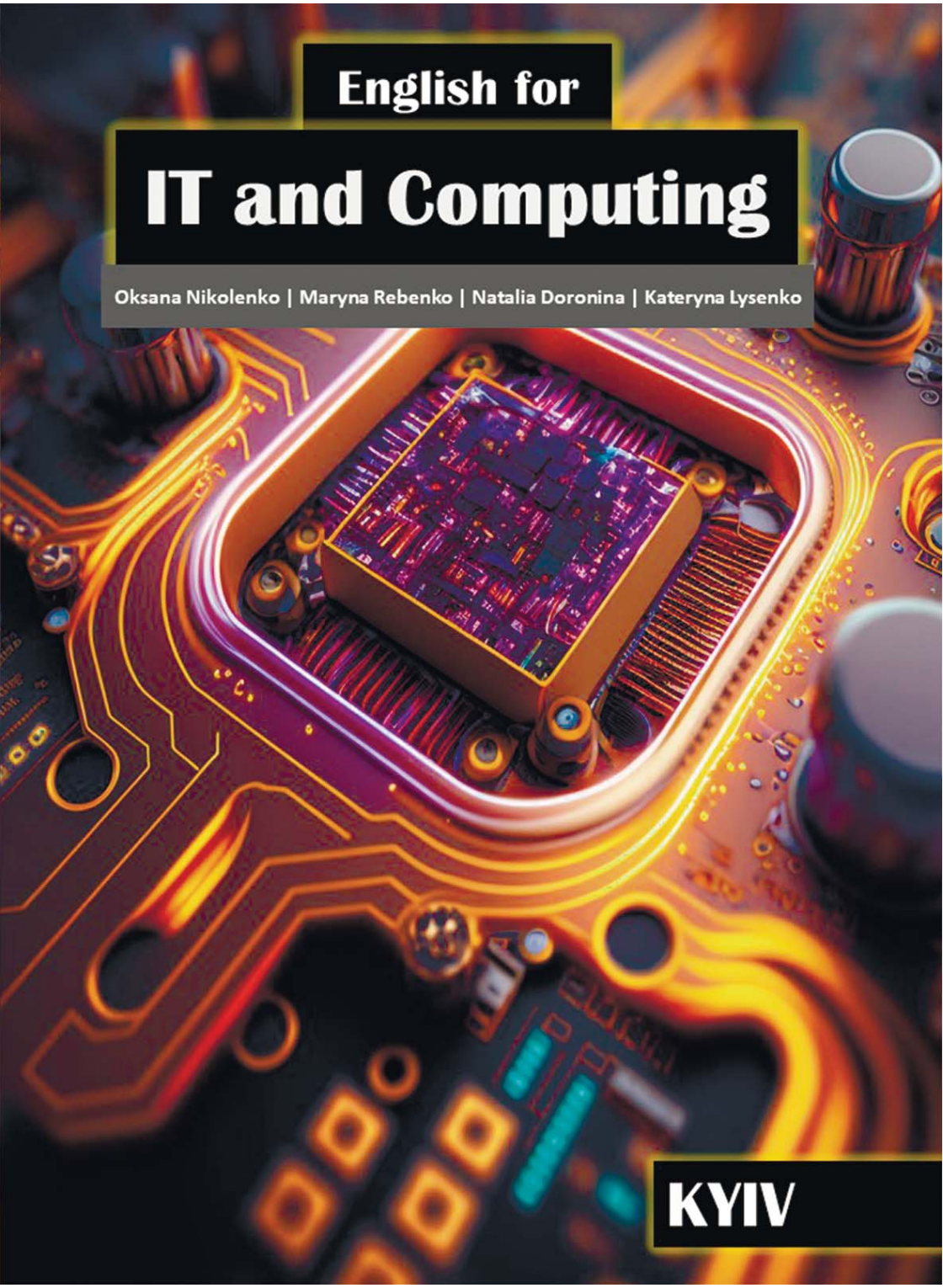
English for
IT and Computing
Oksana Nikolenko | Maryna Rebenko | Natalia Doronina | Kateryna Lysenko
KYIV

ФАКУЛЬТЕТ КОМП'ЮТЕРНИХ НАУК ТА КІБЕРНЕТИКИ
КИЇВСЬКОГО НАЦІОНАЛЬНОГО УНІВЕРСИТЕТУ
ІМЕНІ ТАРАСА ШЕВЧЕНКА

Oksana Nikolenko, Maryna Rebenko,

Natalia Doronina, Kateryna Lysenko

ENGLISH FOR IT AND COMPUTING

АНГЛІЙСЬКА ДЛЯ ІТ ТА КОМП'ЮТЕРНИХ НАУК

Навчальний посібник

Київ
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"English for IT and Computing" (Англійська для ІТ та комп'ютерних наук) укладено відповідно до програми навчальної дисципліни "Іноземна мова для академічних цілей і за професійним спрямуванням" для студентів ОС "Бакалавр" (113-прикладна математика, 124-системний аналіз, 121-інженерія програмного забезпечення, 122-комп'ютерні науки). Посібник складається з 8 розділів, що охоплюють основні сфери комп'ютерних наук і містять автентичні тексти зі спеціальної тематики, аудіо та відеоматеріали з популярних комп'ютерних журналів, вебсторінок. Кожен розділ супроводжується професійно-орієнтованими текстами, післямовними лексичними та практичними завданнями, спрямованими на розвиток різних мовних навичок, насамперед, професійного мовлення. Запропоноване видання допоможе студентам успішно досягти рівня володіння мовою B1-C1, який є стандартом для ступеня бакалавра у вищій школі.

Для студентів других-третіх курсів факультету комп'ютерних наук та кібернетики.

"English for IT and Computing" is created in accordance with the program of the study discipline "Foreign language for academic purposes and professional field" for students of OS "Bachelor" (113-applied mathematics, 124-system analysis, 121-software engineering, 122-computer science). The book consists of 8 chapters, covering the main areas of computer science and containing authentic texts on special topics, audio and video materials from popular computer magazines, web pages. Each section is accompanied by professionally-oriented texts, post-language lexical, and practical tasks aimed at the development of various language skills, primarily professional speech. The proposed edition will help students successfully achieve the B1-B2 level of language proficiency, which is the standard for a bachelor's degree in higher education.

For second and third-year students of the Faculty of Computer Science and Cybernetics.

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CONTENTS

Unit 1

IT JOBS. RECENT DEVELOPMENTS IN IT

1. Starter. Let's talk

1.1 Work in pairs and discuss.

- ***What do the following people do in computing?***
- ***List as many It jobs as you can think of.***

***1.2 Decide whose functions are the following*:**

IT manager ***support technician***
social media specialist ***systems administrator***

• Evaluate, recommend and implement infrastructure systems (cloud and on-premise)

• Ensure the availability of systems

• Integrate disparate systems (cloud and on-premise)

• Ensure that the protection of data is occurring

• Test backup and disaster recovery plans and policies

• Implement monitoring and log management systems to ensure systems performance.

PRACTICAL TIP

Soft skills/ Interpersonal skills

Soft skills are abilities that relate to how you work and how you interact with other people. Popular soft skills include communication, teamwork, and other interpersonal skills. Employers look for soft skills in candidates because these skills are hard to teach and are important for long-term success. Soft skills are different from hard skills, which are technical and job-specific.

Other names for soft skills: personal skills, interpersonal skills, non-technical skills, essential skills, and transferable skills.

https://www.indeed.com/career-advice/resumes-cover-letters/soft-skills

1.3 Read tips for effective interpersonal communication from Deakin University and then try one or more of the following exercises to carry out:

https://ugc.futurelearn.com/uploads/files/16/27/162746fa-8d05-4d5e-a46d-0e5a0066211a/1.7-tips-for-effective-interpersonal-communication.pdf

1. Think of a situation from either your working or personal life where your interpersonal communication was effective and 'easy'. What made it so? How would you describe the rhythm or 'vibe' of this communication? Which of the tips contributed most to the positive nature of this communication?

2. Reflect on a situation where communication was difficult and the reasons why. Next, refer to tips and identify three practical steps you could adopt to either avoid or overcome these challenges in the future.
3. Ask a friend or trusted work colleague to give you some honest feedback about how well you communicate – focusing specifically on your interpersonal skills. Were you surprised by this feedback? Which tips could you learn from and why?

1.4 Problem-solving.

Study the requirements for different jobs in computing advertised on the Internet. Match the requirements to the list of the jobs which follow.

- Bachelor's degree in Computer Science or a similar field.
- Extensive knowledge of computer hardware systems.
- Familiarity with general OS systems, Enterprise, programming languages, and Office software.
- Knowledge of LAN and wireless networks.
- Ability to project manage.
- Good communication skills.
- Ability to troubleshoot complex software and hardware issues.
- Knowledge of database and networking security systems.

- Bachelor's degree in Computer Science and/or Software Engineering
- Minimum of 3 years of experience working as a C# developer on .NET and front end development with HTML5/CSS/JavaScript/Typescript.
- Strong web front-end development experience in HTML5/CSS/JavaScript/Typescript (Angular 9, Angular JS, Razor, Kendo with Telerik libraries)
- Experience with MVC + Web API
- Demonstrated excellence in working with agile development teams designing and developing APIs
- Experience in analyzing and understanding business problems with excellent oral and written communication skills
- Experience with iterative methodologies such as the SCRUM methodology
- Excellent soft skills with a positive attitude and initiative

- Successful track record of supporting and maintaining an organisations IT infrastructure.
- Proven experience with and knowledge of supporting:
- Windows 7 and above and iOS and Android.
- Office 2010 and above.
- Exchange 2013.
- Active Directory.
- TCP, IP connectivity.
- DHCP, DNS and other standard network protocols.
- SOHO Routers.
- Backup and Anti-virus solutions.
- Able to build and repair standard PCs and Laptops.
- Ability to lift and move boxes and IT equipment in line with manual handling procedures.

a IT Support Technician
b Web Developer
c IT Engineer

2. Language Focus

"Must," "have to," and "need to" in the positive or question form are used to speak about responsibilities, obligations, and important actions.

Use "have to" in the past, present, and future to express responsibility or necessity.

- *She had to work hard yesterday.*

Use "must" to express something that you or a person feels is necessary. This form is used only in the present and future.

- *I must finish this work before I leave.*

Use "need to" to express that something is important for you to do. This form is often used for something that is important one time, rather than referring to responsibility or duty.

- *We need to focus on getting new business this month.*

2.1 Fill in the blanks with the appropriate form of the verbs, need to, have to, and must to make sensible statements. More than one possible answer is possible in some examples.

1. IT specialists primarily work alone and thus **……..** have strong time management skills.
2. They also **……..** to be detail-oriented when learning each piece of software to walk customers through the setup and the different software processes remotely.
3. IT managers **……..** take responsibility for budgets.
4. A senior project manager **……** have knowledge and experience with Microsoft Project, Excel, Word and PowerPoint, and other project management software.
5. Technical support specialists **…….** have strong verbal communication skills, as they **……** be able to describe a solution in a way that a non-technical person can understand.
6. An information technology specialist **……..** a multitude of roles to fill.
7. You **…….** to match every listed expectation to apply for the position.

TOP IT AND SOFTWARE COMPANIES IN THE WORLD

3. Reading

Before reading discuss the following questions:

- *What are the top IT and Software companies in the world?*
- *What are the major fields of leapfrog innovation?*
- *Can we say that Google is at the forefront of technology?*
- *How has Google changed the world?*
- *What's it like to work at Google?*
- *What is inside the massive Google headquarters?*

Watch the video and check your answers: https://www.youtube.com/watch?v=Z-pT0XDYvDM

3.1 Read the text and give the meaning of the words in bold.

Google, in full **Google LLC** formerly **Google Inc. (1998–2017)**, American search engine company, founded in 1998 by Sergey Brin and Larry Page, that is a **subsidiary**

of the holding company Alphabet Inc. More than 70 percent of worldwide online search requests are handled by Google, placing it at the heart of most Internet users' experience. Its **headquarters** are in Mountain View, California.

Google began as an online search firm, but it now offers more than 50 Internet services and products, from e-mail and online document creation to software for mobile phones and tablet computers. In addition, its 2012 **acquisition** of Motorola Mobility put it in the position to sell hardware in the form of mobile phones. Google's broad product portfolio and size make it one of the top four influential companies in the high-tech marketplace, along with Apple, IBM, and Microsoft. Despite this **myriad** of products, its original search tool remains the core of its success. In 2016 Alphabet earned nearly all of its **revenue** from Google advertising based on users' search requests.

Brin and Page, who met as graduate students at Stanford University, were intrigued with the idea of **extracting** meaning from the mass of data accumulating on the Internet. They began working from Page's dormitory room at Stanford to devise a new type of search technology, which they dubbed BackRub. The key was **to leverage** Web users' own ranking abilities by tracking each Web site's "backing links"— that is, the number of other pages linked to them. Most search engines simply returned a list of Web sites ranked by how often a search phrase appeared on them. Brin and Page incorporated into the search function the number of links each Web site had; i.e., a Web site with thousands of links would logically be more valuable than one with just a few links, and the search engine thus would place the heavily linked site higher on a list of possibilities. Further, a link from a heavily linked Web site would be a more valuable "vote" than one from a more **obscure** Web site.

In mid-1998 Brin and Page began receiving outside financing (one of their first investors was Andy Bechtolsheim, a cofounder of Sun Microsystems, Inc.). They **ultimately** raised about $1 million from investors, family, and friends and **set up** shop in Menlo Park, California, under the name Google, which was derived from a misspelling of Page's original planned name, *googol* (a mathematical term for the number one followed by 100 zeroes). By mid-1999, when Google received a $25

million round of venture capital funding, it was processing 500,000 queries per day. Activity began to explode in 2000, when Google became the client search engine for one of the Web's most popular sites, Yahoo! By 2004, when Yahoo was dispensed with Google's services, users were searching on Google 200 million times a day. That growth only continued: by the end of 2011 Google was handling some three billion searches per day. The company's name became so **ubiquitous** that it entered the lexicon as a verb: *to google* became a common expression for searching the Internet.

To accommodate this unprecedented mass of data, Google built 11 data centres around the world, each of them containing several hundred thousand servers (basically, multiprocessor personal computers and hard drives mounted in specially constructed racks). Google's interlinked computers probably number several million. The heart of Google's operation, however, is built around three **proprietary** pieces of computer code: Google File System (GFS), Bigtable, and MapReduce. GFS handles the storage of data in "chunks" across several machines; Bigtable is the company's database program; and MapReduce is used by Google to generate higher-level data (e.g., putting together an index of Web pages that contain the words "Chicago," "theatre," and "participatory").

Adapted from "Google". Hall, Mark, and Hosch, William L. *Encyclopedia Britannica*, 11 May. 2020, https://www.britannica.com/topic/Google-Inc. Accessed 9 August 2022

3.2 Find the answers to these questions in the text.

1. Who first developed Google and when?
2. When did Google become available to the public for use?
3. How did the number googol get its name?
4. What makes Google a highly successful company?

3.3 Vocabulary practice

A. Match the words with their synonyms.

generate	increase
venture	piece
handle	project
chunk	income
devise	produce

revenue	invent
explode	manage

B. Fill in the blanks choosing from the variants given.

1. Google's entry into the lucrative mobile operating system market was based on its …… in 2005 of Android Inc., which at that time had not released any products.
   a) bargain b) acquisition c) disposal
2. A whole …… of options exists for us.
   a) handful b) dozens c) myriad
3. Context-dependent simplifications help in ……. the relevant code from a micro protocol.
   a) releasing b) extracting c) implanting
4. The advantage of developing the ……. model is that it facilitates arriving at common terminology and definitions of the concepts and principles.
   a) high-level b) upper-level c) inferior
5. His book …… all his thinking on the subject.
   a) incorporates b) admits c) forms

C. Make a two-word combination using the words in columns and then fill in the gaps in the following sentences.

A:	B:
video-sharing	personal computers
high-tech	software
client search	data
close-captioned	file
user-submitted	site
higher-level	engine
multiprocessor	video
public-domain	marketplace

1. In the past, it was common for individuals to share _____ through local user groups.

2. If you have a video that you would like to make more accessible, you can create _____ yourself in a text editor like Windows Notepad.

3. YouTube is by far the most popular online _____ in the world.

4. Activity began to explode in 2000, when Google became the _____ for one of the Web's most popular sites, Yahoo!

4. Listening

Discuss before listening how the coronavirus pandemic influenced our lives. Give translation to the underlined words.

To say that 2020 was a year like no other is an understatement. The coronavirus pandemic shuttered huge swaths of the economy, cost people their livelihoods, and distanced us from our friends and family.

But unlike prior generations that have dealt with such catastrophes, we've had the benefit of technologies that have let us see and talk to our loved ones, watch the latest movies, play games with friends, and, for those lucky enough, work from home without issue.

From streaming services to video chat platforms and a slew of online games, all the way to the humble laptop, these technologies helped us get through an otherwise unbearable year.

2020 Company of the Year

zoom

https://finance.yahoo.com/news/tech-that-got-us-through-2020-204418401.html

4.1 Watch the video and answer these questions.

1. What is the biggest benefit of Zoom video service for everyone?
2. When did the company debut?
3. What issues have been called "Zoombombings"?
4. What is the company's annual income?
5. How is the number of daily meeting participants changed from December 2019 to April 2020?

4.2 Listen again and complete the gaps:

1. Video chat service has become a _____for everyone from friends and families to schools and businesses.
2. Zoom has managed to become the kind of _____used by everyone from teens to adults trying to keep their social lives _____.
3. Zoom classes quickly became the norm as schools were seeking the transition from in-person to _____learning.
4. The number of users that began _____ the platform can't be understated.

5. Speaking

5.1 Discuss in the groups the following questions.

1. The coronavirus pandemic has been bad news for businesses. But even as some technology companies have been squeezed tight, others have actually seen a boost. Can you name the tech industry's winners and losers in the pandemic?
2. Has the coronavirus outbreak spurred innovations in high tech? What are they? Read the article using the following link and make a summary: https://news.miami.edu/stories/2020/08/pandemic-spurs-a-burst-of-technology-innovation.html
3. Breaking news. Make a report about the latest advances in high tech.

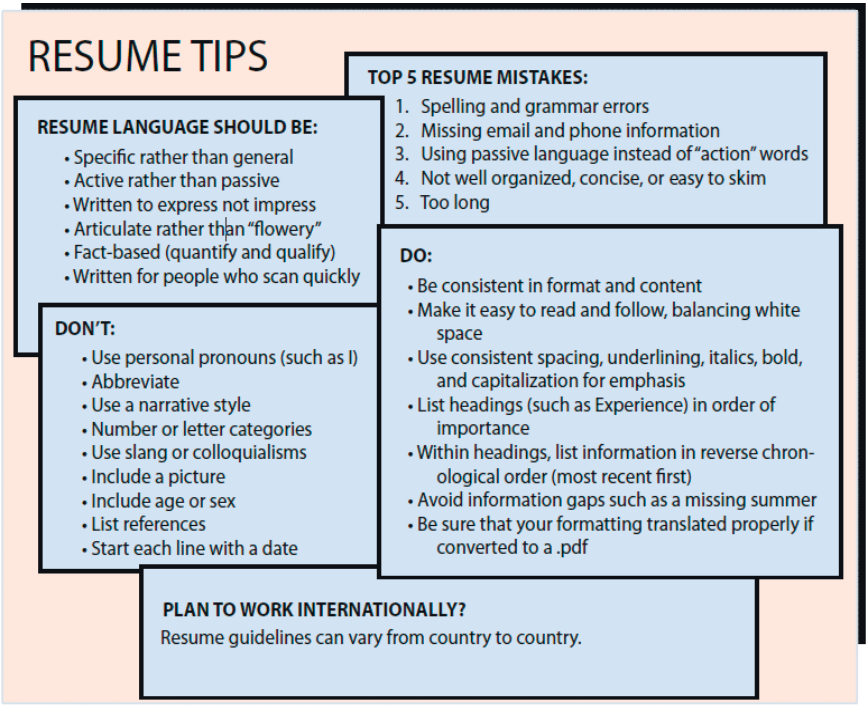
6. Writing

Writing a resume in English can be very different than in your native language. The first and most important step is to take the time to prepare your

materials thoroughly. Taking notes on your career, education, and other accomplishments and skills will ensure that you can shape your resume to a wide variety of professional opportunities.

The resume should include:

- **personal details** - name, address, email, and telephone number
- **objective** - a headline that summarises the job opportunity you are seeking
- **work experience** - your previous employment in reverse chronological order - with most detail for your present or most recent job
- **education** - details of secondary and university education - including the establishments and qualifications (but excluding any that are irrelevant to your career)
- **personal interests** - demonstrating that you are a balanced, responsible member of society with an interesting life outside work



Useful Vocabulary for Creating a Resume

It is common to use words such as **make, do, improve,** or **get** on resumes. However, these words are too common and are seen as "weak" words: there are other stronger verbs in the English language that much more effectively express what you did at your last job. Try using some of the words below instead. In the parentheses, you will see the words or concepts that are commonly used with these power verbs. Some of the words are applicable to more than one category, so they may appear twice.

Instead of MADE or DO, say:

- Acted as (an employee with a title)
- Conducted (research, and studies)
- Coordinated (events. meetings, groups, activities)
- Developed (ideas, projects)
- Delivered (results)
- Designed (projects, spaces, events, graphics)
- Devoted (yourself to a cause, devoted time to something important)
- Gathered (information, ideas, objects)
- Participated in (events, conferences, meetings, and projects)
- Performed (tasks, duties, and responsibilities)

Instead of THINK/RESEARCH, say:

- Analyzed (data, statistics, research findings, etc.)
- Evaluated (data, statistics, research findings, etc.)
- Examined (data, statistics, research findings, etc.)
- Defined (target markets, audiences)
- Developed (research studies, ideas, projects)
- Observed (data, statistics, research findings, etc.)
- Recommended (actions based on professional experience or research

Instead of GOT/RECEIVED, say:

- Achieved (a goal)
- Accomplished (a goal)
- Earned (a new job title, an award, money)
- Fulfilled (a goal)
- Gathered (data, information)
- Obtained (data, information)
- Received (data, information, objects)

Instead of HELPED or IMPROVED, say:

- Advanced (an industry, a cause, an idea)
- Assisted with/in (a job, tasks, duties)
- Contributed to (an industry, a cause, an idea)
- Contributed by + ing (an action you took to improve this cause)
- Consulted (a company, a person)
- Encouraged (growth through action, a company, a person)
- Enhanced (growth through action, a company, a person)
- Generated (revenue, sales, internet traffic, acclaim)
- Gained (revenue, sales, internet traffic, acclaim)
- Identified (a problem, a market, an audience)
- Maximized (profits, efficiency, sales)
- Modernized (an industry, a system, an organization)
- Strengthened (an industry, a system, an organization)
- Upgraded (technology, software)

For ACTIONS you took (organizing, managing), say:

- Delegated (responsibilities, tasks, duties)
- Diversified (a company's portfolio)
- Facilitated (meetings, and changes)
- Formulated (ideas, projects, change)
- Headed (a project)
- Hosted (a conference, a meeting)
- Implemented (change)
- Influenced (a person or company to change)
- Launched (a project, advertising campaign)
- Managed (people, a company, a project)
- Mediated (issues between people, departments, or companies)
- Negotiated (agreements and transactions between people, departments, or companies)
- Operated (machinery, computer programs, production)
- Organized (meetings, plans)
- Overhauled (change in a company)
- Oversaw (a project or company)
- Planned (an event, a project)
- Prepared (a presentation, a proposal, anything to be presented or given to the public or co-workers or clients)
- Presented (ideas, findings, proposals)
- Promoted (ideas, companies)
- Provided (support, and professional help)
- Pursued (a goal or new project)
- Redesigned or Re-engineered or Restructured (a way of doing things, a system)
- Reorganized (a way of doing things, a system)
- Represented (a company, an organization, a team, a department)
- Trained (a person or a team)

- Unified (a group, departments, companies)
- Utilized (resources, tools)

British / American English

There are sometimes differences between British and American English and conventions. Here is a guide to some of the most important differences between your CV/resume and covering letter. But remember, this is a **guide only** - there are no strict rules. For example, some British people like to use "American" words, and some American people like to use "British" words.

British	**American**
CV/curriculum vitae	resume
covering letter	cover letter
Standard paper size: A4 (210 x 297 millimeters)	Standard paper size: Letter (8 1/2 x 11 inches)
Mrs; Miss	Ms
Yours faithfully, Yours sincerely	Yours truly, Sincerely
Managing Director (MD)	Chief Executive Officer (CEO), General Manager
date format: DD/MM/YY example: 30/12/15 30 December 2015	date format: MM/DD/YY example: 12/30/15 December 31st, 2015

6.1 Study the resume of Willow Zanghi, https://resumelab.com/resume-examples/software-engineer. Then write your resume in the same way. Follow the given tips.

Writing a good software engineer resume is surprisingly similar to writing good code—well-constructed sentences, bug-free grammar, and adaptability to new requirements.

You're about to learn how easy that is to achieve. Here is a software developer resume example to see exactly how it's done. Read on, and you'll see how to write a job-winning resume for software engineer and developer jobs.

Willow Zanghi

Software Engineer & Programmer

Friendly software engineer & programmer with 5 years of experience and proven cloud and security skills. Seeking to deliver robust solutions for Microsoft. At Softhammer, drove team that received the 2017 Bossie. Cut breach risk 68% through automated standards enforcement. Cut lead times 23%.

Experience

2017 - 2019 — **Senior Software Engineer**

Softhammer, Inc.

- Led team of 12 programmers handling end-to-end software development life cycle for 27 client projects. Increased customer satisfaction 25%.
- Drove team that received 2017 BOSSIE award for software development.
- Slashed security breaches 68% by automating standards enforcement.
- Raised code efficiency 35%. Cut lead times 23%. Raised client retention 35%.

2015 - 2017 — **Programmer**

Cloudbouncy, Inc.

- Developed infrastructure to process millions of files in proprietary systems.
- Achieved 100% compliance with development best practices by building security into new features. Cut software rework time by 18%.
- Decimated production bugs by getting 97% buy-in for test-driven development program. Increased code reliability by 35% and slashed security risk 23%.

2013 - 2016 — **Volunteer Programmer**

Cattaraugus County Animal Shelter

- Transferred all record keeping to cloud database form.
- Implemented principle of least privilege to slash security risk 35%.
- Wrote new donations functionality that increased collections $5,500/year.

2014 - 2015 — **Freelance Software Engineer**

- Built a working productivity app for real-time project management collaboration. App was downloaded 1,254 times.
- Wrote a native Java cryptocurrency tracking app. The app retrieves and displays current prices for the 10 most popular cryptocurrencies.
- Composed a messenger app using websockets for instant messaging.
- Added invisible keypad to open source Wikimedia Commons App for Android. Debugged crash reports. Wrote code to show media talk page.

Education

2010 - 2014 — **University at Buffalo, BS, Software Engineering**

- Excelled in Java programming with 5 advanced classes.
- President of student cloud computing club.
- Completed a senior project to build a working web app and Java server.
- Pursued a passion for programming coursework.
- Created a YouTube video on cloud security that got 98,000 views.
- My article, "Machine Learning Will Change Everything" appeared in the campus magazine. Linked to by TechCrunch and Gizmodo.

Additional Activities

- President, women in coding club. Raised membership 20%.
- Active member, IAENG Society of Software Engineers.
- Nominated for Ada Lovelace Award, Association for Women in Computing.
- Led a session on cloud computing at FOSDEM 2017.
- Attended the NYC Hackathon 2016.
- Avid cross country skier for health and wellness.

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Skills

- Programming ●●●●●
- Debugging ●●●●●
- Database knowledge ●●●●○
- Leadership ●●●●○
- Collaboration ●●●●○
- Critical thinking ●●●●●

Languages

Java

SQL

C#

KEY TERMS

anti-virus	Google	search engine
Apple	GFS	security system
application	hard drives	software company
backup	hardware	software engineering
cloud computing	high tech	soft skills
chat platform	holding company	subsidiary
close-captioned text	HTML	tablet computers
computer science	LAN	TCP
database program	Microsoft	web site
Excel	multiprocessor personal	Windows
infrastructure system	computer	wireless networks
IBM	OS system	Word
Internet user	online security	Zoom
IP	PowerPoint	Yahoo
IT	programming	YouTube
JavaScript	propriety system	

TEST QUESTIONS

1. What is the difference between soft skills and technical skills?

2. What should you leave out of your resume?

3. What are the key tasks of a software engineer?

4. What are the largest IT companies in the world and Ukraine?

5. What are some of the notable changes to the biggest companies in the world caused by Coronavirus?

Unit 2

THE INTERNET AND TECHNOLOGIES

1. Starter. Let's talk

1.1. Work in groups and discuss.

- ***What is, in your opinion, the main role of the Internet in today's world?***
- ***Look at the pictures below. Name each of the depicted fields and single out one which can function without the Internet.***

A

B

C

D

E

1.2. Decide how the Internet might affect the users or on the other hand, be beneficial. You can use the following ideas to substantiate your answer.

- ➢ breaches of privacy and security
- ➢ the rapid spreading of fake news
- ➢ cyberbullying
- ✓ time-saving
- ✓ easier access to information
- ✓ immediate communication through emailing and messaging

- ➢ Internet addiction
- ➢ information overload
- ➢ harm to social relationships
- ✓ education boost due to online courses' affordability
- ✓ business and banking services improvement
- ✓ visual memory development

2. Practical tips for the Internet consumers

Safer Internet Day is organized each year in February to promote safer and more responsible use of online technology and mobile phones. From cyberbullying to social networking and sexting, each year this campaign aims to raise awareness of emerging online issues.

2.1. Read on to find out more about practical ways in which you can get involved in the event, not just on Safer Internet Day but all year round. The following-up tips aim to ensure your safety while being online. Match the tips (1-11) to the actions (A-K) which suit each tip the most.

1. Do your research
2. Check and double-check
3. Discuss with people you trust
4. Is it a fact or an opinion?
5. Is it too good to be true?
6. Think before you share
7. Learn how to shop smart
8. Set an example
9. Take positive action
10. Make a difference
11. Stay safe online

A Question, evaluate and reflect on the online content you see.

B Consider how unpleasant it is to return goods and items.

C Remember that users mostly write positive reviews of items to boost sales.

D Use other websites and sources to fact-check online information.

E List the apps and websites you know that feature reliable information and could have a significant effect on you.

F Remain suspicious of what you see online and talk to your friends for a second opinion.

G Show your younger siblings how you question and evaluate online content.

H Fact-check and reflect before sharing content, posts or pictures.

I Help to make the Internet a more trustworthy and respectful place.

J Be aware that a lot of what we see online is just other people's opinions.

K Don't share your personal details or completely trust strangers online.

Adapted from "An Internet we trust; exploring reliability in the online world". UK Safer Internet Centre, 9 February. 2021, https://saferinternet.org.uk/safer-internet-day/safer-internet-day-2021/top-tips. Accessed 27 July 2022.

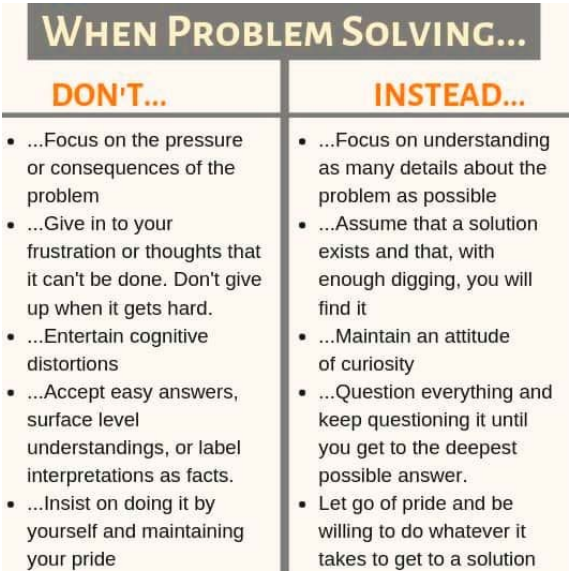
3. Problem-solving

3.1. Discuss:

What are the key problem-solving skills?

How can the Internet affect problem-solving skills?

Is the Internet the most effective problem-solving tool? Why?



3.2. Problem-solving practice

John, a 20-year-old intern at GEnerator startup, is currently busy with a project targeted at creating an educational platform for IT students. He is at the working place now when suddenly his girlfriend's call interrupts him. Sue is tearfully asking John to come to her place immediately because her laptop fails to work properly. John is at a crossroads. On the one hand, he cannot leave the office and delay the task because of the pressure of the deadline; on the other hand, John realizes that his refusal to help Sue could spoil their relationship.

3.3. Talk to other students.

How would you tackle the situation given? Suggest your solution to the particular problem.

4. Language Focus

4.1. Fill in the blanks with the correct preposition from the box to form an appropriate phrasal verb in each gap.

out (x10) up (x5) on (x3) off (x3) over (x1) through (x1) in (x1) for (x1)

Before building 1) ____ a project that involves the use of the Internet, you should ask yourself, "Is the Internet the most efficient medium to gain the goals and reach 2) ____ to users?" The following-up guidelines aim to help you figure it 3) ____.

The projects you'd like to carry 4) ____ should be meaningful.

As with other forms of technology, the Internet should be used to take advantage of its specific instructional features. Pick 5) ____ such an Internet-based project that will be well-defined and catch your peers' attention.

Think 6) ____ the Internet as a tool.

Work 7) ____ this tool to start 8) ____ new and fresh ideas. Structure and integrate the like-minded people's initiatives into your worked-9) ____ plan and follow 10) ____ the goals.

Look 11) ____ projects with specific aims.

If you intend to roll 12) ____ an Internet-based project for school you'd better back 13) ____ of word-for-word copying from suspicious web pages. Set 14) ____ the objectives clearly at the beginning of the project so that participators can assess the relevance.

Try starting 15) ____ small.

Begin on a small scale; plan and practice with a few participants and do your best to get 16) ____ in a team. It might turn 17) ____ that then, you'll get bigger.

Keep 18) ____ communicating in a team.

Participants must find 19) ____ what are each other's expectations and timelines. Starting a project without a kick-20) ____ meeting is like setting 21) ____ on a trip without any concrete plan. Stay 22) ____ contact with others at least once per week and check for messages regularly.

Share the results.

Don't put 23) ____ sharing your results and underestimating success in sorting 24) ____ all problems. Just keep it 25) ____!

5. Reading

5.1. You are going to read an article about the changes caused by the World Wide Web. First, look at the picture below and share your expectations of what it might describe and/or refer to.

How the Internet Has Changed Everyday Life?

By Juan Ignacio Vázquez

As children, we were fascinated by everyday objects that turned out to be magic. In modern popular culture, this motif is perhaps best embodied in Disney films where **inanimate objects** become sentient beings who come to the aid of the main character.

"Any sufficiently advanced technology is indistinguishable from magic." Arthur C. Clarke's widely quoted proposition seems particularly **apt** in this context. Our magic brooms are home-cleaning robots; our magic mirrors are smartphones, equipped with Internet search engines that work much like all-knowing oracles, answering our questions out loud in a human voice. The value of our home appliances increasingly lies in their **embedded electronics** and software.

The term Internet of Things was proposed by Kevin Ashton in 1999. In his presentation, the author argued that by associating physical objects with RFID labels (or smart labels) we can give each object an identity enabling it to generate data about itself and its perceptions and publish that information on the Internet. The idea of the Internet of Things is that the things around us – **home appliances**, vehicles, clothes, soft drink cans, even the street bench – should become first-class Internet citizens, producing and consuming information generated by other things, people, or systems.

So, how can things connected to the Internet make our lives happier or longer? For instance, a smart chair looks like an ordinary chair, but the back and seat conceal a set of small sensors that continually track the user's posture. Then a wireless module sends the posture data to a set of servers, where the data is stored and analyzed for **patterns** that tell us whether or not the sitter spends too long in the same position, or doesn't

take enough breaks. This information can help the user of the smart chair to improve his posture and relieve back trouble. Some smart chairs vibrate when they detect an unhealthy way of sitting, prompting the user to learn and adopt a good posture in an almost unconscious way. The key concept of this example is that the chair is no longer just an item of furniture; it is a medical device designed to prevent back pain. And this may be the most promising feature of the Internet of Things – its ability to create a new, different, and enhanced value proposition by providing **conventional objects** with Internet connectivity and data processing power in the cloud. Other consumer goods include web-connected bathroom scales that let you monitor your diet and set weight-loss goals, sleep trackers that help identify sleep disorders, sports shoes that monitor your performance and suggest ways you can improve, and wearable necklace micro-cameras that take snaps at regular intervals as you go about your daily life so that later on you can remember what you were doing.

Although the idea of magic objects has existed in human culture since antiquity, it has become reality only now due to three main reasons: electronic parts have become smaller and cheaper; the world is interconnected by communications, and people have adopted a digital lifestyle.

Another example is Wikipedia – one of the major achievements of humanity, though perhaps not as widely recognized now as it will be eventually. Let's try to visualize how the wiki concept could apply to the Internet of Things in a specific location, such as a city. A WikiCity would be a **repository** of knowledge about the city whereby the physical objects within it – street furniture, pollution sensors, traffic lights, garbage trucks, green area irrigation systems – would create and update content in keeping with the changes perceived over time. So the "daily pollution level" webpage would be updated continually by pollution and particulate matter sensors at given times of day, in given areas. The "weather information" page would be updated by temperature, wind, sunlight, and rainfall sensors deployed in the city's parks and gardens. And then both pages would be referred to by traffic control systems to determine the interrelationships between rising pollution levels in a given area. So, the WikiCity concept is not that different from Wikipedia. The only difference lies in who produces and consumes the information – now it is physical objects connected to the Internet that create a store of knowledge about a given environment to enhance one another's functionality and grow smarter when viewed as **a conjoined whole**. "WikiCity, the free city that anyone can edit." Some real-life leading examples include Smart Santander (Spain), Amsterdam Smart City (Netherlands), and Songdo IBD (South Korea).

A particularly good example is the Air Quality Egg, a personal air-quality sensor that measures pollution levels outside your own home. You can work together with other Egg users to create maps that track patterns of change in air quality across entire cities.

So, the device has such a trait that makes it more interesting – it gives users a way to work together as a community, and this makes their information more valuable.

In 1874 a team of French engineers built a system of sensors allowing for remote monitoring from Paris of weather and snow depth conditions on Mont Blanc. In 2022, you can use your smartphone to estimate the calories you burned over the past hour of running or cycling. Next, you get in your car, which will suggest the best route to take based on **traffic congestion** and the cheapest service stations on the way. While driving, you can give voice commands to your refrigerator so that it produces an inventory and suggests balanced, healthy recipes you can cook today using the available ingredients. Twenty minutes in advance of your arrival, the central heating in your home is **triggered remotely**. These two scenarios are separated by an interval of more than a hundred years and several technological revolutions. The magic of enchanted objects is finally becoming a reality. Enchanted objects are here. They are here to stay. And they are here to help us, opening up fascinating new horizons.

Adapted from "The Internet of Things: outlook and challenges". Juan Ignacio Vázquez. Change: 19 Key Essays on How the Internet Is Changing Our Lives, https://www.bbvaopenmind.com/en/articles/the-internet-of-things-outlook-and-challenges/. Accessed 28 July 2022.

5. Comprehension check

5.2. Answer the following questions.

1. What, in your opinion, did Arthur C. Clarke mean by saying that any sufficiently advanced technology is indistinguishable from magic? To what extent do you agree or disagree?

2. How did Kevin Ashton feature the Internet of Things technology?

3. Which items, according to the author, might become “first-class Internet citizens”?

4. How can things connected to the Internet make our lives happier and longer? Exemplify your answer.

5. What caused the idea of “magic objects” or the IoT to become reality?

6. Vocabulary practice

6.1. Find the words and word combinations in bold in the article that match the definitions a-j.

a a condition in transport that is characterized by slower speeds, longer trip time, and increased vehicular queueing;

b common and traditional stuff;

c a set of hardware and software designed to carry out a predefined task;

d the elements which repeat in a predictable manner;

e a unity that is brought together to meet, touch, or overlap;

f things that are not alive, such as a rock, a chair, a book, etc.;

g machines that assist in household functions such as cooking, cleaning, and food preservation;

h a place where things are or may be stored;

i appropriate or suitable under the circumstances;

j caused to operate from a distance.

6.2. Match the verbs in the box with their synonyms a-j. Use each verb in a sentence of your own.

generate	consume	conceal	improve	relieve	detect	track
		adopt	perceive	deploy		

a to hide, mask, cover;

b to produce, originate, cause;

c to find, discover, reveal;

d to apply, introduce, spread;

e to recognize, grasp, comprehend;

f to facilitate, ease, reduce;

g to eat and/or drink; spend;

h to follow, trace, pursue;

i to choose to take up; legally take another's child;

j to develop, enhance, or boost.

6.3. Read the article below. For items (1-10), choose the correct answer (A, B, C, or D).

The weirdest IoT-enabled devices of all time

You know this one is actually quite useful. The *Nora* snoring solution (1)_____ of a pad under your pillow (2)_____ to a little gadget by your bed. When you start snoring, it gently moves your (3)_____ to open your airways: no more snoring, and they claim you won't feel a thing, either.

(4)_____ a clever dispensing system, the world's first smart deodorant aimed to dispense the perfect (5)_____ of product to ensure both user comfort and sustainable use. You can also (6)_____ your preferences in a mobile app to allow for auto-orders.

Step counting is all the rage, but why use a watch or your phone when you could use a smart belt? The WELT product will (7)_____ you know your waist size! Unfortunately, this is one of the ghosts (8)_____ the WELT is no longer for sale.

Looking (9)_____ enhancing your dining experience? The world's first interactive salt dispenser can play music and produce mood lighting (10)_____ measure out your salt.

1	**A**	consists	**B**	includes	**C**	contains	**D**	comprises
2	**A**	united	**B**	linked	**C**	combined	**D**	mixed
3	**A**	body	**B**	mouth	**C**	head	**D**	nose
4	**A**	Through	**B**	Thanks	**C**	Though	**D**	Due
5	**A**	number	**B**	amount	**C**	sum	**D**	quality
6	**A**	settle	**B**	sit	**C**	set	**D**	seat
7	**A**	allow	**B**	permit	**C**	enable	**D**	let
8	**A**	but	**B**	still	**C**	and	**D**	as
9	**A**	at	**B**	after	**C**	forward	**D**	for
10	**A**	too	**B**	as well as	**C**	except	**D**	in addition to

7. Listening

7.1. Watch the video* History of the Internet. *Match the years in Column A to the right scientists' names in Column B and the relevant information in Column C. https://www.youtube.com/watch?v=h8K49dD52WA

A	B	C
1962		ARPANET
1969		TCP/IP protocols
1971	Ray Tomlinson	mosaic web browser
the 1980s	Tim Berners-Lee	the World Wide Web
1991	Vinton Cerf	Dial-up
1992	J.C.R. Licklider	Erwise browser
1993		the first email system
1994		Netscape navigation
the early 1990s		a network of computers that could talk to one another

7.2. Watch the video* Close Your Facebook Account Now! *For each statement (1-9), choose the correct ending (A, B, C, or D).

https://www.youtube.com/watch?v=RJqf0qYrYvU

1. According to the report, since its launching in 2004 Facebook has replaced almost every other…

A CIA* information-gathering program.

B CIA's funding of artificial intelligence projects.

C CIA's controlling the internet and compiling lists on all users of the internet.

D CIA's blocking posting the current news.

2. It has been found out that most users are eagerly publicizing their…

A selfie-photos and images with mates.

B accommodation and surroundings.

C holiday and travel experiences.

D dwelling place, religious and political views.

3. Mark Zuckerberg called his creation the single most powerful tool for …

A people gathering together.

B people sharing their interests with each other.

C population overall vaccination.

D population control.

4. The graph in the report represents the dependency relation between the rate of Facebook users playing Farmville with the…

A rate of hours spent studying.

B rate of hours spent working.

C rate of hours spent dreaming.

D rate of hours spent doing sports.

5. In the realm of contemporary society the role of Facebook is considered to be…

A effecting.

B breathtaking.

C overwhelming.

D neutral.

6. It has been fingered out that the CIA is rather thorough in convincing the nation of constantly sharing information about…

A everything you're doing.

B everything you're planning to get.

C everything you enjoy in your life.

D everything you have lately experienced.

7. In its turn Facebook programs say that the CIA money has been spent mostly on…

A entertainment shows.

B blackmail applications.

C advertising promotion.

D international spying projects.

8. The trend of social networks' information gathering is believed to have a real…

A tremendous perspective for human beings' development.

B danger lurking in the shadow.

C hidden threat to people.

D merit for people's prosperity.

9. Experts guess that the CIA should be more concerned about people's …

A searching for intriguing facts.

B eavesdropping for politicians.

C losing interest in Facebook.

D losing their interest in celebrities' lives.

**CIA is the Central Intelligence Agency, a civilian foreign intelligence service of the U.S. Government, tasked with gathering, processing, and analyzing national security information from around the world, primarily through the use of human intelligence.*

8. Speaking

8.1. Look at the list of incredible Internet facts and decide which is true and which is not. Discuss those facts which are false from your point of view.

1. It may seem like only yesterday we were all dialed in for our Internet connection, but wireless Internet was actually founded in September 1990 – quite not long ago.

2. Interbrand invented the term "Wi-Fi" as a play on words of the term "Hi-Fi" or "High Fidelity". Hence, Wi-Fi stands for nothing meaningful.

3. Wireless Internet signals generally emit from your router in the shape of Italian pasta. Tasty!

4. In the early days of computer networking, coaxial cables were used, the same type of cabling that is commonly operated in space satellites today.

5. You may have only heard it recently, but the term Internet of Things (IoT) has actually been around for 23 years! It was first coined in 1999 by Kevin Ashton, a British visionary and engineer.

6. By 2030, it is estimated there will be over 125 billion Internet-connected devices – with every household projected to own, on average, 15 connected devices.

7. The new Wi-Fi will bring faster wireless Internet and better performance for a world increasingly reliant on technologies like big data and blockchain.

8. Some of the strangest devices that are connected to the Internet nowadays include mirrors, pillows, bathtub drains, birdhouses, card wallets, and desk mats. We've left the particularly odd items off this list!

9. South Korea leads the way with the most Internet usage – over 854 million users, making up a 5th of the total number of people online.

10. Google is ranked as the most popular website worldwide, with Instagram coming in second and Twitter third.

8.2. Share your thoughts on the following quotes and sayings about the Internet.

The Internet is becoming the town square for the global village of tomorrow. (Bill Gates, born in 1955, an American business magnate, software developer, investor, author, and philanthropist)

We are all now connected by the Internet, like neurons in giant brains. (Stephen Hawking, 1942 – 2018, an English theoretical physicist, cosmologist, director of research at the Centre for Theoretical Cosmology at the University of Cambridge, and author)

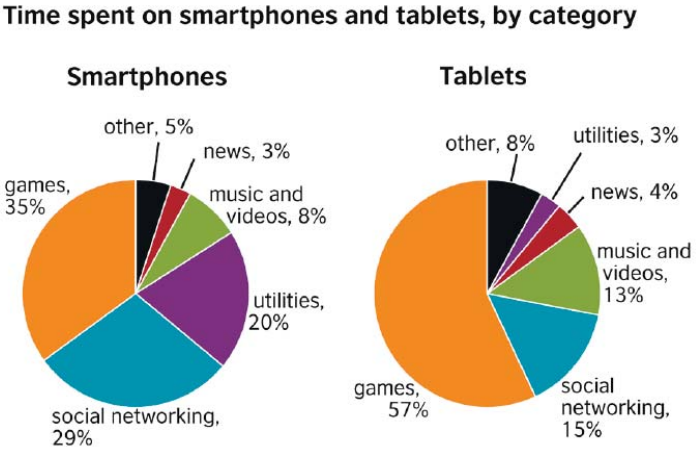
The Internet is so big, so powerful, and pointless that for some people it is a complete substitute for life. (Andrew Brown, born 1955, was an English journalist, writer, and editor who featured technology for Prospect, the New Statesman, and The Guardian)

The Internet gave us access to everything, but it also gave everything access to us. (James Veith, a British writer, and comedian)

Access to computers and the Internet has become a basic need for education in our society. (Kent Conrad, born 1948, a former American politician)

9. Writing

9.1. First, look at the two pie charts below. Study the practical tips on how to compare two charts. Next, read the sample answer.



Tips

1. Before writing about the detailed figures, give an overview of what the graphs or charts represent.

2. Say precisely what the data refers to. There is a difference between, for example, a user spending 57% of *their time* on games and a user spending 57% of *their tablet time* on games. (You can write % or percent, but be consistent.)

3. You don't need to describe all the information in the diagrams. Select the most important things.

4. Don’t repeat vocabulary. Use different words and phrases with the same or similar meanings, e.g. *playing games = gaming*.

5. Use *similarly, in the same way, or also* to show similarities.

6. Use, *however, in contrast, but, while, or instead* to show differences.

Sample Answer

Overall, the two pie charts show that smartphones and tablets are used for the same purposes but to very different extents.

The first pie chart shows how people spend their time on smartphones while the second pie chart illustrates how time is spent on tablets. For both types of devices, the top use is for games, but the figures differ greatly. 57% of the time spent on a tablet is given to

playing games, while only 35% of the time spent on a smartphone is used for this. In contrast, smartphone users spend 29% of their time on their gadgets accessing social networking sites compared with just 15% of tablet time spent on the same activity.

The third most popular use of the tablet is for consuming entertainment, with users spending 1 3% of their tablet time watching videos and listening to music. Smartphone users, however, dedicate only 8% of their smartphone time to such entertainment, preferring instead to spend 20% of their time on their phone accessing utilities. These can include maps, weather information, and calculators.

There is a clear difference in the way people are using their smartphones and tablets. In general, while tablets are being used more for gaming and other forms of entertainment, smartphones seem to be the preferred option for tasks as well as communication with the world around us.

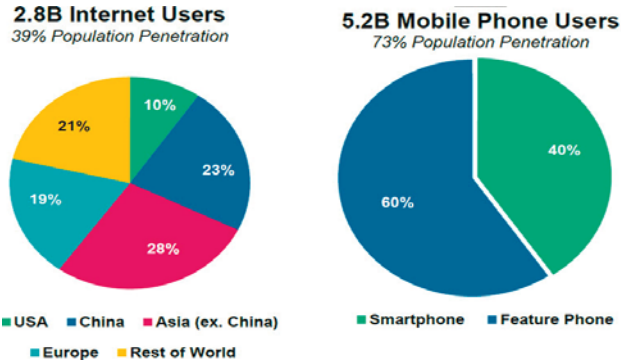
9.2. Write a 150-word essay *"Time spent on smartphones and tablets, by category".*

You have to describe the trend in the graph(s). Your report should be structured with an introduction, a body, and a conclusion. Also, tenses should be used appropriately. In the introduction, you should define what the graph(s) is/are about, that is, the date, location, what is being described, etc. The body will indicate the overall trend and describe the graph(s) in detail. You need to decide on the clearest and most logical order to describe the information.

Last, the conclusion should sum up the global trend shown on the graph(s).

Adapted from "Comparing two charts". Learn English. British Council, https://learnenglish.britishcouncil.org/skills/writing/upper-intermediate-b2/comparing-two-charts. Accessed 29 July 2022.

9.3. The pie charts below illustrate the difference between Internet users and mobile phone ones in the year 2022. Compare the data given and **write your answer in an essay** of at least 150 words. You are advised to spend a maximum of 20 minutes on this task.



KEY TERMS

1. 'at' symbol/sign 2. accurate data 3. addictive nature 4. the advent of the Internet 5. the aftermath of face-to-face communication elimination 6. attention-getting and attention-holding image 7. digital citizen 8. distraction for users 9. emerging technologies 10. globalized community 11. immersive virtual reality environment 12. intercontinental jam session 13. Internet speeding 14. Internet/web-based training 15. Internet technology launch	16. new information environments 17. online schooling 18. the onset of distance education 19. open education systems 20. plain text 21. real-life interaction 22. search engine 23. social networking site 24. to ban access to 25. to disrupt student life 26. to generate a 3D image 27. to maintain the education standards 28. to take virtual classes 29. wireless connection 30. would-be career paths

TEST QUESTIONS

1. Which ideas and principles does Safer Internet Day involve?
2. How can the Internet affect problem-solving skills?
3. What kind of changes has the World Wide Web initiated?
4. What is implied in the idea of the Internet of Things technology? Give examples of some weird IoT applications and devices.
5. Which dangers do social networks like Facebook and Instagram forward to their users?
6. What are the top facts from Internet origin and history?
7. How do you personally consider an Internet addiction phenomenon, as a norm or a kind of some disorders?
8. How has education been revolutionized due to the Internet launch?
9. What is the possible aftermath of face-to-face communication elimination due to Internet speeding?
10. What are the perks and potential dangers of Internet speeding?

Unit 3
THE WORLD WIDE WEB

1. Starter. Let's talk.

1.1 ***Take a quick quiz and discuss the following questions in the groups:***

- *Are 'Internet' and 'World Wide Web' interchangeable terms?*
- *What is the difference between the Internet and the World Wide Web?*

List the differences between the two.

1. A computer network is...
a) when every computer in the world is connected
b) when multiple computers are connected
c) the world wide web
d) an internet protocol

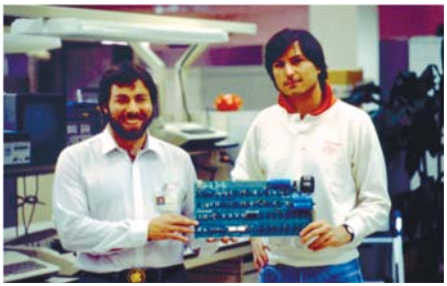
2. The internet is...
a) the place web pages are stored
b) the world wide web
c) a global network of computers
d) how your computer links to a supercomputer

3. The world wide web is...
a) where the internet can be found
b) owned by Tim Berners-Lee
c) part of the internet, the store of websites
d) a global network of computers

4. A web browser is...
a) how web pages are encoded
b) a program for accessing web pages
c) the protocol of the internet
d) where web pages are stored

1.2 ***Can you identify these notable people in the photos?***






1.3 Match the names of people who changed the Internet with their inventions.

1. Tim Berners-Lee
2. Ray Tomlinson
3. Vint Cerf and Bob Kahn
4. Scott Fahlman
5. Larry Page and Sergey Brin
6. Bill Gates
7. Steve Jobs
8. Jimmy Wales
9. Nicklas Zennstrom
10. Chad Hurley, Steve Chen, and Jawed Karim
11. Mark Zuckerberg

a) He/they changed the way we search and use the Internet. He/they worked at the top of the search giant. His/Their company grew rapidly every year since it began. He/They started with his/their own funds, but the site quickly outgrew his/their own existing resources. He/They later obtain private investments through Stanford.	b) The Father of Email made it possible to exchange messages between machines in diverse locations; between universities, across continents, and oceans. He came up with the "@" symbol format for e-mail addresses.	c) His/Their innovative idea of a personal computer led him/them into revolutionizing the computer hardware and software industry. The Apple founder changed the way we work, play, and communicate. He/They made simple and uncluttered web design stylish.

d) He/They created the TCP/IP suite of communication protocols. A language used by computers to talk to each other in a network.	e) He/They is/are credited with originating the first ASCII-based smiley emoticon, which he/they thought would help to distinguish between posts that should be taken humorously and those of a more serious nature.	f) He/They invented the World Wide Web. He/They wrote the first web client and server and designed a way to create links, or hypertext, amid different pieces of online information.
g) He/They founded Facebook to help students in universities keep in touch with friends. The "status update" started its rebirth on Facebook, where user after user tells their extended network of trusted friends what they're doing. They also show off photos, upload videos, chat, make friends, meet old ones, join causes, groups, have fun and throw virtual sheep at one another.	h) He/They founded the software company called "Micro-Soft". a combination of "microcomputer software." Later on, he/they developed a new GUI (Graphical User Interface) for a disk operating system. He/They called this new style Windows. He/They has/have all but accomplished his/their famous mission statement, to put "a computer on every desk and in every home". at least in developed countries.	i) He/They met as early employees at PayPal. He/They later started the internet's most popular video-sharing site YouTube which is broadcasting more than 100 million short videos daily on myriad subjects.
j) He/They co-founded the fastest-growing communications trend in history called Skype. It offered consumers worldwide free software for making superior-quality calls using their computer and expanded its offering for Linux, MAC & PC and mobile/ handheld devices.		k) He/They founded the world's largest encyclopedia which carries articles that can easily be edited by anyone who can access the website. It was launched in 2001 and is currently the most popular general reference work on the Internet.

2. Reading

The World Wide Web from its origins

'Information Management: A Proposal'. That was the bland title of a document written in March 1989 by a then little-known computer scientist called Tim Berners-Lee, who was working at CERN, Europe's particle physics laboratory, near Geneva. His proposal, modestly called the World Wide Web, has achieved far more than anyone expected at the time.

In fact, the Web was invented to deal with a specific problem. In the late 1980s, CERN was planning one of the most ambitious scientific projects ever, the Large

Hadron Collider, or LHC. As the first few lines of the original proposal put it, 'Many of the discussions of the future at CERN and the LHC end with the question "Yes, but how will we ever keep track of such a large project?" This proposal provides an answer to such questions.

The Web, as everyone now knows, has many more uses than the original idea of linking electronic documents about particle physics in laboratories around the world. But among all the changes it has brought about, from personal social networks to political campaigning, it has also transformed the business of doing science itself, as the man who invented it hoped it would.

It allows journals to be published online and links to be made from one paper to another. It also permits professional scientists to recruit thousands of amateurs to give them a hand. One project of this type, called GalaxyZoo, used these unpaid workers to classify one million images of galaxies into various types (spiral, elliptical, and irregular). This project, which was intended to help astronomers understand how galaxies evolve, was so successful that a successor has now been launched, to classify the brightest quarter of a million of them in finer detail. People working for a more modest project called Herbaria@home examine scanned images of handwritten notes about old plants stored in British museums. This will allow them to track the changes in the distribution of species in response to climate change.

Another new scientific application of the Web is to use it as an experimental laboratory. It is allowing social scientists, in particular, to do things that were previously impossible. In one project, scientists made observations about the sizes of human social networks using data from Facebook. A second investigation of these networks, produced by Bernardo Huberman of HP Labs, Hewlett-Packard's research arm in Pato Alto, California, looked at Twitter, a social networking website that allows people to post short messages to long lists of friends.

At first glance, the networks seemed enormous – the 300,000 Twitterers sampled had 80 friends each, on average (those on Facebook had 120), but some listed up to 1,000. A closer statistical inspection, however, revealed that the majority of the messages were directed at a few specific friends. This showed that an individual's

active social network is far smaller than his 'clan'. Dr. Huberman has also helped uncover several laws of web surfing, including the number of times an average person will go from web page to web page on a given site before giving up, and the details of the 'winner take all' phenomenon, whereby a few sites on a given subject attract most of the attention, and the rest get very little.

Scientists have been good at using the Web to carry out research. However, they have not been so effective at employing the latest web-based social-networking tools to open up scientific discussion and encourage more effective collaboration. Journalists are now used to having their articles commented on by dozens of readers. Indeed, many bloggers develop and refine their essays as a result of these comments.

Yet although people have tried to have scientific research reviewed in the same way, most researchers only accept reviews from a few anonymous experts. When Nature, one of the world's most respected scientific journals, experimented with open peer review in 2006, the results were disappointing. Only 5% of the authors it spoke to agreed to have their article posted for review on the Web – and their instinct turned out to be right because almost half of the papers attracted no comments. Michael Nielsen, an expert on quantum computers, belongs to a new wave of scientist bloggers who want to change this. He thinks the reason for the lack of comments is that potential reviewers lack incentives.

Adapted from The Economist. What's the score. Rex Features. March 12th, 2009. https://www.economist.com/science-and-technology/2009/03/12/whats-the-score

2.1. ***Decide whether the statements are True or False.***

Write: **TRUE** if the statement agrees with the information / **FALSE** if the statement contradicts the information / **NOT GIVEN** if there is no information.

1. Berners-Lee was famous for his research in physics before he invented the World Wide Web.
2. The original intention of the Web was to help manage one extremely complex project.
3. Tim Berners-Lee has also been active in politics.
4. The Web has allowed professional and amateur scientists to work together.

5. The second galaxy project aims to examine more galaxies than the first.
6. Herbaria@home's work will help to reduce the effects of climate change.

2.2 Complete the notes below. Choose NO MORE THAN TWO WORDS from the passage for each answer.

Social networks and the Internet use

The web was used by Social scientists (including Dr. Huberman) to investigate the **(1)……..** of social networks.

Most **(2) …….**intended for a limited number of people – not everyone on the list.

Dr. Huberman has also investigated: **(3)……..** to discover how long people will spend on a particular website, and why a small number of sites get much more **(4)……** than others on the same subject.

3. Listening

On the World Wide Web's 30th birthday, Sir Tim Berners-Lee, its founder, and web inventor reflects on how the web has changed our world and what we must do to build a better web that serves all of humanity. March 12, 2019

30 years on, what's next #ForTheWeb?

https://cutt.ly/5I3ENe0

3.1 ***Listen to Part 1 of the recording (up to 2:50) and answer the following questions:***

1. Why are there still so many people who are afraid to use the web?
2. Tim Berners-Lee compiled and formed certain problems that affect today's web. What are they?
3. Is it possible to eliminate all the issues mentioned by Sir Tim? What can be

done to tackle the first problem mentioned?

Are the following statements TRUE or FALSE?

1. The web has opened wide opportunities for every person, regardless of income or origin.
2. The web has given a voice to the underprivileged and frauds.

3.2 Listen to Part 2 of the recording (up to 4:17) and answer the following questions:

1. Why shouldn't we simplify the situation in order to ease the symptoms of the problems?
2. How did previous generations build a better future?
3. What is the purpose of a new Contract for the Web?
4. Who initiated this Contract?

Are the following statements TRUE or FALSE?

1. We need to designate an authoritative government that will take responsibility to solve the issue.
2. Only essential contributions must be made as the problem is very serious.

3.3. Listen to Part 3 of the recording (up to the end) and answer the following questions:

1. Who are “open web champions”?
2. What should we do not to walk away from our responsibility to put the issues on our governments' agenda?
3. What is the real value of the Contract for the Web according to Sir Tim?

4. Vocabulary

4.1 Choose the appropriate word from each pair.

What's the difference between the Web and the internet?

Some people think that the internet and the Web are the same thing, but in fact, they are different. The internet (often called simply "the net") is a global (1)

network/net of interconnected computers. These computers communicate with each other (2) **over/through** existing telecommunications networks – principally, the telephone system. The World Wide Web (usually known as just "the Web") is the billions of web pages that are stored on large computers called web (3) **servers/services**.

To (4) **see/access** the web, you need a computer and a modem. You then connect over your telephone line to an internet service (5) **port/provider** (ISP), which sends your request to view a particular web page to the correct web server.

Websites are not the only service available on the internet. It is also used for many other functions, including sending and receiving emails, connecting to newsgroups, and (6) **discussion/talking** groups.

You could say that the internet is a system of roads, and web pages and emails are types of traffic that travel on those roads.

4.2 Fill in the blanks with the correct words or phrases.

1. ADSL* is more commonly known as ___.

a. longband **b.** broadband **c.** wideband

2. Broadband internet connection is much faster than ___.

a. dial-in **b.** dial-through **c.** dial-up

3. Before you can connect to the internet for the first time, you have to ___ an account with an ISP.

a. set **b.** set up **c.** set in

4. Each time you want to connect to your ISP's system, you have to enter a log-in name and a ___.

a. security word **b.** safe word **c.** password

5. You can set your computer to ___ your log-in details, so you don't have to type them in each time.

a. store **b.** remember **c.** recall

6. With a broadband connection, you usually have to pay a ___.

a. fixed monthly price **b.** fixed monthly fee **c.** fixed monthly cost

7. With dial-up, you can usually choose a ___ tariff.

a. pay-as-you-go **b.** pay-what-you-want **c.** pay-if-you-like

8. Some broadband contracts limit the amount of ___ you can have each month.

a. pages **b.** traffic **c.** use

9. Looking at web pages can be called "navigating the Web" but is more commonly called ___.

a. "surfing the net" **b.** "skiing the net" **c.** "swimming the net"

10. You can often find the answer to a question by ___ on the Internet.

a. looking at it **b.** looking for it **c.** looking it up

11. When your computer is not connected to the internet, it is ___.

a. out of line **b.** offline **c.** off the line

12. Internet banking is also called ___.

a. online banking **b.** on the line banking **c.** inline banking

13. An unexpected disconnection from the Internet is called a ____.

a. lost connection **b.** missed connection **c.** dropped connection

14. A file which is copied from the Internet onto your computer is called ___

a. an upload **b.** a download **c.** a load

15. Downloading files from the internet can ___ your computer with a virus.

a. infect **b.** contaminate **c.** dirty

**ADSL stands for asymmetric digital subscriber line, but the full term is almost never used.*

5. Speaking

5.2 Read about an other initiative of Sir Berners-Lee. Explain the meaning of the words in bold.

The New York Times

For Mr. Berners-Lee, the Solid-Inrupt venture is a fix-it project. He has spent his career championing information sharing, openness, and personal empowerment online — as director of the World Wide Web Consortium, president of the Open Data Institute, and an academic at the Massachusetts Institute of Technology and Oxford University. His accolades include a Turing Award, often called the Nobel Prize for computer science. In his native England, he is a knight — Sir Tim.

He Created the Web. Now He's Out to Remake the Digital World.

Tim Berners-Lee wants to put people in control of their personal data. He has the technology and a start-up pursuing that goal. Can he succeed?

By Steve Lohr

Jan. 10, 2021

Three decades ago, Tim Berners-Lee devised simple yet powerful standards for locating, linking, and presenting multimedia documents online. He set them free into the world, **unleashing** the World Wide Web.

Others became internet billionaires, while Mr. Berners-Lee became the steward of the technical norms intended to help the web flourish as an **egalitarian** tool of connection and information sharing.

But now, Mr. Berners-Lee, 65, believes the online world **has gone astray**. Too much power and too much personal data, he says, reside with the tech giants like Google and Facebook — "silos" is the **generic** term he favours, instead of referring to the companies by name. Fueled by **vast troves of data**, he says, they have become **surveillance** platforms and gatekeepers of innovation.

Regulators have voiced similar complaints. The big tech companies are facing tougher privacy rules in Europe and some American states, led by California. Google and Facebook have been hit with antitrust suits.

But Mr. Berners-Lee is taking a different approach: His answer to the problem is the technology that gives individuals more power.

The goal, he said, is to move toward "the web that I originally wanted."

"Pods," personal online data stores, are a key technical ingredient to achieving that goal. The idea is that each person could control his or her own data — websites visited, credit card purchases, workout routines, music streamed — in an individual data safe, typically a **sliver** of server space.

Companies could gain access to a person's data, with permission, through a secure link for a specific task like processing a loan application or delivering a personalized ad. They could link to and use personal information selectively, but not store it.

Mr. Berners-Lee's vision of personal **data sovereignty** stands in sharp contrast to the harvest-and-hoard model of the big tech companies. But it has some echoes of the original web formula — a set of technology standards that developers can use to write programs and that entrepreneurs and companies can use to build businesses. He began an **open-source software project**, *Solid*, and later founded a company, *Inrupt*, with John Bruce, a veteran of five previous start-ups, to kick-start adoption.

"This is about making markets," said Mr. Berners-Lee, who is *Inrupt*'s chief technology officer.

Inrupt introduced in November its server software for enterprises and government agencies. And the start-up is getting a handful of pilot projects underway **in earnest** this year, including ones with Britain's National Health Service and with the government of Flanders, the Dutch-speaking region of Belgium.

Inrupt's initial business model is **to charge** licensing fees for its commercial software, which uses *Solid* open-source technology but has **enhanced** security, management, and developer tools. The Boston-based company has raised about $20 million in venture funding.

Inrupt is betting that trusted organizations will initially be the sponsors of pods. The pods are free for users. If the concept **takes off**, low-cost or free personal data services — similar to today's email services — could emerge.

The National Health Service has been working with *Inrupt* on a pilot project for the care of dementia patients that moves from development into the field this month. The early goal is to give caregivers access to a broader view of patients' health, needs, and preferences.

Each patient has a *Solid* pod with an "All About Me" form with information submitted by the patient or an authorized relative, supplementing the person's electronic health record. The pod might list that the patient needs help with daily tasks like getting out of bed, tying shoelaces, or going to the bathroom. It might also include what soothes the patient when agitated — perhaps country music or classic old movies. Later, activity data from an Apple Watch or Fitbit could be added.

The medical goal, said Scott Watson, technical director of the pilot project, is

improved health and better care that is less stressful for the patient. “And it’s a fundamental change in how we share information in health care systems,” he said.

The initial project will begin with up to 50 patients in the Manchester region and be evaluated in a few months.

In Flanders, a region of more than six million people, the government hopes the new data technology can **nurture** opportunities for local entrepreneurs and companies and new services for citizens. Personal data in pods can be linked with public and private data to create new applications, said Raf Buyle, an information architect for the Flanders government.

One potential app, Mr. Buyle said, might suggest routes and modes of travel for work commutes, once Covid-19 restrictions are lifted. Such an app, he said, could combine location data from a person’s smartphone, with preferences for exercise and reducing the carbon footprint, weather and public transport schedules, and bike or scooter rental pickup sites.

“... Tim has become increasingly concerned as power in the digital world is weighted against the individual,” said Daniel Weitzner, a principal research scientist at the M.I.T. Computer Science and Artificial Intelligence Laboratory. “That shift is what *Solid* and *Inrupt* are meant to correct.”

The push to give individuals greater control over their data, Mr. Berners-Lee said, often begins as a privacy issue. But a new deal on data, he said, will require entrepreneurs, engineers, and investors to see opportunities for new products and services, just as they did with the web.

The long view is a **thriving** decentralized marketplace, fueled by personal **empowerment** and collaboration, Mr. Berners-Lee said. “The end vision is very powerful,” he said.

Whether his team can realize that vision is uncertain. Some in the field of personal data say the *Solid*-*Inrupt* technology is too academic for mainstream developers. They also question whether the technology will achieve the speed and power needed to become a platform for future apps, like software assistants animated by a person’s data.

Inrupt faces a series of technical challenges, but none that are “**go-to-the-moon**

hard," said Bruce Schneier, a well-known computer security and privacy expert, who has joined *Inrupt* as its chief of security architecture.

And Mr. Schneier is an optimist. "This technology could unlock an enormous amount of innovation," potentially becoming a new platform as the iPhone was for smartphone apps, he said.

"I think this stands a good chance of changing how the internet works," he said. "Oddly, Tim has done it before."

Adapted from The New York Times. Jan. 10, 2021. He created the Web. Steve Lohr. https://www.nytimes.com/2021/01/10/technology/tim-berners-lee-privacy-internet.html

5.2. Discuss the following questions:

- ***Do you think there should be a real concern about data security or there's too much fuss about it and everybody already knows what is to be done to protect our information?***
- ***Can you answer the question set before the text?***

5.3. Watch the video "The Internet of Everything" and comment on it.

- *What do you think of the digitalization of our lives?*
- *Is it forward-looking or elusive? Justify your opinion.*
- *Is sharing and using personal health data without a person's permission acceptable?*
- *Can you imagine people's life when everything is under digital control?*

https://youtu.be/bqpJK2O2B-8

KEY TERMS

accomplish	gatekeeper	particle physics
ADSL/asymmetric	general reference work	pods
digital subscriber line	generic term	rebirth
amid	global network	reside
an accolade	GUI/Graphical User	search
antitrust suit	Interface	security architecture
ASCII	handheld device	sliver
be credited with	hardware	smiley emoticons
bland title	harvest-and-hoard model	software
broadband connections	hypertext	spiral
data sovereignty	incentive	start-up
data stores	interchangeable	status update
designate	interconnected	surveillance
dial-up	ISP	TCP/IP suite
disc operating system	join causes knight	traffic
distribution of species	launch	underprivileged
diverse locations	link	vast troves of data
egalitarian	log-in details	venture
eliminate	mission statement	video-sharing site
elliptical	multiple	web surfing
extended network	network	WWW/WorldWide Web
fix-it project	open peer review	
fraud	open web champions	
	open-source software	

TEST QUESTIONS

1.What is the difference between the Internet and the World Wide Web? List the differences between the two.
3. Who is “the father” of the WWW?
4. When was the World Wide Web born?
5. What was the initial purpose of the Web?
6. What are the problems of the World Wide Web?
7. What is the Contract for the Web according to Sir Tim?
8. What is the real value of the Contract?
9. Should we bother about our data security? Is it possible for the individuals to control their data?
10. What other initiatives of Sir Tim do you know?

Unit 4

COMPUTER PROGRAMMING

1.1 Work in groups and discuss:

- ***What are code and coding?***
- ***What is programming in coding?***
- ***What is code on a computer?***
- ***Is coding hard to learn?***
- ***What is an example of code?***
- ***Is programming a stressful job?***
- ***Do you need to be good at math to code?***

https://www.computersciencedegreehub.com/faq/what-is-coding/

1. Reading.

2.1 Read the text and give the meaning of the words in bold.

What Coding Is

Coding is basically the computer language used to develop apps, websites, and software. Without it, we'd have none of the most popular technology we've come to rely on such as Facebook, our smartphones, the browser we choose to view our favorite blogs, or even the blogs themselves. It all runs on code.

How Coding Works

To put it very simply, the code is what tells your computer what to do. To go a bit deeper, computers don't understand words. They only understand the concepts of on and off. The capabilities of a computer are guided by on and off switches, or transistors. Binary code represents these on-and-off transistors as the digits 1 and 0. An infinite number of combinations of these codes make your computer work. In order to make binary code **manageable**, computer programming languages were formed. These languages each serve different purposes, but they all allow programmers to translate important commands into binary code.

Each computer application needs properly written code to know what to do. Most software has thousands to billions of lines of coded text and numbers. The code gives computers a step-by-step guide on how to function. Computers speed through reading the code to execute every online and offline task. In today's digital world, everything from mobile phones to smart TVs and cars runs using coded software. For example, the code might tell the computer to input an image and make it spin. Creating **flawless**

code is essential to avoid 404 error pop-ups and software crashes. Debugging code is always the final step to revealing and fixing coding issues.

Is Learning to Code Difficult?

Coding isn't that hard for **tech-savvy** people who patiently put in the time and effort to learn. Coding gets an unnecessarily bad reputation from people who weren't persistent enough to practice. The easiest coding languages only involve a few hundred terms and rules to remember. That's a tiny **sliver** in comparison to learning a spoken foreign language. Once the easier languages are mastered, it's relatively simple to learn other ways to code. Many programming languages use similar methods to code and debug computer applications.

Beginners starting to code must possess certain skills to be successful. Having strong attention to detail to pour over long lines of coded text is imperative. New coders need abstract thinking skills to visualize what written code will become. **Novices** must have problem-solving skills to persist against challenges without letting frustration win. Intuitive logical reasoning skills help coders correctly conclude why a code isn't working right. Good writing skills are critical to creating code that appropriately conveys the intended message. Technology skills are also an obvious requirement for coders to fearlessly work with computer programs.

Popular Coding Languages to Learn

Since the 1970s, computer experts have created more than 700 different programming languages. Each language has a unique way of helping computers process huge amounts of information. Every coding language has different features and terms with some **overlap**. New coders shouldn't be overwhelmed by the **plethora** of programming types though. There are only about a dozen programming languages that are commonly used. These include Ruby, Swift, JavaScript, Cobol, Objective-C, Visual Basic, and Perl. Let's look at some of the major coding languages that beginners should know.

HTML – HTML, or **hypertext markup language**, is the standard way of coding web pages to showcase electronic information. Founded by Tim Berners-Lee in 1990, HTML is used to format the content, pictures, and videos featured online. HTML tells the internet browser how to display websites for an optimal user experience.

Java – Java is an **object-oriented coding language** created by Sun Microsystems in 1995. Java has English-based commands used to create applications for a single computer or whole server and tiny applets for websites. Java is a popular favorite for programming mobile apps and video games, especially on Android operating systems.

Python – Python is a **server-side web and software development language** started by Guido van Rossum in 1991. Python has a simple, English-like syntax to script back-end actions for applications, user interfaces, and operating systems that work well. Many platforms, including Google and NASA's Integrated Planning System, use Python.

CSS – CSS, or cascading style sheets, is a coding language used to specify a website's style. Developed by Håkon Wium Lie in 1994, CSS tells internet browsers each page's layout, background color, font size, cursor shape, and more. Crafting and maintaining solid CSS code is crucial for websites to have aesthetic appeal.

C Language – C Language is a simple, **low-level coding type** initiated in 1972 by Bell Labs to build the UNIX system. Perhaps the easiest language, C has just 32 basic keywords used for scripting embedded systems, network drivers, and artificial intelligence. C language is versatile to get computer hardware to communicate.
C++ – C++ is another object-oriented programming language that expands on C to execute higher-level computer tasks. Released in 1983 by Bjarne Stroustrup, C++ organizes and stores info in bundles for more complex programs. Adobe, Microsoft Office, Amazon, and Mozilla software utilize C++ for fast processing.
PHP – PHP, or hypertext processor, is a coding language for web development founded in 1994 by Rasmus Lerdorf. PHP is widely used for server scripting with HTML to piece together dynamic website content. WordPress, an open-source online platform that accounts for 20 percent of websites and blogs, is notably written with PHP.
SQL – SQL, or **structured query language**, is a domain-specific coding type that streams information into a database. First introduced by IBM researchers in 1974, SQL has simple syntax to run back-end web databases. SQL is used by most businesses to load, retrieve, and analyze text or numbers in their servers.

Ways to Learn How to Code

People looking to become **proficient** in coding for a long-term career may want a college degree. Most coding-related tech careers require at least a **baccalaureate**. Bachelor's degrees require 120 education credits beyond a high school diploma or GED certificate. Find an accredited, four-year college with a **slew** of coding courses. Computer science **majors** typically get the best in-depth understanding of various programming languages. Other viable majors include information technology, computer information systems, information science, data science, web development, software engineering, and computer engineering. For careers that don't demand a bachelor's, consider attending a community college or technical school. **Associate's degrees** in computer science and programming take only two years to complete 60-course credits.
However, paying for 24-48 months of a college education isn't the only way to learn to code. Many of the best coders are self-taught. The internet is packed with free and paid online tutorials to master the science of coding. Great platforms, such as Coursera, Codecademy, EdX, Khan Academy, and Udacity, offer online coding classes that cost $0. Games like Minecraft, Robocode, and Lightbot teach coding skills. Free code editors, including Notepad++, Sublime Text, Bluefish, and Visual Studio Code, help beginners learn. Attending a **coding boot camp** can also be effective. Bootcamps are short-term, intensive training workshops available online or in person. Bootcamp providers like the Flatiron School, App Academy, Codesmith, and Wyncode usually charge a fee for three to 12 months of coding education. **STEM** summer camps can teach kids how to code before high school graduation too.

Adapted from the Computer Science degree hub. 2023.
https://www.computersciencedegreehub.com/faq/what-is-coding/

2.2 Find the answers to these questions in the text:

1. What is coding used for?
2. How does coding work?
3. What is an example of coding?
4. Are there any benefits of learning to code?
5. What are some skills the new coders must possess to be successful?
6. What are the main priorities to be set in choosing the language to learn?
7. Is SQL a coding language?
8. What are the hardest programming languages to learn?
9. How many coding languages are there?
10. What languages use Object-Oriented Programming?
11. Is it a server-side technology for Web development?
12. What is Structured Query Language? How is it used?

3. Vocabulary practice

3.1 Match the words with their synonyms.

manageable, surpass, abundant, serve a purpose, execute, flawless, tech-savvy, possess, novice, plethora, proficient, median, reap;
produce, excess, excel, beginner, average, give an aim, perform, computer literate, own, skilled, ample, perfect, achievable

3.2 What do the following abbreviations stand for?

MS-DOS, SQL, OCR, PDF, URL, VoIP, STEM, EHR, CPU, DSN, LAN, HTML, MPEG, PHP, CSS, AI, CAD.

3.3 Fill in the blanks with the programming languages you might need in software development.

If you mainly want to develop…	You should probably learn…	And maybe avoid…
Online (web) applications		
Games		
Business applications		
Science & Engineering applications		
Military, Aerospace, Transport and Communications applications		
Educational Applications		

3.4 Make the word combination on the left with the words on the right:

A:	coding boot	B:	commands
	hypertext		coding language
	structured query		online platform
	back-end		coding language processor
	low-level coding		markup language
	open-source		language
	server-side web		language type
	english-based		camp
	object-oriented		processor web databases
	hypertext		and software development language

4. Listening

4.1 Watch the video and answer the questions.

https://www.youtube.com/watch?v=Tkg8FdwfvlU

1. What do you know about the early history of computing? Who invented computer coding? (*Ada Lovelace*)
2. What do we learn about Ada's childhood?
3. Why was mathematics a form of poetry to Ada Lovelace?
4. What is Ada's "primary contribution" to the history of science?
5. How were Lovelace's notes rediscovered and reconsidered in the middle of the XXth century?

4.2 These are explanations of the words in the video. Watch the video again and, figuring out the meaning from the explanations given, find the words.

1. Definition: an element, feature, or factor that is liable to vary or change. (noun)
   For example: Something that is …. changes quite often, and there usually seems to be no fixed pattern to these changes*;*
2. Definition: strictly applied or adhered to if we're talking about a rule, system, etc., extremely thorough and careful. (adjective)
   For example: A test, system, or procedure that is …. is very thorough and strict.
3. Definition: to keep something in place, hold fixed, continue to have (something); keep possession of. (verb)
   For example: The interior of the shop can still … a nineteenth-century atmosphere.
4. Definition: a self-taught person. (noun)
   For example: It has a Greek origin which is a combination of "self" and "to teach".
5. Definition: to make a complex story or pattern from a number of interconnected elements. (verb)

For example: If you …. details to a story or design, you include them, so that they are closely linked together or become an important part of the story or design. In the video you could use computers to … numbers.

6. Definition: sordid and disreputable, unwell. (adjective)
   For example: If you describe a person or place as …., you disapprove of them because they look dirty and untidy, or they have a bad reputation.
7. Definition: restrain or keep in check. (verb)
8. *For example*: If you … an emotion or your behaviour, you keep it under control. You must …. your extravagant tastes.
9. Definition: a group of people who are socially connected. (noun)
   For example: You can build up a …. with people who like and respect you.

4.3 Read an article about Ada Lovelace. Choose from phrases A-E the one which fits each gap (1-5) to complete the text.

Who was Ada Lovelace?

Ada Lovelace was a leading 19th-century mathematician and daughter of the famous poet Lord Byron. She was born on 10 December 1815. Her mother, Annabella Milbanke, 1) …….. - which was rare for women at the time. From childhood, Ada had a fascination with machines. At the age of 19, she married an aristocrat called William King. When he was made Earl of Lovelace in 1838 she became Lady Ada King, Countess of Lovelace.

In 1833 she met Charles Babbage, 2) ……. Lovelace was extremely interested in Babbage's plans for a complicated device called the Analytical Engine. It was never built, but the design had all the essential elements of a modern computer. Lovelace studied the plans for the Analytical Engine and wrote lots of her own comments about how the machine could work – 3)…….. She described how codes could be created for the device to handle letters and symbols along with numbers. She also created a method for the engine to repeat a series of instructions, a process known as 'looping' that computer programs still use today. Her work was published in 1843, 4) ……..

However, it would be more than 100 years until the Analytical Engine became a reality. Lovelace's notes inspired Alan Turing's work on the first modern computers in the 1940s. Lovelace died on 27 November 1852 at just 36 and 5)……. Her passion for mathematics and early computer engineering has made her a symbol for modern women in technology. Lovelace has received many honors for her work since she died. In 1980, the U.S. Department of Defense named a newly developed computer language "Ada".

Adapted from BBC Newsround, 13 Oct 202013 October 2020, https://www.bbc.co.uk/newsround/49960544

A. her contributions to the field of computer science were not discovered until well after her death.

B. insisted that Ada was taught logic, science, and mathematics from a young age

C. in an English science journal

D. which have been described as early computer programs

E. an inventor and mechanical engineer and they became good friends.

5. Speaking

5.1 Look at the list of facts about coding taken from the article* "11 cool facts about programming and coding you need to know" *and discuss them. Express your point of view in groups. *https://gocoderz.com/blog/coding-trivia-for-teachers-the-facts/*

1. Coding has over 700 languages.
2. Coding bugs were not named after the actual bugs.
3. Coding will soon be as important as reading.
4. The first programmer was a daughter of a mad poet
5. The first computer virus was a Creeper.
6. NASA still operates some projects on programming from the 1970s.
7. There is BIG money in coding.
8. It's all 0's and 1's.
9. You don't have to work in tech to use coding.

10. The computer was a job title, and the first programmers were women.
11. Coding can “power up” your brain.

5.2 Discuss the following quotes and sayings about coding.


“Any fool can write code that a computer can understand. Good programmers write code that humans can understand.” – Martin Fowler


“Java is to JavaScript what car is to Carpet.” – Chris Heilmann


“ Code is like humor. When you have to explain it, it’s bad.” – Cory House


“Fix the cause, not the symptom.” – Steve Maguire


“Before software can be reusable it first has to be usable.” – Ralph Johnson

6. Writing

6.1 ***Work in pairs.*** *Did you know there are many types of essays in IELTS writing? Can you name the main essay types?*

1) To what extent do you agree or disagree?
2) Discuss both these views and give your own opinion.
3) Do the advantages of this outweigh the disadvantages?
4) What are the problems and how can these problems be tackled?
5) What are the reasons for this, and how can the problem be solved? What could be the possible causes of this? Suggest some solutions.
6) Positive or Negative Development.
7) Two-Question (Mixed) Essay.

6.2 Read the sample argumentative essay "To what extent do you agree or disagree?" in detail focusing on the appropriate connectives.

Argument: *Some employers believe that job applicants' social skills are more important than their academic qualifications. Do you agree or disagree with this opinion? Give reasons for your answer and include any relevant examples from your own knowledge or experience.*
Write 250 words or more.

There are a few ways to write an essay of this kind: you strongly agree, in between, balanced answer or strongly disagree. Let's have a look at the sample answer.

There has been much discussion revolving around the issue of whether *job applicants' social skills are more important than their academic qualifications.* ***In this essay, I will explain why*** *social skills are more vital,* ***compared with*** *academic qualifications.*
The merits of *outstanding social skills* ***are apparent****.* ***Firstly,*** *communication is the key to career success* ***in this day and age. This is mainly due to the fact that*** *the 21st century* ***is best characterized by*** *constant interaction with different people, no matter*

whether the communication happens in person or online. ***Secondly,*** *the ability to sell products or services* ***is of paramount significance*** *in any business – this requires strong social skills.* ***For example,*** *an employee with excellent social skills is able to have an impact in front of customers or clients****; as a result,*** *products or services can be perceived as high-value.* ***Furthermore,*** *employees with better social skills are generally more easy-going, which is very important to the workplace, including the employer.* ***After all,*** *as the saying goes, "Who you work with is as important as what you do." – An enjoyable work environment needs socially skillful employees.* ***In contrast, some others may claim that*** *academic qualifications are* ***the prerequisite of*** *employment.* ***Apparently,*** *many positions require certain qualifications.* ***However, in modern-day society,*** *more and more employers have realized that whether employees can get the results that the business wants is the key to a business' success.* ***It can be seen that*** *qualifications do not* ***play a key role in this regard****.* ***Having considered both views, I think*** *employees' social skills* ***are of overriding importance*** *for an organization.* ***Also, I would suggest*** *employers consider job applicants' social skills first****, which I believe is soundly based on the above reasoning I have presented.***

The key to successfully writing IELTS Task is to use an essay style with an introduction, an analysis of both points of view, and a conclusion based on the evidence presented. It is essential to follow these points:

- **paragraphing**
- **a formal style**
- **an introduction and a conclusion**
- **presentation of both viewpoints**
- **your own opinion**
- **connective devices**

The structure of the essay includes:

1. Introduction: Paraphrase the Task.
2. The first reason why I agree + Explanation + Example.
3. On the other hand, + why do people disagree? + Explanation + Example.

4. Conclusion: sum up the reasons + My Opinion: I agree … (paraphrasing the Intro)

In the **Introduction** you can use the following expressions:

The subject of ____ is the complex one. The topic/subject of ___ is a very important concern for society at the moment. The topic/subject of ____ has been largely debated.

In the first viewpoint:

Firstly let us look at ___. First of all, let us look at ____. I would like to start by taking a look at ___. This is a complex area, so we should start by looking at ___.

In the second viewpoint:

Turning to the second viewpoint ___. The other point is ___. Secondly, ___.

Conclusion*: To conclude ___. To sum up ___. To come to my own opinion ___.*

6.3 Write an essay about the following topic:

Some people believe that television is a powerful educational tool. Other people believe that television is nothing more than mindless entertainment and should be discouraged. To what extent do you agree or disagree with this statement? Discuss both views and give your own opinion. Provide examples and supporting evidence to back up your opinion on this subject.

Write approximately 250 words or more.

KEY TERMS

analytical engine	language-based commands
artificial intelligence	looping
associate's degrees	low-level coding type
baccalaureate	novice
back-end web database	object-oriented coding language
binary code	online platform
coding boot camp	open-source
computer programming language	plethora
computer science majors	processor
craft	proficient
credit	server-side web and software
debugging code	development language
domain-specific coding type	structured query language
flawless code	tech-savvy
hypertext markup language	versatile

TEST QUESTIONS

1. Who developed HTML and in what year?
2. What education is enough to start working in most coding-related tech careers?
3. What kind of jobs can you work in with an associate's degree in computer science?
4. What languages should you avoid in developing online web applications?
5. What languages should you learn in developing business applications?
6. What have you learned about Ada Lovelace and why mathematics was a form of poetry to her? Who was inspired by her work?
7. What do you know about the first computer virus?
8. Was the idea of the Analytical Engine realized?
9. Since when has NASA been using High-order Assembly Language/Shuttle?
10. Why has the term "bug" become widely widespread in technical circles since 1947? What is the story behind that?

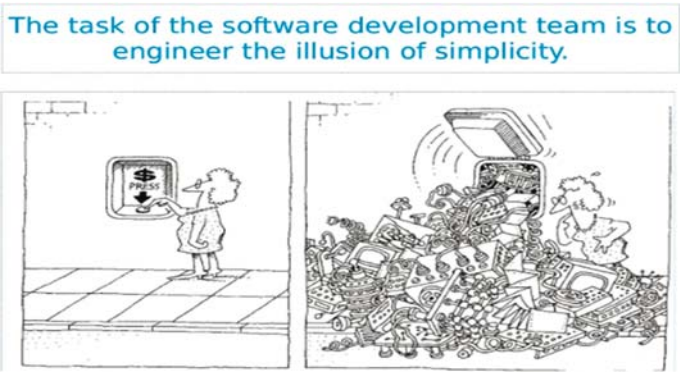
Unit 5

Object Oriented Programming

1. Starter

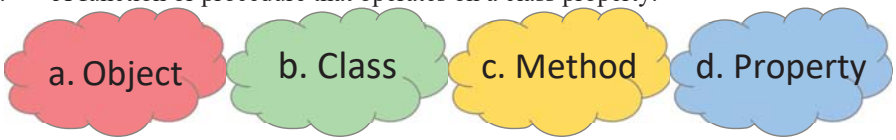
1.1 ***Discuss the following questions in the groups:***

- *What are the pillars of Object Oriented Programming?*
- *What is the most important goal of a program? Give your arguments.*
- *Do you agree with the statement describing the picture?*



1.2 ***Match questions 1-3 to option a-d (there's one extra option).***

1. This can be thought of as a software blueprint for implementing objects of a given type.
2. This is an instance of a class. It has properties as well as methods that operate them.
3. A function or procedure that operates on a class property.



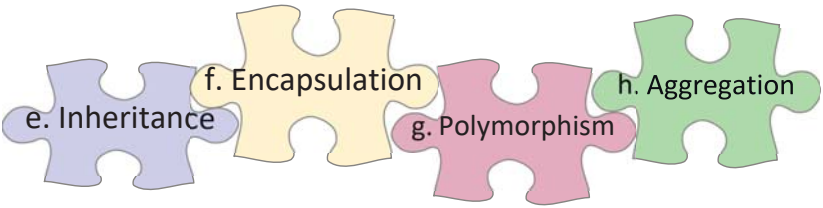
Match questions 4-7 to options e-h.

4. To hide or isolate the properties of an object, allowing access only through public methods.

5. The relationship among classes where one class shares the principles and behaviour of another.

6. This refers to the ability to process objects differently depending on the class or data type.

7. This is when the object may be built up from other objects.



2. Reading

4 Advantages of OOP

Object-oriented programming is such a fundamental part of software development that it's hard to remember a time when people used any other approach. However, when objected-oriented programming, or OOP, first appeared in the 1980s, it was a radical leap forward from the traditional top-down method.

These days, most major software development is **performed** using OOP. Thanks to the widespread use of languages like Java and C++, you can't develop software for mobile unless you understand the object-oriented approach. The same goes for web development, given the popularity of OOP languages like Python, PHP, and Ruby. That said, many developers start with top-down languages like Visual Basic or JavaScript.

You may be used to **breaking down** large problems into sub-problems and solving them in separate units of code. Or you may have experience with functional programming, which treats elements of code as precise mathematical functions, and prevents them from affecting other elements — that is, no side effects. Come to grips with OOP, however, and you'll see that it offers a whole new way of solving problems. With OOP, instead of writing a program, you create classes. A class contains both data and functions. When you want to create something in memory, you create an object, which is an instance of that class. So, for example, you can declare a Customer class,

which holds data and functions related to customers. If you then want your program to create a customer in memory, you create a new object of the Customer class.

The advantages of object-oriented programming lie in this kind of **encapsulation**. Here's a look at some of OOP's top benefits:

1. Modularity for easier troubleshooting

When working with object-oriented programming languages, you know exactly where to look when something goes wrong. "Oh, the car object broke down? The problem must be in the Car class!" You don't have to go line-by-line through all your code.

That's the beauty of encapsulation. Objects are **self-contained**, and each bit of functionality does its own thing while leaving the other bits alone. Also, this **modularity** allows an IT team to work on multiple objects simultaneously while minimizing the chance that one person might duplicate someone else's functionality.

2. Reuse of code through inheritance

Suppose that in addition to your Car object, one colleague needs a RaceCar object, and another needs a Limousine object. Everyone builds their objects separately but discovers **commonalities** between them. In fact, each object is just a different kind of Car. This is where the **inheritance** technique saves time: Create one generic class (Car), and then define the subclasses (RaceCar and Limousine) that are to inherit the generic class's traits.

Of course, Limousine and RaceCar still have their unique attributes and functions. If the RaceCar object needs a method to "fireAfterBurners" and the Limousine object requires a Chauffeur, each class could **implement** separate functions just for itself. However, because both classes inherit key aspects from the Car class, for example, the "drive" or "fillUpGas" methods, your inheriting classes can simply reuse existing code instead of writing these functions all over again.

What if you want to make a change to all Car objects, regardless of type? This is another advantage of the OOP approach. Make a change to your Car class, and all car objects will simply inherit the new code.

3. **Flexibility** through polymorphism

Riffing on this example, you now need just a few drivers, or functions, like "driveCar," driveRaceCar" and "DriveLimousine." RaceCarDrivers share some traits with LimousineDrivers, but other things, like RaceHelmets and BeverageSponsorships, are unique.

This is where object-oriented programming's **polymorphism** comes into play. Because a single function can **shape-shift** to adapt to whichever class it's in, you could create one function in the parent Car class called "drive" — not "driveCar" or "driveRaceCar," but just "drive." This one function would work with the RaceCarDriver, LimousineDriver, and so on. In fact, you could even have "raceCar.drive (myRaceCarDriver)" or "limo.drive (myChauffeur)."

4. Effective problem solving

Many people avoid learning OOP because the learning curve seems **steeper** than that for top-down programming. But take the time to master OOP and you'll find it's the easier, more intuitive approach for developing big projects.

Object-oriented programming is **ultimately** about taking a huge problem and breaking it down into **solvable chunks**. For each mini-problem, you write a class that does what you require. And then — best of all — you can reuse those classes, which makes it even quicker to solve the next problem.

This isn't to say that OOP is the only way to write software. But there's a reason that languages like C++, C# and Java are the **go-to options** for serious software development.

What to know about OOP developer jobs

There's an **insatiable** demand right now for talented software developers with experience using C# and Java. Employers are also keen for OOP programmers with other qualifications, such as Certified Information Security Manager (CISM) or AWS-Certified Cloud Practitioner.

Industries with the highest demand for OOP developers include:

- Financial services
- Healthcare

- High tech
- Professional services
- Real estate
- Retail and e-commerce

Adapted from Robert Half. 4 Advantages of Object-Oriented Programming. Robert Half. January 5, 2023. https://www.roberthalf.com/blog/salaries-and-skills/4-advantages-of-object-oriented-programming

2.1. ***Decide whether the statements are True or False.***

1. When OOP first appeared it followed the traditional top-down method.
2. Both software and web development are using OOP.
3. IT team members always know what to do even if they work on different tasks.
4. Different objects of the same class just duplicate codes of key aspects from the class.
5. One function cannot adapt to whichever class.
6. Breaking problems down into simple tasks is just a waste of time.

2.2 ***Answer the following questions***

1. What kind of programming uses mathematical functions to treat code elements?
2. What do programmers create instead of writing programs?
3. What is the beauty of encapsulation?
4. How does inheritance help programmers?
5. When does polymorphism matter?
6. Is it worth spending time learning OOP?
7. Is there a need for OOP programmers in the job market?

2.3 ***Explain the meaning of the highlighted words.***

3. Listening

3.1 Before listening: Match the words (1-5) with the definitions (a-e).

1. flowchart	a. Program instructions written in a particular computer language
2. source code	b. The techniques of detecting and correcting errors that may occur in programs

3. compiler	c. A diagram representing the successive logical steps of the program
4. machine code	d. A special program that converts the source program into machine code – the only language understood by the processor
5. debugging	e. The basic instructions understood by computers; it consists of 1s and 0s (binary code)

3.2 Listen to the recording. The speaker is a software developer, talking to a group of students on a training course about how a program is written. Check your answers.

3.3 Listen again and put these steps in the correct order.

- Write instructions in a programming language
- Prepare documentation
- ***1. Understand the problem and plan a solution***
- Make a flowchart of the program
- Compile the program (to turn it into machine code)
- Test and debug the program

3.4 ***Listen again and make detailed notes. In pairs, use your notes to write a short explanation of what each step in* 3.3 *means.***

4. Vocabulary

4.1 Read the article.

The United Arab Emirates is starting a new programme to teach people computer (1) __. One million people will receive free training to learn how to code apps and computer software. The new initiative was launched (2) __ the UAE's Prime Minister and ruler of Dubai Sheikh Mohammad Bin Rashid Al Maktoum. It is called the One Million Arab Coders initiative. Sheikh Mohammad wants young Arabs in the Middle East to have the skills (3) __ the digital economy in their countries. Sheikh Mohammad said: "Coding will create many job opportunities for young people to (4)__. It will pave the way for them to participate in the global economy online, from (5) __."

The new initiative will encourage many young people living in the Middle East to get (6)__ coding. Studies show that 50 percent of the Arab population is (7)__ 25 years old and that 40 percent of these hope to own their own business within the next five

years. Sheikh Mohammad said: "This project is part of our mission to (8) __ hope in the region, create employment opportunities and give our youth the skills needed for (9) __ to successfully lead our region into the future." He added, "From the world's leading companies to the global economy (10) __, programming is the future." The top ten students will receive $50,000, (11) __ the top student will win a $1 million prize.

Which of these words go in the above text?

1. (a) coding (b) coded (c) codes (d) coder
2. (a) to (b) by (c) at (d) of
3. (a) for development (b) by developers (c) to develop (d) at development
4. (a) complete (b) compete (c) compose (d) complain
5. (a) building (b) home (c) apartment (d) house
6. (a) into (b) of (c) at (d) out
7. (a) of (b) under (c) at (d) by
8. (a) roll (b) cover (c) spread (d) span
9. (a) those (b) these (c) they (d) them
10. (a) themselves (b) self (c) its (d) itself
11. (a) also (b) such (c) as (d) while

4.2 Complete the notes below using one of the options given

*(maintenance / manageable / encapsulation/software)***.**

The main advantage of OOP is better *(1)*__ code that covers the following:

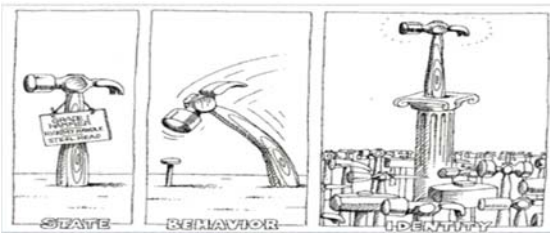
1) The overall understanding of the *(2)* __ is increased as the distance between the language spoken by developers and that spoken by users.

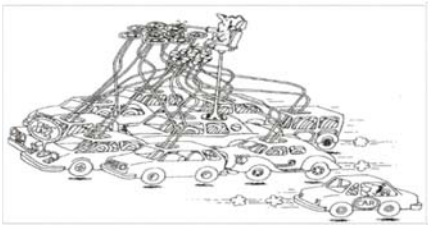
2) Object orientation eases *(3)* __ by the use of *(4)* __. One can easily change the underlying representation by keeping the methods the same.

5. Speaking

5.1 ***Look at the pictures (1-3) and comment on them. Match the pictures to the statements (a-c).***

1





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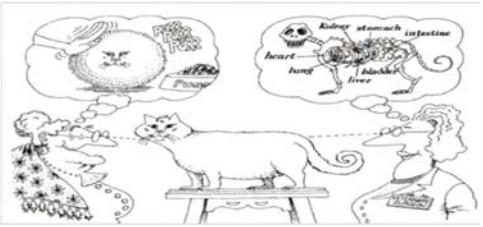


3

a. "An object has state, exhibits some well-defined behaviour and has a unique identity"

b. "A class represents a set of objects that share a common structure and a common behaviour"

c. "Abstraction focuses upon the essential characteristics of some objects, relative to the perspective of the viewer"

5.2. Read the following part of the article. Express your opinion on it. Discuss it in groups and brainstorm possible arguments for and against it.

The Daily V

Tuesday, August 30, 2022

Criticism

The OOP paradigm has been criticised for a number of reasons, including not meeting its stated goals of reusability and modularity, and for overemphasizing one aspect of software design and modeling at the expense of other important aspects. Luca Cardelli has claimed that OOP code is "intrinsically less efficient" than procedural code, that OOP can take longer to compile, and that OOP languages have "extremely poor modularity properties with respect to class extension and modification", and tend to be extremely complex. The latter point is reiterated by Joe Armstrong, the principal inventor of Erlang, who is quoted as saying: The problem with object-oriented languages is they've got all this implicit environment that they carry around with them. You wanted a banana but what you got was a gorilla holding the banana and the entire jungle.

6. Writing

6.1 Use the beginning of the article in 5.2, the ideas of the unit, and write down your arguments for and against OOP in an essay.

KEY TERMS

aggregation	method	software development
bottom-up approach	modularity	solvable chunks
C++	modularity	source code
class	multiple objects	steep/steeper
class extension	object	sub-classes
coding	OOP – object-oriented programming	sub-problems
commonalities	PHP	the digital economy
compiler/to compile	polymorphism	the go-to options
debugging	principal inventor	the learning curves
encapsulation	property	to come into play
flexibility	Python	to implement/ implementation
flowchart	regardless	to launch
functional programming	reiterated	to pave the way
generic classes	reusability	to shape-shift
implicit environment	riffing	top-down method
inheritance	Ruby	traits
insatiable demand	self-contained	ultimately
intuitive approach	simultaneously	Visual Basic
Java/JavaScript		

TEST QUESTIONS

1. What is Object Oriented Programming?
2. Why use OOPs?
3. What are the main features of OOPs?
4. What problems can OOP solve?
5. What are the advantages of OOP?
6. Is it really necessary for programmers to learn OOP?
7. Why is OOP criticized by some professionals?

Unit 6

DATABASES. DATABASE DESIGN

1. Starter. Let's talk

1.1 Work in pairs and discuss.

- What is a database?
- What are databases used for?
- What are the components of a database?
- What are database challenges?

1.2 Databases test questions

1. Which of the following is NOT true of databases?

- ☐ You can store large amounts of data.
- ☐ You have to use a computer.
- ☐ You can search the data.

2. Which of the following is a piece of software used to create databases?

- ☐ Google Chrome
- ☐ Microsoft Office PowerPoint
- ☐ Microsoft Office Access

3. What term describes a personalised letter which can be sent to customers of a supermarket?

- ☐ Report
- ☐ Mail merge
- ☐ Macro

4. Which of the following is an advantage to paper-based databases?

- ☐ It is easy to add or amend records.
- ☐ You do not need any training on how to use the database.
- ☐ Data can be sorted and re-sorted easily.

5. Thinking of data, information and knowledge - which of the following is an example of information?

- ☐ The average men's shoe size is nine.
- ☐ 9

- If you are to open a shoe shop, you must stock plenty of size nine shoes.

6. Which of the following holds a single piece of data?

- Table
- Record
- Field

7. Which field would be inappropriate in a database of countries?

- Continent
- Population
- First Name

8. What is the correct definition of primary key?

- The first field in a table.
- A field that contains unique data in each record.
- The field which we will use to search with.

9. What database feature checks to see if data meets certain rules when entered to a table?

- Table
- Query
- Validation

10. Which validation rule would you use to limit what a user can enter to only a few options, e.g. male or female?

- List check
- Presence check
- Range check

Check score https://www.bbc.co.uk/bitesize/guides/z37tb9q/test

2. Reading

2.1 Read the text and give the meaning of the words in bold.

A database, also called an **electronic database**, is 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. A database management system (DBMS) **extracts** information from the database in response to queries.

A database is stored as 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 pertaining to one aspect or attribute of the entity described by the database. Although a *database* is applied loosely to any collection of information in computer files, a database in the strict sense provides **cross-referencing capabilities**. 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 **aggregates of data**.

Database records and files must be organized to allow **retrieval** of the information. Queries are the main way users retrieve database information. The power of a DBMS comes from its ability to define new relationships from the basic ones given by the tables and to use them to get responses to queries. 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 businesses 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 DBMS have been developed to support these requirements: flat, hierarchical, network, relational, and object-oriented.

Early systems were arranged **sequentially** (i.e., alphabetically, numerically, or chronologically); the development of direct-access storage devices made possible random access to data via indexes. 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 within businesses and in e-commerce. Relational databases are used where associations between 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 the desired information. Various **iterations** of SQL (Structured Query Language) are widely employed in DBMS for relational databases. 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.

The information in many databases consists of natural-language texts or documents; number-oriented databases primarily contain information such as statistics, tables, financial data, and raw scientific and technical data. Small databases can be maintained on personal computer systems and used by individuals at home. These and larger databases have become increasingly important in business life, in part because they are now commonly designed to be integrated with other office software, including spreadsheet programs.

Typical commercial database applications include airline reservations, production management functions, medical records in hospitals, and legal records of insurance companies. The largest databases are usually maintained by governmental agencies, business organizations, and universities. These databases may contain texts of such materials as abstracts, reports, legal statutes, wire services, newspapers and journals, encyclopedias, and catalogs of various kinds.

Increasingly, formerly separate databases are being combined electronically into larger collections known as **data warehouses**. Businesses and government agencies then employ "data mining" software to analyze multiple aspects of the data for various patterns. For example, a government agency might flag for human investigation a

company or individual that purchased a suspicious quantity of certain equipment or materials, even though the purchases were spread around the country or through various subsidiaries.

Adapted from "Britannica", The Editors of Encyclopedia. "Database". *Encyclopedia Britannica*, 17 Sep. 2021, https://www.britannica.com/technology/database. Accessed 8 August 2022.

2.2 Find the answers to these questions in the text.

1. What are the basic units of data storage?
2. What requirements several types of DBMS have been developed to support:
3. How are records organized in hierarchical databases?
4. What does the information in many databases consist of?
5. What are typical commercial database applications?

2.3 Vocabulary practice

A. Five descriptions and seven relational database terms are shown below. Draw a line to link each description to its correct database term.

Description	**Database term**
Any object, person, or thing about which it is possible to store data	***Secondary key***
The dataset organized in rows and columns; the columns form the structure and the rows form the content	***Candidate key***
Any attribute or combination of attributes that can act as a unique key	***Entity***
Attribute(s) in a table that link to the primary key in another table to form a relationship	***Foreign key***
	Tuple

Attribute or combination of attributes that is used to uniquely identify a record	***Table***
	Primary key

B. Complete the gaps in each sentence with an appropriate form of the word.

retrieve	**retrieving**	
retrieved		**retrievable**
	retrieval	

1. A system of storage and **……..** of personnel records has been established.
2. The product helps **…….** accidentally deleted image files from virtually any kind of removable media for digital cameras.
3. Records should be maintained in an easily manageable and **……**format.
4. If there are multiple database tables that contain instances satisfying the user requirements, they can be **……..** together.
5. There may be serious issues with successfully storing all the knowledge and **……** the relevant knowledge in a reasonable time.

C. Make a two-word combination using the words in columns and then fill in the gaps in the following sentences.

data-processing	databases
number-oriented	systems
direct-access storage	devices
personal-computer	tools
cross-reference	operations

1. There are five forms of _____ which include recording, verifying, duplicating, sorting, and finally summarizing and reporting.
2. _____ store strings of numbers rather than text. If these numbers represent measures of the same thing at different points in time, the string of numbers is called a “time series”.

3. When so-called _____ (DASDs; primarily magnetic disks) were developed, it became possible to access a random data block on the disk.
4. Web user interfaces are presented on a _____, mobile system or some other type of network-connected device.
5. Xref is a _____ that can be used for finding dependencies between functions, modules, applications, and releases. It does so by analyzing the defined functions and the function calls.

3. Language Focus

A participle is a verbal or a word based on a verb that expresses a state of being, ending in -ing (present tense) or -ed, -en, -d, -t, -n, or -ne (past tense) that functions as an adjective.

This means it needs to modify (or describe) a noun or a pronoun.

- Present Participle Example: The ***crying*** baby had a wet diaper.
- Past Participle Example: The ***wrecked*** car was totaled.

3.1 Complete the sentences with participles as adjectives, using the verbs in the box.

pertain	***correspond***	***process***	***base***	***result***	***implement***

Ex. *The director addressed the meeting on issues* ***pertaining*** *to the Institute.*

1. Theoretical study of the dynamical systems is associated with reactive chemicals, the activated complex, and their **……** differential equations.
2. Though this data …… method is accurate, reliable, and faster than its predecessor, it still requires data specialists for manual data entry and calculations.
3. With properly …….. data, researchers can write scholarly materials and use them for educational purposes.
4. Most modern-day software allows users to perform different actions …… on the analysis or study to be carried out.

5. This processing is performed in order to store the most …….. information in their systems for later use.
6. The …… information can then be manipulated once more into a format suitable for end-users, such as graphs, charts, reports, video, and audio, whichever is most suitable for the task.
7. This step transforms the input data into more meaningful information through the business logic …… in software programs.

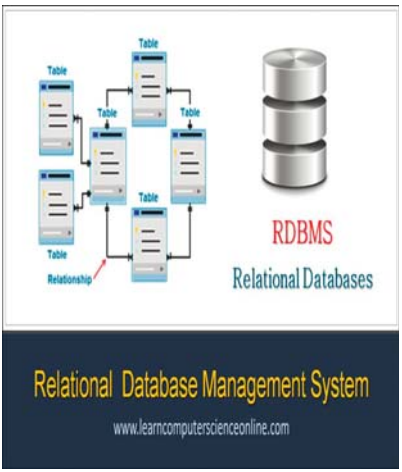
4. Listening

History of Databases

https://www.youtube.com/watch?v=PA3LtpwfFwQ

4.1 Before you listen answer these questions:

- *Do you know who is Ted Codd?*
- *What is a relational model?*



4.2 Watch the video and answer these questions.

1. What did the original paper of Edgar F. Codd introduce?
2. When did the first commercial implementation arrive?
3. What does the "table joins" term mean?

4. What language became the language of data?

5. What databases were built to scale out easily and tolerate node failures with minimum disruption?

4.3 Listen again and complete the gaps:

1. The first commercial **……** arrived in the 1970s.
2. During the 80s and 90s, **……** grew increasingly dominant.
3. Table joins, is a term for read operations to pull together **……..** into one.
4. Relational databases **……** the assumption of running on a single machine lack something that became essential with the advent of the Internet.
5. The only path is to move forward from a single database server to **……..**

5. Speaking

5.1 Work in small groups. Discuss tables, fields, and primary keys that you could use for records in databases in these cases.

1. A language college's database of students
2. A dentist's database of patients
3. A travel agent's database of airline tickets
4. A database in an online multiplayer game in which players can stop and restart their game whenever they want.

6. Writing

6.1 There are more than 300 databases on the market. Choosing between so many tools is overwhelming. There are several aspects you should pay attention to when answering the question *"What type of database should I use?"*

https://yalantis.com/blog/how-to-choose-a-database

Write an opinion essay answering the question.

Give reasons for your answer and include any relevant examples from your own experience or knowledge. You should write at least 250 words.

KEY TERMS

Attribute	Deletion	Retrieval
Cross-referencing capabilities	Field	Sequentially
Database application	Hierarchical	Spreadsheet
Data storage	Indexes	SQL (Structured Query Language)
Data mining	Iterations	Table
Database node	Network-connected device	Tuple
Dataset	Overlapping data	Validation
Database record	Primary key	Versatility
Data warehouses	Query	
DBMS	Relational database	

TEST QUESTIONS

1. What are database types and components?
2. What are database benefits?
3. What is DBMS? Explain a few advantages of a DBMS.
4. What are the features of Database language?
5. Explain what is meant by referential integrity.
6. Explain the terms 'Record', 'Field', and 'Table' in terms of database.
7. How many years can data collected in large Big Data database systems survive, data warehouses, and underground information banks?
8. Employees using the new computers receive training. At the end of the training, each employee completes a series of questions. Three answers given by an employee are shown below. Explain why each answer is incorrect.

   (i) "Encryption prevents hackers from breaking into the company's computers."

   .....

   .....

   .....

   .....

(ii) “Data validation is used to make sure that data keyed in are the same as the original data supplied.”

.....

.....

.....

.....

(iii) “The use of passwords will always prevent unauthorized access to the data stored on the computers.”

.....

.....

.....

.....

Unit 7

SOFTWARE ENGINEERING

1. Starter. Let's talk

1.1 Work in groups and discuss.

1. What skills are important in software engineering?
2. What qualifications do you need to be a software engineer?
3. Which field is best in software engineering?
4. What language do software engineers use?
5. Do software engineers write code?

1.2 Read the text and find the answers to these questions in the text:

1. Why has the demand for software engineering emerged recently?
2. What are the steps in producing quality software products?
3. What does SDLC stand for? What is it for?
4. What is the purpose of the feasibility study?
5. When is the thorough testing conducted by experts?

What is "Software Engineering"

Software engineering is a detailed study of engineering to the design, development, and maintenance of software. Software engineering was introduced to address the issues of low-quality software projects. Problems arise when software generally exceeds timelines, budgets, and reduced levels of quality. It ensures that the application is built consistently, correctly, on time, and within budget, and requirements. The demand for software engineering also emerged to cater to the immense rate of change in user requirements and the environment in which application is supposed to be working.

A software product is judged by how easily it can be used by the end user and the features it offers to the user. An application must score in the following areas:

1) Operational: This tells how well the software works on operations like budget, usability, efficiency, correctness, functionality, dependability, security, and safety. 2) Transitional: Transitional is important when an application is shifted from one platform to another. So, portability, reusability, and adaptability come in this area. 3) Maintenance: This specifies how good software works in a changing environment. Modularity, maintainability, flexibility, and scalability come in the maintenance part.

Software Development Lifecycle or SDLC is a series of stages in software engineering to develop a proposed software application, such as:

1) Communication
2) Requirement Gathering
3) Feasibility Study
4) System Analysis
5) Software Design
6) Coding
7) Testing
8) Integration
9) Implementation
10) Operations and maintenance
11) Disposition

Software engineering generally begins with the first step as a user-request initiation for a specific task or an output. He submits his requirement to a service provider organization. The software development team segregates user requirements, system requirements, and functional requirements. The requirement is collected by conducting interviews with a user, referring to a database, studying the existing system, etc. After requirement gathering, the team analyses if the software can be made to fulfill all the requirements of the user. The developer then decides on a roadmap for his plan. System analysis also includes an understanding of software product limitations. As per the requirement and analysis, a software design is made. The implementation of software design starts in terms of writing program code in a suitable programming language. Software testing is done while coding by the developers and thorough testing is

conducted by testing experts at various levels of code such as module testing, program testing, product testing, in-house testing, and testing the product at user's engagement and feedback.

***Adapted from the Economic Times,* Accessed 13 January 2023.**
https://economictimes.indiatimes.com/definition/software-engineering

1.3 Find the find the words or word combinations in the text that correspond to the following definitions. Give Ukrainian equivalents.

1. An extremely large measure, quantity, or frequency. 2. The process of putting a decision or plan into effect. 3. To set apart from the rest or from each other; isolate or divide. 4.To bring what someone needs or requires. 5. A plan or strategy intended to achieve a particular goal. 6. The person who actually uses a particular product. 7. A preliminary exploration of a proposed project or undertaking to determine its merits and viability, usually aims to provide an independent assessment that examines all aspects of a proposed project, including technical, economic, financial, legal, and environmental considerations. 8. The capacity to be changed in size or scale. 9. In engineering it is the ease with which a product can be maintained to correct defects or their cause. 10. It is controlled by a workflow in order to make sure it is managed according to a defined process. Only authorized users can manage it and change its status.

3. Vocabulary practice

3.1 Complete the missing items in this world-class table, using the dictionary if necessary.

Verb	**Adjective**	**Noun (thing or idea)**
exist		
test		
require		
depend		

exceed		
consist		
implement		
scale		
maintain		

3.2 Fill in the blanks with prepositions in, for, of, to, on, with, and by where necessary.

What is Cloud Computing?

At its most basic level, cloud computing is a model ____ remote computer access. The idea is simple: You use your computer and an Internet connection to make contact _____ on a remote server. This server, which is really just a computer, runs applications using its hardware. You're able to influence the application ___ by executing commands through a Web browser or other user interface. But the remote server is doing all the heavy lifting.

One reason to use a cloud computing system is that it lets you access applications your own computer might not be able to execute. Your computer only has to run a Web browser or simple user interface. In most cloud computing applications, this client-side program requires minimal resources from your machine. That means you can take advantage ___ a variety of programs and services without having to continually invest in the fastest computers. Since the cloud computing service is handling all the processor work, you just need a machine capable ___ connecting to the Internet.

Another major selling point ___ cloud computing services is that they allow you to access your data on a variety of devices no matter where you are. If you rely on ___ your own computer to execute programs, you're limited ___ that machine. You may have to e-mail a file to yourself so that you can access it on another device. You may have to set up a home network to allow file transfers between machines. Cloud computing services store your information ___ remote servers. You can log into the cloud computing service using your account login and password.

Language Focus

Borrowed Plural Forms

The English language borrowed many words from Greek and Latin and most of them still have original plurals. The Latin-style plural is appropriate to formal, scientific, or technical writing, while the English plural is better suited to everyday language. For example, rock guitarists use plectrums which they rarely call plectra. To better understand the principles of plural formation here is an explanation.

Words ending in *-on* and *-um* in plural usually have an ending *-a*. But many of them can be formed by adding *-s*: a symposium – symposiums or symposia, minimum – minima or minimums. *ex. erratum – errata, medium – media*	Words ending in *-us* have plural *-uses* or *-i*. Mind the pronunciation [ai:]. Ending *-s* is also possible. *ex. nucleus – nuclei, fungus – fungi or funguses.*
Words ending in *-is* in plural have *-es*. Mind the long pronunciation [: iz]. *ex. analysis – analyses, axis – axes.*	Words ending in *-ix, -ex* have in plural *-ices*. It is possible to add *-s*. Mind the long pronunciation [: iz]. *ex. appendix – appendixes or appendices, matrix – matrices or matrixes.*
Words ending in *-a* have plural *-s* or *-ae*. Mind the long pronunciation [i:]. *ex. formula – formulae, formulas*	Words ending in *-ion* have in the plural *-ia* rarely *-s*. *ex. criterion – criteria, ganglion – ganglia or ganglions.*

2.3 Pluralize the following words paying attention to their pronunciation.

Syllabus, alga, erratum, apex, addendum, bacillus, stratum, automaton, antenna, phenomenon, index, terminus, formula, agendum, aquarium, larva, vortex, criterion, symposium, analysis, atrium, bacterium, crisis, corrigendum, diagnosis, datum, cactus,

curriculum, focus, nebula, fungus, ellipsis, appendix, minimum, hypothesis, matrix, memorandum, oasis, vertebra, gymnasium, maximum, ganglion, locus, medium, narcissus, paralysis, stimulus, spectrum, parenthesis, moratorium, synopsis, podium, radius, synthesis, referendum, platypus, axis, millennium, thesis, alumnus/alumna, basis, hippopotamus.

Problem-solving:

Problems in software engineering appear from many different domains like software design, testing, project management, and even riddles! Can you crack these software engineering riddles?

3. Reading

3.1 Read an extract from an article about the anatomy of Cloud computing. First, look at the picture below and comment on what idea, in your opinion, is implied.

The Anatomy of a Cloud

Google's approach to cloud computing may seem surprising at first. You might think a huge corporation would have data centers packed with modern, high-tech servers and machines. Wouldn't Google executives want the best equipment?

But Google's approach is more pragmatic. The company purchases mid-range servers for its data centers. The company has a good reason for this approach. Should something break, it's relatively easy and inexpensive to get a replacement. Repair and maintenance can be huge costs for a data center − each building may house thousands of machines. To ensure services remain online, Google dedicates several servers to provide the same function. That way, should one server malfunction, another can take its place with minimal interruption in services. It builds redundancy into the system.

Google's philosophy is to keep the back-end system as simple as possible. As systems become more complex the opportunity for problems to arise increases. Simplifying a system reduces the chance of problems even if the system itself is enormous. The Google cloud's foundation is the Google File System.


CLOUD COMPUTING

The entire file system consists of networks called clusters. The Google File System relies on master servers to coordinate data requests − each cluster has a single master server. When you interact with information stored on the cloud, your actions are translated into data requests. Your computer acts as a client − a machine that sends data requests to other machines. Ultimately, a master server takes the request and sends a message to the Google machine that keeps the data − Google calls these machines chunk servers. The chunk server sends the data directly to the client − the information never passes through the master server.

Because Google stores several copies of each piece of information for the sake of redundancy, making changes to data in the cloud is a little complicated. First, your write request goes to a master server. The master server chooses one chunk server storing the appropriate data to respond to your request − this becomes the primary replica chunk server. The master server tells the client the location of all replica chunk servers storing your file. When you make changes, those changes go to the first replica chunk server to which your computer can connect. The written request moves through the system to all the replica chunk servers, including the primary replica. The primary replica makes the actual change to the data and then sends a message to all other replica chunk servers to do the same. Once the primary replica receives confirmation that all copies of the data have changed, it sends a notification to the client.

Adapted from Howstaffsworks. Jonothan Strickland. "How the Google Cloud Works" 8 August 2011. https://computer.howstuffworks.com/cloud-computing/google-cloud.htm. Accessed 12 January 2023.

3.2 Find the words and word combinations in bold in the article that match the definitions a-h.

a it sends transaction log records of each principal database to every secondary database. This process - known as data synchronization - occurs at the database level

b a specialized server that retrieves chunks of data

c a message from a visitor's browser to a web server to request or send data or to perform an action

d the hardware that operates as the main server on which Customer uses and runs the Server Software that Customer has designated as its primary Server Software

e (in a network) a desktop computer or workstation that is capable of obtaining information and applications from a server

f a group of similar things or people positioned or occurring closely together

g the part of a computer system, piece of software etc., where data is stored or processed rather than the parts that are seen and directly used by the user

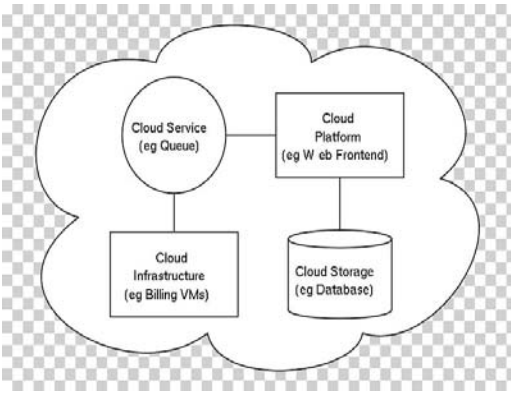
h a server whose processing power falls somewhere between that of a mainframe and that of a standard commodity server

Read the text and complete the following tasks.

Cloud Computing Architecture

When talking about a cloud computing system, it's helpful to divide it into two sections: the front end and the back end. They connect to each other through a network, usually the Internet. The front end is the side the computer user, or client, sees. The back end is the "cloud" section of the system.

The front end includes the client's computer (or computer network) and the application required to access the cloud computing system. Not all cloud computing systems have the same user interface. Services like Web-based e-mail programs



leverage existing Web browsers like Internet Explorer or Firefox. Other systems have unique applications that provide network access to clients. On the back end of the system are the various computers, servers, and data storage systems that create the "cloud" of computing services. In theory, a cloud computing system could include practically any computer program you can imagine,

from data processing to video games. Usually, each application will have its own dedicated server.

A central server administers the system, monitoring traffic and client demands to ensure everything runs smoothly. It follows a set of rules called protocols and uses a special kind of software called middleware. Middleware allows networked computers to communicate with each other.

If a cloud computing company has a lot of clients, there's likely to be a high demand for a lot of storage space. Some companies require hundreds of digital storage devices. Because these devices, like all computers, occasionally break down a cloud computing system must make a copy of all its clients' information and store it on other devices. Making copies of data as a backup is called redundancy.

Adapted from ElectroSome. Neenu Suresh, January 01. https://electrosome.com/cloud-computing/

3.3 Find the words and word combinations in bold in the article that match the definitions a-h.

a the inclusion of extra components which are not strictly necessary to functioning, in case of failure in other components

b it includes the hardware and the software used by the person to access the cloud services. The hardware could be any device such as a digital notepad, a laptop, a desktop computer, a smartphone, or any other connected device.

c to use for gain, exploit

d it uses both software and middleware to manage the connectivity between different client devices and cloud servers.

e to manage or supervise the execution, use, or conduct of

f to make sure, certain, or safe, to guarantee

g it’s a fundamental aspect of digital communication as it dictates how to format, transmit and receive data

h it is software that lies between an operating system and the applications running on it.

Comprehension check

3.4 Find the answers to these questions in the text::

1. Is Google considered a cloud?
2. Where is Google Cloud data stored?
3. What's Google's approach to cloud computing?
4. Why does Google want to keep its back-end system as simple as possible?
5. What kind of file system does Google use?
6. What is the architecture of cloud computing?
7. What are the sections of cloud computing and their features?
8. What does the central server consist of?
9. What's the purpose of middleware?
10. What is system redundancy in cloud computing?

4. Listening

4.1 Watch the video "Programming vs Coding - What's the difference?" and answer the questions. https://www.youtube.com/watch?v=CIRGjwYgdT4

1. What branches do people call "theoretical" and "practical" in programming and why?
2. What does the presenter call "a close cousin of math"?
3. What's the reason why the world is run by former programmers?
4. What definition is given for coding and what do you need to learn to be a good coder?
5. Do you agree or disagree with the explanations given that coding and programming are actually different things?
6. Why is it useful to know the difference between coding and programming?

4.2 Read an article about the difference between programming and coding. Choose from phrases A-E the one which fits each gap (1-5) to complete the text.

Now that we are a part of the digital era, you might have come across the two terms, *coding* and *programming,* used interchangeably. It is a common

notion that coders and programmers are one and the same thing. On the contrary, 1) _____. There is also much refinement perceived in computer programming recently as top professionals such as data scientists also need to do programming in their job.

Although one can be regarded as a part of the other, 2) _____. Depending on scope and complexity, one can be more beneficial than the other.

In most cases, when a professional software creator has to choose between coding and programming, programming is the way to go. In important projects, 3) _____, you need to have an outline for your program and an idea of how many resources you will need. When the code is done, you need to review, optimize and thoroughly test it.

So, when is coding more important in the coding vs programming dilemma?

First of all, coding is a way to solve simple problems, 4) _____**.** Another answer to the question "What is coding for?" is that it is a starting point for beginners. To learn how to build an intricate program, one has to know how to handle each part of it and that is where the knowledge of what is the difference between coding and programming comes in handy.

So, it is clear that programming and coding both are important for providing efficient and potential software for the end-user. None of them should be given more priority than the other one. Both terms are interlinked with each other.

The one who is interested in logic can choose and announce themselves as a programmer and those 5) _____**.** It all matters to you to choose the one that you like to explore. Computer Science is a vast field as well as evolving and it is not going to stop at a certain point, you will find a lot to explore and enjoy.

A coding and programming can also mark a fundamental difference in approach to a project

B who are good at memorizing and understanding things can be a perfect coder

C such as related to one-task applications and one-page websites that don't need a lot of planning and resources

D before writing the first line of code

E there is so much difference between computer programming and coding as per the software development vocabulary

5. Speaking

5.1 Discuss your thoughts on the following sayings about software engineering.

"When done well, the software is invisible." by Bjarne Stroustrup.

"Debugging is twice as hard as writing the code in the first place. Therefore, if you write the code as cleverly as possible, you are, by definition, not smart enough to debug it." by Brian Kernighan.

"The central problem of C and C++ is that they require programmers to do their own memory management." by Eric S. Raymond.

"The greatest risk we face in software development is that of overestimating our own knowledge." by Jim Highsmith.

5.2 Look at the list of interesting facts about software development. Discuss those facts which are false from your point of view.

1. Software developers spend more time learning as compared to others.
2. Software engineers who specialize in machine learning and data science are the most sought-after.
3. Women make up the majority of developers, ranging from 85-89 % of the usual workforce.
4. Most programmers enjoy caffeine while coding, drinking 2-6 cups of coffee per day.
5. Developers in the gaming industry are the saddest.

6. Writing

Previously we discussed different types of essays in IELTS writing. One of them is the Problems/Solutions Essay which can have questions "*What are the problems and how can these problems be tackled*? *What are the issues and what measures can be taken*? *What are the problems and how can they be solved*?" In this essay, you can write about two or three problems, and, accordingly, about two or three solutions to these problems. It's better to write the problem + solution in one paragraph so that your solution is related to the problem. Don't state your personal position, you're NOT asked if you agree or disagree. Just write your point of view about problems and solutions. In the introduction, it's better to paraphrase and add common words like "there are problems and there are solutions". In conclusion, you summarize the problems and solutions that have been talked about. The topics of such essays can be different: fast food, environment, education, migration, etc. but the essay structure is the same! Be prepared to paraphrase the words "problems, solutions, solve" to demonstrate your knowledge of synonyms.

Here's an effective strategy for this kind of IELTS essay:

1. **Introduction**: Paraphrase the Task + Add general words like there are numerous problems and there are certain measures to be taken to resolve them. 2 sentences.

2. One of the biggest problems is … + explain it + give an example. To solve this problem, the government could …, which would ... (do what? Add a result).

3. Another issue is … + explain it + give an example OR result. This problem could be addressed by Verb+ing … which would … + result.

4. Finally, another problem is the … That is to say, … (explain the problem). The way forward should be to …

5. **Conclusion**: In conclusion, it is clear that there are various reasons for... (topic), and steps need to be taken to tackle this problem. Sum up the problems and solutions you wrote above in 2 sentences.

6.1 Read the assignment of problems and solutions essay and write your response to the following problem.

In the developed world, average life expectancy is increasing. What problems will this cause for individuals and society? Suggest some measures that could be taken to reduce the impact of aging populations.

Write approximately 250 words or more.

Some advice:

1. Write 4 paragraphs: introduction, problems, solutions, and conclusion.
2. Don't worry about separating ideas about individuals and ideas about society. Just mention something about both in your paragraphs.
3. Below are some ideas.

Problems caused:

an increase in the number of retired people (who will receive a pension); a smaller proportion of young adults; smaller working populations; a greater tax burden on working adults; demand for healthcare will rise; young adults will have to look after elderly relatives

Possible solutions:

people may have to retire later; the state pension age will rise; medical advances and health programs might allow elderly people to stay healthy and work for longer; people should be encouraged to have more children; governments should encourage immigration (in order to increase the number of younger adults)

KEY TERMS

adaptability	index
alumnus/alumna	integration
analysis	leverage
automaton	maintainability
back end	master server
back end system	middleware
basis	mid-range server
bug	modularity
central server	operations and maintenance
chunk server	phenomenon
cluster	portability
coding	primary replica
compiler	protocol
configuration file	pseudocode
correctness	redundancy
datum	reusability
dependability	roadmap
disposition	scalability
end-user	SDLC
ensure	segregate
feasibility study	software design
flexibility	syntax
front end	system analysis
functionality	usability
immense rate	user-request
implementation	write request

TEST QUESTIONS

1. What is Software Engineering? Give an explanation.
2. What skills and qualifications do you need to be a software engineer?
3. What are the most popular languages used by software engineers?
4. What are the steps in producing quality software products?
5. What is cloud computing mainly used for?
6. What is the anatomy of a cloud?
7. What happens when you interact with information stored on the cloud?
8. What is the backend in cloud computing architecture?
9. What are the front-end and back-end architecture?
10. Is there any difference between coders and programmers?

Unit 8

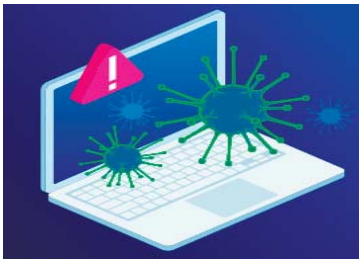
CYBERCRIME AND DATA SECURITY

1. Starter. Let's talk

1.1. Work in groups and discuss.

- ***What is, in your opinion, the role of data encryption and why is it significant to keep your data secure?***
- ***Look at the pictures below which depict different types of cyberattacks. Match each picture (A-E) to the types of cyberattacks listed in the box below. Then, single out one which, in your opinion, might affect data security the most.***

Malware attack Man-in-the-middle attack Phishing attack Password attack Cryptojacking



A

B

C

D

E

1.2. Think about the algorism to prevent a cyberattack either on an individual user or a large business. First, complete the sentences below with the choices that best fit each gap, and then, use the ideas to summarize your answer.

A Use antivirus software to protect _____.

B Use default built-in firewalls which aim to filter _____

C Stay alert and avoid _____

D Update your _____ regularly.

E Examine carefully the emails you receive. Most phishing emails have significant errors like _____.

F Use strong alphanumeric passwords with _____.

G Be mindful of the security of the website you are using. Use encryption on your devices to _____.

H Refrain from using public _____.

I Install an ad blocker as ads are a _____ of cryptojacking scripts. Also have extensions, which are used to identify and block _____.

2. Practical tips for effective data encryption/decryption

2.1. First, read the short article below and find out what cryptography is about.

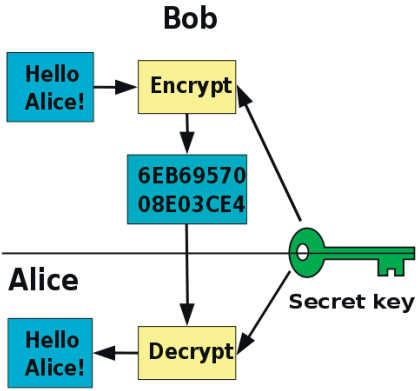
In computer science, CRYPTOGRAPHY refers to secure information and communication techniques derived from mathematical concepts and a set of rule-based calculations called algorithms, to transform messages in ways that are hard to decipher. The word "cryptography" is derived from the Greek kryptos, meaning "hidden". The origin of cryptography is usually dated from about 2000 B.C., with the Egyptian practice of complex pictograms.

When information is transformed from a useful form of understanding to an opaque form of understanding, this is called encryption. When the information is reverted into a useful form, it is called decryption. Intended recipients or authorized use of the information is determined by whether the user has a certain piece of secret knowledge. Only users with secret knowledge can transform the opaque information back into its useful form. The secret knowledge is commonly called the key, though the secret knowledge may include the entire process or algorithm that is used in the

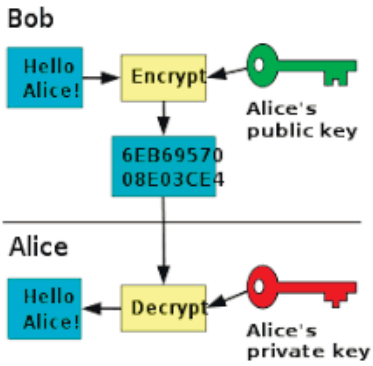
encryption/decryption. The information in its useful form is called plaintext (or cleartext), and in its encrypted form – cyphertext. The algorithm used for encryption and decryption is called a cipher.

Cryptography is an interdisciplinary subject, drawing from several fields. Before the time of computers, it was closely related to linguistics. Nowadays the emphasis has shifted, and cryptography makes extensive use of technical areas of mathematics, namely discrete mathematics, number theory, information theory, computational complexity, statistics and engineering.

Next, the two pictures below would give you more practical tips on how two main types of cryptography – symmetric and asymmetric (public-key) work. Look at the pictures and try to describe them.



Symmetric-key cryptography, where a single key is used for encryption and decryption



Asymmetric / Public-key cryptography, where different keys are used for encryption and decryption.

Adapted from "Cryptography". Wikipedia. March 2022. https://en.wikipedia.org/wiki/Cryptography. Accessed 26 August 2022.

2.2. To recognize better what cryptography is about, match its four common objectives (1-4) to the actions (A-H). Mind that each goal should refer to two actions to reveal the essence of the objective the best.

1. message confidentiality (or privacy)	A Only an authorized recipient should be able to extract the contents of the message from its encrypted form.
	B The sender and receiver can confirm each other's identity and the origin/destination of the information.
2. message integrity	C The recipient should be able to determine if the message has been altered.
3. sender authentication	D The information cannot be understood by anyone for whom it was unintended.
4. sender non-repudiation	E The information cannot be altered in storage or transit between the sender and intended receiver without the alteration being detected.
	F The sender of the information cannot deny at a later stage their intentions in the creation or transmission of the information.
	G The sender should not be able to deny sending the message.
	H The recipient should be able to verify from the message, the identity of the sender, the origin, or the path it traveled (or combinations).

Adapted from "What is Cryptography". Kathleen Richards, TechTarget. Search Security, https://www.techtarget.com/searchsecurity/definition/cryptography. Accessed 27 August 2022.

3. Problem-solving

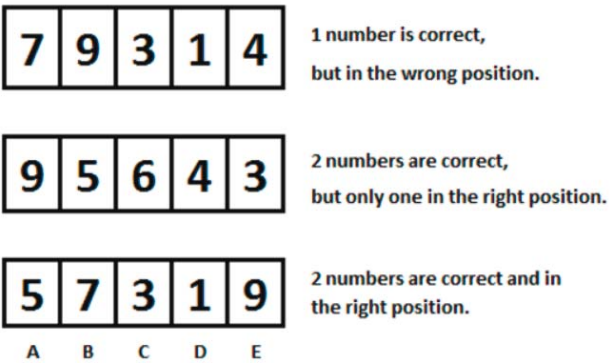
3.2. Discuss.

What, in your opinion, are the key skills for a successful cryptographer career?

Do you think that writing codes should boost problem-solving and abstract thinking skills?

And what about breaking ciphers? Are advanced mathematical skills a must to puzzle out secret codes (like in the example below)?

Can you crack the code?

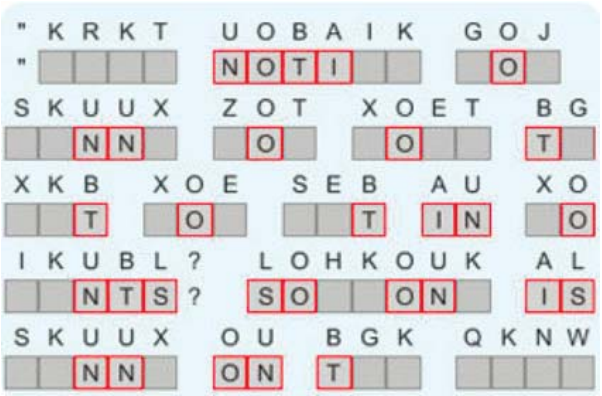


*The sum of the numbers is equal to the last two numbers (A+B+C+D+E=D*10+E)*

3.2. Cryptograms solving practice

- *Scan through the cipher, looking for single-letter words.* They're almost definitely A or I.
- *Count how many times each symbol appears in the puzzle.* The most frequent symbol is probably E. It could also be T, A, or O, especially if the cryptogram is fairly short.
- *Look for repeating letter patterns.* They may be common letter groups, such as TH, SH, RE, CH, TR, ING, ION, and ENT.
- *Try to decipher two-, three-, and four-letter words*, like OF, TO, IN, IS, and IT; THE, AND, FOR, WAS, and THAT.
- *Scan for double letters.* They're most likely to be LL, followed in frequency by EE, SS, OO, and TT.

Now, using the above step-by-step process, figure out a substitution cipher of the puzzle below and solve this cryptogram:



3.4. Talk to other students.

Share the way you came up with the substitution cipher. What is your solution to the given cryptogram? Suggest your puzzle to the class.

4. Language Focus

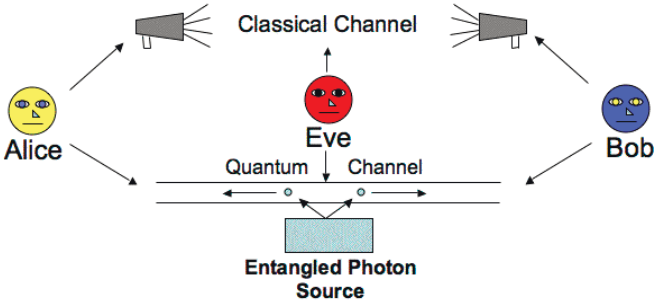
4.1. Fill in with the correct ending, –ing or –ed, to form appropriate Present or Past Participle forms correspondingly in each gap.

Global cybercrime continues to increase at a rapid pace. Cybercriminals, explor(1)____ various new ways to commit cybercrimes, and get access to computer systems and networks illegally. Effective information officers need to get better at anticipat(2)____ criminal behavior to provide efficient risk management. Since increas(3)____ are both information risk and cyber security threats, organizations need to move away from react(4)____ to incidents and towards predict(5)____ and prevent(6)____ them. There has been a correspond(7)____ increase in the hack(8)____ skills of cyber attackers with the advent of Big Data, stat(9)____ to be one of the five major global security threats. The large data sets if aggregat(10)____, stor(11)____ and process(12)____ without security measures then could make a huge amount of information vulnerable to cyber-attacks. Assumingly, affect(13)____ by frauds and expos(14)____ to data breaches, big data could create a chaotic situation with an ensur(15)____ sense of caus(16)____ bigger damage to a larger number of people at the same time. On the other hand, big data might be also a tool of strengthen(17)____ cyber security. Accordingly, big data has already been utiliz(18)____ in terms of locat(19)____ weak links in cyber security walls, real-time surveillance, fraud detection, and guard(20)____ vulnerable areas in social media.

5. Reading

5.1. You are going to read an article about quantum cryptography essence, key types, and predictions for future technology development. First, look at the scheme below and try to describe the principle of Quantum Key Distribution.

How Will Quantum Technologies Change Cryptography?



Quantum information science, which harnesses the properties of quantum mechanics to create new technologies, has the potential to change how we think about encryption in two main ways – quantum and post-quantum cryptography.

Quantum cryptography uses the laws of quantum physics to transmit private information in a way that makes undetected **eavesdropping** impossible. Information in quantum cryptography uses qubits, while classical cryptography is encoded in bits. Quantum Key Distribution (QKD), the most widely studied and workable method of quantum cryptography, uses a series of photons to transmit a secret, random **sequence**, the key. By comparing measurements taken at either end of the transmission, users will know if the key has been compromised. If someone wiretapped a phone, they could **intercept** a secret code without the callers knowing. In contrast, there is no way to "listen in" or observe a quantum encrypted key without disturbing the photons and changing the outcomes of the measurements at each end. This is due to a law in quantum mechanics called the **uncertainty principle**, which says that the act of

measuring a property of a quantum system may alter some of the other properties of the quantum object (in this case, a photon).

Post-quantum cryptography, also known as quantum-proof or **resistant** cryptography, aims to create encryption methods that cannot be broken by algorithms, or calculations, that run on future quantum computers. Today's encryption methods will not necessarily remain secure if and when quantum computers become a reality.

Let's take RSA (Rivest–Shamir–Adleman) cryptography. RSA is a widely used secure data-transmission system on which things like Internet browsers and digital signature software are built. The encryption system relies on the fact that it is prohibitively time-consuming and computationally intensive to factor the large **integer** in the public key to determine the two prime numbers that make up the private key. However, Peter Shor's algorithm, published in 1994, describes how, in theory, quantum computers could **factor** incredibly large numbers efficiently. This means that Shor's algorithm could be the downfall of RSA cryptography.

As a result, most likely, people will switch to new public key cryptography systems based on problems that quantum computers can hardly solve efficiently. Identifying such problems is an active area of research in mathematics and cryptography.

Everlasting security? Scientists have demonstrated that QKD works, but it is not widely used due to significant technological limitations. To send a quantum key, a single-photon laser beams a signal, one photon at a time, via a fiber optic cable. This method is slower than current telecommunication technologies and requires a dedicated fiber optic cable between the two parties. For example, Amazon could not secure customer transactions using quantum encryption because it would require cables between its servers and individual devices that make purchases. Distance is also a factor. When fiber optic cables are used to transmit data, as in your home Internet and cable systems, they use repeaters to send the data over longer distances. However, those repeaters disturb the **delicate** quantum state that is crucial to QKD.

Chinese scientists have implemented twin-field QKD through an 833-km optical fiber, using a combination of fiber optic cables with "trusted relay nodes" as **repeaters** and a satellite that transmits photons through the air. The system has tolerated a channel

loss beyond 140 dB. Furthermore, the optimized four-phase twin-field protocol and high-quality set-up make its secure key rate more than two orders of magnitude greater than previous records over similar distances. The experiment, led by the University of Science and Technology of China, is a new world record in the field and a solid step towards building reliable and efficient terrestrial quantum-secure networks over a scale of 1,000 kilometers.

In theory, quantum cryptography is unhackable, because eavesdropping would always be detected, but its practical uses are limited. “If you build a house, it’s only going to be as strong as the weakest pillar,” says Thomas Vidick, a Caltech professor of computing and mathematical sciences. “To have a truly usable system, you may need to combine quantum cryptography with elements that are not quantum, and those other elements could be vulnerable to attacks that theorists have not envisioned.”

Nowadays cryptographers should develop new quantum-resistant cryptosystems rather quickly because no one knows when today’s classic cryptography will be broken. It’s difficult and time-consuming to pull and replace existing cryptography from production software. Add to all the fact that someone could store existing encrypted data and unlock it in the future once they have a quantum computer, and cryptographers’ task becomes even more **urgent**.

Adapted from "How Will Quantum Technologies Change Cryptography?". Caltech, Science Exchange, https://scienceexchange.caltech.edu/topics/quantum-science-explained/quantum-cryptography. Accessed 27 August 2022.

Comprehension check

5.2. Answer the following questions.

1. What is quantum cryptography? What differentiates it from classical cryptography?

2. What is Quantum Key Distribution and how does it work? Is it widely used nowadays?

3. What is the objective of post-quantum cryptography? Does it, in your opinion, exist already?

4. Which record did the researchers from the University of Science and Technology of China set?

5. What did Thomas Vidick mean by saying that “If you build a house, it’s only going to be as strong as the weakest pillar”? Which challenges does his idea refer to?

6. Vocabulary practice

6.2. Find the words and word combinations in bold in the article that match the definitions a-j.

a an electronic device that receives a signal and retransmits it;

b calling for immediate attention;

c the unauthorized real-time interception of private communication, such as a phone call, instant message, videoconference, etc.;

d very fine in texture or structure; fragile;

e the concept rendering the idea that it is in general not possible to predict the value of a quantity with arbitrary certainty, even if all initial conditions are specified;

f capable of withstanding the force or effect of something or someone;

g to receive (a communication or signal directed elsewhere) usually secretly;

h a number that can be written without a fractional component;

i (regarding a number) resolve or be resolvable into factors; to factorize;

j (in mathematics) an enumerated collection of objects in which repetitions are allowed and order matters.

6.2. Match the verbs in the box with their synonyms a-j. Use each verb in a sentence of your own.

harness	transmit	detect	compromise	wiretap	identify
secure	disturb	tolerate	envision		

a to find, discover, reveal;

b to settle a dispute; to accept lower than desirable standards;

c to pass, transfer, convey;

d to recognize, distinguish, single out;

e to imagine, fancy, picture;

f to endure, stand, bear;

g to protect, defend, guard;

h to interfere, violate, trouble;

i to eavesdrop, listen in, spy;

j to apply, exploit, or utilize.

6.3. Read the article below. For items (1-10), choose the correct answer (A, B, C, or D).

Cyber Security and Data Mining

Data mining is a process used by businesses to (1)_____ raw data into useful information. It is, at its (2)_____, finding a template. Software is used to identify (3)_____ in large datasets, helping businesses to learn more about their customers. Data miners are experts at using specialized software to find regularities (and (4)_____) in large data sets. Data mining has many applications in security including in national security (e.g., surveillance) as well as in cyber security (e.g., virus detection). The threats to national security (5)_____ attacking buildings and destroying critical infrastructures such as power grids and telecommunication systems. Cyber security is concerned (6)_____ protecting computer and network systems from corruption (7)_____ malicious software including Trojan horses and viruses. Data mining is also applied to (8)_____ such solutions as intrusion detection and auditing. Last but not (9)_____, data mining is used to support more traditional methods of cyber security like firewalls and authentication tools and is (10)_____ exploited across three areas: malware detection, intruder detection, and fraud detection.

1	**A**	switch	**B**	turn	**C**	adjust	**D**	take
2	**A**	key	**B**	part	**C**	core	**D**	point
3	**A**	pictures	**B**	patterns	**C**	algorithms	**D**	samples
4	**A**	unregularities	**B**	non-regularities	**C**	irregularities	**D**	disregularities
5	**A**	adopt	**B**	encompass	**C**	consist	**D**	apply
6	**A**	with	**B**	at	**C**	by	**D**	in
7	**A**	because	**B**	in case	**C**	despite	**D**	due to

8	**A**	provide	**B**	perform	**C**	carry	**D**	solve
9	**A**	the least	**B**	less	**C**	little	**D**	least
10	**A**	totally	**B**	firstly	**C**	primarily	**D**	namely

7. Listening

7.1. Before listening to the audio script Biohackers: Practical or hazardous? discuss with your partner the following issues:

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

- Who do you think biohackers are?
- Why are chips implanted under the skin called “a hazardous situation” and “a controversial trend”?
- How, in your opinion, that might compromise privacy?

7.2. Fill in the gaps with the missing phrase according to what you hear.

1. Some workers in Sweden are volunteering to have _____ _____ into their hands.

2. John Blackstone looks at a controversial trend and how it could put your _____ ____ _____.

3. This is something that you can use just like a _____ _____.

4. I use this many times a day, for example, to _____ ____ _____, to open the door to my office.

5. We biohackers, we think that a human body is a good start but there is certainly _____ ____ _____.

6. Suddenly a touch of a hand is enough to tell the office printer – this is an _____ _____.

7. The microchips are radio frequency _____ _____, the same technology is widely used in things like key cards.

8. Now the technology is moving to humans but each touch leaves a _____ _____ and that can compromise privacy.

9. It's very easy to hack a chip implant, so my advice is not to put your _____ _____ on a chip implant.

10. For now, _____ _____means never having to say you're sorry you forgot your key card.

7.3. Listen to the report Stanford Cyber Security Expert: Dan Boneh Talks and mark the statements as True (T) or False (F).

https://www.youtube.com/watch?v=H-YGdcNFBJk

1. Cybersecurity is an increasing problem because of the data online availability.

2. The ease to get money from computer security breaches is currently making cryptography more and more important.

3. One of the first problems to resolve is how to test hardware so that it can't be broken easily.

4. There is an issue with how to isolate software components from one another in case of infection.

5. Pr. Boneh is mostly occupied with decryption and how to facilitate data decoding when it is stored in a computer system.

6. It is worth shifting to 'chip and pin' technology, which enhances your credit card number security and prevents it from any breaches.

7. Proper use of encryption strategies can hardly sort out the tension between the issues of data utility and privacy.

8. You won't lose a lot of information utility until you upload the encrypted data to the cloud.

9. Mr. Boneh's team is designing its first tool how to search for data on encrypted information in the cloud.

10. Researchers are unwilling to develop more sophisticated technologies of minimizing the risks of fraud and information breaches.

8. Speaking

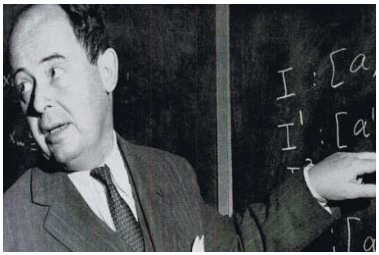
8.1. Work in groups of three and role-play the situations given below. Discuss all ideas and come to an agreement.

Student A: gives a reason to be concerned about.
Student B: suggests an idea of handling a situation or making an effective decision.
Student C: rejects or supports the idea or decision and explains why.

1. One of your friends receives a discount offer email from a well-known company. He has doubts about whether the email is authentic or not. He calls you asking for advice on how to detect a scam when it arrives in the inbox.
2. Your friend thinks that he has opened a malicious link by accidentally clicking on a few pop-ups on the Internet. He is frustrated and asking you to sort it out.
3. A friend of yours probably knows that he has been tracked by now. He calls you saying that it makes him scared that Google and Facebook know what he is watching, where he is going, and what he is interested in online.
4. Your friend seems to have a phobia thinking that his savings are at constant risk and might be attacked. Calm your friend down and teach him how to spot if his bank account has been hacked and what to do in case it has.
5. You are asked to run online data privacy training to equip the employees of a small start-up with the skills to recognize data security threats.

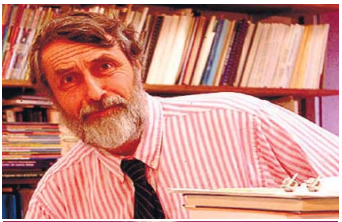
8.2. Share your thoughts on the following quotes and sayings about data security and encryption techniques.

"A cryptographic system should be secure even if everything about the system, except the key, is public knowledge." – **Auguste Kerckhoffs**, *a Dutch military cryptographer of the 19th century, who conceptualized Kerckhoffs's law as six principles of practical cipher design*

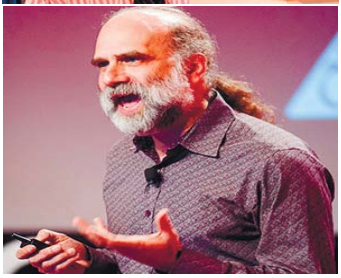


"Anyone who attempts to generate random numbers by deterministic means is, of course, living in a state of sin." – **John von Neumann**, *a Hungarian-American mathematician, physicist, computer scientist, engineer, and polymath of the 20th century, who was said to have been "the last representative of the great mathematicians who were equally at home in both pure and applied mathematics."*

"Cryptography without system integrity is like investing in an armored car to carry money between a customer living in a cardboard box and a person doing business on a park bench." – **Gene Spafford**, *an American professor of computer science and a leading computer security expert*



"Anyone can create an algorithm they can't break." – **Bruce Schneier**, *an American cryptographer, computer security professional, privacy specialist, and writer*



"If you think cryptography will solve your problem, either you don't understand cryptography, or you don't understand your problem." – **Peter G. Neumann**, *an American computer-science researcher who worked on the Multics operating system in the 1960s*

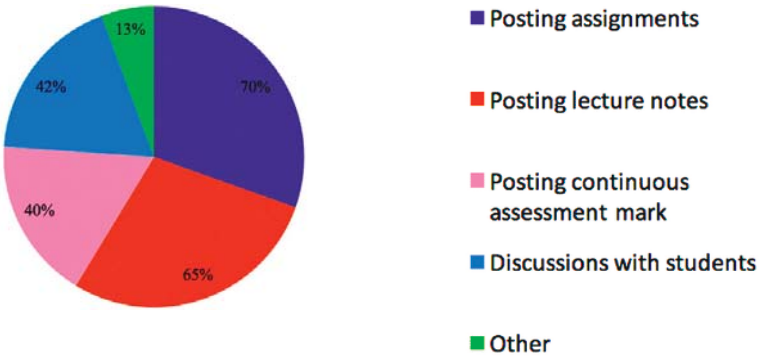
9. Writing

9.1. First, look through an abstract revealing Stanford University's endeavors to study the pros and cons of cloud security services in tertiary education settings. Next, do the writing task below.

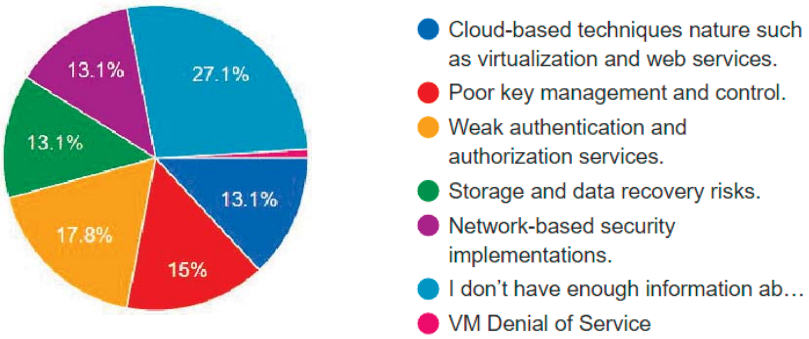
Cloud computing represents an opportunity for universities to take advantage of the enormous benefits of cloud services and resources in the educational process. However, cloud users remain concerned about security issues as the key obstacle that may prevent the adoption of cloud computing on a large scale. A cloud computing model is limited in services and common users are often not familiar with possible security risks or procedures used to protect their data. Against this background, the 2022 survey of 154 respondents aimed to review cloud security challenges faced by Stanford University's teaching and student staff.

The pie charts below illustrate the 2022 survey results on two issues: "What are the key activities cloud computing is used for in higher education?" and "What are the common vulnerabilities that the educational cloud environment suffers from?". Describe the data given and **write your answer in an essay of at least 150 words**. You are advised to spend a maximum of 20 minutes on this task.

Usage of cloud computing in higher education



Common vulnerabilities the educational cloud environment suffers from:



Adapted from "A Systematic Review of Cloud Security Challenges in Higher Education". Rajesh, Manoharan. The Online Journal of Distance Education and E-Learning, October 2017, https://www.researchgate.net/publication/320215630_A_SYSTEMATIC_REVIEW_OF_CLOUD_SECURITY_CHALLENGES_IN_HIGHER_EDUCATION. Accessed 29 August 2022.

9.2. Choose one issue from the given below and **write a list of baseline recommendations** on how to handle the situation described.

- What should a common user do to ensure his personal data protection?
- What should companies do to defend against cyber threats and attacks?
- What should cloud administrators within universities do to adopt secure cloud computing?

KEY TERMS

1. cyberattack (cryptojacking; malware / man-in-the-middle / password / phishing attack) 2. software viruses (worms, spyware, ransomware, adware, Trojans) 3. virus/malware/intruder/fraud detection 4. a weak password 5. data breach 6. data cracking 7. data vulnerability 8. data encryption and decryption 9. to (en)code / encrypt/encipher vs decode/decrypt / decipher 10. a suspicious/malicious link 11. a legitimate source 12. network vulnerability 13. quantum cryptography 14. a useful form vs an opaque form	15. a plaintext/cleartext vs a cyphertext 16. a symmetric-key vs asymmetric-key/public-key cryptography 17. eavesdropping 18. quantum key distribution (QKD) 19. a secure data transmission system 20. data mining 21. surveillance 22. firewalls 23. authentication tools 24. a biohacker 25. an authorized user 26. an identification tag 27. a digital footprint 28. an anti-spyware scan 29. cyberwarfare 30. to verify the authenticity

TEST QUESTIONS

1. What is data encryption and how does it work?
2. Which key types of cyberattacks one should be aware of?
3. What is phishing and how can it be prevented?
4. How can a common user protect himself from a malware attack?
5. How can you identify password cracking and stop it?
6. What causes a man-in-the-middle attack and what could it lead to?
7. What is cryptography about? What are the main types and objectives of modern cryptography science? How is cryptography applied today?
8. What is meant by quantum cryptography and in what way is it different from traditional cryptographic systems?
9. What is data mining and how is it used in cybersecurity?
10. How are called “biohackers”? Is it practical or, on the contrary, rather hazardous, and why?

ANSWER KEY

Unit 1. IT jobs. Recent Developments in IT.

2. Language Focus

2.1 1. must; 2. need; 3. have to; 4. must. 5. must. 6. has. 7. don't need.

3. Vocabulary practice

3.3 A: generate, produce: venture, project; handle manage; chunk, piece; devise invent; revenue income; explode increase.

3.3 B: 1. b; 2. c; 3. b; 4. a; 5. a.

C: high-tech marketplace; close-captioned file; higher-level data; user-submitted video; client search engine; multiprocessor personal computers; public-domain software; video-sharing site.

1. public-domain software; 2. close-captioned file; 3. video-sharing site; 4. client search engine.

4. Listening

https://finance.yahoo.com/news/tech-that-got-us-through-2020-204418401.html

4.2 1. lifeline; 2. app; afloat; 3. remote; 4. piling into.

Unit 2. The Internet and Technologies.

1. Starter

1.1. The I-net covers e-commerce, cloud, mobile, and Web-based technologies EXCEPT for picture D (face-to-face intera ction)

Practical tips

2.1. 1A 2D 3F 4J 5 C 6H 7B 8G 9I 10E 11K

Language Focus

4.1. 1up 2out 3out 4 out 5up 6over 7on 8up 9-out 10through 11for 12 out 13 out 14up 15off 16on 17out 18on 19out 20off 21out 22in 23off 24out 25up

Reading. Vocabulary practice

6.1. a traffic congestion b conventional objects c embedded electronics d patterns e conjoined whole f inanimate objects g home appliances h repository i apt j triggered remotely

6.2. a conceal b generate c detect d deploy e perceive f relieve g consume h track i adopt j improve

6.3. 1A 2B 3C 4A 5B 6C 7D 8D 9D 10B

Listening 1 https://www.youtube.com/watch?v=h8K49dD52WA

A	B	C
1. a network of computers that could talk to one another	1962	J.C.R. Licklider
2. ARPANET	1969	
3. the first email system	1971	Ray Tomlinson
4. TCP/IP protocols	1980s	Vinton Cerf
5. the World Wide Web	1991	Tim Berners-Lee
6. Erwise browser	1992	
7. mosaic web browser	1993	
8. Netscape navigation	1994	
9. Dial-up	early 1990s	

Listening 2 https://www.youtube.com/watch?v=RJqf0qYrYvU

1A 2 D 3 D 4 B 5 A 6 A 7 B 8 C 9 C

Speaking

8.1. Incredible Internet facts

1. TRUE
2. FALSE However, Wi-Fi doesn't actually stand for anything. What added to the confusion was the Wi-Fi Alliance's use of a nonsense advertising slogan, "The Standard for Wireless Fidelity," which led many people to think that Wi-Fi was an abbreviation of "Wireless Fidelity".
3. FALSE - Wireless Internet signals generally emit from your router in a doughnut shape.
4. FALSE - In the early days of computer networking, coaxial cables were used, the same type of cabling that is commonly used for cable or satellite TV today.
5. TRUE
6. TRUE
7. FALSE - .....reliant on technologies like virtual reality and cloud computing.
8. TRUE
9. FALSE – China not S.K.
10. FALSE - YouTube comes in second and Facebook third.

Unit 3. The world wide web

1.1. No, they are not. The Internet is a global network of interconnected computers which communicate with each other over existing telecommunication networks. The WWW is the billions of webpages that are stored on large computers called "web servers".

1a, 2c, 3c,4b

1.2. Tim Berners-Lee, Mark Zuckerberg, Larry Page and Sergey Brin, Bill Gates

1.3. 1f, 2b, 3d, 4e, 5a, 6h, 7c, 8k, 9j, 10i, 11g

2.1. 1F, 2T, 3NG, 4T, 5F, 6NG

2.2. 1. sizes; 2. messages; 3. web surfing; 4. attention

3.1.

1.) Against the backdrop of news stories about how the web is misused, it's understandable that many people feel afraid and unsure if the web is really a force for good.

2.) I broadly see three sources of dysfunction affecting today's web:

1. Deliberate, malicious intent, such as state-sponsored hacking and attacks, criminal behaviour, and online harassment.
2. System design that creates perverse incentives where user value is sacrificed, such as ad-based revenue models that commercially reward clickbait and the viral spread of misinformation.
3. Unintended negative consequences of benevolent design, such as the outraged and polarised tone and quality of online discourse.

3.) While the first category is impossible to eradicate completely, we can create both laws and code to minimize this behaviour, just as we have always done offline. The second category requires us to redesign systems in a way that change incentives. And the final category calls for research to understand existing systems and model possible new ones or tweak those we already have.

4.) 1F, 2T

3.2.

1.) You can't just blame one government, one social network or the human spirit. Simplistic narratives risk exhausting our energy as we chase the symptoms of these problems instead of focusing on their root causes. To get this right, we will need to come together as a global web community.

2.) At pivotal moments, generations before us have stepped up to work together for a better future.

3.) as the web reshapes our world, we have a responsibility to make sure it is recognised as a human right and built for the public good.

4.) The Web Foundation is working with governments, companies and citizens to build a new Contract for the Web.
5) 1F, 2F

3.3.

1.) Open web champions within government — civil servants and elected officials who will take action when private sector interests threaten the public good and who will stand up to protect the open web.
2.) Citizens must hold companies and governments accountable for the commitments they make, and demand that both respect the web as a global community with citizens at its heart.
3.) The Contract for the Web must not be a list of quick fixes but a process that signals a shift in how we understand our relationship with our online community. It must be clear enough to act as a guiding star for the way forward but flexible enough to adapt to the rapid pace of change in technology. It's our journey from digital adolescence to a more mature, responsible and inclusive future.

4.1. 1. network, 2. over, 3. services, 4. access, 5. provider, 6. discussion

4.2. 1.b, 2.c, 3.b, 4.c, 5.b, 6.b, 7.a, 8.b, 9.a, 10.c, 11.b, 12.a, 13.c, 14.b, 15.a.

Unit 4. Computer Programming.

Starter.1.1.

1. Coding, sometimes called computer programming, is how we communicate with computers. Code tells a computer what actions to take, and writing code is like creating a set of instructions. By learning to write code, you can tell computers what to do or how to behave in a much faster way. 2. While coding means writing codes from one language to another, programming means programming a machine with a given set of instructions to run. A coder's task is to translate logic into language the machine can understand, whereas a programmer has to do more than just write the codes. 3. Code (short for source code) is a term used to describe text that is written using the protocol of a particular language by a computer programmer. Examples of programming languages include C, C#, C++, Java, Perl, and PHP. 4. No, coding is not hard to learn. However, like anything new, it's not easy to start, and how difficult a time one has with learning to code will vary across a number of factors. The point is, learning to code isn't impossible; or, it's not as impossible as it might seem when it comes to getting your kids involved. 5. The definition of a code is a set of rules or a system of communication, often with randomly assigned numbers and letters given specific meanings. An example of code is the state's vehicle laws. An example of code is a made-up language that two children use to speak to each other. 6. The job can be stressful at times, but computer programmers are compensated well for any anxiety they might experience. Many jobs in this profession are being outsourced to other countries where pay is lower, saving companies money. 7. Learning to program involves a lot of Googling, logic, and trial-and-error—but almost nothing beyond fourth-grade arithmetic. Math has very little to do with coding, especially in the early stages.

Reading. 2.2.

1. Coding is used for writing systematic lines of instructions that will perform certain actions. Coding uses computer programming languages to give computers and machines a set of instructions to perform tasks. **2.** The binary code represents these on and off transistors as 1 and 0 digits. An infinite number of combinations of these codes make your computer work. To make binary code manageable, computer programming languages were formed. **3.** Coding is what makes it possible for us to create computer software, apps, and websites. Your browser, your OS, the apps on your phone, Facebook, and this website – they're all made with code. Here's a simple example of code, written in the Python language: print 'Hello, world!' **4.** You can make your own Website, Coding ability gives a new perspective to problem-solving, Learning to code offers career opportunities, You can start your own Business, You can do Freelancing, etc… **5.**

optional answer **6.** Personal preference, the kind of things you want to develop, how limiting the language is, how easy or hard the language is to learn, potential career prospects, whether the language is rising or declining in popularity **7.** SQL stands for Structured Query Language, which is a programming language used to communicate with relational databases. ... Despite its critics, SQL has become the standard language for querying and manipulating data stored in a relational database **8.** The hardest programming languages to learn are Prolog, LISP, Haskell, and Malbolge. **9.** There are about 700 programming languages, including esoteric coding languages. Some sources that only list notable languages still count up to an impressive 245 languages. **10.** Java, Python, C++, Lisp, and Perl are all examples of popular object-oriented programming languages. They support programming using the classes and objects paradigm. Five of the most popular object-oriented languages include Java **11.** Server-side technology is a set of tools and programming languages that are used to design, build and maintain server-side operations of a web application. **12.** Structured Query Language (SQL) is the standard and most widely used programming language for relational databases. It is used to manage and organize data in all sorts of systems in which various data relationships exist. SQL is a valuable programming language with strong career prospects.

Vocabulary practice

3.1. manageable - achievable, surpass - excel, abundant - excess, serve a purpose - give an aim, execute - perform, flawless - perfect, tech-savvy - computer literate, possess - own, novice - beginner, a plethora - ample, proficient - skilled, median - average, reap – produce.

3.2.

2. MS-DOS (Microsoft Disk Operating System), SQL (structured query language), OCR (Optical Character Recognition), PDF (Portable Document Format), URL (Uniform Resource Locator), VoIP (Voice over Internet Protocol), STEM (science, technology, engineering and mathematics), EHR (Electronic health record), CPU (Central Processing Unit), DSN Distributed Systems Network, LAN (Local Area Network), HTML (HyperText Markup Language), MPEG (Moving Pictures Experts Group), PHP (Hypertext Preprocessor), CSS (cascading style sheets), AI (Artificial Intelligence), CAD (Computer Aided Design).

3.3.

If you mainly want to develop…	**You should probably learn…**	**And maybe avoid…**
Online (web) applications	HTML, CSS, JavaScript, PHP, and SQL	Ruby, ASP, Perl, ColdFusion
Games	C, C++, Python, and DarkBASIC	Ada, Java, Fortran, COBOL
Business applications	C, C++, Java, Python, and SQL	Fortran, COBOL
Science & Engineering applications	Fortran, Pascal, Ada, C++, and C	BASIC, COBOL, Java
Military, Aerospace, Transport and Communications applications	Ada, Python, C, C++, and SQL	COBOL
Educational Applications	BASIC, Python, Pascal, Java, C, C++	Fortran, COBOL

3.4. coding boot camp, hypertext processor, structured query language, back-end web databases, low-level coding type, open-source online platform, server-side web and software development language, English-based commands, object-oriented coding language, hypertext markup language.

Listening

4.2. 1. variable 2. rigorous 3. retain 4. autodidact 5. weave 6. seedy 7. curb. 8. social circles

4.3. 1 b 2c 3d 4c 5a

Speaking

5.1.

1. In the United States there are about 350 spoken languages. But coding has us beat with over 700 coding languages in use today! Only two countries speak more languages, Papua New Guinea (836) and Indonesia (710). Some programming languages, like Java, Python, and HTML, are more common, but others, like Rust and Kotlin, are used in very specific situations. The good news for coders? Once you learn the big ones, the more niche languages come easily.

2. Have you ever encountered a computer bug? How about a real bug in your computer? In 1947 a technician at Harvard had an issue with the performance of their Mark II computer. Once they investigated, they discovered that a moth had gotten into a relay – an actual real live bug. In the logbook, it was noted as the "First actual case of bug being found." While it is oft-repeated that this is where the term "bug" came to refer to errors that impacted the performance of programs, this is not the case. The term "bug" was already in fairly widespread use in technical circles in 1947. Thomas Edison used it in 1869 to describe problems in his own inventions.

Even if the origin story isn't quite true, debugging is still an essential part of programming. If bugs aren't discovered, the results can be disastrous! In 1983, the soviet early warning system registered five incoming nuclear missiles from the USA. Lt. Col. Stanislaus Petrov reasoned that if the U.S. wanted to attack the Soviet Union, would it really launch only five missiles? He ordered his men to stand down, and 15 minutes later, radar outposts confirmed that there were no incoming missiles. The mistake was due to a bug in the system.

3. In the future, coding and technical literacy may be nearly as essential to daily life as literacy is now. The United States has a literacy rate of 99%. Imagine 99% of the population knowing how to code. While it may sound difficult, coding can be easier than writing for students who struggle with language mechanics. In 2020, MIT neuroscientists found that interpreting code activates a general-purpose brain network, but not language-processing centers.

4. Coding and STEM fields may seem like it's built for boys, but the first person to write our modern understanding of a program was Ada Lovelace. Being the only legitimate daughter of the poet, Lord Byron, Ada's mother feared her daughter would suffer the same madness as her father. To stave off the madness as long as possible, she dedicated her daughter to studying math and science. While working with a peer on a mechanical general-purpose computer known as the Analytical Engine, she recognized that the machine could go way beyond simple and pure calculations, publishing then the first algorithm intended to be carried out by a machine like this one.

5. Just like a virus infects a human body by replicating versions of itself to pass on to other hosts, a computer virus spreads by inserting its own code and spreading to new computers via networks. The idea of a computer virus was published in the essay "Theory of self-reproducing automata" by John von Neumann in 1949, but the first replicating computer program was not written until 1971. The program was not actively malicious software as it caused no damage to data, the only effect being a message it output to the teletype reading "I'M THE CREEPER; CATCH ME IF YOU CAN". The virus was not created to bring harm, but it did not take long for the idea of self-replicating software to turn to the dark side. The good news, there are "ethical hackers" out there that work for the good guys.

6. You may be fluent in JavaScript or C++ but what NASA engineers really need to know is ADA and HAL/S. Up through 2005, NASA was still using a computer language from 1973 specifically designed for their needs called HAL/S (or High-order Assembly Language/Shuttle).

Although HAL/S is designed primarily for programming onboard computers, it is general enough for almost any application and is used widely across NASA's projects. Newer projects, such as the International Space Station, operate on a programming language called ADA, developed in 1980 and accepted as an international standard programming language in 1995.

7. In 1972, Steve Wozniak and Steve Jobs collaborated on an arcade game, Breakout, for Atari. In 2018, Apple Inc became the first US Trillion dollar company. There's no doubt, there is big money to be had in coding. And by big money, we mean billions. The average salary of a data scientist is up to $100,000.Enjoy computer games? Markus Persson, a Swedish programmer, created and launched the computer game Minecraft in 2009. By 2014, Microsoft bought it for $2.5 billion.

8. Computers operate on what is called a "binary code." All of the software that runs them is written using only 0s and 1's, and there are infinite combinations of these two digits. That's why new software can be written all the time.
9. As of the end of 2020, 70% of coding jobs are in career fields not connected with technology. Those who learn to code early and well will have a choice of many careers in almost every industry imaginable.
10. In 1945 the ENIAC (Electronic Numerical Integrator and Computer) was turned on and put to use computing trajectories of ballistics during World War II. It was the first programmable, electronic, general-purpose digital computer, and it was operated by six women. The women studied the machine's logic, physical structure, operation, and circuitry in order to not only understand the mathematics of computing, but also the machine itself. To use it, they had to manipulate switches and cables by understanding the machine's blueprints, as programming languages did not yet exist. Though contemporaries considered programming a clerical task and did not publicly recognize the female programmers' effect on the successful operation and announcement of ENIAC, the six women (McNulty, Jennings, Snyder, Wescoff, Bilas, and Lichterman) have since been recognized for their contribution to computing.
11. Learning to code has definite cognitive benefits – creative problem-solving, critical thinking, and developing teamwork skills. Research dating back to 1991 has demonstrated and confirmed that coders developed higher cognitive skills on average, and that coding or other intellectually stimulating activities dramatically reduced the chances of degenerative diseases such as Alzheimer's. Today, soft and hard skills are equally important, but those who know how to work in teams, solve problems, pay attention to details, and experience mistakes as learning experiences will have way more possibility to become the leaders of tomorrow.

TEST QUESTIONS

1. The first version of HTML was written by Tim Berners-Lee in 1993. Since then, there have been many different versions of HTML. The most widely used version throughout the 2000s was HTML 4.01, which became an official standard in December 1999. Another version, XHTML, was a rewrite of HTML as an XML language. What education is enough to start working in most coding-related tech careers?
2. The education required for a career in coding is a bachelor's degree in technology or science. The certificates or graduate degree is mainly required for entry-level coding. Then having knowledge of the particular field means in which language one do like to code.
3. What kind of jobs can you work in with an associate's degree in computer science? Software Developer, Web Developer, Network Administrator, Computer Programmer, Software Engineer, Information Security Analyst, Computer Hardware Engineer, and Systems Manager.
4. Ruby, ASP, Perl, ColdFusion
5. Java, Python, C++, Kotlin, and Rust are popular app development languages ranked among the world's top 10 most preferred languages in 2022.
6. optional
7. As noted by Discovery, the Creeper program, often regarded as the first virus, was created in 1971 by Bob Thomas of BBN. Creeper was actually designed as a security test to see if a self-replicating program was possible.
8. With the construction project stalled and freed from the nuts and bolts of detailed construction, Babbage conceived, in 1834, a more ambitious machine, later called Analytical Engine, a general-purpose programmable computing engine
9. It has been used in many U.S. space projects since 1973 and its most significant use was in the Space Shuttle program (approximately 85% of the Shuttle software was coded in HAL/S). It was designed by Intermetrics in 1972 for NASA and delivered in 1973.
10. In 1947 a technician at Harvard had an issue with the performance of their Mark II computer. Once they investigated, they discovered that a moth had gotten into a relay – an actual real live bug. In the logbook, it was noted as the "First actual case of bug being found." While it is oft-repeated that this is where the term "bug" came to refer to errors that impacted the performance

of programs, this is not the case. The term “bug” was already in fairly widespread use in technical circles in 1947. Thomas Edison used it in 1869 to describe problems in his own inventions.

Unit 5. OOP.

Starter. 1.1

Pillars: Inheritance, Encapsulation, Polymorphism, Aggregation
Reliability is the most important for any program.

1.2

1b, 2a, 3c, 4f, 5e, 6g, 7h

Reading 2.1

1F, 2T, 3T, 4T, 5F, 6F

2.2

1. Functional programming treats elements of code as precise mathematical functions.
2. Instead of writing a program you create classes.
3. If something goes wrong, you know exactly where to look. Objects are self-contained and each bit of functionality does its own thing while leaving the other bits alone.
4. Inheriting classes can simply reuse existing code instead of writing these functions all over again.
5. Polymorphism comes into play because a single function can shape-shift to adapt to whichever class it’s in.
6. It is worth it because you will find that it’s the easier, more intuitive approach for developing big projects. It’s about breaking a huge problem down into solvable chunks.
7. There’s an insatiable demand for talented software developers with experience using C# and Java as well as for OOP programmers with other qualifications.

modularity – the quality of consisting of separate parts that when combined, form a complete whole
encapsulation - the process of expressing or showing the most important facts about something
self-contained - (of a thing) complete, or having all that is needed, in itself
simultaneously - at the same time
commonalities - the state of sharing features or attributes
inheritance - a physical or mental characteristic inherited from your parents
to implement - to put (a decision, plan, agreement, etc.) into effect
regardless - without paying attention to the present situation; despite the prevailing circumstances
flexibility - the quality of bending easily without breaking
polymorphism - the fact that something can exist in different forms
to riff - to speak for a long time on a particular subject
to shape-shift - to change a physical form at will
steep - rising or falling sharply
ultimately - finally; in the end
chunks - a thick, solid piece of something
go-to - someone or something that is regularly or repeatedly chosen or employed for reliably good results
insatiable - impossible to satisfy

Listening

3.1

1c, 2a, 3d, 4e, 5b

3.3

1. *Understand the problem and plan a solution*
2. Make a flowchart of the program
3. Write instructions in a programming language
4. Compile the program (to turn it into machine code)
5. Test and debug the program
6. Prepare documentation

Vocabulary
4.1
1a, 2b, 3c, 4c, 5d, 6a, 7b, 8c, 9d, 10d, 11d
4.2
1. manageable, 2. software, 3. maintenance, 4. encapsulation
Speaking
5.1
1c, 2a, 3b

Unit 6. Databases.

1. Starter.
1.2 1. You have to use a computer. 2. Microsoft Office Access 3. Mail merge 4. It is easy to add or amend records. 5. The average men's shoe size is 9. 6. Field 7. First name 8. A field that contains unique data in each record. 9. Validation. 10. List check.

2. Vocabulary
2.3 A: 1.retrieval; 2.retrieve; 3. retrievable; 4. retrieved; 5.retrieving.
B: 1. data-processing operations; 2. number-oriented databases; 3. direct-access storage devices; 4. personal-computer systems; 5. cross-reference tool.

3. Language Focus
3.1 1.corresponding; 2.processing; 3.processed; 4.based; 5.refined; 6.resulting; 7.implemented.

4. Listening
4.2 1. implementation; 2. relational databases; 3; separate records; 4. architected around; 5. a cluster of database nodes.
Test Questions
8. https://pastpapers.papacambridge.com/viewer/caie/cambridge-advanced-as-and-a-level-computer-science-9608-2016-nov-9608-w16-qp-11-pdf

Unit 7. Software engeneering

1.1 1. The ability to analyze complex technical information. The ability to analyze business requirements and assess impact within the existing database architecture. Good research skills. Be an excellent problem solver. Have experience building software applications. 2. Formal qualifications for software engineers. Building a career as a software engineer has a minimum entry-level education, which typically involves a bachelor's degree. The most common of these are awarded in computer software engineering or within the fields of computer science or mathematics. 3. Video game designer. National average salary: $60,588 per year. ...SQA engineer. National average salary: $80,699 per year. ... Cyber security engineer. ...Applications engineer. ...Software project manager. ...Software test engineer. ...Full stack engineer. ...Javascript engineer. 4. Although Java and Python are great languages for system programming, C++ is the most popular choice. 5. Though most software engineers usually do not write code, they need a strong background in programming skills to communicate properly with programmers. The software engineering profession requires candidates to have (at a minimum) a bachelor's degree in software engineering, computer science, or a related field.

1.2 1. immense rate (величезна швидкість); 2. implementation (реалізація, виконання); 3. to segregate (відокремити); 4. to cater to (обслуговувати); 5. roadmap (дорожня карта); 6. end user (кінцевий користувач); 7. feasibility study (техніко-економічне обґрунтування); 8. scalability (масштабованість); 9. maintainability (ремонтопридатність); 10. user request (запит користувача).

1.3 1. Software engineering was introduced to address the issues of low-quality software projects. 2. (last paragraph) 3. Software development life cycle (System/Software Development Life Cycle, SDLC) is a process consisting of specific stages, which begins at the moment of making a decision on the need to create a software product and ends at the moment of termination of software support by developers. 4. A feasibility study is a preliminary exploration of a proposed project or undertaking to determine its merits and viability. A feasibility study aims to provide an independent assessment that examines all aspects of a proposed project, including technical, economic, financial, legal, and environmental considerations. 5. Thorough testing is conducted by testing experts at various levels of code such as module testing, program testing, product testing, in-house testing and testing the product at user's engagement and feedback

2.1

Verb	**Adjective**	**Noun (thing or idea)**
exist	existent, existential	existence
test	testable	tester
require	required	requirement
depend	dependable, dependant	dependence, dependency
exceed	exceeding, exceeded	Excess
consist	consistent, consisting	consistency
implement	implemented	implementation
scale	scaled	scale(s)
maintain	maintainable, maintained	maintenance, maintainability

2.2 What is Cloud Computing?

At its most basic level, cloud computing is a model **for** remote computer access. The idea is simple: You use your computer and an Internet connection to make contact **with** a remote server. This server, which is really just a computer, runs applications using its hardware. You're able to influence the application **by** executing commands through a Web browser or other user interface. But the remote server is doing all the heavy lifting.

One reason to use a cloud computing system is that it lets you access applications your own computer might not be able to execute. Your computer only has to run a Web browser or simple user interface. In most cloud computing applications, this client-side program requires minimal resources from your machine. That means you can take advantage **of** a variety of programs and services without having to continually invest in the fastest computers. Since the cloud computing service is handling all the processor work, you just need a machine capable **of** connecting to the Internet.

Another major selling point **for** cloud computing services is that they allow you to access your data on a variety of devices no matter where you are. If you rely **on** your own computer to execute programs, you're limited **to** that machine. You may have to e-mail a file to yourself so that you can access it on another device. You may have to set up a home network to allow file transfers between machines. Cloud computing services store your information **on** remote servers. You can log into the cloud computing service using your account login and password.

2.3 syllabus: syllabi or syllabuses, alga: algae or algas, erratum: errata, apex: apexes or apices, addendum: addenda or addendums, bacillus: bacilli, stratum: strata, automaton: automotons or automata, antenna: antennas or antennae (only antennae is correct for the sensory organs on animals; antennas in more common in other contexts), phenomenon: phenomena or phenomenons, index: indexes or indices, terminus: termini or terminuses, formula: formulas or formulae, agendum: agenda or agendums (agenda is almost invariably used in place of the singular form, and agendums is rare), aquarium: aquariums or aquaria, larva: larvae or larvas, vortex: vortices or vortexes, criterion: criteria, symposium: symposiums or symposia, analysis: analyses, atrium: atria or atriums, bacterium:

bacteria, crisis: crises, corrigendum: corrigenda, diagnosis: diagnoses, datum: data or datums (data is often used as a mass noun, taking a singular verb and being substituted by a singular pronoun), cactus: cacti or cactuses, curriculum: curricula or curriculums, focus: foci or focuses, nebula: nebulae or nebulas: the former ending is employed in astronomy, and the latter applies in medical contexts, fungus: fungi or funguses, ellipsis: ellipses, appendix: appendixes or appendices, minimum: minima or minimums, hypothesis: hypotheses, matrix: matrices or matrixes, memorandum: memorandums or memoranda, oasis: oases, vertebra: vertebrae or vertebras (vertebrae is sometimes incorrectly used to refer to a single vertebra), gymnasium: gymnasiums or gymnasia, maximum: maxima or maximums, ganglion: ganglia or ganglions, locus: loci, medium: mediums or media (media is the correct alternative to refer to forms of expression or information or in biological contexts), narcissus: narcissi or narcissuses or narcissus, paralysis: paralyses, stimulus: stimuli, spectrum: spectra or spectrums, parenthesis: parentheses, moratorium: moratoriums or moratoria, synopsis: synopses, podium: podiums or podia, radius: radii or radiuses, synthesis: syntheses, referendum: referenda or referendums, platypus: platypuses or platypi, axis: axes, millennium: millennia or millenniums, thesis: theses, alumnus/alumna: alumni or alumnae (alumnus refers to a man and alumna to a woman, alumni pertains to men or to men and women and alumnae to women; alumni is often employed in the singular, and alum/alums are used informally as gender-neutral singular and plural forms), basis: bases, hippopotamus: hippopotamuses or hippopotami.

Problem-solving

1. Q: I'm a language for everything yet I have no real identity of my own. Good luck trying to compile me. What am I? A: *Pseudocode*
2. Q: The more you code, the more of me there is. I may be gone for now but you can't get rid of me forever. What am I?
A: *A bug*
3. Q: As a developer, you usually get mad at me because I complain a lot, although I'm usually right. What am I?
A: *A compiler*
4. I'm a simple thing, nothing special. While I have many cousins we're all very similar because we set your project up. What am I?
A: *A configuration file*

3.2

a (primary replica)
b (chunk server)
c (write request)
d (master server)
e (client)
f (cluster)
g (back-end system)
h (mid-range server)

3.3

a (redundancy)
b (the front end)
c (leverage)
d (the central server)
e (to administer)
f (to ensure)
g (protocol)
h (middleware)

3.4

1. Google Cloud Platform is a part of Google Cloud, which includes the Google Cloud Platform public cloud infrastructure, as well as Google Workspace (G Suite), enterprise versions of Android and Chrome OS, and application programming interfaces (APIs) for machine learning and enterprise mapping services.
2. Google Cloud Storage is a service within the Google Cloud Platform. It provides unified object storage for live or archived data. Objects stored in Google Cloud Storage are grouped into buckets. Buckets are containers within the cloud that can be individually assigned to storage classes.
3. Google's approach is more pragmatic. The company purchases mid-range servers for its data centers.
4. Google's philosophy is to keep the back end system as simple as possible. As systems become more complex, the opportunity for problems to arise increases. Simplifying a system reduces the chance for problems even if the system itself is enormous.
5. Like any well-designed software system, all of Google is layered with a common set of scalable services. There are three main building blocks used by each of our storage services: Colossus is our cluster-level file system, successor to the Google File System (GFS)
6. Cloud architecture is the way technology components combine to build a cloud, in which resources are pooled through virtualization technology and shared across a network. The components of a cloud architecture include: A front-end platform (the client or device used to access the cloud)
7. The front end is the side the computer user, or client, sees. The back end is the "cloud" section of the system. The front end includes the client's computer (or computer network) and the application required to access the cloud computing system.
8. A central server is a computer system that provides local area networking services to multiple users. It consists of one or more high-speed computers that store office applications and data files that can be shared by many different people.
9. Middleware is software that lies between an operating system and the applications running on it. Essentially functioning as a hidden translation layer, middleware enables communication and data management for distributed applications.
10. At a basic level, system redundancy means that your provider stores valuable data in more than one place. Ideally, you'll have backups in multiple areas so that any significant server outages won't affect your ability to retrieve information.

4.1

1. math is the theoretical and programming is the practical branch because programming is applied math in the world of logic
2. programming
3. programming helps build mental models for Musk, Gates, etc
4. dictionary: the system of symbols and rules that serve as instructions for the computer, presenter: implementation of details of the logical programming solution... you need to learn the syntax of different coding languages
5. presenter’s explanations: programming is on the higher level of abstraction while coding is more focused on details
6. optional

4.3

1 e 2 a 3 d 4 c 5 b

5.2

1. true
2. true
3. false
4. true
5. false

TEST QUESTIONS

Software Engineering is the development and analysis of interacting processes in information environments, testing, quality assessment, and management of the software development process, work with machine learning algorithms, and the use of cloud and high-performance computing.

1. The ability to analyze complex technical information, the ability to analyze business requirements, and assess impact within the existing database architecture, good research skills, be an excellent problem solver and have experience building software applications.
2. JavaScript, HTML/CSS, SQL, Python, and Java
3. 1 – Brainstorming. ...2 – Business analysis. ... 3 – Design. ... 4 – Programming. ... 5 – Integration. ... 6 – Quality assurance. ... 7 – Release. ...
4. Cloud Computing refers to the delivery of on-demand computing services over the Internet on an as-needed basis. It allows businesses to rent access to computing services like servers, storage, databases, analytics, networking, software, and intelligence, typically over the Internet.)
5. It is a central configuration repository wherein all the metadata and configuration of different modules, and resources are kept and updated on a real-time basis. The repository can then be accessed using standard protocols like SOAP by third-party software and integration components.
6. When you interact with information stored on the cloud, your actions are translated into data requests. Your computer acts as a client − a machine that sends data requests to other machines. Ultimately, a master server takes the request and sends a message to the Google machine that keeps the data − Google calls these machines chunk servers. The chunk server sends the data directly to the client − the information never passes through the master server.
7. Backend refers to the cloud itself which is used by the service provider. It contains the resources as well as manages the resources and provides security mechanisms. Along with this, it includes huge storage, virtual applications, virtual machines, traffic control mechanisms, deployment models, etc
8. Front-end development focuses on the visual aspects of a website – the part that users see and interact with. Back-end development comprises a site's structure, system, data, and logic. Together, front-end and back-end development combine to create interactive, visually pleasing websites.
9. While a programmer simply has to think and build a logical framework of decisions for the application, a coder has to implement that logic with a particular programming language in a standard, efficient way. A coder has to become familiar with code syntax and be up-to-date with newer and recommend ways of writing code

Unit 8. Cyber Crime and Data Security.

Starter

1.1. A Malware attack; B Phishing attack; C Cryptojacking D Password attack E Man-in-the-middle attack

1.2.

A your computer against a cyberattack
B the traffic that may enter your device.
C clicking on suspicious links.
D operational system, browsers, and passwords
E spelling mistakes and format changes from that of legitimate sources
F special characters
G protect the data
H Wi-Fi networks
I primary source; crypto mining scripts.

Practical tips

2.2. 1 A; D 2C; E 3B; H 4F; G

Problem-Solving – Can you crack the code?
Solution:
One of 57620 or 57628 must be the secret code.
Explanation:
Hint-1: 79314
Only 7 are there and in wrong
Hint-2: 95643
6 is in the right position while 5 is not
Hint-3: 57319
4 and 7 are in the right position
5 Sum Hint: A + B + C + D + E = D*10 + E
6 Case A – 57620
7 5 + 7 + 6 + 2 + 0 = 2 * 10 + 0
8 20 = 20
9 Case B – 57628
10 5 + 7 + 6 + 2 + 8 = 2 * 10 + 8
11 28 = 28
3.2.
substitution cipher:
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
S V X F R D H G U K J Z N M P O W E A Y I B Q C T L
Which, translated, reads: “This is how anyone can learn how to solve cryptograms”
Language Focus
4.1. 1 ing 2 ing 3 ed 4 ing 5 ing 6 ing 7 ing 8 ing 9 ed 10 ed 11 ed 12 ed 13 ed 14 ed 15 ed 16 ing 17 ing 18 ed 19 ing 20 ing
Reading. Vocabulary practice
6.1. a repeater; b urgent; c Eavesdropping; d Delicate; e Uncertainty principle; f Resistant; g To intercept; hInteger; I To factor; j a sequence.
6.2. a detect; b compromise; c transmit d identify e envision f tolerate g secure h disturb i wiretap j harness
6.3. 1B 2C 3B 4C 5B 6A 7D 8A 9D 10C
Listening 1 https://www.youtube.com/watch?v=xlbtcqUYFkQ
7.2. 1. chips injected; 2. privacy at risk 3. key badge 4. unlock my smartphone 5. room for improvement 6. authorized user 7. identification tags 8. digital footprint 9. life secrets 10. being chipped
Listening 2 https://www.youtube.com/watch?v=H-YGdcNFBJk
7.3. 1. T; 2. T; 3. F; 4. T; 5. F; 6. T; 7. F; 8. T; 9. F; 10. F

Навчальне видання

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ENGLISH FOR IT AND COMPUTING

АНГЛІЙСЬКА ДЛЯ ІТ ТА КОМП'ЮТЕРНИХ НАУК

Навчальний посібник

(англійською мовою)

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