Courses of English First Year Science and technology basic studies, Semester 2

1. Pronunciation of Final "-ed" (Past Tense Verbs)

The **-ed** ending in English can be pronounced in **three different ways**: **/t/, /d/, or /ɪd/**. The pronunciation depends on the **last sound of the base verb**.

Rule 1: "-ed" = /ɪd/ (Extra Syllable)

If the verb ends in **/t/** or **/d/**, the **-ed** is pronounced as **/ɪd/** (adding a syllable).
Examples:

- **Want → Wanted** (/ˈwɒntɪd/)
- **Need → Needed** (/niːdɪd/)

English Phonetics Course

Module 3: Pronunciation Rules for Final Sounds

1. Pronunciation of the Final (-ed)

The past tense and past participle of regular verbs end in **-ed**, but the pronunciation varies depending on the final sound of the base verb.

Three Possible Pronunciations:

Final Sound of Base Verb	Pronunciation of (-ed)	Examples
/t/ or **/d/**	**/ɪd/** (extra syllable)	*want → wanted (/ˈwɒntɪd/), need → needed (/ˈniːdɪd/)*
Voiceless consonants (p, k, f, s, ʃ, tʃ, θ)	**/t/** (no extra syllable)	*stop → stopped (/stɒpt/), laugh → laughed (/laːft/)*
Voiced consonants & vowels (b, g, v, z, ʒ, dʒ, ð, m, n, ŋ, l, r + vowels)	**/d/** (no extra syllable)	*rob → robbed (/rɒbd/), play → played (/pleɪd/)*

2. Pronunciation of the Final (-s/-es)

The plural nouns, possessive forms, and third-person singular verbs end in **-s/-es**, but the pronunciation changes based on the final sound.

Three Possible Pronunciations:

Final Sound of Base Word	Pronunciation of (-s/-es)	Examples
/s/, /ʃ/, /tʃ/, /ks/ (hissing sounds)	**/ɪz/** (extra syllable)	*kiss → kisses (/ˈkɪsɪz/), watch → watches (/ˈwɒtʃɪz/)*
Voiceless consonants (p, t, k, f, θ)	**/s/**	*cat → cats (/kæts/), laugh → laughs (/laːfs/)*

Final Sound of Base Word	Pronunciation of (-s/-es)	Examples
Voiced consonants & vowels (b, d, g, v, ð, m, n, ŋ, l, r, z, vowels)	**/z/**	*dog → dogs (/dɒgz/), see → sees (/siːz/)*

3. Silent Letters: Definition, Spelling & Pronunciation

Silent letters are letters in a word that are not pronounced but affect pronunciation or meaning.

Common Silent Letters in English:

Letter	Examples	Notes
Silent B	*comb (/kəʊm/), doubt (/daʊt/), climb (/klaɪm/)*	Usually silent after **m** or before **t**.
Silent C	*muscle (/ˈmʌsl/), scene (/siːn/), science (/ˈsaɪəns/)*	Often silent before **k, q, s, or e/i/y**.
Silent D	*handkerchief (/ˈhæŋkətʃɪf/), Wednesday (/ˈwenzdeɪ/)*	Sometimes silent in compound words.
Silent E	*name (/neɪm/), like (/laɪk/), hope (/həʊp/)*	Often silent at the end, making the vowel long.
Silent G	*gnaw (/nɔː/), sign (/saɪn/), foreign (/ˈfɒrɪn/)*	Usually silent before **n**.
Silent H	*hour (/aʊər/), honest (/ˈɒnɪst/), ghost (/gəʊst/)*	Silent in some words, especially after **g, r, or ex-**.
Silent K	*knee (/niː/), knife (/naɪf/), know (/nəʊ/)*	Always silent before **n**.
Silent L	*walk (/wɔːk/), could (/kʊd/), salmon (/ˈsæmən/)*	Often silent after **a, o, or u**.
Silent N	*autumn (/ˈɔːtəm/), column (/ˈkɒləm/)*	Usually silent after **m**.
Silent P	*psychology (/saɪˈkɒlədʒi/), pneumonia (/njuːˈməʊniə/)*	Often silent at the start before **s, n, or t**.
Silent T	*castle (/ˈkaːsl/), listen (/ˈlɪsn/), often (/ˈɒfən/)*	Sometimes silent after **s or f**.
Silent U	*guess (/ges/), guitar (/gɪˈtaːr/), guard (/gaːd/)*	Often silent after **g**.
Silent W	*write (/raɪt/), wrong (/rɒŋ/), sword (/sɔːd/)*	Usually silent before **r**.

Conclusion:

Understanding these pronunciation rules helps improve fluency and accuracy in spoken English. Practice with example words to master these patterns!

Illustration:
☐ *Listen:*

- "I **visited** (/ˈvɪzɪtɪd/) the lab yesterday."
- "He **started** (/ˈstɑːrtɪd/) the experiment."

Rule 2: "-ed" = /t/ (Unvoiced Sound)

If the verb ends in an **unvoiced** consonant (**p, k, f, s, sh, ch, th**), pronounce **-ed** as **/t/**.
Examples:

- **Stop → Stopped** (/stɒpt/)
- **Work → Worked** (/wɜːrkt/)

Illustration:
☐ *Listen:*

- "She **helped** (/hɛlpt/) her colleague."
- "The machine **stopped** (/stɒpt/) suddenly."

Rule 3: "-ed" = /d/ (Voiced Sound & Vowels)

If the verb ends in a **voiced** consonant (**b, g, v, z, m, n, l, r**) or a **vowel**, pronounce **-ed** as **/d/**.
Examples:

- **Call → Called** (/kɔːld/)
- **Play → Played** (/pleɪd/)

Illustration:
☐ *Listen:*

- "They **arrived** (/əˈraɪvd/) late."
- "He **used** (/juːzd/) a new method."

2. Pronunciation of Final "-s" (Plurals & Verb Endings)

The **-s** ending can be pronounced as **/s/, /z/, or /ɪz/**, depending on the **last sound of the word**.

Rule 1: "-s" = /ɪz/ (Extra Syllable)

If the word ends in **s, z, sh, ch, x, ge, dge**, pronounce **-s** as **/ɪz/**.
Examples:

- **Box → Boxes** (/ˈbɒksɪz/)
- **Watch → Watches** (/ˈwɒtʃɪz/)

Illustration:
☐ *Listen:*

- "The **classes** (/ˈklɑːsɪz/) are difficult."
- "She **fixes** (/ˈfɪksɪz/) computers."

Rule 2: "-s" = /s/ (Unvoiced Sound)

If the word ends in an **unvoiced** consonant (**p, t, k, f, th**), pronounce **-s** as **/s/**.
Examples:

- **Book → Books** (/bʊks/)
- **Graph → Graphs** (/græfs/)

Illustration:
☐ *Listen:*

- "The **tests** (/tɛsts/) are important."
- "He **likes** (/laɪks/) physics."

Rule 3: "-s" = /z/ (Voiced Sound & Vowels)

If the word ends in a **voiced** consonant (**b, d, g, v, m, n, l, r**) or a **vowel**, pronounce **-s** as **/z/**.
Examples:

- **Lab → Labs** (/læbz/)
- **Computer → Computers** (/kəmˈpjuːtərz/)

Illustration:
☐ *Listen:*

- "The **students** (/ˈstjuːdənts/) study hard."
- "She **solves** (/sɒlvz/) equations."

Summary Table for Quick Reference

Ending	Rule	Pronunciation	Examples
-ed	After **/t/ or /d/**	**/ɪd/**	Wanted, Needed
-ed	After **unvoiced** sounds	**/t/**	Stopped, Worked
-ed	After **voiced** sounds & vowels	**/d/**	Called, Played
-s	After **s, z, sh, ch, x**	**/ɪz/**	Boxes, Watches
-s	After **unvoiced** sounds	**/s/**	Books, Graphs
-s	After **voiced** sounds & vowels	**/z/**	Labs, Computers

Practice Exercises for Algerian Students

1. **Listen & Repeat:**

- o "The engineer **designed** (/dɪˈzaɪnd/) a new system."
- o "The scientists **discovered** (/dɪˈskʌvərd/) a solution."

2. **Choose the Correct Pronunciation:**

- o "He **developed** (/dɪˈvɛləpt/ or /dɪˈvɛləpd/) a new app."
- o "The **results** (/rɪˈzʌlts/ or /rɪˈzʌltz/) were accurate."

3. **Apply in Sentences:**

- o "The software **crashed** (/kræʃt/)."
- o "The data **shows** (/ʃoʊz/) an error."

Course on Silent Letters: Definition, Spelling & Pronunciation

For Algerian Students of Science & Technology

Objective:

Understand silent letters in English, their role in spelling, and pronunciation, with practical examples relevant to scientific and technical vocabulary.

1. Definition of Silent Letters

A **silent letter** is a letter in a word that is written but **not pronounced** when speaking. Example:

- **K** in **knee** (we say /niː/, not /kniː/)
- **B** in **comb** (we say /koʊm/, not /komb/)

Silent letters exist due to historical changes, borrowed words, or spelling conventions.

2. Common Silent Letters with Examples

A. Silent B

Rule: Often silent after **m** at the end of a word.
Examples:

- **Comb** (/koʊm/) – *used in material science (comb-shaped structures)*
- **Bomb** (/bɒm/) – *important in physics (nuclear bomb)*
- **Thumb** (/θʌm/) – *anatomy term*

Exception: When followed by a vowel (e.g., **number** → /ˈnʌm.bər/).

B. Silent C

Rule: Usually silent before **k, q, or s**.
Examples:

- **Science** (/ˈsaɪ.əns/) – *key word for students!*
- **Muscle** (/ˈmʌ.səl/) – *biology term*
- **Scene** (/siːn/) – *used in computer graphics*

C. Silent D

Rule: Often silent before or after **n**.
Examples:

- **Wednesday** (/ˈwenz.deɪ/) – *calendar term*
- **Handkerchief** (/ˈhæŋ.kɚ.tʃɪf/) – *lab equipment term*

D. Silent E

Rule: Silent at the end of words (but lengthens the vowel before it).
Examples:

- **Name** (/neɪm/) – *used in data naming (e.g., file names)*
- **Code** (/koʊd/) – *programming term*
- **Bone** (/boʊn/) – *biology term*

E. Silent G

Rule: Often silent before **n** at the start or end of a word.
Examples:

- **Gnome** (/noʊm/) – *used in Linux OS (Gnome desktop)*
- **Design** (/dɪˈzaɪn/) – *engineering term*
- **Foreign** (/ˈfɔː.rən/) – *used in international studies*

F. Silent H

Rule: Silent in some words, especially after **w** or at the start.
Examples:

- **Hour** (/aʊər/) – *time measurement*
- **What** (/wɒt/) – *common question word*
- **Chemistry** (/ˈkem.ɪ.stri/) – *key science subject*

G. Silent K

Rule: Silent before **n** at the start of a word.
Examples:

- **Knee** (/niː/) – *anatomy term*
- **Knife** (/naɪf/) – *lab equipment*
- **Knowledge** (/ˈnɒl.ɪdʒ/) – *important in research*

H. Silent L

Rule: Often silent after **a, o, or u**.
Examples:

- **Could** (/kʊd/) – *modal verb in technical manuals*
- **Half** (/hæf/) – *mathematics term*
- **Talk** (/tɔːk/) – *communication term*

I. Silent N

Rule: Usually silent after **m** at the end of a word.
Examples:

- **Autumn** (/ˈɔː.təm/) – *seasonal term in climate studies*
- **Column** (/ˈkɒl.əm/) – *used in matrices (math)*

J. Silent P

Rule: Often silent at the start before **s, n, or t**.
Examples:

- **Psychology** (/saɪˈkɒl.ə.dʒi/) – *study of human behavior*
- **Pneumonia** (/njuːˈməʊ.ni.ə/) – *medical term*
- **Receipt** (/rɪˈsiːt/) – *financial term*

K. Silent T

Rule: Silent in some words, especially after **s or f**.
Examples:

- **Castle** (/ˈkɑː.səl/) – *historical term*
- **Listen** (/ˈlɪs.ən/) – *communication skill*
- **Often** (/ˈɒf.ən/) – *common adverb*

L. Silent U

Rule: Often silent after **g** and before a vowel.
Examples:

- **Guess** (/ges/) – *problem-solving term*
- **Guide** (/gaɪd/) – *used in manuals*
- **Circuit** (/ˈsɜː.kɪt/) – *electronics term*

M. Silent W

Rule: Silent before **r** or in some other cases.
Examples:

- **Write** (/raɪt/) – *documentation term*

- **Wrong** (/rɒŋ/) – *error analysis*
- **Who** (/huː/) – *question word*

3. Why Are Silent Letters Important?
- **Spelling:** Helps distinguish between words (e.g., **know** vs. **now**).
- **History:** Shows word origins (e.g., **knight** comes from Old English).
- **Pronunciation:** Avoids mispronunciation in technical terms.

4. Practice Exercises
1. Circle the silent letters:
   o **k**nee, **h**onest, clim**b**, **p**sychology
2. Pronounce correctly:
   o **Software** (not /sɒft.weər/ but /ˈsɒft.weər/)
   o **Debt** (not /debt/ but /det/)

5. Conclusion

Silent letters can be tricky, but recognizing them improves **spelling, pronunciation, and reading fluency**—essential for scientific and technical English.

Tip: Memorize common patterns and practice with technical terms from your field!

Overview of the general grammar tenses, including their structures, uses, and examples

1. Simple Tenses
Simple Present
- **Structure:** Subject + V1 (s/es for 3rd person singular)
- **Use:** Habits, general truths, fixed schedules.
   o *Example:* She **works** at a bank. / They **play** football every Sunday.

Simple Past
- **Structure:** Subject + V2 (past form)
- **Use:** Completed actions in the past.
   o *Example:* He **visited** Paris last year.

Simple Future
- **Structure:** Subject + will/shall + V1
- **Use:** Predictions, promises, spontaneous decisions.

o *Example:* They **will travel** to Japan next month.

2. Continuous (Progressive) Tenses
Present Continuous
- **Structure:** Subject + am/is/are + V-ing
- **Use:** Actions happening now or temporary situations.
    o *Example:* She **is reading** a book right now.

Past Continuous
- **Structure:** Subject + was/were + V-ing
- **Use:** Actions in progress at a specific past time.
    o *Example:* I **was cooking** when you called.

Future Continuous
- **Structure:** Subject + will be + V-ing
- **Use:** Actions in progress at a future time.
    o *Example:* This time tomorrow, I **will be flying** to London.

3. Perfect Tenses
Present Perfect
- **Structure:** Subject + have/has + V3 (past participle)
- **Use:**
    o Past actions with present relevance.
    o Unfinished time (e.g., today, this week).
    o Life experiences.
    o *Example:* She **has finished** her homework. / I **have visited** Italy twice.

Past Perfect
- **Structure:** Subject + had + V3
- **Use:** An action completed before another past action.
    o *Example:* When I arrived, the movie **had already started**.

Future Perfect
- **Structure:** Subject + will have + V3
- **Use:** Actions completed before a future time.
    o *Example:* By 2025, he **will have graduated**.

Key Notes:
- **Simple Tenses:** Focus on facts or completed actions.
- **Continuous Tenses:** Emphasize duration or progress.
- **Perfect Tenses:** Show a connection between time periods (past → present, past → past, etc.).

Course Title: English General Grammar – Mastering Tenses

Course Outline

Module 1: Introduction to Tenses

- What are tenses?
- Why are they important?
- Overview of **12 English tenses** (focusing on the 6 key ones in this course).

Module 2: Simple Present Tense

Structure:

- **Affirmative:** Subject + V1 (add **-s/-es** for **he/she/it**)
  - *Example:* She **works** at a hospital.
- **Negative:** Subject + do/does + not + V1
  - *Example:* They **do not like** coffee.
- **Question:** Do/Does + subject + V1?
  - *Example:* **Does** he **play** football?

Usage:

- Habits & routines (*I drink tea every morning.*)
- General truths (*The sun rises in the east.*)
- Fixed schedules (*The train leaves at 6 PM.*)

Practice:

- Fill-in-the-blanks exercises
- Writing daily routines

Module 3: Simple Past Tense

Structure:

- **Affirmative:** Subject + V2 (past form)
  - *Example:* She **visited** London last year.
- **Negative:** Subject + did not (didn't) + V1
  - *Example:* He **didn't go** to school yesterday.
- **Question:** Did + subject + V1?
  - *Example:* **Did** you **watch** the movie?

Usage:

- Completed actions in the past (*I ate breakfast at 8 AM.*)
- Past habits (*She always carried an umbrella.*)

Practice:

- Converting present sentences to past

- Storytelling in the past tense

Module 4: Simple Future Tense

Structure:
- **Affirmative:** Subject + will/shall + V1
  - *Example:* They **will travel** next month.
- **Negative:** Subject + will not (won't) + V1
  - *Example:* She **won't attend** the meeting.
- **Question:** Will + subject + V1?
  - *Example:* **Will** you **call** me later?

Usage:
- Predictions (*It will rain tomorrow.*)
- Promises (*I will help you.*)
- Spontaneous decisions (*I'll take the blue one.*)

Practice:
- Making future predictions
- Writing future plans

Module 5: Present Continuous Tense

Structure:
- **Affirmative:** Subject + am/is/are + V-ing
  - *Example:* He **is reading** a book.
- **Negative:** Subject + am/is/are + not + V-ing
  - *Example:* They **are not sleeping**.
- **Question:** Am/Is/Are + subject + V-ing?
  - *Example:* **Are** you **listening**?

Usage:
- Actions happening now (*She is cooking dinner.*)
- Temporary actions (*I'm staying with a friend this week.*)

Practice:
- Describing pictures (What's happening now?)
- Role-playing ongoing actions

Module 6: Present Perfect Tense

Structure:
- **Affirmative:** Subject + have/has + V3
  - *Example:* I **have finished** my work.
- **Negative:** Subject + have/has + not + V3

- o *Example:* She **has not seen** that movie.
- **Question:** Have/Has + subject + V3?
  - o *Example:* **Have** you **eaten** lunch?

Usage:
- Past actions affecting the present (*I have lost my keys!*)
- Life experiences (*She has visited Japan.*)
- Unfinished time (*I haven't seen him today.*)

Practice:
- "Have you ever…?" game (sharing experiences)
- Writing about personal achievements

Module 7: Past Perfect Tense

Structure:
- **Affirmative:** Subject + had + V3
  - o *Example:* When I arrived, the train **had left**.
- **Negative:** Subject + had not (hadn't) + V3
  - o *Example:* She **hadn't finished** her homework.
- **Question:** Had + subject + V3?
  - o *Example:* **Had** you **met** him before?

Usage:
- An action completed before another past action (*After he had eaten, he left.*)

1. Present Simple Tense

Used for:

- General truths, laws, and established facts.
- Descriptions of current knowledge or standard procedures.

Example:
*"Newton's First Law of Motion **states** that an object in motion **remains** in motion unless acted upon by an external force. In electronics, Ohm's Law **defines** the relationship between voltage, current, and resistance."*

2. Present Continuous Tense

Used for:

- Ongoing research or experiments.
- Temporary actions in progress.

Example:
*"Researchers **are currently investigating** the effects of climate change on marine biodiversity. Meanwhile, engineers **are developing** more efficient solar panels."*

3. Present Perfect Tense

Used for:

- Completed actions with present relevance.
- Summarizing past research without specifying exact times.

Example:
*"Scientists **have discovered** a new species of deep-sea bacteria. Recent studies **have shown** that CRISPR gene editing **has revolutionized** genetic engineering."*

4. Past Simple Tense

Used for:

- Completed experiments or historical events.
- Describing specific past research.

Example:
*"Fleming **discovered** penicillin in 1928. The team **conducted** the experiment under controlled conditions and **recorded** the results."*

5. Past Continuous Tense

Used for:

- Background actions in progress when another event occurred.

Example:
*"While the researchers **were analyzing** the data, an unexpected anomaly **appeared** in the results."*

6. Future Simple (Will) / Future with "Going to"

Used for:

- Predictions, planned research, or intended actions.

Example (Will):
*"This new polymer **will enhance** the durability of construction materials."*

Example (Going to):
*"The team **is going to test** the prototype under extreme conditions next month."*

7. Future Perfect Tense

Used for:

- Actions that will be completed before a future time.

Example:
*"By 2030, renewable energy sources **will have surpassed** fossil fuels in many countries."*

8. Passive Voice (Common in Scientific Writing)

Used for:

- Emphasizing the action rather than the doer.

Example:
*"The samples **were heated** to 100°C, and then the solution **was cooled** gradually."*

Combined Example in a Technical Report:

*"Previous studies **have demonstrated** that machine learning algorithms **can improve** diagnostic accuracy in medical imaging. Currently, researchers **are exploring** deep learning models to enhance early cancer detection. Last year, a team at MIT **developed** a neural network that **achieved** 95% accuracy. Future advancements **will likely incorporate** real-time data processing."*

Key Takeaways:
- **Present Simple** = Facts, laws, standard procedures.
- **Past Simple** = Completed experiments, historical findings.
- **Present Perfect** = Past research with current relevance.
- **Future Tenses** = Predictions, planned studies.
- **Passive Voice** = Common in methods/results sections.

Certainly! Modal verbs (e.g., *can, could, may, might, must, shall, should, will, would*) are frequently used in scientific and technical writing to express possibility, necessity, permission, ability, and recommendations. Below are examples of their usage in different contexts:

Modal Verbs

Modal verbs are special verbs used to express **ability, permission, obligation, possibility, necessity, and advice**. They are essential in both everyday and technical English.

Here are the most common modal verbs:

Modal Verb	Usage	Example
Can	Ability, Permission, Possibility	"You **can** program in Python." (Ability)
Could	Polite requests, Past ability	"**Could** you help me with this code?" (Request)
May	Formal permission, Possibility	"You **may** use the lab computer." (Permission)
Might	Weak possibility	"The software **might** crash if overloaded."
Must	Strong obligation, Necessity	"You **must** install antivirus software." (Necessity)
Should	Advice, Recommendation	"You **should** test your code before deploying it."
Will	Future certainty, Promise	"The system **will** update automatically."
Would	Hypothetical situations, Polite requests	"**Would** you explain this algorithm again?"

Illustrations

1. **Can (Ability)**

   o *"I **can** write HTML and CSS code."*
   o *"This robot **can** perform complex tasks."*

2. **Must (Obligation/Necessity)**

   o *"You **must** secure your database to prevent hacking."*
   o *"Engineers **must** follow safety protocols."*

3. **Should (Advice)**

   o *"You **should** back up your files regularly."*
   o *"Students **should** practice coding daily."*

4. **May (Permission/Possibility)**

   o *"You **may** access the server after authentication."*
   o *"The new update **may** improve performance."*

5. **Will (Future Certainty)**

- *"AI **will** transform many industries."*
- *"The technician **will** repair the laptop tomorrow."*

Key Notes

✔ Modal verbs do not change form (no -s, -ing, -ed).
✔ They are followed by a **base verb** (without "to").
✔ Questions and negatives do not use "do/does/did".

✘ *"He can to fix the computer."* (Incorrect)
✅ *"He **can fix** the computer."* (Correct)

Practice Exercise

Fill in the blanks with the correct modal verb:

1. "You _____ (should/can) update your software to avoid bugs."
2. "_____ (May/Will) I use your laptop for coding?"
3. "The network _____ (might/must) be down; try again later."

Answers:

1. should
2. May
3. might

Mastering Modal Verbs for Science & Technology

A Practical Guide to Using Modal Verbs in Technical Contexts

Course Overview

This course is designed for science and technology students who want to improve their English communication skills, particularly in academic writing, research papers, and technical discussions. Modal verbs (e.g., *can, could, may, might, must, shall, should, will, would*) are essential for expressing possibility, necessity, ability, and permission—key concepts in scientific and technical fields.

Through illustrations, real-world examples, and interactive exercises, students will learn how to use modal verbs accurately in lab reports, research proposals, and technical documentation.

Objective: Understand the basic functions of modal verbs in scientific contexts.

- Definition and examples of modal verbs
- How modals differ from regular verbs
- **Illustration:** A flowchart showing when to use different modals

Example:

- *"Scientists **must** follow ethical guidelines."* (necessity)
- *"This experiment **could** yield unexpected results."* (possibility)

Module 2: Expressing Ability & Possibility (Can, Could, May, Might)

Objective: Use modals to describe capabilities and uncertainties in research.

- **Can/Could** → Ability & theoretical possibility
- **May/Might** → Probability & permission
- **Illustration:** A lab scenario where a robot *can* perform tasks, but *might* fail under extreme conditions

Science Application:

- *"Nanotechnology **can** revolutionize medicine."*
- *"The results **might** vary under different temperatures."*

Module 3: Necessity & Obligation (Must, Have to, Should)

Objective: Learn to state requirements and recommendations in technical writing.

- **Must** → Strong obligation (rules, laws)
- **Have to** → External necessity
- **Should** → Advice or recommendation
- **Illustration:** A safety manual excerpt showing *must* (mandatory) vs. *should* (recommended)

Tech Example:

- *"Engineers **must** ensure software compatibility."*
- *"Researchers **should** double-check their data."*

Module 4: Future Predictions & Willingness (Will, Would, Shall)

Objective: Use modals for hypotheses, future tech trends, and conditional statements.

- **Will** → Certain future predictions
- **Would** → Hypothetical scenarios
- **Shall** → Formal suggestions (common in legal/technical documents)
- **Illustration:** A futuristic AI dialogue using *"The system **will** adapt, but it **would** fail if overloaded."*

Science Example:

- *"Renewable energy **will** dominate future power grids."*
- *"If optimized, this algorithm **would** process data faster."*

Texts containing applications When writing scientific or technical texts, it's important to consider pronunciation, especially for non-native English speakers or in contexts like presentations or lectures. Below are examples of technical sentences that include words with **final -ed** (past tense verbs or adjectives) and **final -s** (plural nouns or third-person singular verbs), along with their phonetic pronunciations.

1. Final -ed Pronunciation

The **-ed** ending can be pronounced in three ways:

- **/t/** (voiceless ending, e.g., *passed*)
- **/d/** (voiced ending, e.g., *measured*)
- **/ɪd/** (when the verb ends in *-t* or *-d*, e.g., *tested*)

Examples:
- **The data were analyzed (/ˈæn.ə.laɪzd/) using statistical methods.**
  (Here, *analyzed* ends with a /d/ sound because the root *analyze* ends with a voiced /z/.)

- **The reaction was catalyzed (/ˈkæt.ə.laɪzd/) by the enzyme.**
  (*Catalyzed* ends with a /d/ sound because the root *catalyze* ends with a voiced /z/.)

- **The sample was heated (/ˈhiː.tɪd/) to 100°C.**
  (*Heated* ends with /ɪd/ because the root *heat* ends with /t/.)

- **The results suggested (/səˈdʒes.tɪd/) a significant correlation.**
  (*Suggested* ends with /ɪd/ because the root *suggest* ends with /st/.)

2. Final -s Pronunciation

The **-s** ending can be pronounced in three ways:

- **/s/** (voiceless ending, e.g., *tests*)
- **/z/** (voiced ending, e.g., *models*)
- **/ɪz/** (when the word ends in a sibilant sound: *-s, -z, -sh, -ch, -x, -ge*, e.g., *phases*)

Examples:
- **The experiment included three tests (/tɛsts/).**
  (*Tests* ends with /s/ because the root *test* ends with a voiceless /t/.)

- **The researchers developed new models (/ˈmɒd.əlz/).**
  (*Models* ends with /z/ because the root *model* ends with a voiced /l/.)

- **Different phases (/ˈfeɪ.zɪz/) of the study were compared.**
  (*Phases* ends with /ɪz/ because the root *phase* ends with a sibilant /z/.)

- **The device processes (/ˈprɒs.es.ɪz/) data efficiently.**
  (*Processes* ends with /ɪz/ because the root *process* ends with /s/.)

1. Expressing Ability or Possibility

- **"The device *can* detect minute changes in temperature with an accuracy of ±0.1°C."**
  (*Indicates capability*)
- **"Under extreme conditions, the material *may* degrade faster than predicted."**
  (*Indicates possibility*)

2. Speculating or Predicting

- **"The algorithm *might* improve computational efficiency by 20% if optimized."**
  (*Uncertainty in prediction*)
- **"Future studies *could* explore the long-term effects of this treatment."**
  (*Suggestion for further research*)

3. Indicating Necessity or Obligation

- **"Safety protocols *must* be followed to prevent contamination."**
  (*Strong obligation*)
- **"All experimental data *should* be recorded in triplicate to ensure reproducibility."**
  (*Recommendation*)

4. Giving Recommendations

- **"Researchers *should* consider potential biases when interpreting these results."**
  (*Advisory statement*)
- **"The system *shall* undergo calibration before each use, as per manufacturer guidelines."**
  (*Formal requirement, common in protocols*)

5. Hypothetical or Conditional Statements

- **"If the pressure exceeds 5 bar, the valve *would* automatically close to prevent damage."**
  (*Conditional outcome*)
- **"A higher sample size *could* yield more statistically significant results."**
  (*Hypothetical improvement*)

Key Considerations in Scientific Writing:

- **Precision:** Use modals carefully to avoid ambiguity (e.g., *may* vs. *must*).
- **Formality:** *Shall* is common in legal/technical specifications, while *should* is softer.
- **Hedging:** In academic writing, *might/could/may* soften claims to reflect uncertainty.

Certainly! Below are some sample texts that include **WH questions** (who, what, when, where, why, how) tailored for **science and technology students**. These questions encourage critical thinking and deeper engagement with the topics.

1. Artificial Intelligence (AI) in Healthcare

Artificial Intelligence is transforming healthcare by improving diagnostics, treatment plans, and patient care. AI-powered tools can analyze medical images faster than human doctors, predict disease outbreaks, and even assist in robotic surgeries.

WH Questions:

- **What** are the main applications of AI in healthcare?
- **How** does machine learning improve medical diagnostics?
- **Why** is AI considered both an opportunity and a risk in medicine?
- **Who** benefits the most from AI-driven healthcare solutions?
- **When** did AI start being widely used in medical research?
- **Where** are AI healthcare technologies being developed the fastest?

2. Renewable Energy Technologies

Solar, wind, and hydropower are leading the shift toward sustainable energy. Engineers are constantly improving efficiency and storage solutions to make renewables more reliable.

WH Questions:

- **What** are the biggest challenges in storing solar energy?
- **How** do wind turbines convert wind into electricity?
- **Why** is renewable energy crucial for combating climate change?
- **Who** are the key innovators in renewable energy technology?
- **When** will renewable energy replace fossil fuels globally?
- **Where** are the best locations for solar and wind farms?

3. The Future of Quantum Computing

Quantum computers use qubits instead of traditional bits, allowing them to solve complex problems much faster. They could revolutionize cryptography, drug discovery, and financial modeling.

WH Questions:

- **What** makes quantum computing different from classical computing?
- **How** do qubits achieve superposition and entanglement?
- **Why** is quantum computing a potential threat to cybersecurity?

- **Who** are the leading companies in quantum computing research?
- **When** will quantum computers become widely available?
- **Where** are the most advanced quantum computers located today?

4. Genetic Engineering and CRISPR

CRISPR-Cas9 allows scientists to edit DNA with high precision, opening possibilities for curing genetic diseases and improving crops. However, ethical concerns remain.

WH Questions:

- **What** are the potential benefits and risks of CRISPR technology?
- **How** does CRISPR-Cas9 target specific DNA sequences?
- **Why** is gene editing controversial in human embryos?
- **Who** regulates the use of CRISPR in different countries?
- **When** was CRISPR first used in genetic engineering?
- **Where** are the most significant CRISPR research breakthroughs happening?

5. The Impact of 5G Technology

5G networks promise faster speeds, lower latency, and better connectivity for IoT devices, smart cities, and autonomous vehicles.

WH Questions:

- **What** are the key advantages of 5G over 4G?
- **How** does 5G enable the Internet of Things (IoT) to expand?
- **Why** are some people concerned about 5G radiation?
- **Who** are the major players in 5G infrastructure development?
- **When** will 5G be fully deployed worldwide?
- **Where** has 5G been implemented most successfully so far?