe technical issues. Read the words and decide which technical component is named by the following words:

- hand, coat, sleeve, eye, belt, arm, (blue)-tooth, human body model, …

3.3 Pronunciation

Technical words are often easy to understand, but difficult to pronounce. Being able to read the phonetic transcription is essential to say the words correctly. Have a try with the following examples.

a) autotechnology [ˌɔːtəʊtek'nɒlədʒɪ]

b) technical ['teknɪkl]

c) aluminium BE: [ˌæljʊ'mɪnɪəm]; AE: [ə'luːmɪnəm]

d) carbon monoxide [ˌkɑːbən mɒ'nɒksaɪd]

e) determine [dɪ'tɜːmɪn]

f) polymer ['pɒlɪmə]

g) microprocessor [ˌmaɪkrəʊ'prəʊsesə]

h) thermoplastic [θɜːməʊ'plæstɪk]

i) acid ['æsɪd]

j) component [kəm'pəʊnənt]

4. All about dictionaries

4.1 A monolingual dictionary is particularly useful, because it doesn't just tell you meanings, it really can help you to learn words and find out how they are used. Study the dictionary entry for the word 'manufacture' of the Macmillan English Dictionary and match the descriptions to the corresponding parts.

a) This symbol tells you that the verb is transitive, i.e. it must be followed by an object.
b) The phonetic transcription helps you to pronounce the word correctly.
c) These symbols inform you about the part of speech, such as noun, verb, adjective etc.
d) The headword gives information about spelling and where to divide the word
e) This symbol indicates that this noun is not countable.
f) An example sentence shows how the word is used.
g) Numbers mark different meanings of the same word.

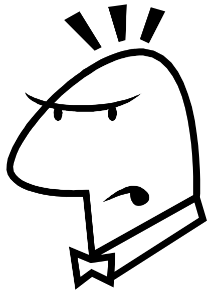
manufacture[1] /ˌmænjʊ'fæktʃə/ verb [T] ★★
1 to make goods in large quantities in a factory: *The firm manufactures women's clothing.*
2 to produce a natural substance in your body: *Diabetics don't manufacture enough insulin.*
3 to make up a story that is not true: *He manufactured an alibi about his car breaking down.*
manufacture[2] /ˌmænjʊ'fæktʃə/ noun ★
1 [U] the process of making goods in large quantities in a factory: **+of** *The company is engaged in the manufacture of computer hardware.*
2 manufactures [plural] goods that are manufactured
manufacturer /ˌmænjʊ'fæktʃərə/ noun [C] ★★★ a person or company that manufactures a product: *one of the leading computer manufacturers*
manufacturing /ˌmænjʊ'fæktʃərɪŋ/ noun [U] ★ the business of making goods in large quantities in a

By the way, a lot of dictionaries are nowadays available on CD-ROM.
On the Internet you have access to the following dictionaries at

http:// dictionary.cambridge.org :

- Cambridge International Dictionary of English
- Cambridge Dictionary of American English
- Cambridge International Dictionary of Idioms
- Cambridge International Dictionary of Phrasal Verbs
- http://www.leo.org

5 A taste of structure



5. 1 Verbs (aux, modals, full/ lexical)

5.1.1 Fill in the correct form of an auxiliary verb (be, do, have)

Sometimes they are used as full verbs.

____ you ever heard the sad story of the clever student and the poor professor? Or___ it the other way round?

The student___ reading his e-mails when the professor asked him a question. He ___ not know what to answer, because he ____ absent- minded. So what? "___n't do it again", said the professor to him. The student couldn't help smiling and ____ not stop reading the mails. Suddenly, the professor _____ an idea. While he ____ talking to the students he went to his PC, opened his mail composer and sent a message to the student. The student ____ reading his mail, and a new message came in. "Be alert! There ___ a virus coming with this message. It will ___ flashing into your eyes and make you blind. You ____ a 30 sec chance to shut down your PC to prevent this virus from _____ activated."

Well, the student ____ not realise that it had _____ a warning by his professor, so he did what he ___ asked to do. And now the professor ____ smiling.

5.1.2 Modals

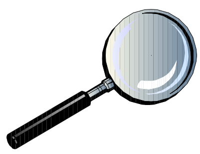
Transfer this text into the past tense.

Talking about energy sources in the year 2050 we could perhaps look back and say….

The fuel cell can help to save energy in many ways. It may well be used in a variety of fields. You only need hydrogen and some chemicals to generate electricity. You don't have to pollute the air with a lot of smoke and other substances. You must know on the other hand that it will take some time to build really efficient and cheap fuel cell generators. Most cars must use petrol or diesel for their engines, but the time will come when we have many fuel cell driven cars on the roads…

5.1.3 Translate

Vom Gerät, dem Studenten und dem Professor ...



82. Das Gerät war nicht an seinem Platz.
83. Der Techniker konnte das Gerät nicht finden.
84. Der Student durfte das Gerät nicht benutzen.
85. Das Gerät sollte aber an seinem Platz sein.
86. Der Prof braucht das Gerät in der nächsten Vorlesung.
87. Der Student braucht das Gerät nicht zu suchen.
88. Der Student mußte das Gerät nicht suchen.
89. Der Prof fand das Gerät auch nicht.

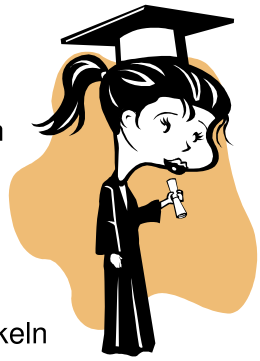
5.1.4 Present Tenses

Simple or progressive? Circle the correct version.

90. The sun rises / is rising early in summer.
91. I do / am doing an interesting experiment. Don't disturb me.
92. The professor always makes / is always making silly jokes.
93. Technical English is / is being difficult.
94. What a noise! They are reconstructing / reconstruct the building.
95. I've just checked the schedule. We change / are changing rooms tomorrow.
96. The university of applied science lies / is lying on a river.
97. The student cheats / is cheating when the prof catches / is catching him.
98. The prof to an unattentive student: "Are you sleeping well?" / "Do you sleep well?"
99. He frequently uses / is using the net for information exchange.

5.1.5 Past Tenses

Simple or Progressive ? Translate.



100. Als ich am Morgen in die Uni ging, regnete es.
101. Wir hatten Elektrotechnik in der ersten Vorlesung.
102. Während der Prof über magnetische Felder sprach, ging plötzlich das Licht aus.
103. Keiner wußte, warum dies geschah.
104. Dass das auch immer in E-technik passieren mußte!
105. Aber der Prof ließ nicht beeindrucken und machte einfach im Dunkeln weiter.
106. Manche schliefen sogar, während der Prof uns mit Feldlinien und Formeln beeindruckte.

5.1.6 Past Tense or Present Perfect?

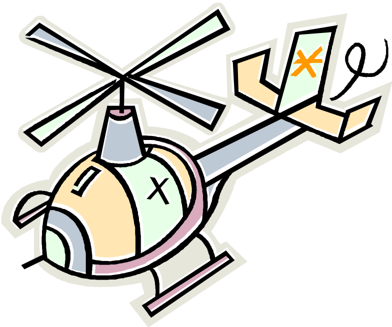
Fill in the correct form of the verb given.

107. I [miss] _____________ the lecture this morning.
108. Computers [be helpful] always____________ for people.
109. John [study] ________________ mechanical engineering for three semesters.
110. The engineer [check] ______________ the machine last Friday.
111. BMW [sell] ______ Rover some time ago.
112. The car doesn't work. Do you know who [repair] ___________ it?
113. Porsche [produce] ______________ a lot of fabulous cars.
114. The students [do] ___________ this experiment a week ago.
115. This coil [work] ________________ for such a long time now.

5.2 Future Concepts

Find out what concept is used in the following sentences and what this concept expresses.

Planning to be an inventor



116. My friend Charles will be an inventor.
117. He is going to study mechanical engineering.
118. Next week Charles is applying at the Jena University of Applied Sciences.
119. One day he will have completed his course of studies and got his degree.
120. He wants to invent a special helicopter.
121. Therefore, he is also going to learn to fly.
122. He says he will need this feeling.
123. Well, I will see how successful he might be one day.
124. Anyway, on 4 October his courses start.

5.3 Tense Mix I Translate

125. Wann hast du mit dem Studium begonnen?
126. Seit wann studierst du Augenoptik?
127. Wann wirst du dein Studium beendet haben?
128. Welche Vorlesungen hast du Mittwoch morgen?
129. Wo willst du dein Praktikum absolvieren?
130. Hast du schon lange English gelernt, bevor du mit dem Studium hier angefangen hast?
131. Welche Fächer hattest du nur im ersten Semester?
132. Hast du in der Industrie gearbeit, als du studiert hast?
133. Hilft dir der Prof, wenn ihr Experimente macht?
134. Hast du jemals an ein Auslandspraktikum gedacht?
135. Welche Prüfungen werden die schwersten sein?
136. Hast du das Gefühl, dass du jetzt endlich die Grammatik verstehst?

Wordlist (to be completed)

alternating current
amber
amount
apparatus
attraction, attract, attractive
battery
carbon dioxide
component
concern
conduct, conductor
construction
determine
direct current
discovery
disk
distribution
doubler
electricity
friction
galvanic cell
Greek
induction
intensify
invention
large-scale
Latin
long-term
magnetism
matter (n)
mount (on)
operation
origin
particular
peculiar
peculiarity
power
provide
research
resemble
shaft
sleeve
spark
sulphur
supply (n)
supply (v)
supply network
switch
technique
transmission
voltage

Unit Three Mathematics and Graphs

Read the text and solve the tasks given

(i) What kind of calculators do you know about and which ones do you have? Can you explain some features of them after having read the first part of the text?

The Calculator

[taken and adapted from wikipedia.org; calculator as of Sept 8, 2008]]

A calculator is an electronic device for performing mathematical calculations, distinguished from a computer by a limited problem solving ability and an interface optimized for interactive calculation rather than programming. Calculators can be hardware or software, and mechanical or electronic, and are often built into devices such as PDAs or mobile phones.

Modern electronic calculators are generally small, digital, (often pocket-sized) and usually inexpensive. In addition to general purpose calculators, there are those designed for specific markets; for example, there are scientific calculators which focus on advanced math like trigonometry and statistics, or even have the ability to do computer algebra. Modern calculators are more portable than most computers, though most PDAs are comparable in size to handheld calculators.

Modern calculators are electrically powered (usually by battery and/or solar cell) and vary from cheap, give-away, credit-card sized models to sturdy adding machine-like models with built-in printers. They first became popular in the late 1960s as decreasing size and cost of electronics made possible devices for calculations, avoiding the use of scarce and expensive computer resources. By the 1980s, calculator prices had reduced to a point where a basic calculator was affordable to most. By the 1990s they had become common in math classes in schools, with the idea that students could be freed from basic calculations and focus on the concepts.

Basic configuration -
(ii) ***Label the image with the respective letters***

A simple modern calculator (usually known colloquially as a "four function" calculator, even with the presence of a square root button) might consist of the following parts:

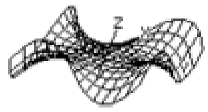
- A power source, such as a battery or a solar panel or both ***[a]***
- A display, usually made from LED lights or liquid crystal (LCD), capable of showing a number of digits (typically 8 or 10) ***[b]***
- Electronic circuitry (often a single chip and some other components)
- A keypad containing:
    - The ten digits, 0 to 9
    - The decimal point *[c]*
    - The equals sign, to prompt for the answer ***[d]***
    - The four arithmetic functions (addition, subtraction, multiplication and division ***[e])***
    - A Cancel (or clear) button, to clear the calculation
- On and off buttons ***[f]***
    - Other basic functions, such as square root ***[g]*** and percentage (%) (desktop models will sometimes add tax functions and significant digit selectors to simplify work with money)

- A single-number memory, which can be recalled where necessary. It might also have a Cancel Entry button, to clear the numbers entered. (Many scientific calculators have multiple variables available.)

Since the late-1980s, calculators have been installed in other small devices, such as mobile phones, pagers or wrist watches.

(iii) Which keys do you press if you want to find out how much the fifth portion of 125 is?

Scientific and financial calculators



A TI-89 calculator can produce 3D wire frame graphs such as this graph of $z(x,y) = x^{3y} - y^{3x}$.

More complex *scientific calculators* support trigonometric, statistical and other mathematical functions. The most advanced modern calculators can display graphics, and include features of computer algebra systems. They are also programmable; calculator applications include algebraic equation solvers, financial models and even games. Most calculators of this type can print numbers up to ten digits or decimal places in full on the screen. Scientific notation is used to notate numbers up to a limit chosen by the calculator designer, such as $9.999999999 \times 10^{99}$. If a larger number or a mathematical expression yielding a larger number than this is entered (a common example comes from typing "100!", read as "100 factorial") then the calculator might simply display "Error".
"Error" might also be displayed if a function or an operation is undefined mathematically; for example, division by zero or even roots of negative numbers (most scientific calculators do not allow complex numbers, though a few do have a *special function* for working with them). Some, but not most, calculators *do* distinguish between these two types of "error", though when they do, it is not always easy for the user to understand because they are often given as "Error 1" or "Error 2".
Financial calculators are similar in overall design to scientific calculators, but specialize in time value of money calculations and are used in the accounting and real estate professions.

(iv) Who could be responsible of the calculator displays ERROR? When could this happen? Is there a difference in display between trying to do divisions by zero compared to trying to get square roots out of negative numbers?

+ - % $ = { } [ ] ( )

2. The Language of Mathematics

The following section will give you help with reading, speaking and writing frequently used mathematical expressions. Study them carefully.

2.1 calculations: addition (to add to), subtraction (to subtract from), multiplication (to multiply by), division (to divide by)

50 + 28 = 78	is read as	fifty **plus** twenty-eight **equals (or: is equal to)** seventy-eight
50 – 28 = 22	is read as	fifty **minus** twenty-eight is equal to twenty-two
7 x 8 = 56	is read as	seven **multiplied by (or: times)** eight equals fifty-six
1500 ÷ 4 = 375	is read as	one thousand five hundred **divided by** four equals three hundred and seventy-five

2.2 fractions:

$\frac{1}{2}$	is read as	a (one) half *
$\frac{3}{4}$	is read as	three fourths (or: three quarters)
25/58	is read as	twenty-five fifty-eights (or: twenty-five over fifty-eight)
10 1/5	is read as	ten and one fifth
$\frac{a\,b}{c + d}$	is read as	**a** times **b** over **c** plus **d**

(* The top number is the **numerator**, the bottom number the **denominator.**)

2.3 decimals:

48.02	is read as	forty-eight **point** oh two
0.27	is read as	nought **point** two seven
0.0135	is read as	nought **point oh** one three five

Remember :
The English say and use a **point** instead of our **comma**.
After the point - simply read the digits starting on the left.

2.4 roots and exponents:

$\sqrt{144}$	is read as	square root of one hundred and forty-four
$\sqrt{a^2 + b^2}$	is read as	square root out of **a** squared plus **b** squared

(As well as finding square roots you can find cube roots or fifth roots etc.)

$3^2 + 4^2$	is read as	three sqared plus four squared
6×2^3	is read as	six times two cubed
$(2+3)^2$	is read as	two plus three **all** squared
4^5	is read as	four to the power five
10^{-8}	is read as	ten to the power minus eight

(The number at the bottom is called the base, the top number is called the power or index.)

2.5 some more common mathematical signs and terms:

( )	means	(round) brackets or parentheses
[ ]	means	square brackets
{ }	means	braces
#	means	number, item

%	means	per cent
±	means	plus or minus
≠	means	doesn't equal / equals not
<	means	less (smaller) than
>	means	greater (larger) than

to count, to calculate, to compute	to estimate
to change, to convert	sum / amount / value
to round to / down/ up	figure
approximation	
to cancel	error
to substitute	the highest common factor
	the least / lowest common multiple

3. Practise

3 .1 Work out. Explain your calculation.

a) A mail order book company holds a sale offering all stock at 20 % off the marked prices. Postage and packing costs £ 2.95 for the complete order. Explain how to work out the total bill (including postage and packing) for three books marked at £7.99, £ 8.50 and £ 10.99.

b) Seven tenths of a journey of 540 km is on motorways. What fraction is on ordinary roads ? How many km will be driven on ordinary roads ?

c) In a drug trial, 72 out of 480 people suffer side effects from Drug A and 98 people out of 560 suffer from side effects from Drug B. Work out the percentage of patients suffering from side effects from each drug. Which drug causes fewer side effects?

d) This year, there are 90 applications for a technology course. In fact, there are 20 % more applications this year than last year. How many people applied for the course last year ?

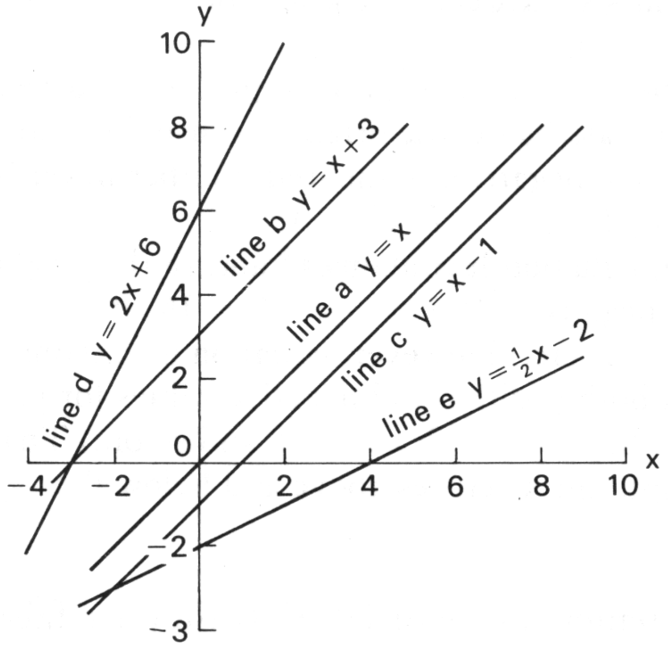
3.2 Translate into English

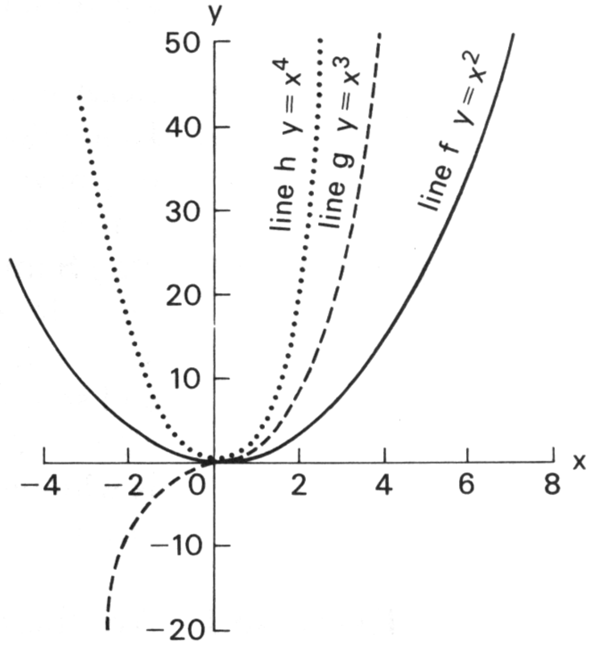
a) Multipliziert man zwei Zahlen mit gleichem Vorzeichen (sign), so erhält man ein positives Ergebnis.
b) Wenn man hingegen zwei Zahlen mit unterschiedlichem Vorzeichen multipliziert, so ist das Ergebnis negativ.
c) Diese Regel trifft nicht auf die vorliegende Aufgabe zu.
d) Wie lautet die fünfte Wurzel aus 2.381?
e) Die obere Zahl in einem Bruch nennt man Zähler, die untere Nenner.
f) Wenn er regelmäßig gearbeitet hätte, wäre ihm die Lösung dieser Aufgabe nicht so schwer gefallen.
g) Der wissenschaftliche Taschenrechner ist der für unsere Zwecke am besten geeignete Rechner.

4 Graphs

4.1 Describing mathematical graphs

4.1.1 ***Look at the two graphs given. Read their equations aloud.***





4.1.2 Read the mathematical description of the two and underline all new maths terms.

Mathematical equations contain variables. If there are only two variables, it is possible to show their relationship on a graph.

The simplest equation is y = x. The graph of y = x is a straight line. In this equation, the values of x and y always remain equal. (If x = 1, then y = l; if x = -3, then y = -3, etc.) This graph line (line a) passes through the *origin* of the graph.

Sometimes the equation of a straight line contains a *constant.* For example, in the equation y = x + 3, x and y are the two *variables* and 3 is the constant. If an equation contains a constant then the graph line does not pass through the origin. Look at lines b and c. If the constant is positive, then the line cuts the y *axis* above the origin. If the constant is negative, then the line cuts the y axis below the origin.

Lines a, b and c all have the same *gradient.* That is to say they all slope at the same angle to the x axis. Now look at lines d and e. Line d has a higher gradient and line e has a lower gradient. This is because the *coefficients* of x are different in these equations. In equations a, b and c, x has a coefficient of 1. That is why the graph lines all have the same gradient. However, in equation d the coefficient of x is 2 and in equation e the coefficient is 1/2. If the coefficient of x is high, the gradient is high. Similarly, if the coefficient is low, the gradient is low.

These five lines are all straight. However, if a graph equation contains x^2, x^3, etc., the graph becomes curved.

Because equation f contains x^2, the graph line is curved. Line f does not pass below the origin because the values of y never become negative. A squared number never has a negative value. (If $x = -2$, $x^2 = 4$; if $x = -3$, $x^2 = 9$, etc.) Similarly, equation h contains x^4 and so the y values never become negative. (If $x = -2$, $x^4 = 16$; if $x = -3$, $x^4 = 81$, etc.) However, equation g contains x^3, and so it gives both positive and negative values for y. (If $x = 2$, $y = 8$; if $x = -2$, $y = -8$ and so on.) That is why the graph line stretches above and below the origin.

4.1. 3 Comprehension Check

Are these statements true or false? If they are false, write corrected statements.

1. $y = x$ (line a)
a) If $x = 10$, $y = 10$.
b) The graph line passes through the origin.
c) The equation contains a constant.

2. $y = x + 3$ (line b)
a) If $x = 4$, $y = 7$.
b) The graph line passes through the origin.
c) The equation contains a negative constant.
d) Lines a and b have the same gradient.

3. $y = x – 1$ (line c)
a) If $x = -2$, $y = 0$.
b) The graph line cuts the y axis below the origin.
c) The equation contains a negative constant.
d) The coefficient of x is 2.

4. $y = 2x + 6$ (line d)
a) If $x = 0$, $y = 6$.
b) The graph line has the highest gradient.
c) The equation contains the constant 2.

5. $y = ½ x – 2$ (line e)
a) If $x = 4$, $y = -2$.
b) Line e has a lower gradient because the coefficient of x is low.
c) The line cuts the y axis above the origin.
d) The equation contains the constant ½.

6. $y = x^2$, $y = x^3$, $y = x^4$ (lines f, g, h)
a) In all three graphs, if $x = 1$, $y = 1$.
b) The three graph lines are all curved.
c) All three lines pass through the origin.
d) The lines all stretch above and below the origin.
e) x^2 , x^3 ,x^4 never have negative values.

4.2 Graphs in trends and statistics

4.2.1 Listening: Electricity Generating Requirements

Robin Coates is the head of an electricity region in Great Britain. In his presentation he describes how trends in electricity requirements have changed.
As you listen fill in the graph below.

Capacity in MW ↓										
12,600										
12,500										
12,400										
12,300										
12,200										
12,100										
12,000										
11,900										
11,800										
11,700										
11,600										
11,500										
11,400										
11,300										
11,200										
11,100										
11,000										
10,900										
10,800										
10,700										
10,600										
10,500										
10,400										
10,300										
	1	2	3	4	5	6	7	8	9	10	year

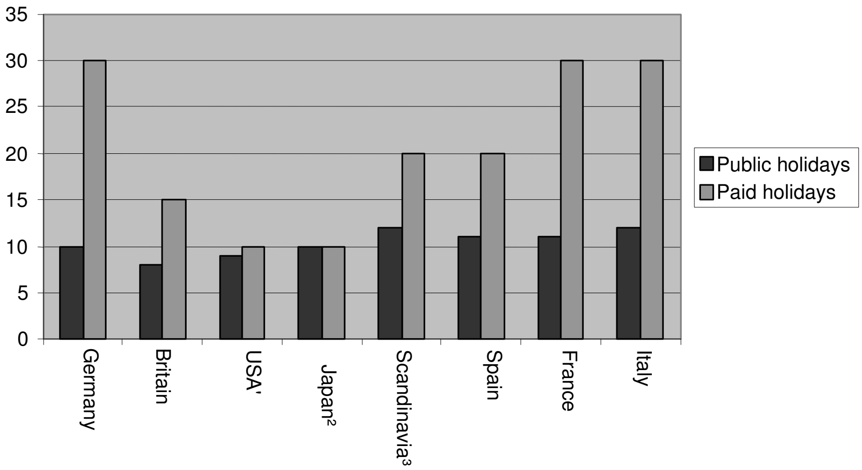
4.3 Exercise: Electricity

Look at the graph on the next page and then complete the sentences below.

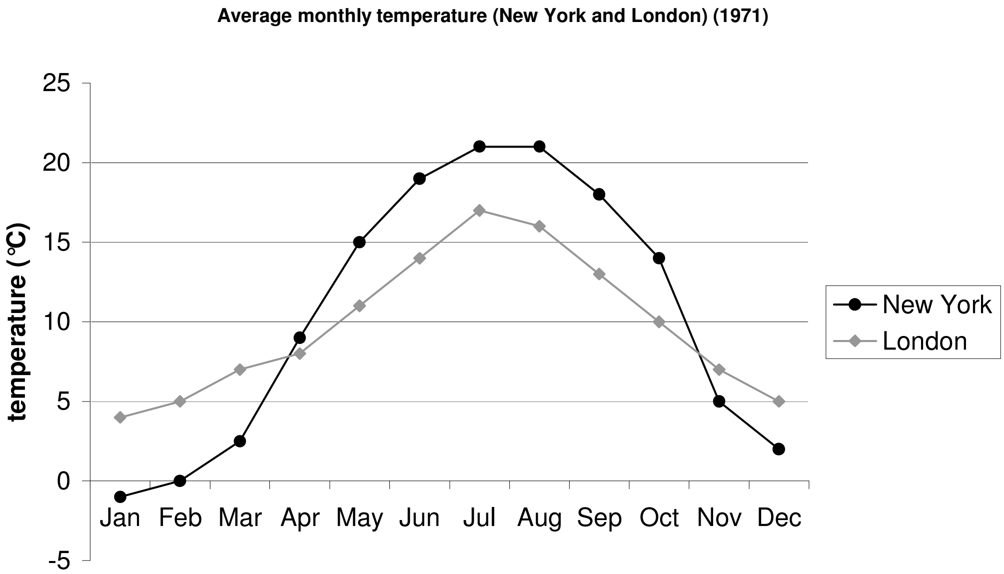
1. In the first year capacity ____________________ 16,000 MW.
2. In year 2 it __________________ by 800 MW.
3. In the third year it ____________________ constant _____ 15,200 MW.
4. Then in the fourth year it __________________ 14,800 MW.
5. And in year 5 we saw a small ____________________ 200 MW.
6. But in the sixth year capacity ___________________ to 14,800 MW.
7. This trend continued, and in the seventh year capacity __________________ substantially _____ 800 MW.
8. There was a further __________________ 200 MW in the eighth year.
9. In year 9 capacity ___________________ 13,400 MW.
10. But in year 10 capacity showed a small ____________________ 200 MW.

4.4 Practise - Describe these graphs.

4.4.1 Number of paid and public holidays in different countries. Compare them.



4.4.2 Comparing the average monthly temperature where would you like to spend your next holiday and why ?



Test yourself:

1. steigen um 10%
2. ein Anstieg auf 25 W
3. schwanken zwischen 10 und 15 kWh
4. schnell wachsen
5. keine Veränderung zwischen August und September
6. geringfügiger Abfall
7. vergleichbare Werte

5. A taste of structure

5.1 Adjectives

5.1.1 Complete the sentences using the comparative or superlative forms.

137. Bob has bought a new PC, but John's PC is even _[neuer]_________ .
138. The memory space of this computer is rather large, still I need a [größere] ____one.
139. Do you know if there is a processor that runs _[schneller]_________ that one?
140. The output quality of this equipment is really bad, have you ever seen a __[schlechteres]_____ image?
141. This is the _____[ergonomisch]________ keyboard I have ever heard of.
142. Second hand computers are usually __[billiger]_____ than new ones.
143. The CD-Rom is one of the _[nützlichste]______inventions of the last 30 years.
144. This data bank system is difficult, but I am able to deal with _[schwierigere]________ ones.
145. Has your keyboard got__[mehr]____ function keys than Pete's?
146. But there is _______________ [viel mehr] than learning all the time.
147. I like biology ________ [am meisten].
148. This question is ______________ [am wichtigsten].
149. PCs make the work ________ [leichter] in every company.
150. It is ______________ [bequemer] to travel by bus or train.

5.1.2 Arrange the comparisons:

151. In the town Jena which has _______100000 inhabitants, one fifth of the population are students. [mehr als]
152. The _____experiment was the ______________. [letzte, interessanteste]
153. Copper and aluminium are two conducting materials, [eines mehr als das andere].
154. I am not using the computer __________ the computer is switched on. [so oft wie]
155. In the 70s more people used the bus _______ in the 50s. [als]
156. A bike is ___________ a bus. [nicht so schnell wie]

5.1.3 Translate:

157. Mit dem neuen Textverarbeitungsprogramm kann man viel mehr machen als mit dem alten.
158. Kennen Sie schon die neuesten Entwicklungen auf diesem Gebiet?
159. Dieser Prozessor ist genauso schnell wie jener.
160. John ist der intelligenteste von uns allen.
161. English gehört zu den leichtesten Sprachen, die man schlecht sprechen kann. Aber es ist die schwierigste, wenn man sie richtig benutzen will.
162. Ich glaube, das ist die einfachste Lösung.
163. Je höher die Taktfrequenz, um so schneller der Rechner - oder nicht?
164. Man braucht weniger Kenntnisse als man glaubt für dieses Problem.
165. Ich war mit meinem Apple nicht so zufrieden wie mit meinem IBM- Rechner.

5.1.4 Spot the mistakes and correct if necessary:

166. In the year 1950 mostly people traveled by bus or by bike.
167. It increased extremely in the following year.
168. After you have well prepared you can continue with the experiment.
169. The equipment at the lab is very well.
170. I told you before that our timetable was fully packed.
171. Jena is well known for its planetarium.
172. Fortunate, my friend can help me
173. The lab is good equipped.
174. In the year 2005 we live in a very fast and high developed society.
175. The computers are a basically part of our lives.
176. The number of cars increase rapid.

5.2 Conditional Sentences

5.2.1 Fill in the verbs given in brackets in the correct form.

177. If Pete [pass] __________ the tests, he will get his driving license soon.
178. I would rather go to Prof X if I [be] ___________ you.
179. The engine would have gone into mass production, if the costs [be] _______ lower.
180. If you press this key, the computer [alter] _________ the symbols.
181. If you need help with your program , [press] _____ the F1 key.
182. If I had another chance, I [buy] ____________ a PC with another motherboard.
183. The student would not give up, unless he [solve] _____ the problem.
184. As long as the program has so many faults I [not buy] ________ it.

If + would = almost impossible

5.2.2 Fill in suitable words

185. If your thesis is good enough, you _______ to the university as a postgraduate.
186. If you pass all exams, you _____________ to major in more specific areas.
187. If you _______ hard, you would graduate well.
188. If you _________ this, you could do the experiment.
189. You would have to leave the lab if you _______to answer the questions.
190. We couldn’t start measuring unless the circuit _______ correctly.

5.2.3 Complete the sentences below. Use the words given in brackets.

a) If you.................... 2 metres by 7, the answer.......... 0.28517414...metres. (divide, be)
b) If you.....................how to do a certain calculation, ...the instruction book. (be not sure, consult)
c) If you.....................a number by 1, the number....................... (multiply, change)
d) If you.....................a fraction or decimal by 100 %, you...........its value. (multiply, change)
e) If you ....two numbers with the same sign, the answer.....positive. (divide, be)
f) This rule only...............if you............the decimal point one place to the right.(work, move)
g) The rules above............only if you ....a positive number. (apply, subtract or add)
h) Using this formula, you.................any change, if you ....the original value as well as the final value. (express, know)

5.2.4 Mixed Practice – Fill in the gaps using the appropriate forms.

a) If we..............more space, this would be a pleasant office. (have)
b) If I spoke English well, I ....very happy. (be)
c) If it is fine tomorrow, we............. for a picnic. (go)
d) If I had managed to repair my car earlier, I .... you to London. (drive)
e) If he ....his seatbelt, he wouldn`t have been hurt. (fasten)
f) If you had asked politely, I ....you. (help)
g) If she............work early, she will go home. (finish)
h) If you fail to pay, they ....the electricity. (cut off)
i) If we....................by car, we would have saved time. (go)
j) If I...............you, I would find another flat. (be)

Unit Four - Computers

1 *What can computers do?*

Can you imagine living in a world without computers? They have become part of our everyday lives such as electric current, automobiles and other technical devices. We visit shops, offices and restaurants that have been designed with the help of computers, we read books, newspapers and magazines that have been produced on computers, we pay bills that have been prepared by computers and get our money from 'computers in the wall'. Just making a flight reservation involves a highly sophisticated computer system.

1.1 How do computers work?

Computers are electronic machines which can accept data in a certain form, process the data and give the results of the processing in a specified format as information. Three basic steps are involved in the process: First, data is fed into the computer's memory. Then, when the program is run, the computer performs a set of instructions and processes the data. Finally, we can see the result on the screen or any other output device.

Information in the form of data and programs is known as software, and the electronic and mechanical parts that make up a computer system are called hardware. A standard computer system consists of three main sections: the Central Processing Unit (CPU), the main memory and the peripherals.

(Complete the words. One dot represents one missing letter)

Perhaps the most influential comp.....is the CPU. Its function is to execute pro…. instructions and coordinate the activ..... of all other units. In a way, it is the `brain' of the computer. The main me…. holds the instructions and the data which are currently being proce...... by the CPU. The peripherals are the physical un… attached to the computer. They include storage devices and input/output de….. Storage devices (floppy or hard disks) provide a permanent storage of both da.. and programs. Disk drives are used to handle one or more floppy di… (FDD) and the hard disk (HDD). Input devices enable data to go into the computer's memory. The most com… input device are the mouse and the keyboard. Output devices enable us to extract the finished pro…. from the system. For example, the computer shows the out…t on the monitor or prints the results onto paper by means of a p……. On the rear panel of the computer there are several ports into wh… we can plug a wide range of peripherals – modems, fax machines, optical drives and scanners.

These are the main physical units of a computer system, generally known as the configuration.

(Text is slightly based on: "Infotech" by Santiago Remacha, Esteras, CUP, 1996;)

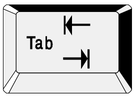
1. 2 Find words in the text that are described by the definitions below:

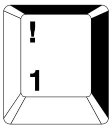
- the brain of the computer
- visual display unit
- hardware equipment attached to the CPU
- physical parts that make up a computer system

1.3 The keyboard

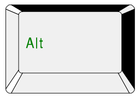
Match the symbols, names, group of keys, and explanations to explain the keys.

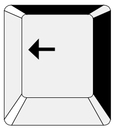
Groups: Alphanumeric keys, Function keys, Editing keys, Special keys
Names: arrow key, return, shift, tab, one, space bar, escape, alternating
Explanations:

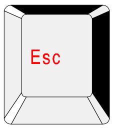


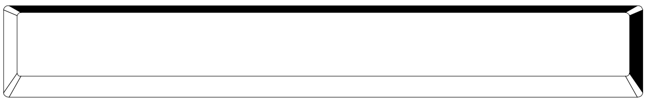


1. It works in combination with other keys to produce special characters or specific actions.
2. It moves the cursor as an alternative to the mouse.
3. It moves the cursor to the beginning of a new line and is also used to confirm commands
4. It moves the cursor to the right for a fixed number of spaces.
5. It produces UPPER-CASE characters or the upper case symbols of a key.
6. A long key at the bottom of the keyboard. Each time it is pressed, it produces a blank space.
7. The number one in the lower case and the exclamation mark when used as upper-case.
8. Describe yourself!!!!! (It is the „panic button“).









1.4 Computer abbreviations

The language of computer science uses a lot of abbreviations. Some were mentioned above, CPU, HDD, FDD. Do you know these ones in full?

⇨ RAM, ROM, ASCII, GUI, BIOS, VGA, TCP/IP, DVD, DDR-RAM

Choose three of them and explain their meaning and function. Use phrases and words like:

..... serves to ....., ... is attached to ..., ... is used to ...., ... means that ...., ...enables the user to ...., ... describes ..., .. represents ..., ... defines.., ...applies to ..., ...controls ..., ... handle ..., .. convert ..., work ..., ...run...

1.5 Gap filling

Fill the gaps leading to a meaningful sentence.

Using the computer all day long can mean ... .
Monitors, CPUs, keyboards, loudspeakers all belong to the .... whereas application programs are referred to as software.
If you want to store the data of your file externally you first have to insert a ... into the appropriate ... .
Nowadays DVDs, or .... in full, are about to replace CDs .... mainly due to their much larger ..... .

1.6 Something went wrong
Spot the mistakes and correct them

Computer networks

Computer networks link computers by comunication lines and software protocolls, allowing datas to be exchanged rapid and reliable. Originally, networks are used to providing terminal access to an other computer and to transfer files between computers. Networks allow also users at one locality to share expansive resources, such as highly quality printers and plotters.

At an distributed enviroment, a user migth uses his PC to make a query against a central database. The PC pass the query, written in an especially langauge (e.g. SQL = Structured Query Language), to the mainframe, which than parse the query, returning to the user only the data requesting. The user might then uses his PC to drawing grafs based on the datas.

1.7 Countable and Uncountable words

In English we speak of data (like the famous commander of spaceship *Enterprise)* and of information. If we want to stress that their is only one part of it we need words to help us like *One piece of information.* Likewise, we have to consider the different quantity adjectives for uncountables [much / little] and countables [many / few]. Decide to which group the following terms belong. Mark them as countable [c] or uncountable [u].

hardware □, software □, equipment □, configuration □, mouse □, hard disk drive □,
disk □, data □, experience □, computer science □, capacity □, access □, application □

1.8 ***Fill in meaningful words in their appropriate form:***

Multi-user _______are managed by a piece of software called a database management system.
All requests for access to ______ from users are handled by the DBMS.
DVDs have a larger _______ to store ______ than CDs.
We need this special hardware ________ to run this particular ______ software.
Unauthorized _____ is a crime that is not easy to be detected.

1.9 Matching Worksheet

Match the words in the first column to the best available answer in the second column.

Embedded Processor	1) a computer input device that uses a set of keys to put data into the computer
Disk Drive	2) capturing & storing & updating & retrieving data and information
Expansion Slot	3) a place to store information (also RAM and ROM)
Input	4) a mechanism that holds & spins & reads and writes either magnetic or optical disks
Integrated Circuit	5) the data that is entered into a computer
Keyboard	6) the physical parts of the computer system that you can touch and feel
Memory	7) an integrated circuit
Chip	8) a connector designed to allow the addition of printed circuit: boards--daughter boards--to the motherboard
Hardware	9) a complete circuit on a chip built by a chip fabrication process
Information processing	10) a chip designed with a specific set of usable instructions

2. Test your reading abilities

2.1 Data Bases

are any collection of data, or information, that is specially organized for rapid search and retrieval by a computer. Databases are structured to facilitate the storage, retrieval, modification, and deletion of data in conjunction with various data-processing operations. Databases can be stored on magnetic disk or tape, optical disk, or some other secondary storage device.

A database consists of a file or a set of files. The information in these files may be broken down into records, each of which consists of one or more fields. Fields are the basic units of data storage, and each field typically contains information belonging to one aspect or attribute of the entity described by the database. Using keywords and various sorting commands, users can rapidly search, rearrange, group, and select the fields in many records to retrieve or create reports on particular sets of data. Database records and files must be organized to allow retrieval of the information The development of direct-access storage devices made possible random access to data via indexes. Queries are the main way users retrieve database information. Typically, the user provides a string of characters, and the computer searches the database for a corresponding sequence and provides the source materials in which those characters appear; a user can request, for example, all records in which the contents of the field for a person's last name is the word Smith.

The many users of a large database must be able to manipulate the information within it quickly at any given time. Moreover, large business and other organizations tend to build up many independent files containing related and even overlapping data, and their data-processing activities often require the linking of data from several files. Several different types of database management systems (DBMS) have been developed to support these requirements: flat, hierarchical, network, relational, and object-oriented.

In flat databases, records are organized according to a simple list of entities; many simple databases for personal computers are flat in structure. The records in hierarchical databases are organized in a treelike structure, with each level of records branching off into a set of smaller categories. Unlike hierarchical databases, which provide single links between sets of records at different levels, network databases create multiple linkages between sets by placing links, or pointers, to one set of records in another; the speed and versatility of network databases have led to their wide use in business. Relational databases are used where associations among files or records cannot be expressed by links; a simple flat list becomes one row of a table, or "relation," and multiple relations can be mathematically associated to yield desired information. Object-oriented databases store and manipulate more complex data structures, called "objects," which are organized into hierarchical classes that may inherit properties from classes higher in the chain; this database structure is the most flexible and adaptable.
(taken and slightly adapted from Encyclopeadia Britannica, CD-ROM edition, 1997)

Comprehension check

True or false Provide justification from the text (catch words will do).

	true	false	justification
1. Databases consist of hardware and the relevant software.			
2. In data bases data are stored I fields rather than in the main memory.			
3. If you need to gain data from a file, this must be well organized.			
4. The question that you ask the data base is called query.			
5. Requests are usually broken down into sequences of letters or characters to find a suitable match.			
6. Database systems cannot retrieve information from different file systems of the same company.			
7. Databases always require a complicated and manifold hierarchy.			
8. Depending on their structure, several data bases are differentiated.			

2.2 He developed the first digital computer

You have met equations in your algebra lessons which are easy enough to solve when there are only two unknown (x and y). But suppose we have fifty unknowns. Life is too short to solve such a problem. And this is where computers come into their own.
The first attempt to build a machine which could do complex mathematical work was made more than 150 years ago by the mathematician Charles Babbage. He clearly understood all the fundamental principles of modern digital computers.
Babbage was born in the county of Devonshire, England, in 1792. He did not receive a good education, but he taught himself mathematics so well that when he went to Cambridge he found that he knew more algebra than his tutor.
Babbage was outstanding among his contemporaries because he insisted on the practical application of science and mathematics. For example, he wrote widely on the economic advantages of mass production and on the development of machine tools.
In 1812, he was looking at a table of logarithms which he knew to be full of mistakes, when the idea occurred to him of computing all the tabular functions by machinery.
Babbage constructed a small working model, which he demonstrated in 1822. In 1833, he began to think of building a machine which was, in fact, the first digital computer, as the expression is understood today.
Babbage devoted the rest of his life to an attempt to develop it. He had to finance the whole of the work himself, and he was only able to finish part of the machine though he prepared thousands of detailed drawings from which it could be made.
Babbage died a disappointed man in 1871. He had tried to solve by himself and with only his own resources a series of problems which in the end required the united efforts of two generations of engineers. After his death his son continued his work and built part of an arithmetic unit which printed out its results directly on paper.
The first modern computer, built in 1925 by an American team led by Vannevar Bush and also using mechanical switches, was similar to Babbage´s design.
The future of computers, however, lay not with mechanical switches but with electronics. The movement of electrons is so rapid, and they are so quickly started and stopped (in millionths of a second) that even very complex calculations can be done in a very short time.

Comprehension Check (and a little bit more)

1. What does the text say about the personal life of Charles Babbage?

2. What was his contribution to the development of the computer?

3. How did he differ from the image of a typical scientist of his time?

4. Why was his “analytic machine“ which used gears and punched cards not completed by himself ?

5. What technical invention was the milestone which marked the beginning of the modern age of computers?

6. Give the names of other famous scientists whose work was closely connected with the development of data communications and computer systems.

Appendix

1 Exploit your dictionary

Some activities are based on Cambridge University Press Dictionary Worksheets photocopyable edition

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Activity 1 ***Collocations***
Certain words occur together frequently. Your dictionary can help with examples sentences or frequent collocations provided. Consult your dictionary to find our whether the words are used with ***make*** or ***do***.

placement examination homework

research progress choice decision

mistake experiment business

Make	***Do***

Complete:
Mark the words you looked up.

1. We __________________________ a list of everything we needed.
2. Some changes have been _____________________ , but there is still more work to do.
3. He _________________ an experiment to test his theory.
4. The next day he _____ an astonishing discovery.

Prepositions
Choose the correct one. Mark the word you looked up.

1. She apologised from/to/for the mess.
2. My parents worry for/on/about me if I fail an exam.
3. We need to make some changes with/to/on the design.
4. Since / For seven weeks I have been a student.
5. It depends on/from/of the experiment's results.
6. They finally succeeded in/for/to running the program.

Activity 2 Multiple meaning
Mark the correct word. How do you find it out?

1. We have Physics only in **straight** / **even** weeks. [gerade]
2. Last week he joined the football **club**/ **association**/ **dressing**. [Verband]
3. It is a heard job to be a **bird cage** / **farmer**. [Bauer]
4. **Equal** / **Same** / **Soon** it will begin. [gleich]
5. My **study** / **studies** / **observations** at the UAS is / are very difficult. [Studium]
6. **Rubbing** / **Friction** is an important phenomenon that is researched in physics. [Reibung]
7. The students had to build circuits with the help of some **leaders** / **ladders**/ **heads** / **conductors.** [Leiter]

Activity 3 Verbs and verb patterns

Consult your dictionaries to find out whether the following expressions can be used. Check the word in bold.

1.a) I like **watching**.☐ B) I like **watching** birds. ☒ Watch is transitive. It needs an object.
2.a) The professor will decide the case soon. ☐ b) The professor will decide on the case soon. ☐
3.a) I liked reading this book. ☐ b) I liked to read this book. ☐ C) I like reading . ☐
4.a) Look up the word in the dictionary. ☐ B) Look the word up in the dictionary. ☐
5.a) I hear good. ☐ I hear well. ☐ I am hearing well. ☐
6.a) She watches a movie on TV. ☐ She sees a movie on TV. ☐

2 Additional reading

2.1 Understanding CD principles

Read this rather long text and be prepared to explain the working principle of a CD to a group of non-experts. Be aware that written language and spoken language are not identical.

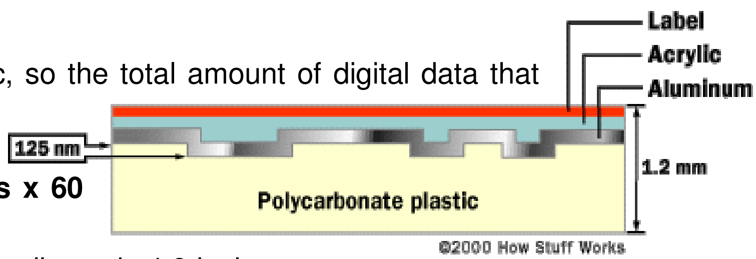
How CDs Work by Marshall Brain

CDs and DVDs are everywhere these days. Whether they are used to hold music, data or computer software, they have become the standard medium for distributing large quantities of information in a reliable package. Compact discs are so easy and cheap to produce that America Online sends out millions of them every year to entice new users. And if you have a computer and CD-R drive, you can create your own CDs, including any information you want.

In this article, we will look at how CDs and CD drives work. We will also look at the different forms CDs take, as well as what the future holds for this technology.

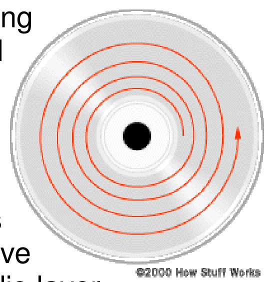
Understanding the CD: Material

A CD can store up to 74 minutes of music, so the total amount of digital data that must be stored on a CD is:



44,100 samples/channel/second x 2 bytes/sample x 2 channels x 74 minutes x 60 seconds/minute = 783,216,000 bytes

To fit more than 783 megabytes (MB) onto a disc only 4.8 inches (12 cm) in diameter requires that the individual bytes be very small. By examining the physical construction of a CD, you can begin to understand just how small these bytes are. A CD is a fairly simple piece of plastic, about four one-hundredths (4/100) of an inch (1.2 mm) thick. Most of a CD consists of an **injection-molded piece of clear polycarbonate plastic.** During manufacturing, this plastic is impressed with microscopic bumps arranged as a single, continuous, extremely long spiral track of data. We'll return to the bumps in a moment. Once the clear piece of polycarbonate is formed, a thin, reflective aluminum layer is sputtered onto the disc, covering the bumps. Then a thin acrylic layer is sprayed over the aluminum to protect it. The label is then printed onto the acrylic. A cross section of a complete CD (not to scale) looks like this:



Cross-section of a CD

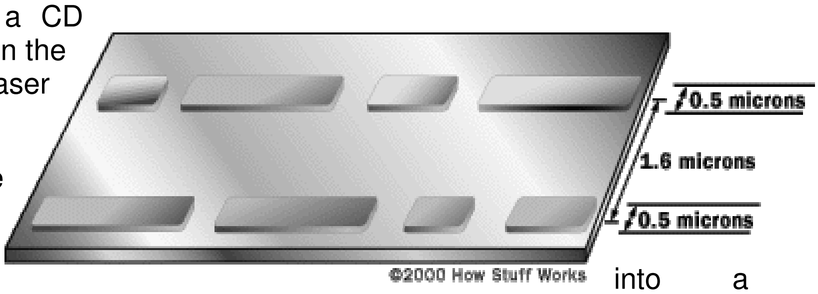
Understanding the CD: The Spiral

A CD has a single spiral track of data, circling from the inside of the disc to the outside. The fact that the spiral track starts at the center means that the CD can be smaller than 4.8 inches (12 cm) if desired, and in fact there are now plastic baseball cards and business cards that you can put in a CD player. CD business cards hold about 2 MB of data before the size and shape of the card cuts off the spiral.

What the picture on the right does not even begin to impress upon you is how incredibly small the data track is -- it is approximately 0.5 microns wide, with 1.6 microns separating one track from the next. (A micron is a millionth of a meter.) And the bumps are even more miniscule...

Understanding the CD: Bumps

The elongated bumps that make up the track are each 0.5 microns wide, a minimum of 0.83 microns long and 125 nanometers high. (A nanometer is a billionth of a meter.) Looking through the polycarbonate layer at the bumps, they look something like this:



You will often read about "pits" on a CD instead of bumps. They appear as pits on the aluminum side, but on the side the laser reads from, they are bumps.

The incredibly small dimensions of the bumps make the spiral track on a CD extremely long. If you could lift the data track off a CD and stretch it out into a straight line, it would be 0.5 microns wide and almost 3.5 miles (5 km) long!

To read something this small you need an incredibly precise disc-reading mechanism.

http://electronics.howstuffworks.com/cd.htm/printable

2.2 Numbers and symbols

[taken, shortened and adapted from www.allaboutcircuits.com]

The expression of numerical quantities is something we tend to take for granted. This is both a good and a bad thing in the study of electronics. It is good, in that we're accustomed to the use and manipulation of numbers for the many calculations used in analyzing electronic circuits. On the other hand, the particular system of notation we've been taught from grade school onward is *not* the system used internally in modern electronic computing devices, and learning any different system of notation requires some re-examination of deeply rooted assumptions.

First, we have to distinguish the difference between numbers and the symbols we use to represent numbers. A *number* is a mathematical quantity. There are many different types of numbers. Here are just a few types, for example:

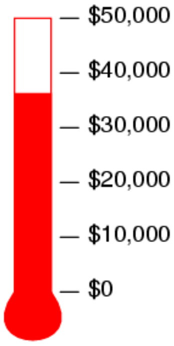
wHOLE NUMBERS:	IRRATIONAL NUMBERS:
1, 2, 3, 4, 5, 6, 7, 8, 9 . .	π (approx. 3.1415927), *e* (approx. 2.71828182 square root of any prime
INTEGERS:	COMPLEX NUMBERS:
-4, -3, -2, -1, 0, 1, 2, 3, 4 . . .	3 - j4 , 34.5i, 20°

Different types of numbers find different application in the physical world. Whole numbers work well for counting discrete objects, such as the number of lamps in a circuit. Integers are needed when negative equivalents of whole numbers are required. Irrational numbers are numbers that cannot be exactly expressed as the ratio of two integers, and the ratio of a perfect circle's circumference to its diameter (π) is a good physical example of this.

If we are to use numbers to understand processes in the physical world, make scientific predictions, or balance our checkbooks, we must have a way of symbolically expressing them. In other words, we may know how much money we have in our checking account, but to keep record of it we need to have some system worked out to symbolize that quantity on paper, or in some other kind of form for record-keeping and tracking. There are two basic ways we can do this: analog and digital.

You're probably already familiar with an analog representation of money, and didn't realize it for what it was. Have you ever seen a fund-raising poster made with a picture of a thermometer on it, where the height of the red column indicated the amount of money collected for the cause? The more money collected, the taller the column of red ink on the poster.

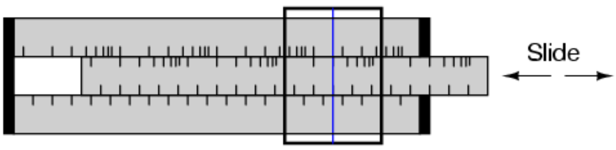
An analog representation of a numerical quantity



This is an example of an analog representation of a number. There is no real limit to how finely divided the height of that column can be made to symbolize the amount of money in the account. Changing the height of that column is something that can be done without changing the essential nature of what it is. Length is a physical quantity that can be divided as small as you would like, with no practical limit.

The slide rule is a mechanical device that uses the very same physical quantity -- length -- to represent numbers, and to help perform arithmetical operations with two or more numbers at a time. It, too, is an analog device.

Slide rule *(an analog device)*



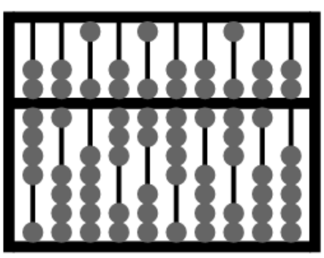
Numerical quantities are represented by the positioning of the slide.

On the other hand, a *digital* representation of that same monetary figure, written with standard symbols (sometimes called ciphers), looks like this:

$35,955.38

Unlike the "thermometer" poster with its red column, those symbolic characters above cannot be finely divided: that particular combination of ciphers stand for one quantity and one quantity only. If more money is added to the account (+ $40.12), different symbols must be used to represent the new balance ($35,995.50), or at least the same symbols arranged in different patterns. This is an example of digital representation. The counterpart to the slide rule (analog) is also a digital device: the abacus, with beads that are moved back and forth on rods to symbolize numerical quantities:

Abacus *(a digital device)*



Numerical quantities are represented by the discrete positions of the beads.

Interpretation of numerical symbols is something we tend to take for granted, because it has been taught to us for many years. However, if you were to try to communicate a quantity of something to a person uninformed about decimal numerals, that person could still understand the simple thermometer chart!

The infinitely divisible vs. discrete and precision comparisons are really flip-sides of the same coin. The fact that digital representation is composed of individual, discrete symbols (decimal digits and abacus beads) necessarily means that it will be able to symbolize quantities in precise steps. On the other hand, an analog representation (such as a slide rule's length) is not composed of individual steps, but rather a continuous range of motion. The ability for a slide rule to characterize a numerical quantity to infinite resolution is a trade-off for imprecision. If a slide rule is bumped, an error will be introduced into the representation of the number that was "entered" into it. However, an abacus must be bumped much harder before its beads are completely dislodged from their places (sufficient to represent a different number).

Please don't misunderstand this difference in precision by thinking that digital representation is necessarily more *accurate* than analog. Just because a clock is digital doesn't mean that it will always read time more accurately than an analog clock, it just means that the *interpretation* of its display is less ambiguous.

2.2.1 Answer the questions

a) Name two types of numbers and explain what they are used for in your studies.
b) What is the basic difference between analog and digital representations of numbers?
c) Add some more information to the table below:

analog		digital
	divisibility	
	devices used to represent	
	comprehensibility	
	precision	
	accuracy	

2.2.2 Explain the words and phrases in your own way.

a) counterpart,
b) beads,
c) prediction,
d) to take for granted
.e) “This is both a good and a bad thing in the ***study*** of electronics.”
What does the word “study” mean in this context?
f) discrete symbols
g) a trade-off for imprecision

2.3 Graduates 'satisfied with jobs'

2.3.1 *Read the following articles and decide whether each statement on the next page is true or false based on the information in the article. For each answer, provide a justification.*

Research involving 4,500 students who graduated in 1995 shows 85% are "very or reasonably satisfied" with their career progress. Two-thirds said a degree had been required for their current job. The report is based on interviews conducted in 2002.

More than 75% of the 1995 graduates were found to be in employment related to their long-term career plans. Immediately after graduation, 43% of those in employment were in non-graduate jobs. Seven years later, this had fallen to just 11%, according to the report, seven years on. The research authors - Professor Peter Elias of Warwick University and Professor Kate Purcell of the University of the West of England - said this showed the need for a "long-term perspective" on careers advice. The government wants 50% of young people in England to enter higher education by 2010, up from the current 44%. Opponents say this would lead to a "dumbing down" of standards and devalue degrees. The focus, many argue, should be on expanding vocational education instead.

Average salaries

The Department for Education and Skills said starting salaries for graduate-level jobs averaged around £18,500 in 2002-03, according to Graduate Prospects. Employers belonging to the Association of Graduate Recruiters are expecting to pay new graduates an average salary of £21,000 in 2004 - an increase of 3.9% on last year. But the figures compiled by the Cardiff and Lancaster researchers suggest the figure is based on "blue-chip" companies[1], taking on just one in 20 graduates. In general, starting wages were actually falling, with last year's average of £12,659 down from £13,422 in 2002, they found.

[1] blue-chip companies - companies that make large profits

The Very Personal Computer

The Macintosh's initial success can partly be attributed to its small size and 'cute' image. The case measured only 13.5 x 9.7 x 10.9 inches and had a built-in handle for "getting carried away" as the original brochure stated. Inside this small box a 32-bit Motorola MC68000 microprocessor worked at a breathtaking speed of 8 MHz, which was state-of-the-art at the time. Unfortunately, a RAM of just 128 KB was a bit thin (an average machine today uses about 4000 times as much RAM). Although the Mac featured a drive for the brand new 3 ½ inch floppy disks, storing 400 KB, it had no hard drive at all.

In 1984, not only the Mac's hardware was small and lightweight, but its software was too. The operating system, a few basic programs, and a couple of documents fitted on one disk. Nevertheless, the Mac was one of the first all-in-one multimedia computers. A soundcard was capable of producing music or even human speech. Of course, the computer came complete with a little black and white screen. It had a resolution of 512 x 342 pixels showing a virtual desktop.

Maybe this desktop and the OS behind it was the Mac's real strength. Right from the beginning it featured icons representing programs, folders and files, a trashcan, and overlapping windows to drag around, all dominated by a menu bar with pull-down menus. This was a radical new concept for the average computer user, who at the time was still typing c:\ and memorizing strange key combinations. The launch of the Mac was quite definitely the start of computers for the masses. Windows 3.1,the first reliable Microsoft OS with a GUI (for which Mac OS was clearly the blueprint) wasn't introduced until 1992!

2.3. 2 Text 1: Graduates 'satisfied with jobs'

1. 66% of all students who graduated in 2002 were in jobs that required a degree.
2. From 1995 to 2002 the number of graduates starting their career in non-graduate jobs declined.
3. The number of people doing vocational training should be increased according to Peter Elias and Kate Purcell.
4. The British government wants half of the young people to start higher education by 2010.
5. Last year most newly hired graduates received higher starting wages than in 2002.

Text 2: The Very Personal Computer

6. The original Mac was portable and had both a state-of-the-art processor and a large RAM capacity for its time.
7. Because it was an all-in-one multimedia computer, the software for the Mac was extensive.
8. The virtual desktop was Mac's real success, because it was unusual for a computer.
9. Mac users had to learn many new key commands in order to use the Mac.
10. Microsoft released its first successful version of Windows with a graphic user interface around the same time as the Mac was introduced.

2.4 *Would somebody turn that noisy child off!*

2.4.1 Read the following article and decide whether each statement on the next page is true or false based on the information in the article. For each answer, provide a justification.

A high-tech remote control device uses the latest technology to filter out any unwanted sounds

A remote control that allows you to switch off annoying noises could be available soon. The gadget – the size of a mobile phone – will allow you to eliminate the sounds of bickering children, thundering traffic, pounding road diggers, barking dogs or twittering colleagues.

The sleek, high-tech silencer, called the Mute, uses technology created for use in hearing aids. It sends a signal via a wireless connection to two little "buds", pieces which users stick in their ears. All they have to do is point the remote at anything and it will filter out the sound coming from it.

The Mute, which is still in development, was created for the Royal National Institute for Deaf People (RNID) to help people with hearing difficulties to filter out background noise that can interfere with their understanding of the spoken word. But its creators soon recognised that its applications could be far wider.

Chris Vanstone, of Human Beans, the design consultancy behind the Mute, said: "We wanted to create a product that could help everyone to manage the noise around them. The world is getting noisier all the time. It is twice as loud now as 50 years ago." He said that the Mute would come into its own in, say, a noisy pub or an office with a digger outside.

Neil Thomas, of the RNID, said that the Mute works by "sampling", or recording, the sound that the user wants to filter out so that it can identify the shape of the sound wave. "It then turns the sampled signal and plays it upside down over the noise that is coming in and they cancel each other out." Mr Thomas said he hoped that a major electronics company would take up the idea and manufacture the product.

The Mute is one of several futuristic hearing aids that have been designed for the RNID's HearWear collection, which was developed with the design magazine *Blueprint* and the brand consultancy Wolff Olins.

Another, which already exists in prototype, is the Goldfish, also designed by Human Beans. This consists of two buds placed in the ears that can record and store up to ten seconds of sound. "If you miss a word or a phrase that someone has just said, you just touch your ear and the Goldfish replays the last ten seconds of conversation," Mr Vanstone said. "I've tried it out and it's very useful for people like me who are very forgetful, although it is a rather surreal experience."

Mr Thomas said that the HearWear range had been developed in an attempt to do for hearing aids what fashion designers had done for glasses. "Years ago glasses were regarded as something you got from your eye specialist and there was very little choice. They were not cool or sexy. Now, glasses have become a fashion item and a style statement and many people wear them even if they have perfect vision.

"In contrast, the design of hearing aids has changed little over the years and they still have very negative connotations with disability. "We are trying to show the massive potential for industry to create stylish and desirable hearing products which, if they were available on the high street, millions of people would want to use," Mr Thomas said.

2.4.2 Statements about the text:

1. At the moment a technical device which can be used to filter out noise is being developed.
2. The original idea was to develop a device for people with hearing problems.
3. There is no cable between the device and the "buds" in your ears.
4. Over the past years it has been possible to reduce the noise around us.
5. In order to filter sounds the original noise must be made stronger first.
6. A producer for the new device has already been found.
7. The Mute is not the first device created for the HearWear collection.
8. The Goldfish makes it possible to listen again to what has just been said.
9. Mr Vanstone says you need experience to use the Goldfish successfully.
10. Mr Thomas wants to increase the acceptance of hearing aids by the society.

3 Phonetic symbols with some examples

Vowels and diphthongs		*consonants*	
[æ]	cat	[s] -	this (voiceless)
[ʌ]	cup	[z] -	isn' t (voiced)
[ə]	mother, about	[θ] -	three (voiceless)
[ɜ:]	learn	[ð] -	mother (voiced)
[ɪ]	it	[ʧ] -	chair (voiceless)
[ai]	my	[ʤ]	juice (voiced)
[ɔ]	what	[ʃ]	shoe (voiceless)
[ei]	day	[ʒ]	decision (voiced)
[ɔi]	boy	[v]	very
[aʊ]	how	[w]	what
[ə ʊ]	go	[ŋ]	sing
[ɪə]	here		
[ɜə]	there		
[ʊə	sure		

[:] – *long vowel*
['] – *stressed syllable*

4. Listening:

4. 1 Science and Technology

1) Is technology applied science?
2) Where does Prof David Channel teach?
3) What did the ancient people think about the sun?
4) What was Newton's concept of the word?
5) By contrast, what do modern scientists compare the concept of the world with?
6) Why is technology so important

4.2 Zero

In his book, The Nothing That Is, Robert Kaplan tells the history of zero. It's tricky because we have to simultaneously see zero as a symbol, a mathematical concept, and a metaphor. How to capture all those *contradictory* roles?

Even today, it might seem confusing that the symbol for nothing is what we use to make numbers very large. "I'll give you two hundred dollars for your horse," says farmer A. "Add a zero," says farmer B, "then we can talk business."

4.2.1 Fill in the missing words:

So Kaplan deals with very-large numbers as well as with the _________*(1)* of number. When Archimedes wanted to show how ______(2) numbers might get, he began with a known Greek word, myriad. Myriad meant ____________(3) : a number that no one yet had any way to write out.

Archimedes said, ________(4) a myriad *grains* of sand making up a *pile* the size of a seed. Now imagine a pile of seeds the _____(5) of your finger. A myriad finger-widths is a ________(6) of mile. How many of those would make up the diameter of Earth; how many Earths, a universe? Archimedes arrives at a number of grains of sand ________(7) to a one followed by ____________(8) zeros. But, without a zero, he can only *recite* this *tortuous* assembly of grains of sand.

4.2.2 True or false?

		True	False
9	Ancient Indian mathematician Brahmaputra already described zero in a way we also see it.		
10	The Mayas invented the symbol for zero we use today.		
11	In India they used a symbol for "point" to mark zero.		
12	The Arabs used the symbol of a circle to represent the number zero.		
13	Europeans used the concept of zero by the 12^{th} century throughout the continent without restrictions.		

4.2.3 Summarize <u>one</u> of Kaplan's riddles / ideas in your words.

taken and adapted from engine-magazine.com: Prof. Dr. John H. Lienhard, University of Houston
R. Kaplan, The Nothing That Is: A Natural History of Zero. New York: Oxford University Press, 1999

4.3 **Quantum computers**

1. List the parameters of Yael's new computer: processor:
   memory:

2. What is the idea behind quantum computers?

3. What special environmental factors have to be taken into consideration?

4.4 Successor to DVD

Successor to DVD

1. Where is the company that promises new storage media based?
2. How much data can info-mica store?
3. Which devices does it compete with?
4. Which physical properties does it have (e.g. weight)?

5 It's the small words that make a language fluent. Look at the gaps. 44 prepositions and articles were deleted. Can you make the text smooth again?

a • for • into of • onto • the • the • • to

Perhaps ________**1)** most influential component is ________**2)** CPU. Its function is _______**3)** execute program instructions and coordinate ________**4)** activities _______**5)** all other units. In ______**6)** way, it is ________**7)** `brain' _______**8)** ________**9)** computer. ________**10)** main memory holds ________**11)** instructions and ________**12)** data which are currently being processed by ________**13)** CPU. ________**14)** peripherals are ________**15)** physical units attached _______**16)** ________**17)** computer. They include storage devices and input/output devices. Storage devices (floppy or hard disks) provide ______**18)** permanent storage _______**19)** both data and programs. Disk drives are used _______**20)** handle one or more floppy disks (FDD) and ________**21)** hard disk (HDD). Input devices enable data _______**22)** go _________**23)** ________**24)** computer's memory. ________**25)** most common input device are ________**26)** mouse and ________**27)** keyboard. Output devices enable us _______**28)** extract ________**29)** finished product from ________**30)** system. ________**31)** example, ________**32)** computer shows ________**33)** output on ________**34)** monitor or prints ________**35)** results _________**36)** paper by means _______**37)** ______**38)** printer. On ________**39)** rear panel _______**40)** ________**41)** computer there are several ports _________**42)** which we can plug ______**43)** wide range _______**44)** peripherals – modems, fax machines, optical drives and scanners.

6 Video: An electronics engineer in Silicon Glen

This film is about John Houston, an electronics engineer in Scotland. He is responsible for controlling and supervising the development of new personal computers at the Mitsubishi PC Division manufacturing plant at Glenrothes.
Glenrothes is a new town north of Edinburgh in the heart of an area known as Silicon Glen. Glen is the Scots word for valley, and Silicon Glen is Scotland's answer to Silicon valley in California.

Part I: Interview with John and his wife Charlie
Answer the following questions.

1. What does John's wife do for a living?
2. Why did John and Charlie move to Clackmannan?
3. How long have they been living there?
4. Why did John opt for a career in electronics?

Part II: The company's products
Complete the gaps in the following text using the words given.

Components – network – manufacturing – mouse – desktop PC – remote control – screen – computer programs – server – work surface

John works at the Mitsubishi PC Division (1) ____________________ plant in Glenrothes. The PC Division makes personal computer systems and products for both home and business use. The so-called (2) ____________________ is small enough for the keyboard and monitor, or (3) ____________________, to fit conveniently on a desk or (4) ____________________. Nowadays there is often a separate tower to house the (5) ____________________ which drive and operate the computer and store information on it. Loudspeakers are for use with (6) _________________ which include sound. There are several other components which aren't part of the computer itself, like the (7) _________________, which moves on a pad to enable users to find their way round the screen and give instructions to computer's programs, or the hand-held (8) ____________________ which performs more or less the same functions as the mouse. The (9) ____________________ is a larger computer, designed for organizations where several people need to share and use the same computer functions and the same information. It serves a (10) _________________ of terminals or workstations, with their own keyboards and monitors.

Part III: New products and cross-functional teams
True or false? Correct the false statements.

1. John works in a Research and Development Centre in Glenrothes.
2. The cross-functional team is headed by a Section Leader.
3. The team consists of three people.
4. Mitsubishi produces all the components.
5. The prototype is sent to the factory in Birmingham, where the computer will be assembled.
6. Efficiency and cost-effectiveness of the final product have to be ensured by the cross-functional team.

Part IV: The development of a new computer product

Answer the following questions.

1. What happens to the prototype for a new product after it has been sent to Glenrothes?
2. What is the function of the processor in a computer?
3. Why do circuits and components vary from one motherboard to another?

4. Why do computer manufacturers test for component failure before they begin full-scale manufacture?

Part V: Interview with Jane Nightingale

Complete the following sentences.

1. Jane studied …
2. Her studies included …
3. She is interested in both … and …
4. It is rare …

Part VI: Interview with Bill Campbell

Answer the following questions.

1. How does Bill Campbell describe the position of British engineering companies on the computer market?
2. How has Silicon Glen influenced the employment situation in Scotland?
3. Where does the money for new investments in Silicon Glen largely come from?
4. How does Bill Campbell see the future of computer technology?