

Week 4 physics

IN THE LAB

Task 1. In pairs, write the transcribed name of the physicists.

[,ɑ:kɪ'mi:di:z]	['aɪzək 'nju:t(ə)n]
['arɪstɒt(ə)l]	[dʒeɪmz 'mækswel]
[,gæli 'leɪəʊ 'gæli:leɪ]	['maɪk(ə)l 'fərədeɪ]
[dʒəu'hæni:s 'keplə]	['ælbət 'lɪnstəɪn]
['sti:vən 'hɔ:kɪŋ]	[mæks plə:ŋk]
['nɪk(ə)ləs kə'pɜ:nɪkəs]	

Task 2. Name the authors of the **phenomena** given below.

- introduced the heliocentric system.
- designed practical mechanical devices.
- challenged Newton's physics.
- introduced electromagnetic field theory.
- proposed the special theory of relativity.
- originated quantum theory.
- measured the density of solid bodies.
- divided the theoretical sciences into physics, mathematics, and theology.
- proposed the law of falling bodies.
- investigated the motions of Saturn's rings
- challenged Aristotle's view on falling bodies.
- designed his own geometric and military compass.
- invented the first electric motor.
- proved the heliocentric model of Copernicus.

Task 3. Write the transcribed word in letters and make sentences with these words.

e.g. ['prɒpəti] – property. *Physical matter properties include colour, odour, density, melting point, boiling point and hardness.*

- [,relə'tɪvəti]
- ['den(t)sɪti]
- [,su:pəflu:'ɪdɪti]
- [æk,selə'reɪf(ə)n]
- [vɪs'kɒsəti]
- ['frɪkfən]
- ['endʒɪn]

Task 4. Underline the correct type of the Participle in the sentences below.

- Kepler's breakthrough overturned a millennium of dogma basing/based on Ptolemy's idea of 'perfect' circular orbits for the 'perfect' heavenly bodies.
- In 1821, Michael Faraday discovered that a wire carried/carrying a current could rotate in a magnetic field.
- Thomas Edison found that light produced/producing by carbon fiber lasted a long time without burning up.
- Two centuries of experimental discoveries in electricity and magnetism expressed/expressing in Maxwell's four famous equations made it possible to unify two phenomena into one – electromagnetism successfully.
- Einstein's development of the special and general theories of relativity described/describing space and time in a new way changed physics forever.
- According to the archives, the top three physicists admired/admiring most by Einstein were all British: Newton, Faraday and Maxwell.

Task 5. In pairs, discuss:

- ✚ Have you ever heard of the “A-ha” music band?
- ✚ Does the info in a passage *have anything in common* with the work of physicists?
- ✚ Can you **highlight** words that you may relate to the work of physicists?

"A-ha" is one of the most famous groups on the planet. At the beginning of the 90s, the team had a colossal success; tickets for their concerts were sold quickly, especially abroad. The musicians were even mentioned in the Guinness Book of Records since they sold about 200 thousand tickets at the festival show "Rock in Rio II" held at a stadium in Maracana, Brazil. In 1998, the group perfectly performed at the Nobel Prize Concert with the single "Summer Moved On". The track was famous in Europe, with more than two million copies.



A-ha - Summer Moved On (Nobel Peace Prize Concert 1998)

Task 6. Study the first lines of the song to guess what the song is about.

*Summer moved on
And the way it goes
You can't tag along (follow).*

Everyone perceives the song in their way. The musicians themselves did not give accurate answers to questions about sense track, but there is an assumption that passed summer is the symbol of outdated relationships or life generally.

Task 7. Listen to the single to complete its lyric with missing words.

*Summer moved on
And the way it goes
You can't tag along.*

*Friendships move on
Until the day
You can't get along.*

*Reasons can't last
And there's just one thing.
Left to ask.*

*Honey moved out
And the way it went
Leaves no doubt.*

*Handshakes unfold
And the _____
No one knows.*

*Stay, don't just _____
And leave me another day.
A day just like today
With nobody else around.*

*Moments will pass
In the _____,
I found out.*

*Moments will pass
In the morning light,
I found out.*

_____.

*Seasons can't last
And there's _____
Left to ask.*

*Reasons _____
So there's just one thing.
Left to ask.*

*Stay, don't just walk away.
And leave me _____
A day just like today
_____ else around.*

*Stay, don't just walk away.
And leave me another day.
A day just like today
_____ else around.*

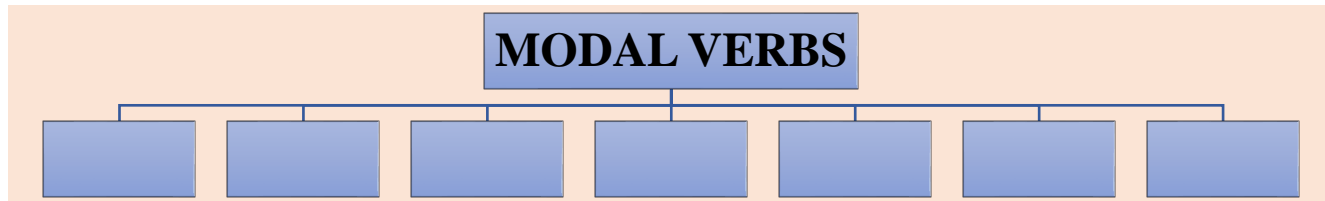
Task 8. Discuss the questions.

- + Can you explain from perspectives of physics how moments will pass in the morning light?
- + Do you agree that Friendships can move on until the day you can't get along?
- + When will handshakes unfold?

USE OF ENGLISH

Modal Verbs (MV)

Task 9. Complete the chart with the MVs.



Task 10. Are the following statements about the MVs TRUE (T) or FALSE (F)?

STATEMENT	T/F
1) We use MVs to express ability, advise, ask for and give permission, express obligation, express possibility, deduce and make predictions.	___
2) MVs can be used for present and future obligations and abilities.	___
3) Past modal verbs differ greatly in use from present modal verbs.	___
4) MVs don't use an 'S' for the third person singular.	___
5) MVs make questions by inversion ('she can go' becomes 'can she go?').	___
6) All MVs are followed directly by the infinitive without 'to'.	___

Task 11. Identify the function of the modal verbs.

Deduction	Permission, Request & offer	Obligation	Advice	Ability
Modal verb				
a. can / could	b. can, may, could	c. will	d. should	
e. must	f. Might, may or could	e. have to / don't have to		

Task 12. Complete sentences with suitable modal verbs in relevant forms (positive, negative or question).

- a) I ___ speak English and German fluently.
- b) You ___ work with this device without protective goggles.
- c) A physicist _____ work in a laboratory, designing materials for computer chips or smashing atomic particles.
- d) We ought to take all the necessary measurements tomorrow.
- e) Your hypothesis _____ be proved without an experiment.
- f) I've done my test. _____ I go now?
- g) If your lab report is not well-organized, clear and easy to read, you _____ get a lower grade or may be asked to rewrite it.
- h) You _____ be very clever if you know how to solve this equation.
- i) They are not at the party. They _____ be preparing for their quantum mechanics exam now.
- j) If you feel you are unsure, _____ you ask your tutor to help you?

Task 13. Scan the word for words that describe the work in the laboratory.

i i f o e b h j r v c x s r a t e f
e z k p s d j a m m e t e r l c p r
b q w w b c m k q t b x n b c s h e
a f u e d d i b n i g o s p r p a q
l l f i l o s l a t o m i c y d s u
a u k d p s s o l m e q t j s p e e
n c a s s m v i k o i p i l t o g n
c t q e i k e t m g s y v b a s m c
e u m r g c s n d e u c e w l i o y
x a o c n k s t t t t t o l p t d u
e t s t a b i l i t y e p p a i u t
l i n a l k p m x h o p r k e v j m
y o g b s m e c h a n i c a l e b q
u n m i c r o p r o c e s s o r u k
n g z w i r e l e s s o p e r a t e

Task 14. Talk about the importance of laboratory work in physics. Use expression below.

- to get a benefit from smth a scientific technique the thrill of discovering smth
 to draw conclusions intellectual exploration to correlate smth with smth
 derivations and equations to prospect for minerals innumerable examples
 to suggest an approach to smth laboratory manual to substitute values into equation

Task 15. Read the text about the importance of laboratory work to check your prediction.

THE LABORATORY

The laboratory work in physics can be an exciting or boring part of the course depending upon your attitude toward it. If you regard it as an obstacle to get through the course, probably you will **get very little benefit from it**. On the other hand, if you regard it as an opportunity to learn more, then it is almost certain you will find the time you spend in the lab both profitable and interesting.

There are several ways in which you may expect to benefit from the laboratory work. It helps you understand and remember the physics you have studied by practicing the application of physical laws and logic to real cases, which helps you to think clearly and gives you some skill in the use of **scientific instruments and techniques**.

It is true that you are not likely to be the discoverer of anything new in physics during your first-year course, as most (but not all) of the material in first-year physics has been known for decades. Anyway, in the laboratory you are certain to experience the **thrill of discovering** for yourself some of the principles of physics. Most of the principles of physics were discovered by men using equipment no better than yours. Most of it, in fact, was not as good. With the equipment in front of you, you have the chance to try out your own ideas, to reason about the results, and to **draw conclusions** from them. In brief, you should regard the laboratory as a place for **intellectual exploration**.

Before you come to the laboratory, study the **laboratory manual** so that you will know what you are going to do and so that you can plan in advance how to use your time efficiently. As you do the experiment, try to **correlate the behavior of the apparatus with the principles**

discussed in lecture. Pay special attention to the **derivations and equations** used; eventually, when you **substitute values into equations**, you will know why you use them.

Keep your mind open to the possibilities of the experiment. Constantly ask yourself such questions as: Why do we do it this way? What would happen if we did it another way? What does this measurement show or prove? The purpose of the laboratory manual is to direct your thinking along those channels most likely to be fruitful.

A student must realize that the laboratory work has applications outside the laboratory. For instance, the magnetometer experiment may suggest ideas in connection with the **magnetic prospecting for minerals**. The experiment on diffraction may help to explain why better directivity is obtained from the higher frequency radars. The experiment on optical instruments may **suggest an approach** to the projection of television pictures. There are, of course, **innumerable other examples**.

Writing laboratory reports is a significant part of your professional training. Speaking and writing are the most important tools of the engineer-scientist. Learn to handle them well. Your report should be well-organized, accurate, clear, concise, and easy to read.

Task 16. Mark the statements *T* for ‘true’ or *F* for ‘false’. Correct the false ones and expand on the true ones.

- It’s up to you whether you make the most of the laboratory work in physics or not.
- You are unlikely to discover something new during your lab work.
- It is lab work that gives you skills in the use of scientific instruments and techniques.
- Only in a well-equipped laboratory it was possible to discover all the known principles of physics.
- Studying laboratory manual is optional and not very helpful.
- Scientific or technical laboratory reports should be brief and easy to understand.

Task 17. Act out an interview discussing the questions below (add your 2-3 questions). Use expressions. **Agree or disagree with the following. Give reasons.**

- + You should regard a laboratory as a place for intellectual exploration.
- + A student must realize that the laboratory work has applications outside the laboratory.
- + When doing lab work students’ initiative is not encouraged.
- + Writing laboratory reports is a significant part of your professional training.

Stating an opinion	Asking for opinion	Expressing agreement	Expressing disagreement
In my opinion... The way I see it... If you want my honest opinion... According to ... As far as I'm concerned...	What's your idea? How do you feel about that? What do you think? Do you agree?	I agree with you 100%. That's for sure. You're absolutely right. Absolutely. That's exactly how I feel. Exactly. No doubt about it.	I don't think so. No way. I totally disagree. I'm afraid I disagree. Not necessarily. That's not always true. No, I'm not so sure about that.

Task 18. Are there any safety rules you must keep when working in a lab?

Work in small groups. Read some of the lab safety instructions. Discuss and sort out what you should and shouldn’t do when working in the lab under these headings.

Do's	Don'ts
<ul style="list-style-type: none"> ▪ follow all written and verbal instructions carefully; ▪ read all procedures thoroughly before entering the laboratory; ▪ be sure that the current is turned off before making adjustments in the circuit; ▪ report any accident (spill, breakage, etc.) or injury (cut, burn, etc.) to the teacher immediately; ▪ fool around in the lab; ▪ look into a container that is being heated; ▪ use equipment with care for the purpose for which it is intended; 	<ul style="list-style-type: none"> ▪ use laboratory glassware as containers for food or beverages; ▪ set up and use the equipment as directed by your teacher; ▪ interfere with the laboratory experiments of others; ▪ wear goggles when using any type of projectile; ▪ place hot apparatus directly on the laboratory desk if there is no an insulated pad; ▪ get the instructor's permission before you try something original; ▪ ask the instructor to check all electrical circuits before you turn on the power.

What else could you add to these lists? Hold a cross-group discussion and compare your lists.