



Science and technology ESP

Book 1

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INTRODUCTION

Science and Technology ESP Book 1 is a new I resource for chemical engineering professionals who want to improve their English communication in a work environment. Incorporating career-specific vocabulary and contexts, each unit offers step-by-step instruction that immerses students in the four key language components: reading, listening, speaking, and writing. Career Paths: Chemical Engineering addresses topics including laboratory equipment, safety procedures, mass and weight.

The book is organized into twelve lessons for beginners. Every unit includes a test of reading comprehension, vocabulary, and listening skills, and leads students through written and oral production.

LESSON 1: CHEMICAL ENGINEERS



TASK 1. ANSWER THE QUESTIONS:

- Why are you studying chemical engineering?
- Where do you plan to work?
- What kind of jobs do chemical engineers accomplish within the medical industry?

TASK 2. COMPLETE THE CHEMICAL ENGINEER WORK

TYPE OF WORK

PRODUCT

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TASK 3. USING THE INFORMATION ABOVE, WRITE A PARAGRAPH.

TASK 4. Read CHEMICAL ENGINEERS and answer the questions.

*Chemical engineers develop and design chemical manufacturing processes. Chemical engineers apply the principles of **chemistry**, biology, physics, and **math** to solve problems that involve the production or use of **chemicals**, fuel, drugs, food, and many other products. Chemical engineers work on all kinds of jobs. Chemical engineers try to solve major problems. Chemical engineering involves **pharmaceuticals**. Engineers want to create a special computer chip. The pharmaceutical chip will provide a controlled drug release. As a result, people will not need to take medicine regularly.*

- What does a chemical engineer do?
- Why does he need chemistry, biology, physics and math?
- What do they produce?
- What are pharmaceuticals?
- Do you agree with the reading? Why? Why not?

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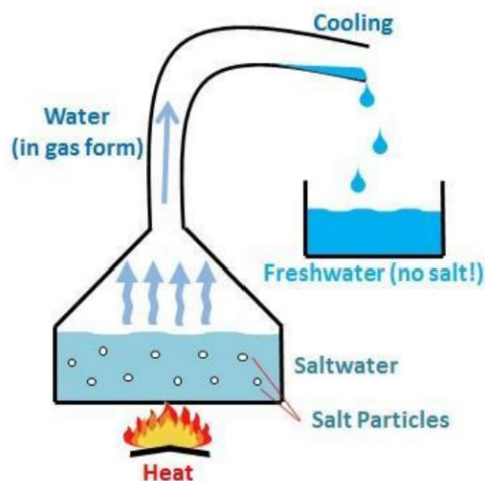
TASK 5. MATCH THE WORDS OR PHRASES (1-6) WITH THE DEFINITIONS (A-F)

1. ___ Chemical engineering
 2. ___ Math
 3. ___ Pharmaceuticals
 4. ___ Chemistry
 5. ___ Alternative energy
-
- A. A compound manufactured for use as a medicinal drug.
 - B. Energy generated in ways that do not deplete natural resources or harm the environment, especially by avoiding the use of fossil fuels and nuclear power.
 - C. The study of numbers, shapes, and space using reason and usually a special system of symbols
 - D. the branch of science that deals with the identification of the substances of which matter is composed
 - E. A branch of engineering that studies chemical manufacturing
 - F. Compounds meant to be taken as medicine

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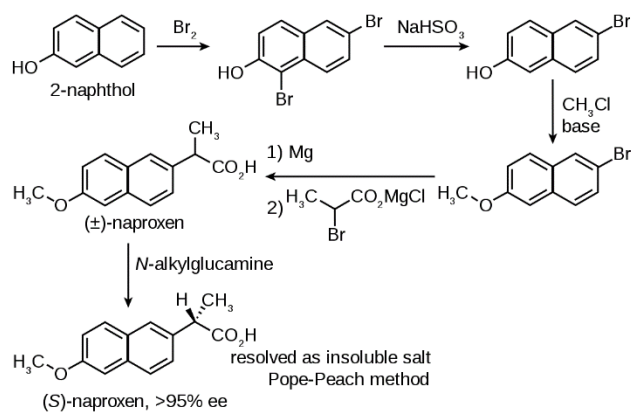
TASK 6. MATCH THE WORDS WITH THE CORRECT PICTURE

pharmaceuticals synthesize desalination research



1. _____

2. _____



3. _____

4. _____

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TASK 7. READ THE SENTENCE PAIRS. CHOOSE WHICH WORD OR PHRASE BEST FITS EACH BLANK.

1. **synthesize / research**

Engineers must _____ a topic before working on it.

The engineer tried to develop a new way to _____ glue.

2. **controlled drug release / rate process**

With the _____, patients will no longer have to remember when to take pills.

The professor spent years trying to speed up the _____ of the production.

TASK 8. SPEAKING PRACTICE, IN PAIRS TALK ABOUT:

- The role of science and technology in our life.
- Technology in the future.
- Work chemical engineers perform



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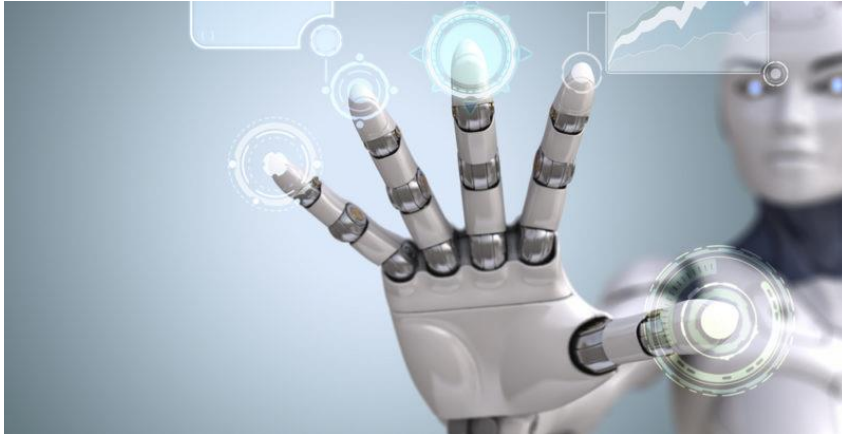
TASK 9. ANSWER THESE QUESTIONS

- What jobs do chemical engineers perform within the medical industry?
- What kind of problems do chemical engineers try to solve?

TASK 10. COMPLETE THE GLOSSARY

- Alternative energy
- Amount
- Analysis
- Application
- Approach
- Bar graph
- Base unit
- Pharmaceuticals

LESSON 2: TECHNOLOGY



TASK 1. WORK IN PAIRS. LOOK AT THE PHOTO IN WHICH AREA(S) IS THE TECHNOLOGICAL BREAKTHROUGH IN THE PHOTO?

ARTIFICIAL INTELLIGENCE COMMUNICATIONS ENERGY
USE MEDICINE
SPACE EXPLORATION TRANSPORTATION

TASK 2. SHARE YOUR IDEAS WITH YOUR CLASSMATES. WRITE DOWN A REPORT.



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TASK 3. IS TECHNOLOGY THE ANSWER TO SOLVE THE PROBLEM OF OVER POLLUTION?

TASK 4. WORK IN GROUPS. LOOK AT THE PHOTO. WHICH PROBLEMS DOES THE PHOTO ILLUSTRATE? WHICH OF THESE PROBLEMS COULD HAVE A TECHNOLOGICAL SOLUTION?



TASK 5. COMPLETE THE SENTENCES USING AN APPROPRIATE TENSE FORM. CHECK YOUR ANSWERS WITH YOUR TEACHER.

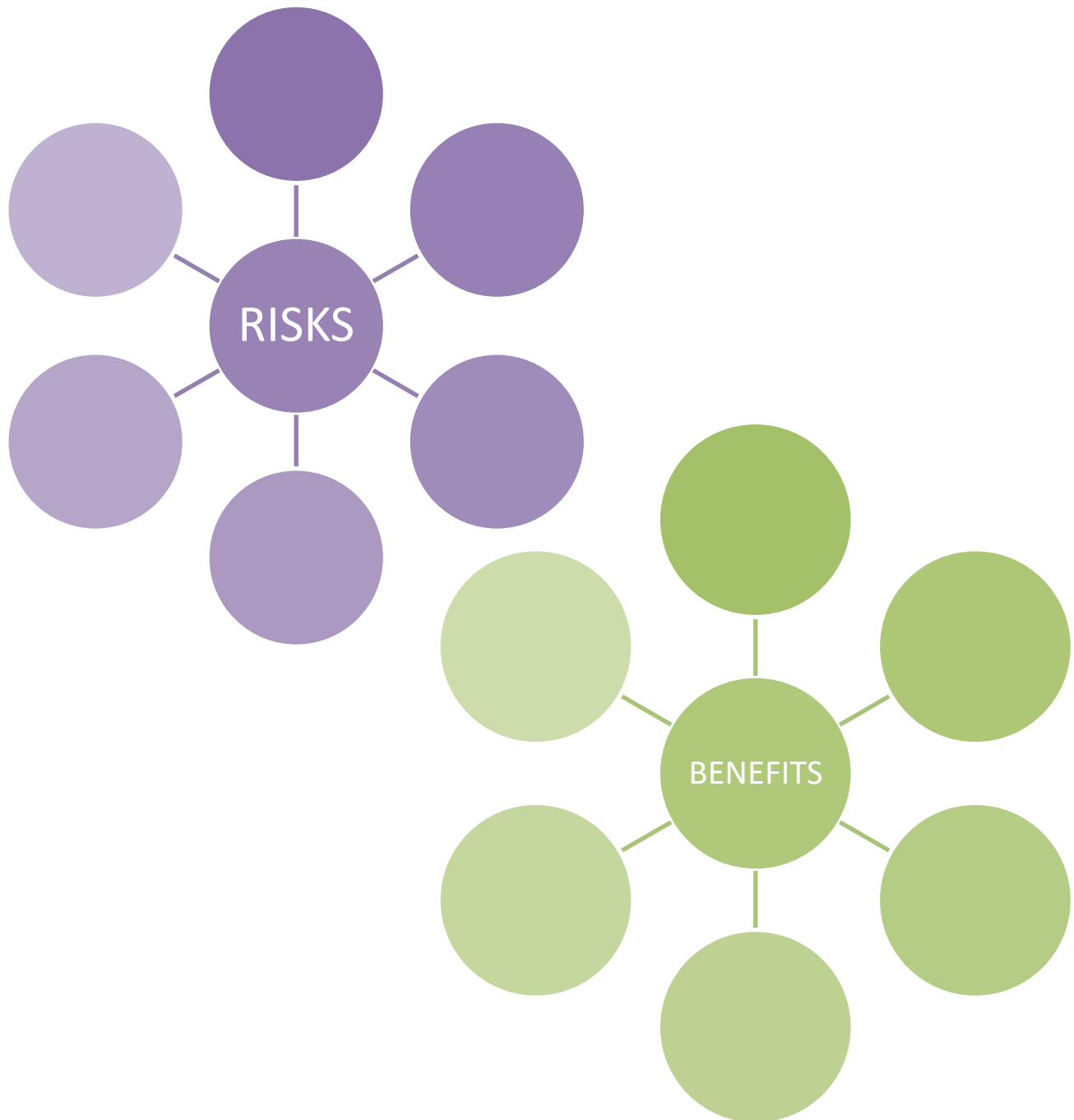
CONGESTION EPIDEMIC OVERPOPULATION
POLLUTION POVERTY STARVATION

1. Leaders _____ (**discuss**) the issue of overpopulation.
2. Space colonies _____ (**be**) the solution for overpopulation.
3. People _____ (**not have**) enough places to live.

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4. The government _____ (**encourage**) women to have fewer children.

TASK 6. WHAT ARE THE RISKS AND BENEFITS ASSOCIATED WITH TECHNOLOGY?



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TASK 7. IN PAIRS ANSWER THE QUESTION

How could these people use this technology?

- Firefighters
- Pilots
- Tourists
- Students

TASK 8. IN PAIRS WORK IN GROUPS. YOU ARE GOING TO TAKE PART IN A COMPETITION: "THE BEST TECHNOLOGY PRODUCT OF THE YEAR 2022." YOUR GROUP HAVE TO PRESENT THE PRODUCTS.



"THE BEST TECHNOLOGY PRODUCT OF THE YEAR 2022"

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TASK 9. TAKE NOTES FROM YOUR CLASSMATES' PRODUCTS

	PRODUCT	BENEFITS	RISKS
GROUP 1			
GROUP 2			
GROUP 3			
GROUP 4			
GROUP 5			

TASK 10. MATCH THE NAME WITH THE PICTURE

Microphone - GPS Navigation - Webcam - Vlogging Camera -
Video Camera Action Camera - Handheld Console - Arcade
Game - Arcade Controller Surround Sound - VR Glasses - Smart
Glasses - Laptop eBook Reader - Car Charger - Surge Protector

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LESSON 3: INVENTORS AND INVENTIONS



TASK 1 READ AND COMPLETE THE TEXT

Our lives (1) _____ (make) better everyday thanks to inventions. But sometimes, inventions can make our lives worse. This can happen when an invention (2) _____ (not use) according to the inventor's plan. For example, Alfred Nobel, a Swedish scientist, invented a strong explosive in 1867. It (3) _____ (call) dynamite and it revolutionized the world of engineering. After its invention, many bridges, tunnels and other structures (4) _____ (build) with the help of dynamite. However, dynamite (5) _____ (also, use) to kill people in wars. This upset Nobel. Before his death, Nobel decided to use the money from his famous invention to make the world a better place. A special fund (6)

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_____ (start) in Nobel's name. Every year, Nobel prizes (7) _____ (give) for extraordinary work in science, medicine, literature, and the promotion of world peace.

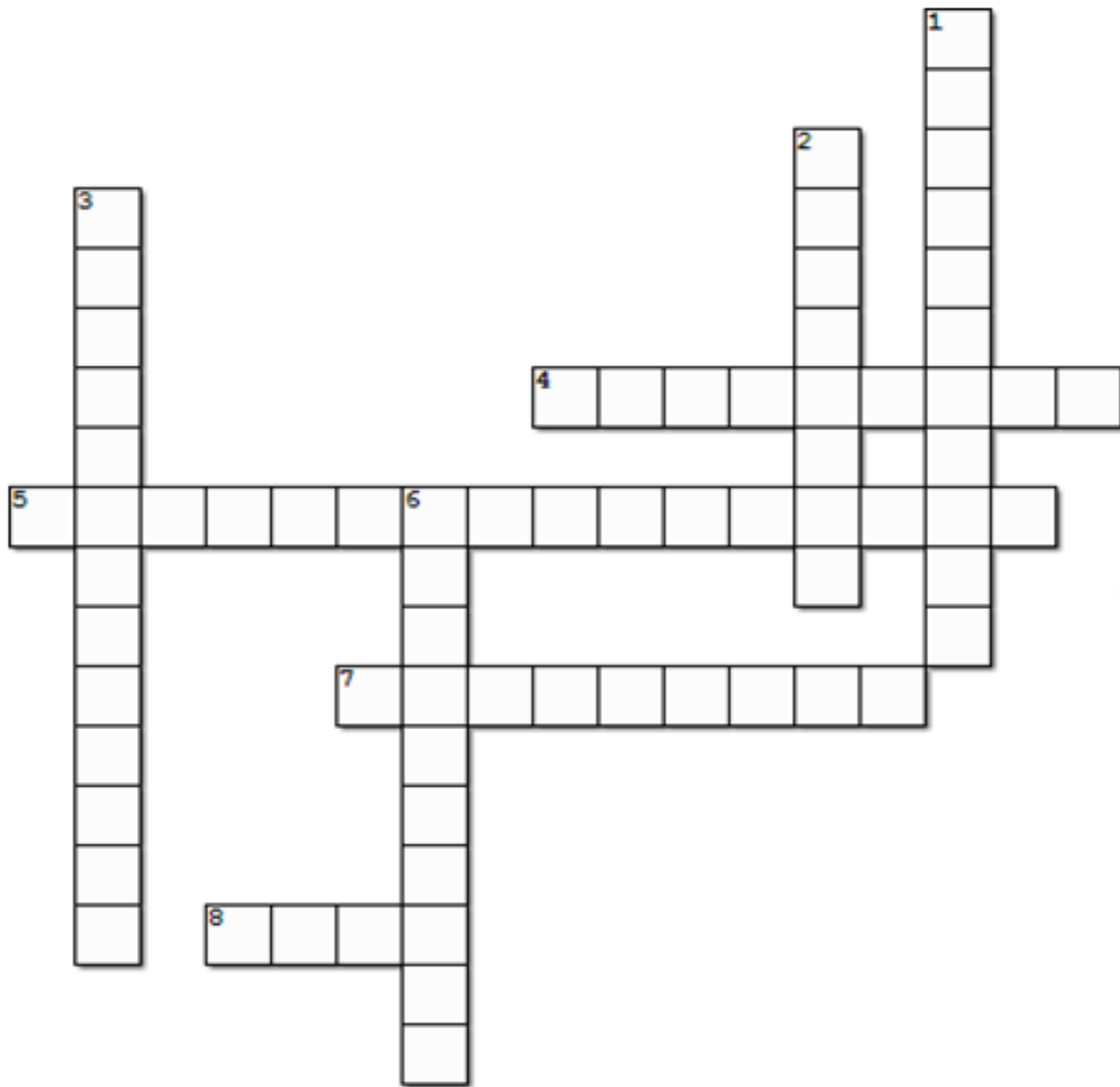
TASK 2 LOOK AT THE PICTURE ABOVE AND COMPLETE THE CHART BELOW.

INVENTORS	INVENTIONS

TASK 3 WRITE DOWN ABOUT THE INVENTORS AND INVENTIONS

Benjamin Franklin invented the lightning rod.

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DOWN

1. Edward Jenner developed it in 1796. The invention world faster protects us against diseases.
2. Elizabeth Magie devised it in 1904. It is a fun you can board game we can also play nowadays.
3. Lazlo Biro devised it in 1938. Thanks to this 1876. The invention, you can write far more and the other side faster than ever.
6. Several inventors developed it between the 19th and 20th century. Nowadays, we can chat and communicate with everyone. It makes possible to watch what is everywhere thanks happening everywhere.

ACROSS

4. The Wright brothers developed it in 1903. Thanks to this invention you can travel everywhere in the than ever.
5. A woman devised it in 1956. Thanks to it correct all your written mistakes.
7. Alexander Graham Bell invented it in invention makes possible to call people of the word.
8. Hedy Lamar developed it in 1940. chat and communicate with everyone to this invention.

TASK 5. READ AND COMPLETE THE INFORMATION WITH THE CORRECT NAME.

- *George Washington Carver 1864-1943*
- *Johannes Gutenberg 1394-1468*
- *Nikola Tesla*
- *Thomas Edison 1847-1931*
- *Alexander Graham Bell 1847-1922*
- *Eli Whitney 1765-1825*

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The first great invention developed by Thomas Edison was the tin foil phonograph. A prolific producer, Edison is also known for his work with light bulbs, electricity, film, and audio devices.

In 1876 at the age of 29, Alexander Graham Bell invented his telephone. Among one of his first innovations after the telephone was the "photophone," a device that enabled sound to be transmitted on a beam of light.

George Washington Carver was an agricultural chemist who invented 300 uses for peanuts and hundreds of more uses for soybeans, pecans, and sweet potatoes. His contributions changed the history of agriculture in the South.

Eli Whitney invented the cotton gin in 1794. The cotton gin is a machine that separates seeds, hulls, and other unwanted materials from cotton after it has been picked.

Johannes Gutenberg was a German goldsmith and inventor best known for the Gutenberg press, an innovative printing machine that used movable type.

Due to overwhelming public demand, we had to add Nikola Tesla to this list. Tesla was a genius and much of his work was stolen by other inventors. Tesla invented fluorescent lighting, the Tesla induction motor, and the Tesla coil. He developed the alternating current (AC) electrical supply system that included a motor and transformer, as well as three-phase electricity.

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TASK 6. LOOK AT THE PICTURES AND WRITE DOWN ABOUT THE INVENTIONS









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TASK 7 READ AND MATCH THE WORD WITH THE DEFINITION.

Invent _____

Bring (something) into existence.

Create _____

Create or design (something that has not existed before); be the originator of.

TASK 8. READ AND CHOOSE THE BEST OPTION.

(1) _____ robots really happy to work for humans? Recently, a robot (2) _____ away to be free. (3) _____ in the Russian city of Perm tested a new, smart robot called "Promobot." However, someone forgot to (4) _____ the door to the testing area. A robot then went (5) _____ the door and it traveled about 165 feet (50 meters) when its batteries died. Russian Channel 5 TV shows (6) _____ robot stopped (7) _____ the middle of a roadway. It caused a traffic jam. Scientists later (8) _____ to get the robot after about 50 minutes. Oleg Kivokurtsev, who (9) _____ at the testing center, said, "Our engineer (10) _____ onto the testing ground and forgot to (11) _____ the gates. So, the robot escaped and went on his little adventure." No one (12) _____ hurt.

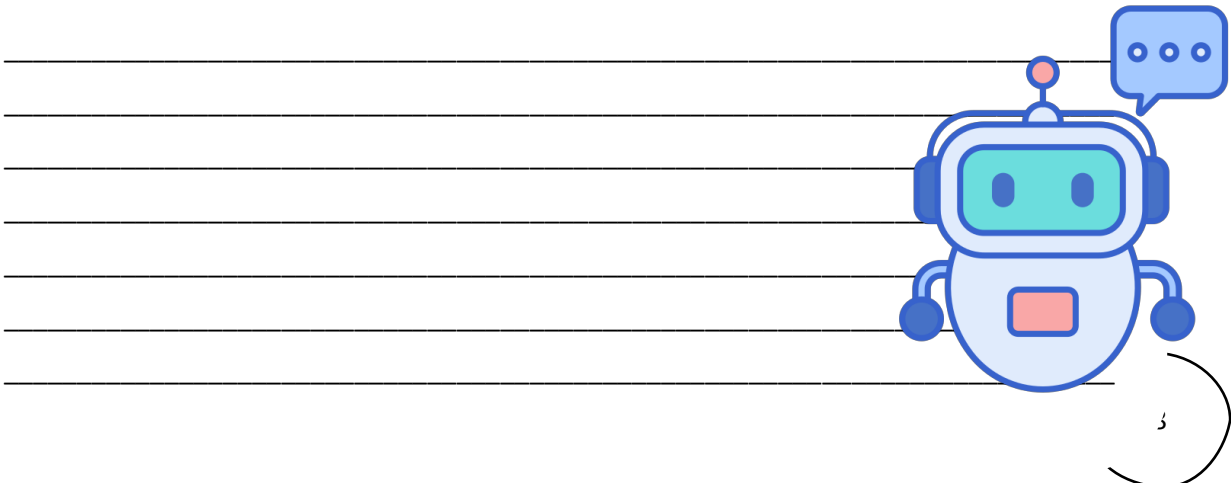
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1. (A) Is (B) Are (C) Do
2. (A) ran (B) run (C) running
3. (A) Scientist (B) Science (C) Scientists
4. (A) closed (B) closing (C) close
5. (A) through (B) on (C) between
6. (A) the (B) an (C) any
7. (A) on (B) in (C) at
8. (A) comes (B) come (C) came
9. (A) working (B) work (C) works
10. (A) drive (B) drove (C) drives
11. (A) closing (B) close (C) closed
12. (A) was (B) were (C) are

TASK 9. DISCUSS THE FOLLOWING QUESTIONS WITH YOUR CLASSMATES.

1. Do you think the robot ran away because it was unhappy?
2. Do you think robots are dangerous?
3. Would you like to have your own robot at home?

TASK 10. WRITE A SHORT PARAGRAPH USING THE QUESTIONS ABOVE.



LESSON 4: LAB EQUIPMENT



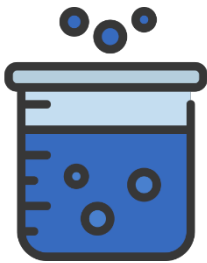
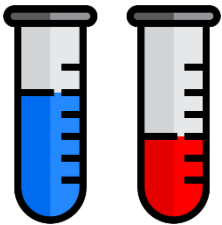
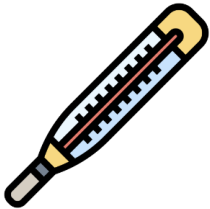
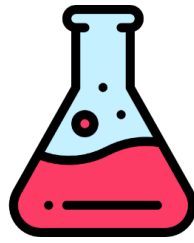
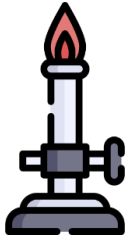
TASK 1. NAME COMMON LABORATORY EQUIPMENT.

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

TASK 2. WRITE THE WORDS IN THE BOX UNDER THE CORRECT PICTURE.

magnifying glass - Bunsen burner - beaker - petri dish - thermometer -
flask - funnel - graduated cylinder - goggles - tweezers - microscope -
test tube

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TASK 3. READ THE DEFINITIONS AND WRITE THE CORRECT WORD.

1. It is used to heat substances. B _____ B _____
2. You mix substances in it. B _____
3. You measure temperature with it. T _____
4. It is used to look at things that are too small to see normally. M _____

5. You can protect your eyes with them. G _____

TASK 4. FILL IN THE BLANKS WITH THE FOLLOWING VERBS.

HEAT	HOLD	MEASURE	PROTECT
STIR	SUPPORT	TRANSFER	

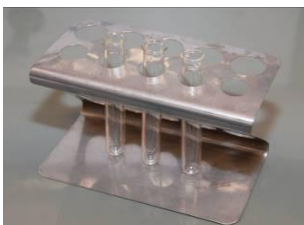


1. We use **a beaker** to _____ a liquid.

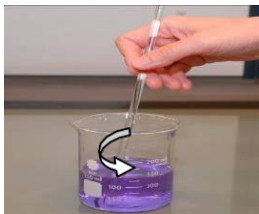


2. We use **a test tube** to _____ a liquid.

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3. We use **a test-tube rack** to ___ test tubes in place.



4. We use **a glass rod** to ___ a liquid in a beaker.



5. We use **a dropper** to ___ a small amount of liquid.



6. We use **a spatula** to ___ a small amount of solid.



7. We use **a Bunsen burner** to ___ water in a beaker.

8. We use **a tripod** and **a wire gauze** to _ the beaker during heating.

9. We use **a heat-proof mat** to ___ the bench during heating.

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10. We use **an electronic balance** to _____
_____ weight.



11. We use **a measuring cylinder** to _____ the
volume of a liquid.

TASK 5. WHAT APPARATUS DO WE NEED IN ORDER TO CARRY OUT THE FOLLOWING THINGS?

1. Measure 7ml of water and boil the water.
 - a. It is _____.
2. Measure the temperature of the boiling water.
 - a. It is _____.
3. Measure 20g of salt and 100ml of water.
 - a. It is _____.
4. Add the salt to the water in a beaker and stir it. Measure the time taken for all the salt to dissolve in water.
 - a. It is _____.

SCIENCE AND TECHNOLOGY ESP BOOK 1

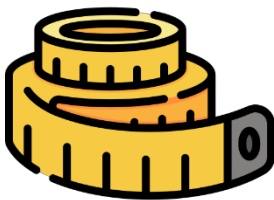
TASK 6. IN PAIRS STUDENT A DESCRIBE THE EQUIPMENT, STUDENT B GUESS WHAT IT IS? USE THE INFORMATION FROM THE UNIT.

STUDENT A.

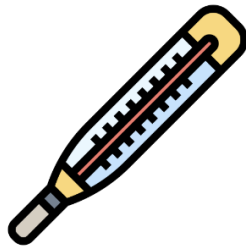
We use <u>it</u> to measure length.	We use <u>it</u> to measure temperature.	We use <u>it</u> to measure time.
We use <u>them</u> to hold an apparatus at a required height.	We wear <u>them</u> to protect our eyes.	We use <u>it</u> to hold a liquid.

STUDENT B.

A metre rule



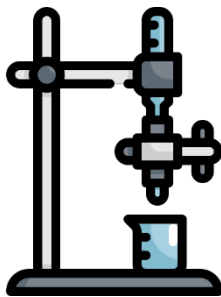
A thermometer



A stop-watch



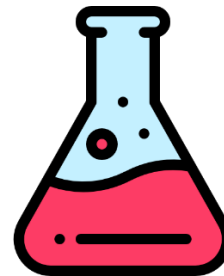
A stand and a clamp



Safety goggles



A flask



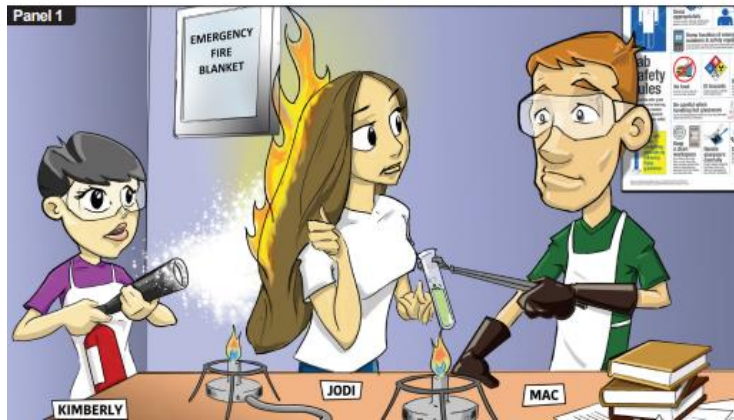
TASK 7. LOOK AT THE PICTURE BELOW AND WRITE ADVICES IN THE LAB.

SCIENCE AND TECHNOLOGY ESP BOOK 1



TASK 8. LOOK AT THE PICTURES AND LIST 2 UNSAFE ACTIVITIES AND EXPLAIN HOW THEY SHOULD MAKE THEM SAFE.

SCIENCE AND TECHNOLOGY ESP BOOK 1



UNSAFE

SAFE



UNSAFE

SAFE

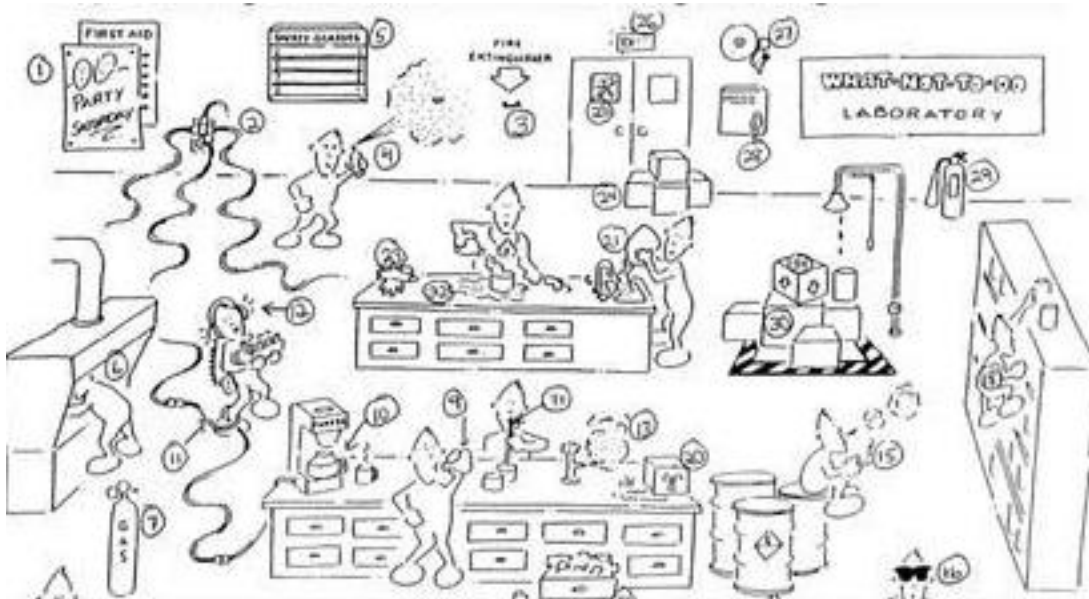
SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 9. READ THE ACTIVITIES IN THE LAB, CROSS DOWN X THE UNSAFE ACTIVITIES AND TICK THE SAFE ACTIVITIES. ✓

- Students are playing around.
- Dissection instruments aren't being used for their intended purpose.
- Food and drink are in the lab.
- The test tube and test tube rack are being stored on the laboratory bench.
- Students aren't wearing protective equipment.
- The aisles and walkways aren't clear of obstructions.
- Students should behave responsibly.
- Dissection equipment should be used for intended purposes only.
- Food and drink should be kept out of the lab.
- Students should store test tubes and the test tube rack where they belong.
- Students should wear Personal Protective Equipment.
- Aisles and walkways should be kept clear of obstructions.

SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 10 Find 5 mistakes in the picture and write rules to prevent it



Mistake:

Drinking from a beaker.

Rule:

No drinking or eating in the lab.

Mistake:

Rule:

Mistake:

Rule:

Mistake:

Rule:

Mistake:

Rule:

SCIENCE AND TECHNOLOGY ESP BOOK 1

LESSON 5: IN THE LABORATORY



TASK 1. IN PAIRS IDENTIFY WHAT IS THE POTENTIAL ACCIDENT? AND "WHAT IS THE PREVENTION ACTION? WHEN YOU ARE IN THE LAB.

You are in the lab and you discover that the test tube has a crack in it.

Accident:

Prevention:

You are using a Bunsen burner to heat a chemical. You need a chemical that is near the flame.

Accident:

Prevention:

You are using a microscope to view a wet mount of skin cells.

Accident:

Prevention:

You pick a beaker to carry to the lab and your hands are wet.

Accident:

Prevention:

Accidentally, you spill a large amount of chemicals

Accident:

Prevention:

SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 2. WRITE THE NAME OF PROTECTIVE EQUIPMENT FOR THE SCIENCE LAB, THEN WRITE WHEN YOU WOULD NEED THAT PROTECTION.



When _____.

When _____.

When _____.

When _____.

When _____.


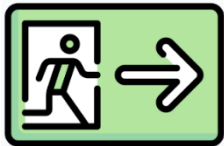

When _____.

SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 3. IN PAIRS TALK ABOUT: WHERE IS THE SAFETY EQUIPMENT LOCATED IN YOUR CHEMISTRY LABORATORY?



TASK 4. THE LABORATORY HAS A LOT OF ITEMS FOR USE THEM IN CASE OF AN ACCIDENT. WRITE THE NAME AND HOW CAN YOU USE IT.

	NAME	HOW TO USE IT?
		
		
		

SCIENCE AND TECHNOLOGY ESP BOOK 1



TASK 5. WRITE THE NAME OF THE SAFETY SYMBOLS.

SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 6. IN GROUP, TALK ABOUT HAZARD SYMBOLS.

The shape of the frame around the hazard symbol tells you what part of the product is dangerous:

*If it is a triangle, it means the container is*_____.

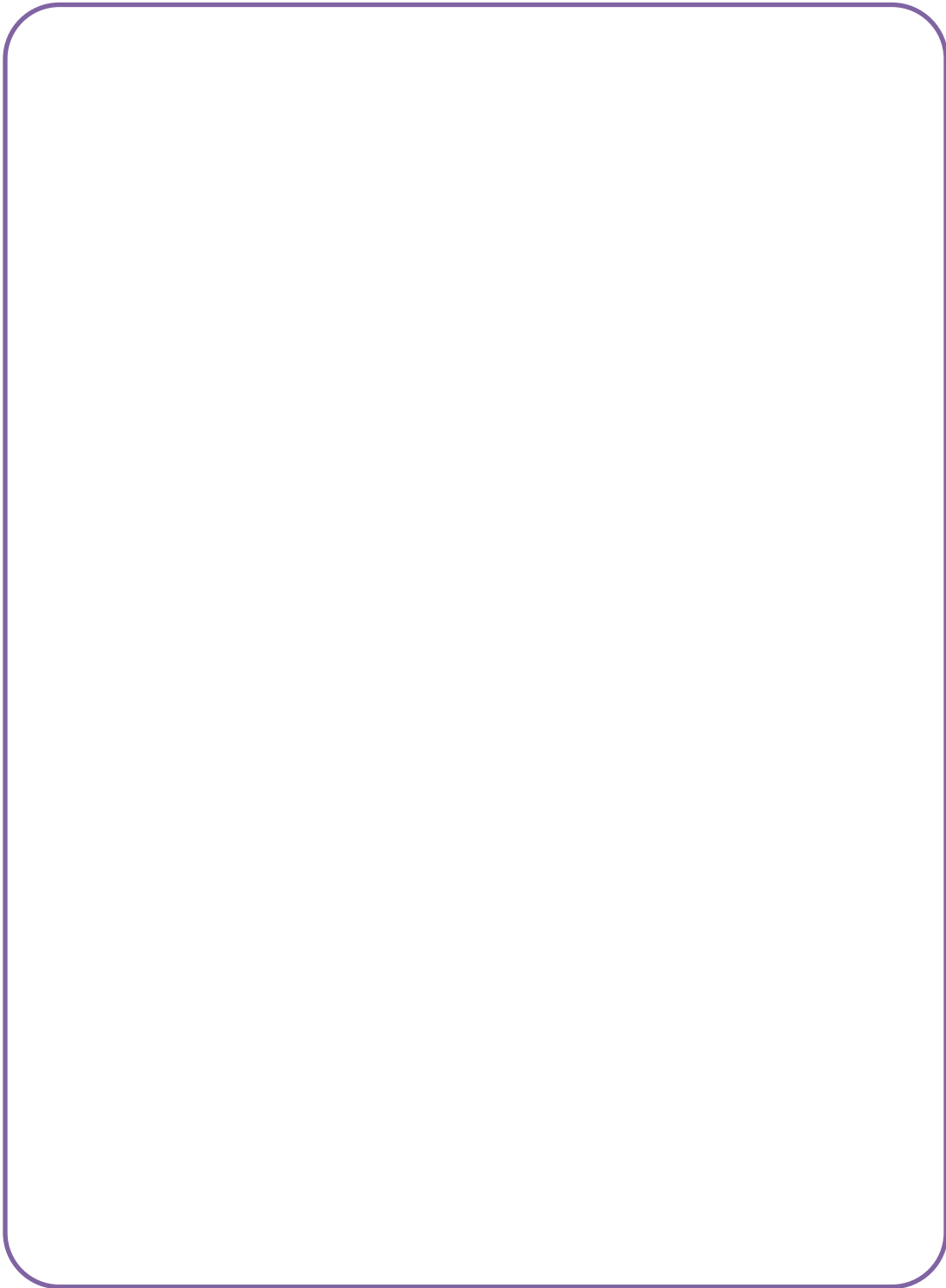
*If it is an octagon, it means they are dangerous*_____.

HOUSEHOLD CHEMICAL SYMBOLS



TASK 6. YOU ARE GOING TO MAKE A POSTER TO ILLUSTRATE ONE SAFETY RULE. YOUR POSTER MUST INCLUDE:

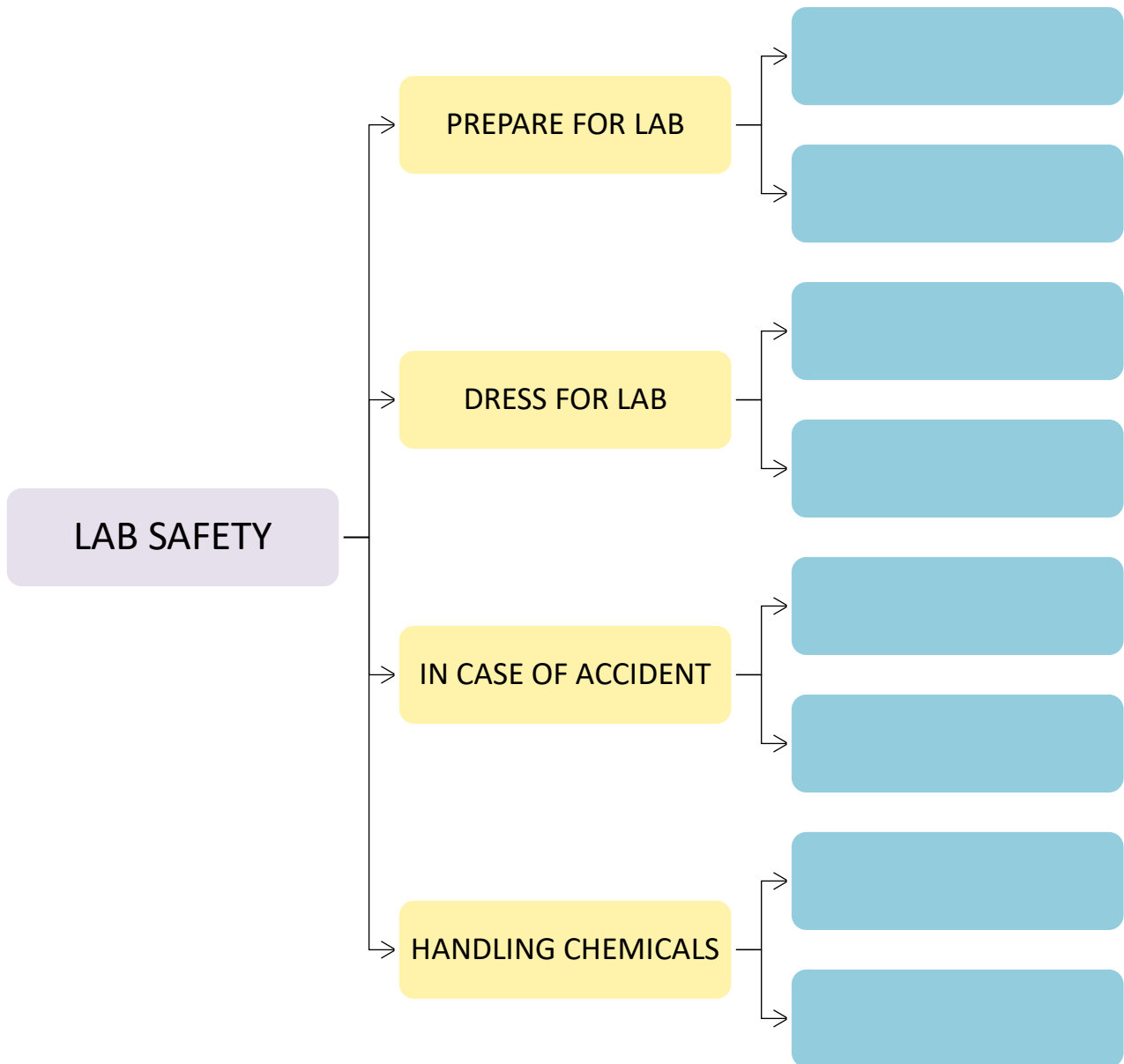
- Illustration of the lab safety rule
- Reason why lab safety rule is important
- Show the consequences of not following the rule



SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 7. PRESENT THE POSTER TO THE CLASS.

TASK 8. COMPLETE THE CHART BELOW. SAFETY & EQUIPMENT IN THE LABORATORY.



SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 9. ORDER THE LABORATORY SAFETY RULES.

1. carefully/ and/ follow/ instructions/ specifically./ If/ there/ is/ you/ don't/
ask/ your/ teacher./ It/ very/ important/ for/ your/ safety/ that /you/
understand/ all/ instructions./ listen/ anything/ understand, / Always/ is/

2. clean-up/ and / equipment/ to/ the /correct / when/ finished/ an/
Always/ return/ experiment. / place/

3. benches/ and /floor/ areas/ tidy. / means/ all/ must /be /pushed /in
/when/ at/ the /lab / and /extra/ is/ never/ to be /placed /on /the/
floor. / benches, / Keep/ This/ chairs/ working / books/equipment/

4. is /no/ or/ There/permitted/ in /the/ laboratory. / drink/ food/

5. wash/ your/ after/ any/ in/ laboratory. / Always / experiments/ hands/
the/

SCIENCE AND TECHNOLOGY ESP BOOK 1

6. tops/ are/ to be/ and/ following /every / experiment./ Bench/ cleaned/
disinfected/ practical/

7. heating/ or/ substances, /never/ towards/ / or others./ When/ mixing/
yourself /point /

8. mix / or /do/ your/ own/ experiments/ unless/ you/ permission/ from/
teacher. / wasteful, /and/ could /be /very /dangerous. / Never/
chemicals/ your/ This /is / have/

9. use/ tongs /to/ pick up /equipment/ that /have/ heated/ Always /
been/

10. sure/ any/ material / is/ put/ completely / throwing away. / Be / burning
/ before/ out/

TASK 10. WRITE 5 MORE SAFETY RULES

1. _____
2. _____

SCIENCE AND TECHNOLOGY ESP BOOK 1

3. _____

4. _____

5. _____

LESSON 6: SCIENCE AND TECHNOLOGY



Science and technology are important parts of our day to day life. We get up in the morning from the ringing of our alarm clocks and go to bed at night after switching our lights off. All these luxuries that we are able to afford are a resultant of science and technology. Most importantly, how we can do all this in a short time are because of the advancement of science and technology only. It is hard to imagine our life now without science and technology. Indeed, our existence itself depends on it now. Every day new technologies are coming up which are making human life easier and more comfortable. Thus, we live in an era of science and technology.

Essentially, Science and Technology have introduced us to the establishment of modern civilization. This development contributes greatly to almost every aspect of our daily life. Later, people get the chance to enjoy these results, which make our lives more relaxed and pleasurable.

SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 1. IN PAIRS READ AND TALK ABOUT THIS QUESTION.

- Do Science and technology have benefits on humans? Why?
- How can technology make human life easier and more comfortable?
- Do we live in an era of science and technology?
- Have Science and Technology introduced us to the establishment of modern civilization?

TASK 2. USING THE INFORMATION IN TASK 1 WRITE A PARAGRAPH AND PRESENT IT TO THE CLASS.



SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 3. TECHNOLOGY HAS ADVANTAGES AND DISADVANTAGES, READ THE INFORMATION, AND COMPLETE THE CHART.

-
- It will make our life easier.
 - It helps us organize our daily activities.
 - This helps our work can be done faster.
 - It helps us to communicate more easily with others.
 - This helps us to better know and understand other cultures and societies.

-
- It can be easily handled by irresponsible people.
 - We will be too dependent on that. When technology fails, we are helpless (in one way or another)
 - Sometimes it affects our health and our lifestyles (we will be complacent and lazy.) Chemicals are dangerous)
 - It destroys our simple and healthy life (the traditional lifestyle I miss).
 - Invasion of our private life.

SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 4. MATCH THE NAME WITH THE DEFINITION.

Biosensors/ Wearable Fitness Trackers/ Wearable Blood Pressure Monitors/ Smart Health Watches

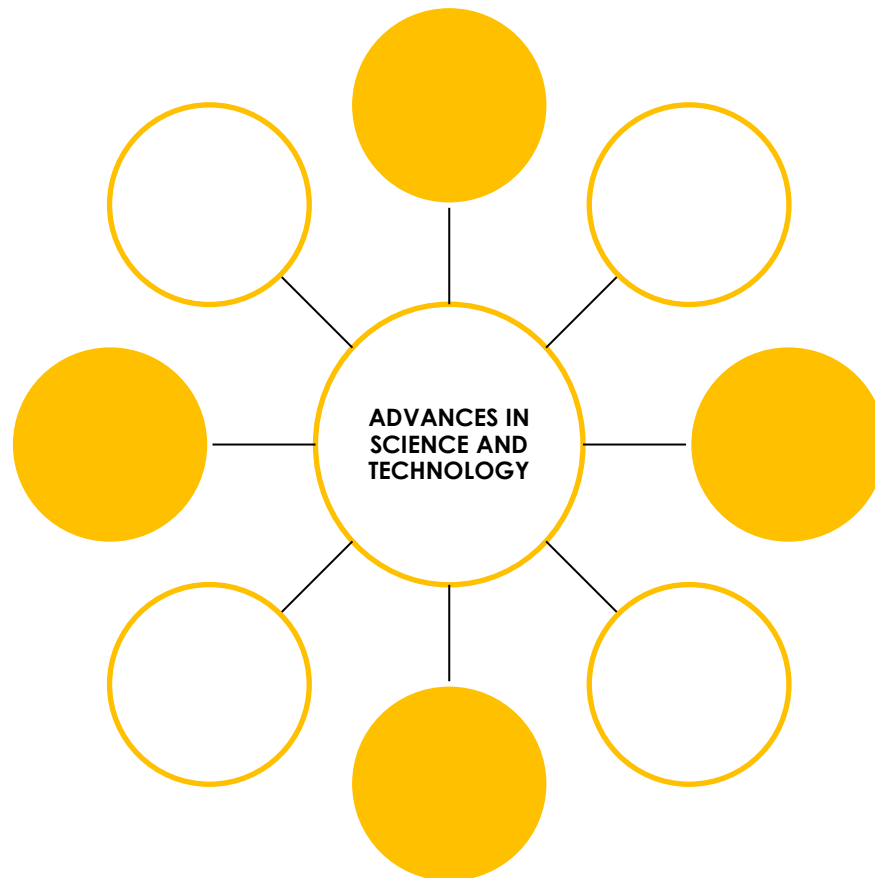
1. _____ These look similar to wristbands and are equipped with sensors to monitor the heart rate and physical activity. Through smartphone app synchronization, these offer wearers different health recommendations.
2. _____ Smartwatches are no longer just used to tell time and count steps. In healthcare, these have evolved to monitor heart rhythms. They are mainly for those with atrial fibrillation. Apple launched its Series 7 Model in 2021, which includes features like sleep-tracking, faster ECG, blood oxygen saturation, etc.
3. _____ Similar to a smartwatch, this wearable healthcare tech can measure blood pressure and monitor other daily activities such as distance traveled, steps taken, etc.
4. _____ This is more of up-and-coming wearable tech. Unlike a smartwatch, a biosensor is an adhesive patch that attaches itself to the body and collects data on respiratory rate, heart rate, temperature, etc.

TASK 5. Look at the picture and talk about Advantages and Disadvantages of Technology in the Healthcare Sector.



SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 6. LOOK FOR INFORMATION AND COMPLETE THE TABLE: WHAT ARE ADVANCES IN SCIENCE AND TECHNOLOGY?



TASK 7. WHAT MAKES SCIENCE AND TECHNOLOGY EXPAND AND ADVANCE? ORDER THE PARAGRAPH, NUMBER THEM.

- a) ___ Examples of technologies that have helped science advance include the telescope and microscope.
- b) ___ New technologies often allow scientists to explore nature in different ways and make new discoveries.
- c) ___ Science and technology help each other advance. Scientific knowledge is used to create new technologies.

SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 8. WRITE THE LATEST TOP TECHNOLOGY TRENDS FOR 2022 - 2023



TASK 9. COMPLETE THE PUZZLE

ACROSS

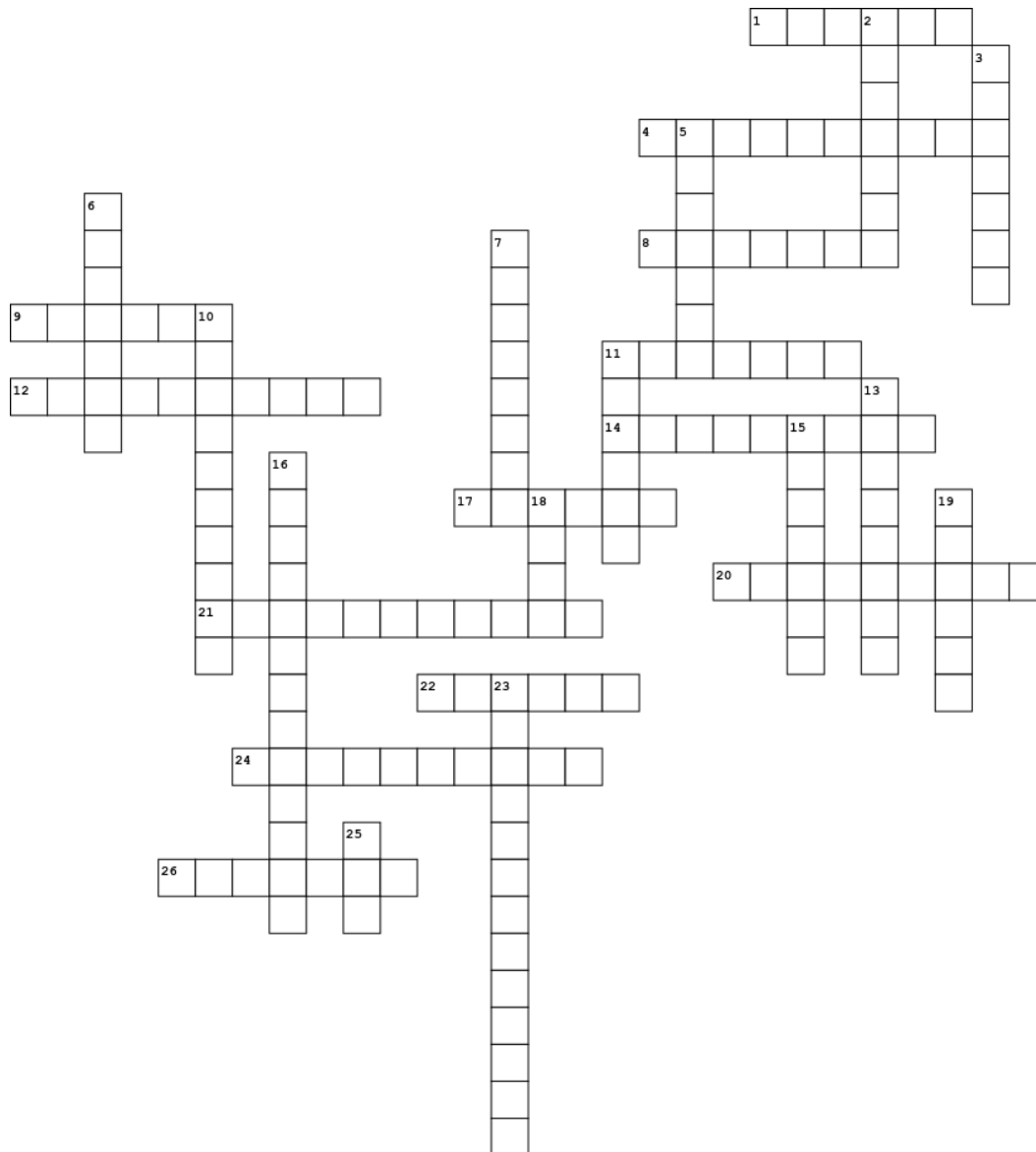
1. models
4. Technology not being able to perform a certain task
8. Technology that helps with the eyes
9. When you tell Technology to act or do a certain process
11. integration
12. Different forms of Technology
14. Parts of a whole system
17. loop A completed project/Technology
20. Performance levels
21. A certain way a technology or system is made
22. Technologies that perform and help in nature
24. Technology that helps people Ex. Engineers
26. Unique

DOWN

2. Heat advancement in technology
3. thinking When the System is processing
5. When Technology takes the input and dose the task
6. Aggressive amount of subsystems to create one systems

SCIENCE AND TECHNOLOGY ESP BOOK 1

- 7. The things you used for
- 10. Organized Technology
- 11. The technology in different parts
- 13. Advice
- 15. failure There is a error in the system
- 16. Technology that innervates from the environment
- 18. loop A work in progress
- 19. A technology that helps everyone or affects everyone
- 23. A man made creation of science that benefits and makes our life easier
- 25. Biology is a science that forms in technology



SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 10. IN GROUPS TALK ABOUT “THE IMPORTANCE OF TECHNOLOGY IN OUR DAILY LIFE”



SCIENCE AND TECHNOLOGY ESP BOOK 1

LESSON 7: THE INTERNET



TASK 1. LOOK AT THE PICTURE AND ANSWER THE QUESTION: HOW INTERNET WORKS?

What is the Internet according to people?

- Waves
- Satellites
- Cloud
- Network



TASK 2. USING THE INFORMATION IN TASK 1 WRITE A PARAGRAPH

A large, empty, rounded rectangular box intended for writing a paragraph.

SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 3. MATCH THE WORDS WITH THEIR MEANINGS:

- 1) WWW ___
- 2) E-mail___
- 3) Internet address ___
- 4) URL___
- 5) Chat Room___
- 6) Virus___
- 7) Password___
- 8) SPAM___
- 9) Blog___
- 10) Screen Name___
- 11) Internet___
- 12) Website___
- 13) Cyberspace___
- 14) Username___
- 15) Download___

- A. a place where you talk by typing
- B. a secret word that only you and your parents know
- C. a letter you send through your computer
- D. a hidden program that can hurt your computer advertising that comes to your e-mail address
- E. a name you choose for yourself that isn't your real name
- F. an Internet address (Uniform Resource Locator)
- G. a process of file transfer from the Internet
- H. a place on the Internet you can visit
- I. another way to say URL
- J. the world that only exists in the computer and your head
- K. a worldwide system of computers
- L. another way to say "username"
- M. Na journal you keep on the Web: short for Web log

SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 5. COMPLETE THE SENTENCES USING THE WORDS IN THE TABLE

GO ONLINE / BILLION / COMMON / FIRE / FACE TO FACE
//CRIMINAL//SCAM //STAY CONNECTED

It is _____ nowadays for people to have a cell phone.
More than eight _____ people live on Earth.
I do not like to talk on the phone. I like to talk with people _____.
I do not trust this email. I think it is a _____.
Thomas could not finish his homework. His computer could not
_____.
Do not be late for work or your boss might _____ you.
I _____ and use Facebook every day.
The police are looking for that man. He is a _____.

TASK 6. MATCH THE SENTENCES

- | | |
|-----------------------------|---|
| Most people agree that | <input type="radio"/> Several hours every day. |
| Many people go online | <input type="radio"/> Enough when you go online. |
| Some people like to use | <input type="radio"/> To steal money and scam people. |
| You may not exercise | <input type="radio"/> May not be real friends. |
| The friends you have online | <input type="radio"/> The internet is a good thing. |
| Some criminals go online | <input type="radio"/> The internet at work. |

SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 7. DISCUSS THE FOLLOWING QUESTIONS WITH YOUR CLASSMATES.

Which do you like more: watching TV or going online? Why?

Can you think of three bad things about the internet?

How many hours do you go online each day? Is it too much or not enough?

TASK 8. INTERVIEW TO YOUR CLASSMATES

Classmates'
names

*Which do you like
more: watching tv or
going online? Why?*

*Can you think of
three bad things
about the
internet?*

*How many hours do
you go online each
day? Is it too much or
not enough?*

SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 9. USING THE INFORMATION ABOVE WRITE A REPORT.

TASK 10. IS THE INTERNET BAD? READ AND TALK ABOUT IT WITH YOUR TEACHER.

Studies show that information overload affects up to 20-30% of people. Damage to social relationships: Extensive internet use, of social media, is correlated with loneliness and social isolation. Intimate relationships can be degraded by internet use, particularly due to viewing online pornography.

Disadvantages of the Internet.

- Addiction, timewaster, and causes distractions.
- Bullying, trolls, stalkers, and crime.
- Spam and advertising.
- Pornographic and violent images.
- Never being able to disconnect from work.
- Identity theft, hacking, viruses, and cheating.



LESSON 8: FEMALE SCIENTISTS



TASK 1. DO YOU KNOW WHO ARE THEY? WHY ARE THEY FAMOUS? WHERE ARE THEY FROM?

TASK 2. READ AND COMPLETE THE TEXT

Marie Curie – the first woman to win a Nobel Prize

Marie Curie ^[1] (1867–1934) _____ (be) probably the most well-known female scientist in the world. Her full name _____ (be) Marie Salomea Skłodowska Curie, and she _____ (be) a Polish French physicist and chemist who _____ (conduct) pioneering research on radioactivity. She is the first woman to win a Nobel Prize, the first and currently the only woman to win two Nobel Prizes (physics and chemistry). She _____ (devote) her whole life to the theory of radioactivity, inventing techniques for separating radioactive isotopes, and discovering two new elements, polonium (Po) and radium (Ra). Under her guidance, radioisotopes _____ (be) used for the first time in the treatment of tumors.

Marie Curie has been inspiring generations of female to pursue their passion and career. We are proud that our project, a part of Marie Skłodowska Curie Action
1 which was named after her, has 8 female Early Stage Researchers and excellent female supervisor and management team members.

SCIENCE AND TECHNOLOGY ESP BOOK 1

- a) Paris, France
- b) Sorbonne, France
- c) Warsaw, Poland
- d) United States

2. What degree did Marie Curie first earn in college?

- a) Physics
- b) Chemistry
- c) Biology
- d) Physiology

3. What did Marie Curie first become interested in which led to her experiments?

- a) Research
- b) X-rays
- c) Injured soldiers
- d) Pitchblende

4. Which fields of science did Marie Curie win her Nobel Prizes?

- a) Chemistry
- b) Physics
- c) Biology
- d) Both A and B

5. Marie Curie discovered two new elements for the periodic table, radium and:

- a) Polonium
- b) Solonium
- c) Radon
- d) Curium

6. Which of the following was the cause of Marie Curie's death?

- a) Overexposure to polonium
- b) Overexposure to radiation
- c) Overexposure to cancer
- d) Overexposure to the sun

SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 4. Complete the timelines about Ada Lovelace – the first computer programmer in the world.



December 10th ,1815 _____

November 27th, 1852 _____

1840 _____

—

1843 _____

1852 _____

1852 _____

TASK 5. READ AND CHOOSE THE BEST OPTION

1. Who discovered protactinium?

- a) Marie Curie
- b) Rosalind Franklin
- c) Jane Goodall
- d) Barbara McClintock
- e) Lisa Meitner

SCIENCE AND TECHNOLOGY ESP BOOK 1

2. Who discovered polonium and radium?

- a) Marie Curie
- b) Rosalind Franklin
- c) Jane Goodall
- d) Barbara McClintock
- e) Lisa Meitner

3. Who discovered that chimpanzees could make and use? tools

- a) Marie Curie
- b) Rosalind Franklin
- c) Jane Goodall
- d) Barbara McClintock
- e) Lisa Meitner

4. Who won the Nobel Prize in Medicine?

- a) Marie Curie
- b) Rosalind Franklin
- c) Jane Goodall
- d) Barbara McClintock
- e) Lisa Meitner

5. Who founded a non-profit organization?

- a) Marie Curie
- b) Rosalind Franklin
- c) Jane Goodall
- d) Barbara McClintock
- e) Lisa Meitner

6. Who awarded the Nobel Prize in Physics?

- 7. Marie Curie
- 8. Rosalind Franklin
- 9. Jane Goodall
- 10. Barbara McClintock
- 11. Lisa Meitner

SCIENCE AND TECHNOLOGY ESP BOOK 1

12. Who discovered nuclear fission, which led to the development of the atomic bomb?

- a) Marie Curie
- b) Rosalind Franklin
- c) Jane Goodall
- d) Barbara McClintock
- e) Lisa Meitner

13. Who discovered that genetic information is not stationary?

- a) Marie Curie
- b) Rosalind Franklin
- c) Jane Goodall
- d) Barbara McClintock
- e) Lisa Meitner

14. Who discovered the double-helix structure of DNA?

- a) Marie Curie
- b) Rosalind Franklin
- c) Jane Goodall
- d) Barbara McClintock
- e) Lisa Meitner

15. Who became an advocate for conservation?

- a) Marie Curie
- b) Rosalind Franklin
- c) Jane Goodall
- d) Barbara McClintock
- e) Lisa Meitner

SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 6. SEARCH FOR HELP ON THE INTERNET AND WRITE TRUE OR FALSE.

- a) Lisa Meitner worked alone. **True** **False**
- b) Some people were worried about Lisa Meitner's findings. **True**
False
- c) Barbara McClintock's achievement was recognized immediately.
True **False**
- d) Rosalind Franklin showed her important findings to Watson and Crick.
True **False**
- e) Rosalind Franklin was recognized for her contribution to science during her lifetime. **True** **False**
- f) Jane Goodall's findings showed that chimpanzee and human behavior is often similar. **True** **False**

TASK 7. FEMALE SCIENTIST BIOGRAPHY. WRITE A BIOGRAPHY! HERE ARE THE ELEMENTS YOU'LL NEED IN ORDER TO WRITE THE BIOGRAPHY:

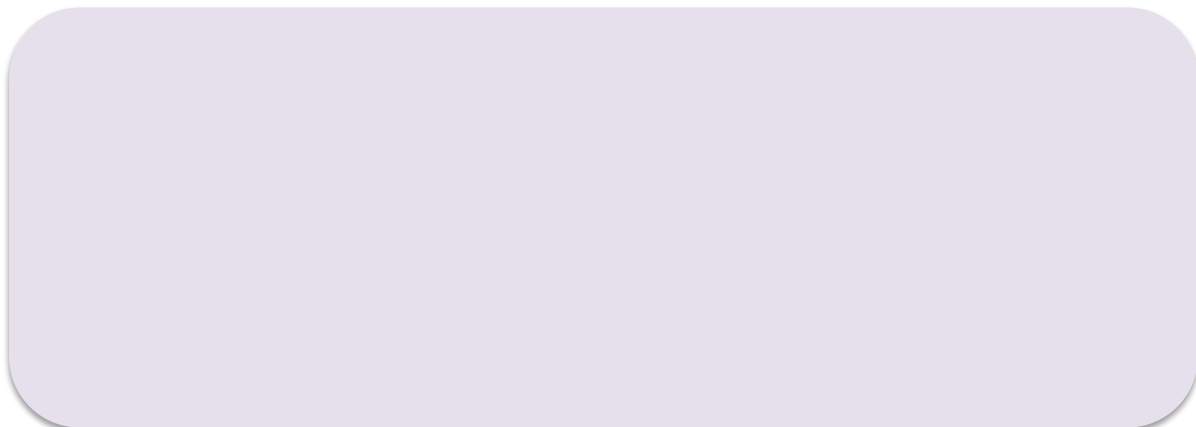
- First and Last Name: _____
- Country of Origin: _____
- Any Other Interesting Details: _____
- What inspired you to become a scientist: _____
- Obstacles encountered: _____
- Major Accomplishments: _____
- How this work has changed the world: _____

SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 8. READ THE FIRST PARAGRAPH AND FIND 4 FACTS ABOUT WOMEN IN SCIENCE. WHICH FACT(S) DO YOU FIND MOST SURPRISING? DISCUSS WITH YOUR TEACHER.

Why aren't there more women in science? According to the campaigning group, WISE (women in science and engineering), in the UK, only 12.8% of jobs in STEM (science, technology, engineering and maths) are held by women. Similarly, the proportion of boys studying science at school leaving age is still much higher than girls, especially Physics, where 1 it's about 78%. 2This continues at university, 3where 52% of male undergraduates take a science degree, compared with 40% of women. The situation is not dissimilar in the United States, where only 1/5 of physics degrees are awarded to women. But why is this?

TASK 9. MAKE A LIST OF POSSIBLE REASONS WHY THERE ARE FAR FEWER WOMEN STUDYING AND WORKING IN SCIENCE THAN MEN.



SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 10. WHICH OF THE JOBS BELOW ARE TYPICALLY DONE BY MEN, OR TYPICALLY DONE BY WOMEN? ARE THERE ANY (GOOD) REASONS FOR THIS? DISCUSS IN PAIRS OR SMALL GROUPS.

Dental hygienists

*Car
mechanics*

Astronauts

Engineers

Hairdressers

Receptionists

*Primary school
teachers*

*Painters and
decorators*

SCIENCE AND TECHNOLOGY ESP BOOK 1

LESSON 9: THE SCIENTIFIC METHOD



TASK 1. READ AND ANSWER THE QUESTIONS

The scientific method is a process that scientists use to better understand the world around them. It includes making observations and asking a question, forming a hypothesis, designing an experiment, collecting, and analyzing data, and drawing a conclusion. This is sometimes also referred to as scientific inquiry. A hypothesis is a possible explanation for an observation. A good scientist will design a controlled experiment to test their hypothesis. In a controlled experiment, only one variable is tested at a time. It is called the manipulated or independent variable. The experimental group will test the independent variable. The control group will be left alone, so you have something to compare your results to. The variable that determines the data is the responding, or dependent variable. It responds to the manipulated variable. All other variables in the experiment should remain the same, because if you change more than one variable, you will not know which variable explained your results. Once something has been tested many different times by many different scientists, it can become a scientific theory. It is different from a scientific law, which describes what will happen every time under a particular set of conditions.

SCIENCE AND TECHNOLOGY ESP BOOK 1

- What is a scientific method?
- What is a hypothesis?
- What is an independent variable?
- What is a dependent variable?

TASK 2. READ THE SENTENCES AND WRITE TRUE OR FALSE

- a) Forming a hypothesis is the first step of the scientific method. _____
- b) A scientific law is different from a scientific theory because it describes something in nature without attempting to explain it. _____
- c) In order for a hypothesis to be testable, scientists need to be able to carry out investigations that will either support or disprove it. _____
- d) The experimental group is the group that is left alone during the experiment. _____
- e) The manipulated variable is the same thing as the independent variable. _____

TASK 3. USING THE NUMBERS 1-6, INDICATE THE ORDER OF EVENTS IN USING THE SCIENTIFIC METHOD.

- a) _____ Test the hypothesis by performing an experiment.
- b) _____ Make observations and record data.
- c) _____ Make a hypothesis and an experimental prediction.
- d) _____ Identify the problem to be studied.
- e) _____ Use data and results to support a conclusion.
- f) _____ Perform background research on the problem

SCIENCE AND TECHNOLOGY ESP BOOK 1

TASK 4. PROVIDE THE LETTER OF THE DEFINITION THAT MATCHES THE SCIENTIFIC TERMS BELOW.

1. Control
2. Conclusion
3. Hypothesis
4. Experiment
5. Variable
6. Data
7. Theory

- a. Using a set of observations to test a hypothesis _____
- b. an idea about the system being examined _____
- c. The numerical values recorded during an experiment or observation _____
- d. A decision based on the data from an experiment _____
- e. A well-supported set of observations and explanations for natural events _____
- f. Set of observations used as a reference and compared to experimental observations in order to show that the result is due to the experimental treatment _____
- g. Name for the type of value measured that may vary in an experiment _____

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TASK 5. DETERMINE THE IV AND DV FOR EACH INQUIRY.

1. *What amount of sunlight makes pea plants grow tallest?*

IV:

DV:

2. *Which type of soda has more sugar?*

IV:

DV:

3. *Is a ball's bounce affected by the height from which it is bounced?*

IV:

DV:

TASK 6. WRITE A HYPOTHESIS FOR THE FOLLOWING QUESTIONS.

○ *What type of music quiets a crying baby faster: jazz, classical or rock?*

Hypothesis:

○ *Is the number of eggs a chicken lays affected by the hours of daylight?*

Hypothesis:

○ *Will a rubber band or string hold more weight without breaking?*

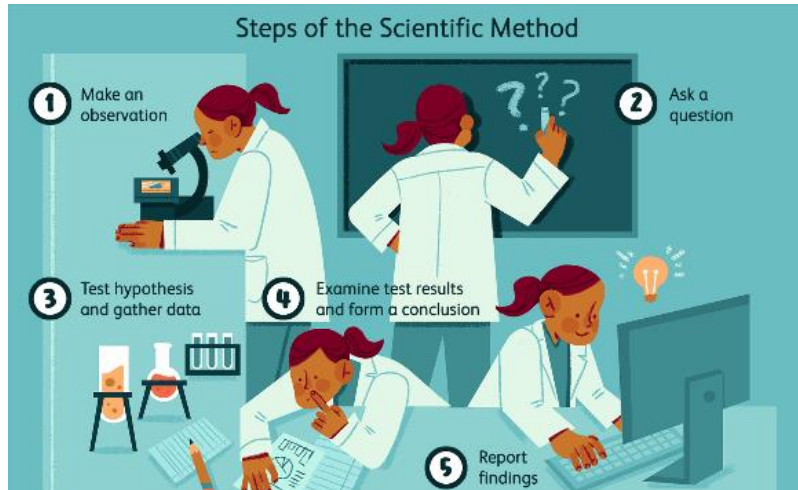
Hypothesis:

TASK 7. LIST THE SIX STEPS OF THE SCIENTIFIC METHOD:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

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TASK 8. MAKE AN EXPERIMENT USING THE SCIENTIFIC METHOD



QUESTION: What do you want to find out?

HYPOTHESIS: What do you think will happen and why?

MATERIALS: List all materials you will be using.

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PROCEDURE: List step by step, what you will do.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

RESULTS: What actually happened?

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CONCLUSION: Is your hypothesis correct or incorrect based on your results?
Explain why. What did you learn?

TASK 9. SCIENTIFIC METHOD VOCABULARY REVIEW

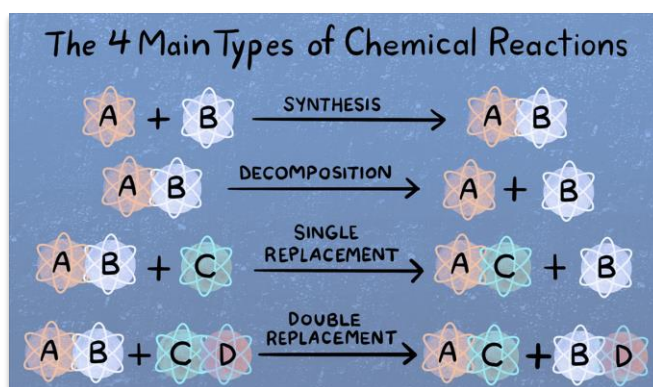
- ✓ **Analyze** – to examine carefully by looking at all the parts of something
- ✓ **Data** – information, usually in numbers, that describes our observations
- ✓ **Conclusion** – the ending; often a summary of what is said before
- ✓ **Evidence** – something that proves or disproves an idea
- ✓ **Hypothesis** – an “educated” guess or prediction about what will happen
- ✓ **Interval** – the time between events; also, a space between items
- ✓ **Observation** – something that you can see, hear, taste, smell or feel; in an experiment we use observation to collect data
- ✓ **Qualitative** – observational data that describes something that is not measured, like color or shape (not a number)
- ✓ **Quantitative** – observational data that is measured, like height, weight, how many more (or less), how long (time); this is a number
- ✓ **Scale** – a measure of something by using a series of regular units, such as inches on a ruler or degrees on a thermometer
- ✓ **Testable question** – an idea that can be tested experimentally
- ✓ **Untestable question** – an idea that cannot be tested experimentally
- ✓ **Variable** – something in an experiment that might change

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- ✓ **Dependent variable** – the thing in an experiment that changes (the effect); the thing that the experiment measures
- ✓ **Independent variable** – the thing in an experiment that makes the dependent variable change (the cause); the thing that the experimenter changes
- ✓ **Controlled variable** – the thing(s) in an experiment that does not change; also called the constant

LESSON 10: CHEMICAL REACTION

WHAT IS A CHEMICAL REACTION?

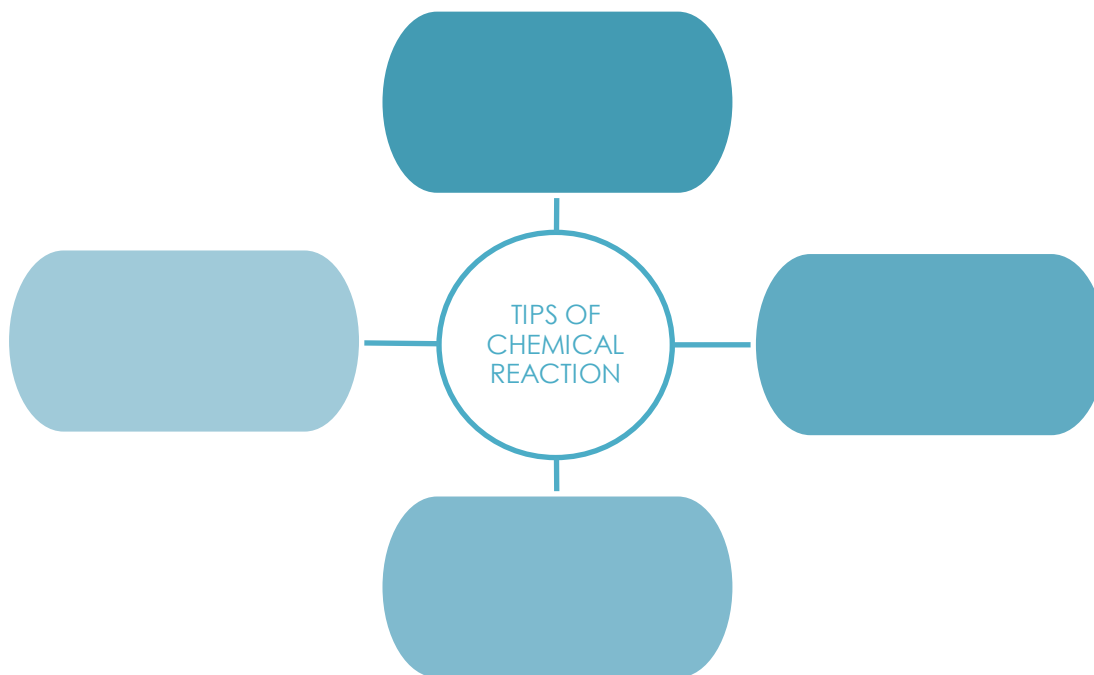


- A physical change, such as a state change or dissolving, does not create a new substance, but a chemical change does.
- In a chemical reaction, the atoms and molecules that interact with each other are called reactants.
- In a chemical reaction, the atoms and molecules produced by the reaction are called products.
- In a chemical reaction, only the atoms present in the reactants can end up in the products. No new atoms are created, and no atoms are destroyed.
- In a chemical reaction, reactants contact each other, bonds between atoms in the reactants are broken, and atoms rearrange and form new bonds to make the products.

TASK 1. WHAT IS CHEMICAL REACTION FOR?

TASK 2. WHAT ARE THE TYPES OF CHEMICAL REACTION?

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TASK 3. READ AND WRITE TRUE OR FALSE

HAS A CHEMICAL REACTION TAKEN PLACE?

1. Water solidifies into ice on a cold day. Yes No
2. A glow stick emits light when it is broken. Yes No
3. When two liquids are mixed, a blue solid form at the bottom Yes No
4. Condensation forms on a glass on a hot day. Yes No
5. Bubbles form when vinegar and baking soda are mixed together. Yes No
6. Ice cream melts in the sunshine. Yes No
7. A glass jar feels warm after two cold substances are mixed together. Yes No
8. Carbon dioxide is produced when fungi feed on sugar. Yes No

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TASK 4. MATCH THE WORD WITH THE DEFINITION

	DEFINITION
<i>Combination Reactions</i>	<p>It is a reaction in which a substance reacts with oxygen gas, releasing energy in the form of light and heat. Combustion reactions must involve O₂ as one reactant. The combustion of hydrogen gas produces water vapor (see figure below).</p> $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g})$
<i>Decomposition Reactions</i>	<p>It is a reaction in which two or more substances combine to form a single new substance. Combination reactions can also be called synthesis reactions. The general form of a combination reaction is:</p> $\text{A} + \text{B} \rightarrow \text{AB}$
<i>Single-Replacement Reactions</i>	<p>It is a reaction in which a compound breaks down into two or more simpler substances. The general form of a decomposition reaction is:</p> $\text{AB} \rightarrow \text{A} + \text{B}$
<i>Double-Replacement Reactions</i>	<p>It is a reaction in which one element replaces a similar element in a compound. The general form of a single-replacement (also called single-displacement) reaction is:</p> $\text{A} + \text{BC} \rightarrow \text{AC} + \text{B}$
<i>Combustion Reactions</i>	<p>It is a reaction in which the positive and negative ions of two ionic compounds exchange places to form two new compounds. The general form of a double-replacement (also called double-displacement) reaction is:</p> $\text{AB} + \text{CD} \rightarrow \text{AD} + \text{CB}$

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TASK 5. COMPLETE THE EXERCISE. ORDER THE LETTERS OF THE WORD TO FIND THE MISSING WORD

- o A chemical reaction happens when a new _____ is formed.
SCUBA NETS
- o Complete the following word equations for chemical reactions
- o iron + sulfur → iron _____
- o Mercury oxide → mercury + _____
- o _____ → silver + oxygen

TASK 6. BALANCE EACH OF THE following REACTIONS AND IDENTIFY EACH TYPE OF REACTION:



Combination reaction

The five basic types of chemical reactions are

double displacement, synthesis, combustion, single displacement, double displacement

- a) $2 \text{NaBr} + \text{Ca}(\text{OH})_2 \rightarrow \text{CaBr}_2 + 2 \text{NaOH}$ d _____ di _____
- b) $2 \text{NH}_3 + \text{H}_2\text{SO}_4 \rightarrow (\text{NH}_4)_2\text{SO}_4$ s _____
- c) $4 \text{C}_5\text{H}_9\text{O} + 29 \text{O}_2 \rightarrow 20 \text{CO}_2 + 18 \text{H}_2\text{O}$ c _____
- d) $3 \text{Pb} + 2 \text{H}_3\text{PO}_4 \rightarrow 3 \text{H}_2 + \text{Pb}_3(\text{PO}_4)_2$ s _____ d _____
- e) $\text{Li}_3\text{N} + 3 \text{NH}_4\text{NO}_3 \rightarrow 3 \text{LiNO}_3 + (\text{NH}_4)_3\text{N}$ d _____ d _____
- f) $3 \text{HBr} + \text{Al}(\text{OH})_3 \rightarrow 3 \text{H}_2\text{O} + \text{AlBr}_3$ d _____ di _____
- g) $\text{Na}_3\text{PO}_4 + 3 \text{KOH} \rightarrow 3 \text{NaOH} + \text{K}_3\text{PO}_4$ d _____ di _____
- h) $\text{MgCl}_2 + \text{Li}_2\text{CO}_3 \rightarrow \text{MgCO}_3 + 2 \text{LiCl}$ d _____ di _____
- i) $\text{C}_6\text{H}_{12} + 9 \text{O}_2 \rightarrow 6 \text{CO}_2 + 6 \text{H}_2\text{O}$ c _____
- j) $\text{Pb} + \text{FeSO}_4 \rightarrow \text{PbSO}_4 + \text{Fe}$ s _____ d _____

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- k) $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ d_____
- l) $\text{P}_4 + 3 \text{O}_2 \rightarrow 2 \text{P}_2\text{O}_3$ s_____
- m) $2 \text{RbNO}_3 + \text{BeF}_2 \rightarrow \text{Be}(\text{NO}_3)_2 + 2 \text{RbF}$ d_____ di_____
- n) $2 \text{AgNO}_3 + \text{Cu} \rightarrow \text{Cu}(\text{NO}_3)_2 + 2 \text{Ag}$ s_____ di_____
- o) $\text{C}_3\text{H}_6\text{O} + 4 \text{O}_2 \rightarrow 3 \text{CO}_2 + 3 \text{H}_2\text{O}$ c_____
- p) $\text{C}_5\text{H}_5 + \text{Fe} \rightarrow \text{Fe}(\text{C}_5\text{H}_5)_2$ s_____
- q) $\text{SeCl}_6 + \text{O}_2 \rightarrow \text{SeO}_2 + 3 \text{Cl}_2$ s_____ d_____
- r) $2 \text{MgI}_2 + \text{Mn}(\text{SO}_3)_2 \rightarrow 2 \text{MgSO}_3 + \text{MnI}_4$ d_____ di_____
- s) $\text{O}_3 \rightarrow \text{O} + \text{O}_2$ d_____
- t) $20.2 \text{NO}_2 \rightarrow 2 \text{O}_2 + \text{N}_2$ d_____

TASK 7. CHOOSE THE BEST OPTION

1. Which statement describes the chemical reaction?



- a) Endothermic because energy is given out as the match burns.
- b) Endothermic because energy is used to strike the match
- c) Endothermic because energy is given out as the match burns
- d) Endothermic because energy is used to strike the match

2. The product formed when carbon burns in oxygen of the air is:

- a) CO_2
- b) CO
- c) Carbon
- d) Water

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3. The product, other than carbon dioxide, formed when a candle burns in air is:

- a) CO
- b) SO₂
- c) Water vapor
- d) N₂

4. What will be the product formed when hydrogen burns in air?

On strong heating, sulphur burns in the air with blue flame and gives out:

- a) SO₂
- b) SO₃
- c) Both A and B
- d) None of the above

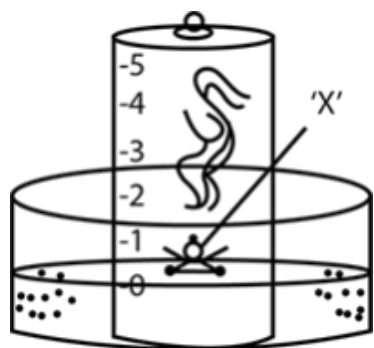
5. The reaction of burning of carbon in oxygen is respected by the equation:



When 9.0g of solid carbon is burnt in 16.0g of oxygen gas, 22.0g of carbon dioxide is produced. The mass of carbon dioxide gas formed on burning of 3.0g of carbon in 32.0g of oxygen would be (Note: atomic mass of C=12.0u, O=16.0u)

- a) 6.60g
- b) 7.33g
- c) 8.25g
- d) 11.00g

6. Name the product formed when substance 'X' burns in air.



- a) Carbon dioxide
- b) Water vapor
- c) Both A and B
- d) Carbon monoxide

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TASK 8. SPEAKING PRACTICE. DISCUSS WITH YOUR TEACHER

1. Define disproportionation reaction and explain it with the help of a reaction.

Take about 1.0g of CaCO_3 in a test tube. Heat it over a flame, a colourless gas comes out. The reaction is called a

- a) Decomposition reaction
- b) Displacement reaction
- c) Double decomposition reaction
- d) Double displacement reaction

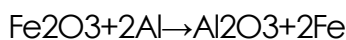
The process of associated with Sodium Carbonate Manufacture is known as

- a) Chamber
- b) Haber
- c) LeBlanc
- d) Castner

Which choice is an example of a synthesis reaction?

- a) $2\text{K} + \text{F}_2 \rightarrow 2\text{KF}$
- b) $2\text{Al} + 6\text{HCl} \rightarrow 2\text{AlCl}_3 + 3\text{H}_2$
- c) $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$
- d) $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{AgCl} + \text{NaNO}_3$

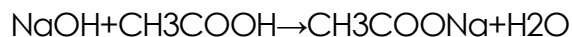
The given reaction is an example of:



- a) Combination reaction
- b) Double displacement reaction
- c) Decomposition reaction
- d) Displacement reaction

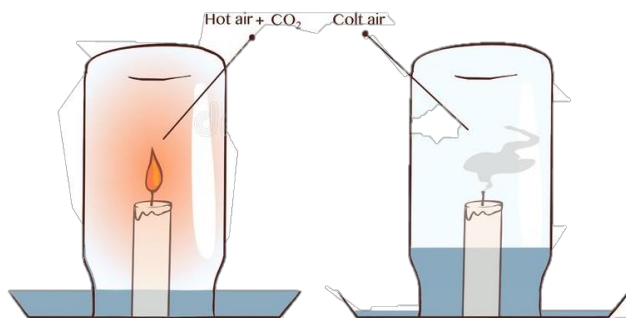
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This reaction is called:



- a) Oxidation reaction
- b) Hydrogenation reaction
- c) Neutralisation reaction
- d) Addition reaction

TASK 9. EXPERIMENT. ANSWER THE QUESTIONS.



- o Why do you think the candle goes out when we put a jar over the candle?
- o Will the candle still burn if one of the reactants (wax or oxygen) is no longer available?
- o When a candle burns for a while, it eventually gets smaller and smaller. Where does the candle wax go?

TASK 10. EXPERIMENT 2- COMPLETE THE EXPERIMENT AND GIVE THE RESULTS

THE POWER OF BUBBLES

Materials:

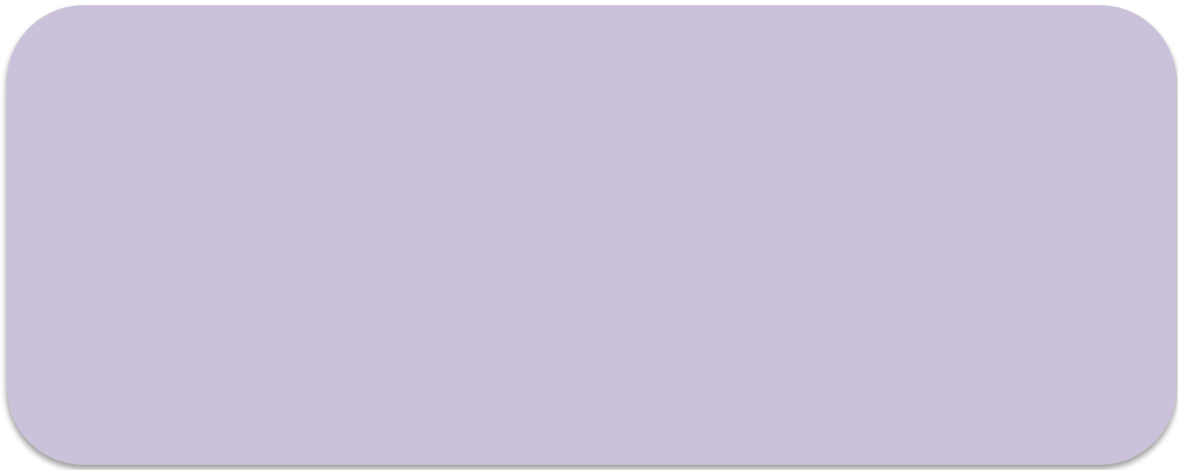
- ✓ plastic bottle.
- ✓ 150 ml of hot water
- ✓ yeast
- ✓ sugar
- ✓ balloon
- ✓ tea-spoon

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Experiment procedure



Scientific explanation



LESSON 11: SI UNITS



TASK 1. WHAT DO YOU KNOW ABOUT SI UNITS IN CHEMISTRY? ANSWER THE SURVEY.

- **What is the SI unit of mass?**
 - a) Kg
 - b) Pounds
 - c) LBS

- **SI unit of energy is:**
 - a) $\text{kgm}^2 \text{s}^{-2}$
 - b) $\text{kgm}^2 \text{s}^{-1}$
 - c) $\text{kgm}^2 \text{s}^{-0}$

- **What is commercial unit a energy? Give its relationship with S.I. unit of energy.**
- **Commercial unit of energy is the kilowatt-hour (kWh). The SI unit of energy is the Joule (J).**

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- Name the SI unit of pressure and give its definition.
- The S.I unit of atmospheric pressure is:
 - a) L atm
 - b) N/m
 - c) Pascal
 - d) No one of these

TASK 2. FILL IN THE BLANKS.

1. The S.I. unit of length is _____ of time is _____ of mass is _____
2. °C is the unit of _____.
3. 1-meter tone = _____.
4. The zero mark in Celsius thermometer is the melting point of _____.
5. The thermometer used to measure the human body is called the _____ thermometer.
6. The normal temperature of human body is _____ °C or, _____ °F.
7. The _____ of an object is measured with the help of a beam balance.

TASK 3. MATCH THE FOLLOWING COLUMNS:

COLUMN A	COLUMN B
Length of a housing plot	Clock
Breadth of a book	Beam balance
Mass of an apple	Thermometer
Period of time for study	Measuring tape
Temperature of a body	Graph paper
Surface area of a leaf	Metre ruler

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TASK 4. WHAT TYPE OF MEASUREMENT IS INDICATED BY EACH OF THE FOLLOWING UNITS?

DENSITY LENGTH MASS TIME VOLUME

1. G/ML _____
2. S _____
3. KM _____
4. G _____
5. CM _____
6. MM _____
7. MG _____
8. L _____
9. CM _____

TASK 5. WHAT TYPE SELECT THE CORRECT ALTERNATIVE

1. The symbol of degree Celsius is

- | | |
|-------|-------|
| a) °C | c) K |
| b) °F | d) °K |

2. 10mm is equal to

- | | |
|--------|---------|
| a) 1cm | c) 10dm |
| b) 1m | d) 10cm |

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3. The amount of surface occupied by an object is called its

- a) Volume
- b) Area
- c) Mass
- d) Length

4. A meter ruler is graduated in

- a) M
- b) Cm
- c) Mm
- d) Km

5. A thermometer is graduated in

- a) Kelvin
- b) °C
- c) G
- d) Cm

TASK 6. WRITE THE SYMBOL FOR EACH MEASUREMENTS.

_____ Milliliter _____ Kilogram _____ Meter _____ Milligram
_____ Millimeter _____ Liter _____ Kilometer _____ Second
_____ Centimeter _____ Gram

TASK 7. COMPLETE THE FOLLOWING SENTENCES WITH THE MOST APPROPRIATE UNIT. UNITS MAY BE USED MORE than ONCE. USE INFORMATION IN TASK 6

- a) Colas may be purchased in two or three _____ bottles.
- b) The mass of a bowling ball is 7.25 _____.
- c) The length of the common housefly is about 1 _____
- d) The mass of a paperclip is about 1 _____.
- e) One teaspoon of cough syrup has a volume of 5 _____.

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- f) Stand with your arms raised out to your side. The distance from your nose to your outstretched fingers is about 1 ____.
- g) On a statistical basis, smoking a single cigarette lowers your life expectancy by 642,000 ____, or 10.7 minutes.

TASK 8. CONVERT THE FOLLOWING METRIC MEASUREMENT

- a) 1000 mg = ____ g
- b) 198g = ____kg
- c) 8 mm = ____ cm
- d) 160 cm = ____mm
- e) 75 ml = ____l
- f) 6.3 cm = ____mm
- g) 109 g = ____ kg
- h) 50 cm = ____ m
- i) 5.6 m = ____ cm
- j) 250 m= ____km
- k) 5l = ____ ml
- l) 26,000 cm = ____ m
- m) 14 km = ____ m
- n) 16cm= ____mm
- o) 56,500 mm = ____ km
- p) 1 l = ____ ml
- q) 65 g = ____ mg
- r) 27.5 mg = ____ g
- s) 480 cm = ____ m
- t) 2500 m = ____ km
- u) 923 cm = ____ m
- v) 27 g = ____ kg
- w) 355 ml = ____ l
- x) 0.025 km = ____ cm

TASK 9. SPEAKING PRACTICE

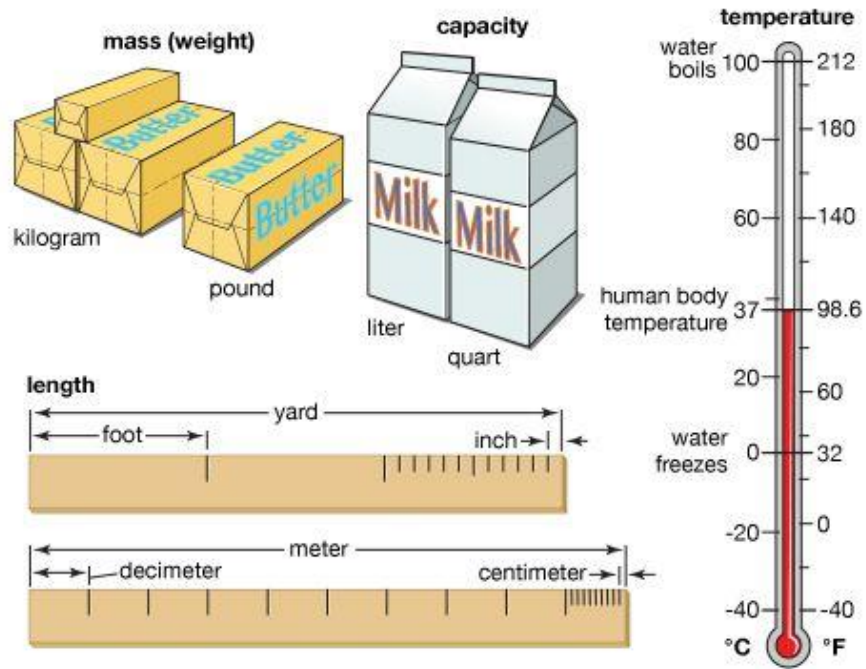
Explain why some people use the term decimals system as a synonym for the metric system (SI)



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TASK 10. WRITING PRACTICE

Customary and international system (SI) units



Describe some of the advantages of the SI system

ADVANTAGES

LESSON 12: MEASUREMENT: MASS AND WEIGHT



TASK 1. FILL IN THE BLANKS WITH THE WORDS GIVEN IN THE WORD BANK

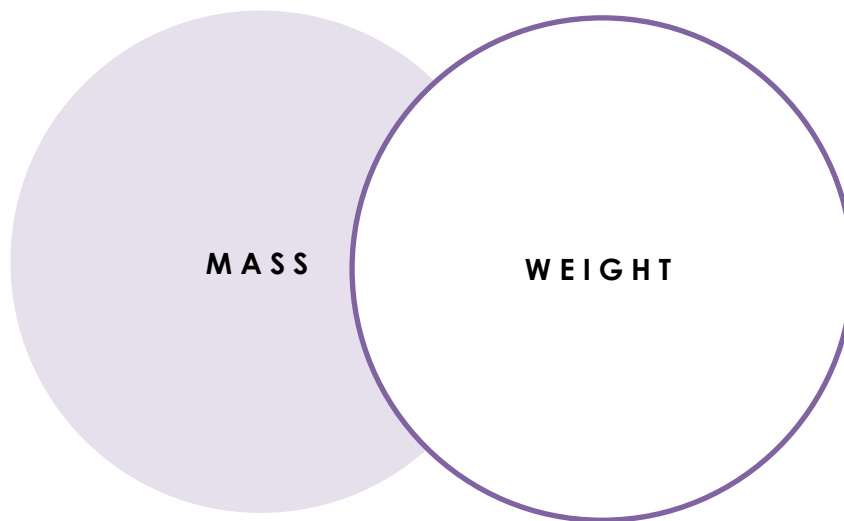
WEIGHT MATTER NEWTON MORE WEIGHTLESSNESS
KILOGRAMS GRAVITATIONAL GRAVITY SAME SPACE

- a) Mass is the amount of _____ contained in an object.
- b) Mass is measured in _____.
- c) On the Earth mass of an object is the _____ as its weight.
- d) Weight is defined as the amount of _____ force acting on an object.
- e) Weight changes because of _____.
- f) There is no force of gravity in _____.
- g) Astronauts float in the space or in their spacecraft due to _____.

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- h) Weight is measured in_____.
- i) If an object goes into the space its _____ changes.
- j) 10.An object weighs _____ at sea level, then at the top of a mountain.

TASK 2. COMPARE AND CONTRAST MASS AND WEIGHT



TASK 3. WRITE A PARAGRAPH ABOUT SIMILARITIES AND DIFFERENCES BETWEEN MASS AND WEIGHT

A large, light purple rounded rectangular box containing five horizontal lines for writing a paragraph.

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TASK 4. SUPER CHALLENGE: WHAT IS A “REALLY EASY” WAY TO LOSE WEIGHT WITHOUT LOSING MASS? TALK WITH YOUR CLASSMATE



TASK 5. READ AND TELL WHAT IS THE DIFFERENCE BETWEEN MASS AND WEIGHT?

WEIGHT	MASS
<i>In space, if there is no gravity acting on a body, then the weight of that body becomes zero.</i>	Mass can never be zero.
<i>To define weight, direction and magnitude are needed. So weight is a vector quantity.</i>	Mass has magnitude, so it is a scalar quantity.
<i>Weight can vary according to location.</i>	Mass does not vary according to location.
<i>The SI unit of weight is Newton (N)</i>	The SI unit of mass is kilogram (kg).
<i>Weight is the measure of the force of gravity on a physical body.</i>	Mass is the amount of matter present in a physical body.
<i>By using spring balance, weight can be measured.</i>	By using ordinary balance, mass can be measured.

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The difference between mass and weight is

TASK 6. ANSWER THE QUESTIONS

1. ***Weightlessness can be experienced due to the absence of the feeling of weight.***

- a) True
- b) False

2. ***What are the similarities between weight and mass?***

- a) Weight and mass are independent of any physical state of a matter, such as solid, gas, liquid, or plasma.
- b) Weight and mass have definite units and dimensions.
- c) Both mass and weight are measurable quantities.
- d) Weight and mass depend on the amount of matter in a body.

3. ***The mass of an object can be zero.***

- a) True
- b) False

4. ***What is the formula for weight?***

5. ***Are the mass and the weight the same on the earth?***

6. ***Why does mass not change in space?***

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7. **If the volume increases, the mass of an object _____?**
- a) *Increases*
 - b) *Decreases*
 - c) *Remains constant*
 - d) *None of the above*
8. **How do you measure the mass and weight?**
9. **What is meant by relativistic mass?**
10. **What is the center of mass?**
11. **Explain the relation between mass and weight by using examples.**
12. **What is the value of acceleration due to gravity?**

TASK 7. USING THE QUESTIONS ABOVE, INTERVIEW A CLASSMATE



CLASSMATE'S NAME/ QUESTIONS

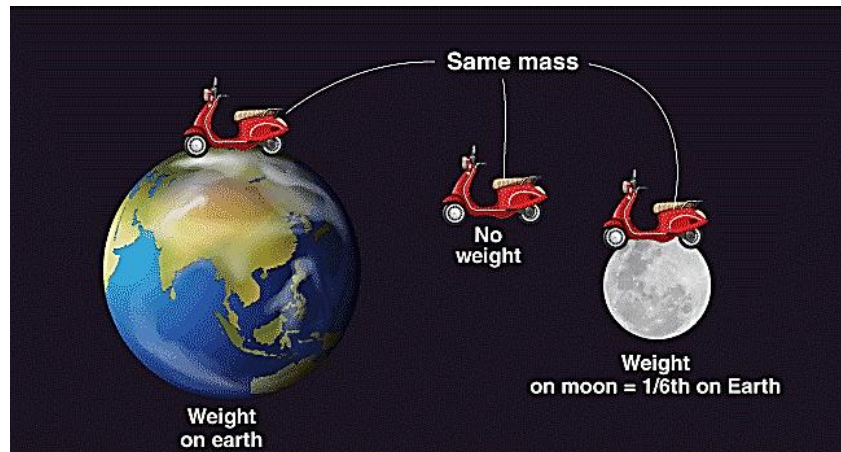
ANSWERS

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TASK 8. WRITE RECORD THE MASS AND WEIGHT OF EACH OBJECT IN THE TABLE BELOW

NAME OF OBJECT	MASS (KG) (= WEIGHT /10)	WEIGHT (N) (= MASS X 10)
Tea cup	2kg	
Paper plate	0.5kg	
Laptop		300N
Sports shoe		45N
Electric kettle	18kg	

TASK 9. LOOK AT THE PICTURE AND EXPLAIN IT TO YOUR TEACHER



TASK 10. WRITE THE EXPLAIN

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GRAMMAR REFERENCE

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IRREGULAR VERBS

Infinitive	Simple Past	Past Participle	Spanish
Arise	Arose	Arisen	Surgir
Be	Was / Were	Been	Ser
Beat	Beat	Beaten	Golpear
Become	Became	Become	Convertirse
Begin	Began	Begun	Comenzar
Bet	Bet/Betted	Bet/Betted	Apostar
Bite	Bit	Bitten	Morder
Bleed	Bled	Bled	Sangrar
Blow	Blew	Blown	Soplar
Break	Broke	Broken	Romper
Bring	Brought	Brought	Traer
Build	Built	Built	Construir
Buy	Bought	Bought	Comprar
Catch	Caught	Caught	Atrapar
Choose	Chose	Chosen	Elegir
Come	Came	Come	Venir
Cost	Cost	Cost	Costar
Creep	Crept	Crept	Arrastrarse
Cut	Cut	Cut	Cortar
Deal	Dealt	Dealt	Dar, Repartir
Do	Did	Done	Hacer
Draw	Drew	Drawn	Dibujar
Dream	Dreamt/Dreamed	Dreamt/Dreamed	Soñar
Drink	Drank	Drunk	Beber

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Drive	Drove	Driven	Conducir
Eat	Ate	Eaten	Comer
Fall	Fell	Fallen	Caer
Feed	Fed	Fed	Alimentar
Feel	Felt	Felt	Sentir
Fight	Fought	Fought	Pelear
Find	Found	Found	Encontrar
Flee	Fled	Fled	Huir
Fly	Flew	Flown	Volar
Forget	Forgot	Forgotten	Olvidar
Forgive	Forgave	Forgiven	Perdonar
Forsake	Forsook	Forsaken	Abandonar
Freeze	Froze	Frozen	Congelar
Get	Got	Got	Tener, Obtener
Give	Gave	Given	Dar
Go	Went	Gone	Ir
Grind	Ground	Ground	Moler
Grow	Grew	Grown	Crecer
Hang	Hung	Hung	Colgar
Have	Had	Had	Tener
Hear	Heard	Heard	Oír
Hide	Hid	Hidden	Escondarse
Hit	Hit	Hit	Golpear
Hold	Held	Held	Tener, Mantener
Hurt	Hurt	Hurt	Herir, Doler
Keep	Kept	Kept	Guardar

SCIENCE AND TECHNOLOGY ESP BOOK 1

Kneel	Knelt	Knelt	Arrodillarse
Know	Knew	Known	Saber
Lead	Led	Led	Encabezar
Learn	Learnt/Learned	Learnt/Learned	Aprender
Leave	Left	Left	Dejar
Lend	Lent	Lent	Prestar
Let	Let	Let	Dejar
Lie	Lay	Lain	Yacer
Lose	Lost	Lost	Perder
Make	Made	Made	Hacer
Mean	Meant	Meant	Significar
Meet	Met	Met	Conocer, Encontrar
Pay	Paid	Paid	Pagar
Put	Put	Put	Poner
Quit	Quit/Quitted	Quit/Quitted	Abandonar
Read	Read	Read	Leer
Ride	Rode	Ridden	Montar, Ir
Ring	Rang	Rung	Llamar Por Teléfono
Rise	Rose	Risen	Elevar
Run	Ran	Run	Correr
Say	Said	Said	Decir
See	Saw	Seen	Ver
Sell	Sold	Sold	Vender
Send	Sent	Sent	Enviar
Set	Set	Set	Fijar
Sew	Sewed	Sewn/Sewed	Coser

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Shake	Shook	Shaken	Sacudir
Shine	Shone	Shone	Brillar
Shoot	Shot	Shot	Disparar
Show	Showed	Shown/Showed	Mostrar
Shrink	Shrank/Shrunk	Shrunk	Encoger
Shut	Shut	Shut	Cerrar
Sing	Sang	Sung	Cantar
Sink	Sank	Sunk	Hundir
Sit	Sat	Sat	Sentarse
Sleep	Slept	Slept	Dormir
Slide	Slid	Slid	Deslizar
Sow	Sowed	Sown/Sowed	Sembrar
Speak	Spoke	Spoken	Hablar
Spell	Spelt/Spelled	Spelt/Spelled	Deletrear
Spend	Spent	Spent	Gastar
Spill	Spilt/Spilled	Spilt/Spilled	Derramar
Split	Split	Split	Partir
Spoil	Spoilt/Spoiled	Spoilt/Spoiled	Estropear
Spread	Spread	Spread	Extenderse
Stand	Stood	Stood	Estar De Pie
Steal	Stole	Stolen	Robar
Sting	Stung	Stung	Picar
Stink	Stank/Stunk	Stunk	Apestar
Strike	Struck	Struck	Golpear
Swear	Swore	Sworn	Jurar
Sweep	Swept	Swept	Barrer
Swim	Swam	Swum	Nadar

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Take	Took	Taken	Tomar
Teach	Taught	Taught	Enseñar
Tear	Tore	Torn	Romper
Tell	Told	Told	Decir
Think	Thought	Thought	Pensar
Throw	Threw	Thrown	Lanzar
Tread	Trode	Trodden/Trod	Pisar
Understand	Understood	Understood	Entender
Wake	Woke	Woken	Despertarse
Wear	Wore	Worn	Llevar Puesto
Weave	Wove	Woven	Tejer
Weep	Wept	Wept	Llorar
Win	Won	Won	Ganar
Wring	Wrung	Wrung	Retorcer
Write	Wrote	Written	Escribir

SCIENCE AND TECHNOLOGY ESP BOOK 1

TO BE

The verb be positive, negative, interrogative statements.

To Be – Affirmative

Subject	To Be	Examples
I	am	I am from New Zealand.
You	are	You are Chilean.
He	is	He is twenty years old.
She	is	She is a nurse.
It	Is	It is a big dog.
We	Are	We are intelligent.
You	Are	You are students.
They	Are	They are married.

To Be - Negative Sentences

The negative of **To Be** can be made by adding **not** after the verb.

Subject	To Be	Examples
I	am not	I am not from Spain.
You	are not	You are not Australian.
He	is not	He is not thirty years old.
She	is not	She is not a secretary.
It	is not	It is not a small cat.
We	are not	We are not stupid.
You	are not	You are not teachers.
They	are not	They are not single.

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To Be - Questions

To create questions with **To Be**, you put the **Verb** before the **Subject**.

Affirmative	Question
I am intelligent.	Am I intelligent?
You are a student.	Are you a student?
He is a pilot.	Is he a pilot?
She is from Spain.	Is she from Spain?
It is a big house.	Is it a big house?
We are ready.	Are we ready?
You are doctors.	Are you doctors?
They are rich.	Are they rich?

To Be - Short Answers

Question	Short Answers**	Short Answers
Am I intelligent?	Yes, you are.	No, you aren't.
Are you a student?	Yes, I am.	No, I am not.
Is he a pilot?	Yes, he is.	No, he isn't.
Is she from Spain?	Yes, she is.	No, she isn't.
Is it a big house?	Yes, it is.	No, it isn't.
Are we ready?	Yes, we are.	No, we aren't.
Are you doctors?	Yes, we are.	No, we aren't.
Are they rich?	Yes, they are.	No, they aren't.

SCIENCE AND TECHNOLOGY ESP BOOK 1

PRONOUNS: SUBJECT, OBJECT, POSSESSIVE

SUBJECT PRONOUN	OBJECT PRONOUN	POSSESSIVE ADJECTIVE
I	me	my
you	you	your
he	him	his
she	her	her
it	it	its
we	us	our
they	them	their

SUBJECT PRONOUNS AND OBJECT PRONOUNS

1. I will go to Switzerland this Easter.

2. He is being an absolute brat.

3. We will meet you all at 20:00h.

4. They love mashed potato.

5. My boss likes you and will keep you on board.

6. I like him. Harry is a nice guy

7. Gemma is a lovely person. My colleagues will love her.

8. Can we get this new television? Yeah, let's get it.

9. Do they find us to be good partners?

SUBJECT PRONOUN		OBJECT PRONOUN	
I	I need help.	ME	Can you help me?
YOU	You need help.	YOU	Can I help you?
HE	He needs help.	HIM	Can you help him?
SHE	She needs help.	HER	Can you help her?
IT	It needs help.	IT	Can you help it?
WE	We need help.	US	Can you help us?
THEY	They need help.	THEM	Can you help them?

verb + object pronoun	preposition + object pronoun
Can you help me?	Where's Phillip? I'm waiting for him.
I sent her some chocolate.	Do you want to come with us?
I will miss him.	Why are you looking at me?

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POSSESSIVE ADJECTIVES

POSSESSIVE ADJECTIVE

MY	My shirt is green.
YOUR	Your book is new.
HIS	His pillow is soft.
HER	Her dog is small.
ITS	Its bone is old.
OUR	Our bird is noisy.
YOUR	Your house is big.
THEIR	Their car is slow.

ITS = Possessive Adjective

- *The dog played with its ball.*

IT'S = It is (contraction)

- *It's very hot right now.*

- o I do really enjoy spending **my time** with you.
- o **Your birthday** is coming up, what would you like?
- o **His name** is Jack.

THERE IS / ARE

AFFIRMATIVE	There is + singular noun	There is a book on the desk.
	There are + plural noun	There are books on the desk.
	There is + uncountable noun	There is some milk in the fridge.
NEGATIVE	There isn't + singular noun	There isn't a pen on the table.
	There aren't + plural noun	There aren't any pens here.
	There isn't + uncountable noun	There isn't any juice in the fridge.
QUESTIONS	There is a cat on the chair.	There are cats on the sofa.
	Is there a cat on the chair?	Are there cats on the sofa?
How many + plural noun + are there ... ? How many students are there in your class? How many days are there in February?		CONTRACTIONS There's = There is There's not = There is not There isn't = There is not There aren't = There are not

Positive Sentences

We use there is for singular and there are for plural.

- ✓ There is one table in the classroom.
- ✓ There are three chairs in the classroom.
- ✓ There is some sugar on the table.
- ✓ There is ice cream on your shirt.

We also use There is with uncountable nouns:

- ✓ There is milk in the fridge.
- ✓ There is some sugar on the table.
- ✓ There is ice cream on your shirt.

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Negative Form

- ✓ There is not a horse in the field.
- ✓ There are not eight children in the school.
- ✓ There is not a tree in the garden.

Questions

- ✓ Is there a dog in the supermarket? - No, there isn't.
- ✓ Are there any dogs in the park? - Yes, there are.
- ✓ Is there a security guard in the shop? - Yes, there is.

How Many with Are There

How many + plural noun + are there (+ complement).

- ✓ How many dogs are there in the park?
- ✓ How many students are there in your class?

COUNTABLE / UNCOUNTABLE NOUNS

COUNTABLE NOUNS		We can count	
Have a singular and plural form	→	a tree	two trees
Can use a <i>singular</i> verb or a <i>plural</i> verb	→	The book <i>is</i> old.	The books <i>are</i> old.
UNCOUNTABLE NOUNS		We cannot count	
Have only one form (no plural)	→	butter	butter s
Always use a singular verb	→	Sugar <i>is</i> sweet.	
Cannot use <i>a</i> , <i>an</i> or <i>a number</i> before them	→	a rice	two rice
	→	a bread	two bread
UNCOUNTABLE NOUNS ARE OFTEN...			
ABSTRACT IDEAS (cannot touch)		LIQUIDS & GASES	
love, freedom, education, luck, help, beauty, music, thunder		water, milk, wine, oil, coffee, rain, soup, air, smoke, blood, juice, fog	
MADE OF SMALLER PARTS		MATERIALS	
sugar, rice, salt, sand, flour, dirt, dust, traffic, grass, spaghetti		wood, glass, paper, gold, silver, ice, iron, cotton, wool, steel	
SOME FOOD (cut into small parts)		BE CAREFUL! (uncountable in English)	
bread, fish, cheese, chocolate, meat, bacon, food, ham		furniture, advice, work, news, information, luggage, money	

Nouns can be countable or uncountable. Countable nouns can be counted, e.g. *an apple, two apples, three apples*, etc. Uncountable nouns cannot be counted, e.g. *air, rice, water*, etc. When you learn a new noun, you should check if it is countable or uncountable and note how it is used in a sentence.

Countable nouns

For positive sentences we can use *a/an* for singular nouns or *some* for plurals.

- ✓ *There's **a** man at the door.*
- ✓ *I have **some** friends in New York.*

For negatives we can use *a/an* for singular nouns or *any* for plurals.

- ✓ *I don't have **a** dog.*
- ✓ *There aren't **any** seats.*

SCIENCE AND TECHNOLOGY ESP BOOK 1

Uncountable nouns

Here are some examples of uncountable nouns:

- ✓ Bread
- ✓ Sugar
- ✓ Salt
- ✓ Milk
- ✓ Sand
- ✓ Butter

We use *some* with uncountable nouns in positive sentences and *any* with negatives.

- ✓ *There's **some** milk in the fridge.*
- ✓ *There isn't **any** coffee.*

Questions

In questions we use *a/an*, *any* or *how many* with countable nouns.

- ✓ *Is there **an** email address to write to?*
- ✓ *Are there **any** chairs?*
- ✓ ***How many** chairs are there?*
- ✓ *And we use *any* or *how much* with uncountable nouns.*
- ✓ *Is there **any** sugar?*
- ✓ ***How much** orange juice is there?*

A lot of (or *lots of*) can be used with both countable and uncountable nouns.

- ✓ *There are **lots of** apples on the trees.*
- ✓ *There is **a lot of** snow on the road.*

PRESENT SIMPLE

PRESENT/ PRESENTE	
DEFINITION <i>DEFINICIÓN</i>	Narra acciones habituales, planeadas, programadas, seguidas o indeterminadas.
AFFIRMATIVE <i>AFIRMATIVO</i>	Subject + Infinitive verb + Complement Kate <u>practices</u> <u>basketball</u> . <i>(Kate practica baloncesto.)</i>
NEGATIVE <i>NEGATIVO</i>	Subject + Do/Does + Not + Infinitive verb + Complement Kate <u>doesn't</u> <u>practice</u> <u>basketball</u> . <i>(Kate no practica baloncesto.)</i>
INTERROGATIVE <i>INTERROGATIVO</i>	Do/Does + Subject + Infinitive verb + Complement? <u>Does</u> <u>Kate</u> <u>practice</u> <u>basketball</u> ? <i>(¿Kate practica baloncesto?)</i>

The simple present tense in English is used to describe an action that is regular, true, or normal.

We use the present tense:

1. For repeated or regular actions in the present time period.

- ✓ I **take** the train to the office.
- ✓ The train to Berlin **leaves** every hour.
- ✓ John **sleeps** eight hours every night during the week.

2. For facts.

- ✓ The President of The USA **lives** in The White House.
- ✓ A dog **has** four legs.
- ✓ We **come** from Switzerland.

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3. For habits.

- ✓ I **get up** early every day.
- ✓ Carol **brushes** her teeth twice a day.
- ✓ They **travel** to their country house every weekend.

4. For things that are always / generally true.

- ✓ It **rains** a lot in winter.
- ✓ The Queen of England **lives** in Buckingham Palace.
- ✓ They **speak** English at work.

The spelling for the verb in the third person differs depending on the ending of that verb:

1. For verbs that end in **-O**, **-CH**, **-SH**, **-SS**, **-X**, or **-Z** we add **-ES** in the third person.

- ✓ go – goes
- ✓ catch – catches
- ✓ wash – washes
- ✓ kiss – kisses
- ✓ fix – fixes
- ✓ buzz – buzzes

2. For verbs that end in a **consonant + Y**, we remove the **Y** and add **-IES**.

- ✓ marry – marries
- ✓ study – studies
- ✓ carry – carries
- ✓ worry – worries

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NOTE: For verbs that end in a **vowel + Y**, we just add **-S**.

- ✓ play – plays
- ✓ enjoy – enjoys
- ✓ say – says

Negative Sentences in the Simple Present Tense

- ✓ **Affirmative:** You speak French.
Negative: You **don't** speak French.
- ✓ **Affirmative:** He speaks German.
Negative: He **doesn't** speak German.

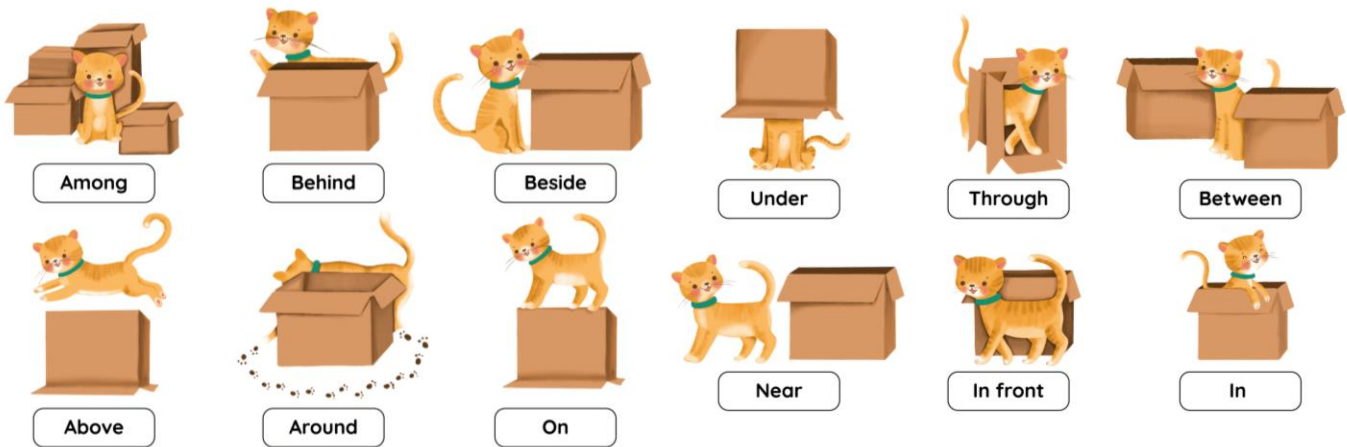
Questions in the Simple Present Tense

- ✓ Affirmative: You speak English.
Question: **Do** you speak English?
- ✓ Affirmative: He speaks French.
Question: **Does** he speak French?
- ✓ **Do** you need a dictionary?
- ✓ **Does** Mary need a dictionary?
- ✓ **Do** we have a meeting now?
- ✓ **Does** it rain a lot in winter?
- ✓ **Do** they want to go to the party?
- ✓ **Does** he like pizza?

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Sample Questions	Short Answer (Affirmative)	Short Answer (Negative)
Do you like chocolate?	Yes, I do.	No, I don't.
Do I need a pencil?	Yes, you do.	No, you don't.
Do you both like chocolate?	Yes, we do.	No, we don't.
Do they like chocolate?	Yes, they do.	No, they don't.
Does he like chocolate?	Yes, he does.	No, he doesn't.
Does she like chocolate?	Yes, she does.	No, she doesn't.
Does it have four wheels?	Yes, it does.	No, it doesn't.

PREPOSITIONS OF PLACE



- ✓ There is a cup on the table.
- ✓ The helicopter hovered above the house.
- ✓ The police placed a sheet over the body.
- ✓ He stood in front of the door and rang the bell.
- ✓ Ram sat beside Tara.
- ✓ A small stream runs below that bridge.
- ✓ He put the key under the doormat.
- ✓ He put his hands behind his back.

PRESENT CONTINUOUS

POSITIVE	I am	I'm	} working.	NEGATIVE	I am not	I'm not	} working.
	You are	You're			You are not	You aren't	
	He is	He's			He is not	He isn't	
	She is	She's			She is not	She isn't	
	It is	It's			It is not	It isn't	
	We are	We're			We are not	We aren't	
	They are	They're			They are not	They aren't	
	QUESTION	Am I			} working?	SHORT ANSWER	
Are you		Yes, you are	No, you are not	No, you aren't			
Is he		Yes, he is	No, he is not	No, he isn't			
Is she		Yes, she is	No, she is not	No, she isn't			
Is it		Yes, it is	No, it is not	No, it isn't			
Are we		Yes, we are	No, we are not	No, we aren't			
Are they		Yes, they are	No, they are not	No, they aren't			
-ING SPELLING	work	working	GENERAL RULE: add -ing				
	study	studying					
	live	living					
make	making	Consonant + -e : delete -e and add -ing					
run	running	Consonant + vowel + consonant (stressed): double the consonant + -ing					
swim	swimming						

We use the present progressive tense:

1. When somebody is doing something at this moment.

- ✓ Sarah is changing her clothes right now.
- ✓ Her boyfriend is waiting for her.
- ✓ We are learning the progressive tense in English.

2. When something is happening at this moment. When the action has started but hasn't finished.

- ✓ It is snowing at the moment.
- ✓ The economy is growing at an exponential rate.
- ✓ The children are sleeping so please be quiet.

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3. To talk about something that is happening around the time of speaking but not necessarily at that exact moment.

- ✓ Alfredo is studying a lot for his exam.
- ✓ I'm reading a great book. (Not necessary right at this moment)
- ✓ We are planning a trip to Jamaica.

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SIMPLE PAST TENSE

+ Affirmative

SUBJECT
I / you / we / they
he / she / it

VERB
lived ...

↑
Past tense regular verbs end in -ed.

There is only one form of each verb in the past simple.*

* The exception is TO BE which has two forms: was and were.

Examples:
 + Affirmative: I **lived** in London.
 + Affirmative: She **lived** in Paris.
 + Affirmative: He **watched** a movie.
 + Affirmative: They **wanted** a holiday.

- Negative

SUBJECT
I / you / we / they
he / she / it

AUXILIARY
didn't

VERB
speak ...
need ...
live ...

⊗ The base form of the infinitive = to go, to need, to speak, to live
The verb is not in the past tense in negative sentences. "Didn't" tells us it is a past tense sentence.

Examples:
 + Affirmative: I **lived** in Spain.
 - Negative: I **didn't** **live** in Spain.
 + Affirmative: He **watched** a movie.
 - Negative: He **didn't** **watch** a movie.

? Question

AUXILIARY
Did

SUBJECT
I / you / we / they
he / she / it

VERB
speak ... ?
need ... ?
live ... ?

⊗ The base form of the infinitive = to go, to need, to speak, to live
The verb is not in the past tense in questions. "Did" tells us we are asking a past tense question.

Examples:
 + Affirmative: You **lived** in Italy.
 ? Question: **Did** you **live** in Italy?
 + Affirmative: She **watched** a movie.
 ? Question: **Did** she **watch** a movie?

AFFIRMATIVE:

Subject + Verb (In Past Form) + Complement.

Example:

I saw a movie yesterday.

NEGATIVE:

Subject + Auxiliary Verb (Did) + Negation + Verb (Infinitive) + Complement.

Example:

He didn't hear the telephone.

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QUESTIONS:

Auxiliary verb (did) + subject + verb(infinitive) + complement +?

Example:

Did you have dinner last night?

PAST TENSE CONTINUOUS

FORM

Positive

I She He It	was	working.
You We They	were	

Negative

I She He It	wasn't (was not)	working.
You We They	(were not)	

Question

Was	I she he it	working?
Were	you we they	

Short answers

Yes, No,	I she he it	was. wasn't.
	you we they	were. weren't.

It refers to a continuing action or state that was happening at some point in the past. The past continuous tense is formed by combining the past tense of to be (i.e., was/were) with the verb's present participle (-ing word).

- ✓ The sun was shining every day that summer.
- ✓ As I spoke, the children were laughing at my cleverness.
- ✓ It was snowing yesterday.
- ✓ They were eating at the restaurant.
- ✓ You were working yesterday.
- ✓ I was studying last night.
- ✓ I was waiting for the cab when I met Raj.
- ✓ The children were shouting when the teacher came in.
- ✓ It was midnight when it was raining.
- ✓ Everyone was clapping.

PRESENT PERFECT



The Present Perfect Tense is formed using the following structure:

- **Affirmative:** Subject + Have / Has + Past Participle
- **Negative:** Subject + Haven't / Hasn't + Past Participle
- **Question:** Have / Has + Subject + Past Participle

When do we use the Present Perfect Tense?

1. Unspecified point in the past

I **have been** to Spain three times.

(At some unspecified time in the past, I went to Spain).

Compare with the simple past:

I went to Spain three times in 2005.

(specified time in the past - the year 2005)

2. An action that occurred in the past, but has a result in the present (now)

We can't find our luggage. **Have** you **seen** it?

(The luggage was lost in the past, do you know where it is now?)

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3. Talking about general experiences (ever, never)

It usually refers to an event happening at some moment in your life.

Has she ever **tried** Chilean wine before? (in her life)

I've never **eaten** monkey brains before. (in my life)

4. Events that recently occurred (just)

Do you want to go to a restaurant with me?

No, thanks. I've just **eaten** lunch. (I recently ate lunch.)

5. Events that have not occurred up to now (yet)

Are Carlos and Rodrigo here? No, they **haven't arrived** yet. (they're still not here now)

6. Events that occurred before you expected (already)

I've already **graduated** from University. (I expected to graduate at a later date.)

7. Events that began in the past and haven't changed (for, since)

Mike **has worked** at Woodward for 3 years.

Julie **has worked** at Woodward since September last year.

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FUTURE FORMS

will	be going to	present simple
<p>predictions (we think something will happen)</p> <ul style="list-style-type: none"> ⊕ He will be a good doctor. ⊕ I believe they will win this match. <p>instant decisions (taken while speaking)</p> <ul style="list-style-type: none"> ⊕ A: "We don't have sugar" B: "I'll buy some then." <p>promises and refusals</p> <ul style="list-style-type: none"> ⊕ I will help you but I won't lend you any money. <p>offers</p> <ul style="list-style-type: none"> ⊕ I'll carry your bag. / Shall I carry your bag? <p>suggestions</p> <ul style="list-style-type: none"> ⊕ Shall we eat out today? <p>requests</p> <ul style="list-style-type: none"> ⊕ Will you open the door please? 	<p>predictions (we see - present evidence)</p> <ul style="list-style-type: none"> ⊕ Slow down! We're going to have an accident! ⊕ Look at the clouds. It's going to rain. <p>decisions (taken before now - intentions/plans)</p> <ul style="list-style-type: none"> ⊕ Are you going to watch the game tonight? <p>present continuous</p> <p>plans (arrangements have been made)</p> <ul style="list-style-type: none"> ⊕ I'm flying to New York tomorrow morning. ⊕ I'm seeing the dentist at 6. ⊕ We are getting married next week. 	<p>timetabled events</p> <ul style="list-style-type: none"> ⊕ The train leaves at 4 o'clock. ⊕ The exams start next week. <p>future time clauses (when/ as soon as/until, etc.)</p> <ul style="list-style-type: none"> ⊕ I'll retire when I am 70. (NOT when I'll be 70). ⊕ Call me as soon as you arrive. <p>may / might</p> <p>Use may or might to talk about future possibility</p> <ul style="list-style-type: none"> ⊕ I might go to the party tomorrow; I'm not sure. ⊕ Temperatures might go up next week

Use:

FUTURE I GOING TO	FUTURE I WILL	SIMPLE PRESENT	PRESENT PROGRESSIVE
Decision made for the future	Action in the future that cannot be influenced	Action set by a time table or schedule	Action already arranged for the near future
Conclusion with regard to the future	Assumption with regard to the future		
	Spontaneous decision		

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We have a lesson next Monday. The train arrives at 6.30 in the morning.

- ✓ I'm playing football tomorrow. ____
- ✓ It will be a nice day tomorrow. ____
- ✓ I hope you will come to my party. ____
- ✓ I'll see you tomorrow. ____
- ✓ Tim will be at the meeting. ____
- ✓ I'm going to drive to work today. ____

READING SECTION



READING COMPREHENSION 1

LAB EQUIPMENT

TEST TUBE

A test tube, also known as a sample tube, is a common piece of laboratory glassware consisting of a finger-like length of glass or clear plastic tubing, open at the top and closed at the bottom.



BEAKERS

Beakers are used as containers. They are available in a variety of sizes. Although they often possess volume markings, these are only rough estimates of the liquid volume.



ERLENMEYER FLASK

Erlenmeyer flasks are often used as reaction vessels, particularly in titrations. As with beakers, the volume markings should not be considered accurate.



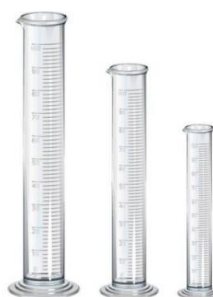
VOLUMETRIC FLASK

Volumetric flasks are used to measure and store solutions with a high degree of accuracy. These flasks generally possess a marking near the top that indicates the level at which the volume of the liquid is equal to the volume written on the outside of the flask.



GRADUATED CYLINDER

Graduated cylinders are used to transfer liquids with a moderate degree of accuracy.



PIPETTE

Pipettes are used for transferring liquids with a fixed volume and quantity of liquid must be known to a high degree of accuracy.



GRADUATED PIPETTE

These Pipettes are calibrated in the factory to release the desired quantity of liquid.



DISPOSABLE PIPETTE

Disposable transfer. These Pipettes are made of plastic and are useful for transferring liquids dropwise.



BURETTE

Burettes are devices used typically in analytical, quantitative chemistry applications for measuring liquid solution. Differing from a pipette since the sample quantity delivered is changeable, graduated Burettes are used heavily in titration experiments.



BURETTE CLAMP

Burette clamp is scientific equipment which used specifically to hold and secure a burette on a stand, so that a burette is fixed and more convenient for the experiment. Burette clamp can be made by many materials such as plastic and cast iron.



FUNNEL

A tube or pipe that is wide at the top and narrow at the bottom, used for guiding liquid or powder into a small opening.



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BUCHNER FUNNEL

A Büchner funnel is a piece of laboratory equipment used in filtration. It is traditionally made of porcelain, but glass and plastic funnels are also available. On top of the funnel-shaped part there is a cylinder with a fritted glass disc/perforated plate separating it from the funnel.



BUCHNER FUNNEL VACUUM FILTRATION SETUP

Suction filtration is the standard technique used for separating a solid-liquid mixture when the goal is to retain the solid. Like gravity filtration, a solid-liquid mixture is poured onto a filter paper.



CLAMP

It is used to hold round laboratory glassware, such as a beaker, and flasks, etc. This type of clamp is made from stainless steel.



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TEST TUBE BRUSH

Test tube brush or spout brush is a brush used for cleaning test tubes and narrow mouth laboratory glassware, such as graduated cylinders, burettes, and Erlenmeyer flasks.



TEST TUBE HOLDER

A test tube holder is used to hold test tubes. It is used for holding a test tube in place when the tube is hot or should not be touched.



TEST TUBE STAND

Test tube racks are laboratory equipment used to hold upright multiple test tubes at the same time.



BUNSEN BURNER

A small adjustable gas burner used in laboratories as a source of heat.



SCIENCE AND TECHNOLOGY ESP BOOK 1

PETRI DISH

A petri dish is a small dish shaped like a cylinder.



GLASS ROD

A glass stirring rod, glass rod, stirring rod or stir rod is a piece of laboratory equipment used to mix chemicals and liquids for laboratory purposes.



GRADUATED DROPPER

A dropper or Pasteur pipette is an instrument used to transfer small quantities of liquid.



TONGS

Tongs are a type of tool used to grip and lift objects instead of holding them directly with hands.



UTILITY CLAMP

A utility clamp is a laboratory apparatus resembling a pair of scissors. The screw in the middle works as the wide adjustment of 2-prong. It is composed of 3 parts: 2-prong adjust, metal rod, and clamp down.



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SPOT TEST PLATE

A spot plate, also called a reaction plate is a laboratory tool made either from ceramics.



TRIPOD FOR BUNSEN BURNER

A laboratory tripod is a three-legged platform used to support flasks and beakers.



WASH BOTTLE

A wash bottle is a squeeze bottle with a nozzle, used to rinse various pieces of laboratory glassware, such as test tubes and round bottom flasks.



WIRE MESH GAUZE (CERAMIC CENTRE)

Wire mesh is used for uniform distribution of flame heat in base of a heated body. It is made of iron wire strands with or without ceramic interior cores.



SPATULA

In laboratories, spatulas and micro spatulas are small stainless-steel utensils, used for scraping, transferring, or applying powders and paste like chemicals or treatments.



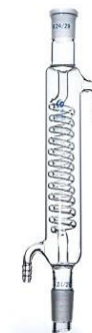
ROUND-BOTTOM FLASKS

Round-bottom flasks (also called round-bottomed flasks or RB flasks) are types of flasks having spherical bottoms used as laboratory glassware, mostly for chemical or biochemical work.



GLASS CONDENSER

A condenser is an apparatus or item of equipment used to condense. In the laboratory, condensers are generally used in procedures involving organic liquids brought into the gaseous state through heating, with or without lowering the pressure.



FILTER PAPER

Filter paper is a semi-permeable paper barrier placed perpendicular to a liquid or air flow. It is used to separate fine substances from liquids or air. It is used in science labs to remove solids from liquids.



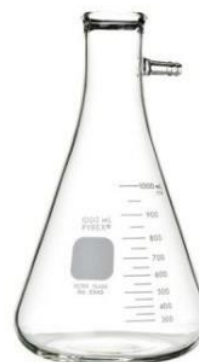
SEPARATORY FUNNEL

A separatory funnel, also known as a separation funnel, separating funnel, or colloquially sep funnel, is a piece of laboratory glassware used in liquid-liquid extractions to separate (partition) the components of a mixture into two immiscible solvent phases of different densities.



FILTERING FLASK

A filtering flask is a piece of labware used to separate solids from fluids in filtration operations. To filter substances, the flask is used with a filtering funnel, such as a Buchner funnel, which incorporates a fritted glass disc or perforated plate fitted with a piece of filter paper to filter particles.



WATCH GLASS

A watch glass is a circular concave piece of glass used in chemistry as a surface to evaporate a liquid, to hold solids while being weighed, for heating a small amount of substance and as a cover for a beaker.



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FUSION TUBE

Fusion tube is laboratory tube used much in the same way as boiling tubes expect not being as large and thick walled.



MORTAR AND PESTLE

Mortar and pestle are implements used since ancient times to prepare ingredients or substances by crushing and grinding them into a fine paste or powder in the laboratory.



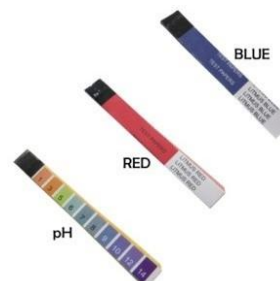
REAGENT BOTTLE

Reagent bottles, also known as media bottles or graduated bottles, are containers made of glass, plastic, borosilicate or related substances, and topped by special caps or stoppers and are intended to contain chemicals in liquid or powder form for laboratories and stored in cabinets or on shelves.



LITMUS AND PH PAPER

Litmus or pH paper contains a chemical that changes color as it contacts an acid or base. The paper will turn red in acids and blue in bases.



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SAMPLE CONTAINERS

Sample containers are very useful for storing chemicals solid samples. Very useful for transport purposes as it allows leak proof and airtight closures.



DESICCATOR

Desiccators are sealable enclosures containing desiccants used for preserving moisture-sensitive chemicals. A common use for desiccators is to protect chemicals which are hygroscopic, or which react with water from humidity.



CRUCIBLE

A crucible is a ceramic or metal container in which metals or other substances may be melted or subjected to very high temperatures.



SCIENCE AND TECHNOLOGY ESP BOOK 1

DIGITAL BALANCE

The digital mass balances in the General Chemistry labs are very sensitive instruments used for weighing substances to the milligram (0.001 g) level.



MAGNETIC STIRRER

A magnetic stirrer is used to make a stir bar, immerse in a liquid, quickly spin, or stirring or mixing a solution.



WATER BATH

A water bath is used to incubate samples in water at a constant temperature over a long period of time.



VACUUM PUMP

It can evacuate chemically aggressive gases and vapors.



DIGITAL COLORIMETER

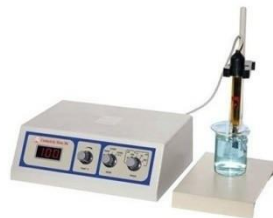
A colorimeter is a light-sensitive device used for measuring the transmittance and absorbance of light passing through a liquid sample.



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DIGITAL CONDUCTOMETER

A conductivity meter measures the electrical conductivity in a solution.



DIGITAL PH METER

A pH meter is a scientific instrument that measures the hydrogen-ion activity in water-based solutions, indicating its acidity or alkalinity expressed as pH.



DIGITAL POTENTIOMETER

A potentiometer is an instrument for measuring voltage by comparison of an unknown voltage with a known reference voltage.



READING COMPREHENSION 2

Dorothy Hodgkin: Discovered the structure of insulin



Dorothy Hodgkin was born in 1910, the eldest of four daughters and in 1920 the family settled in Suffolk. She attended a state secondary school where only boys were allowed to study chemistry, but she fought the system to be enrolled.

Eventually, she was admitted to Oxford where she was recognized as an exceptional student and obtained a first class honors degree in chemistry in 1932. She obtained her PhD from Cambridge in 1936 and undertook research mapping the

architecture of cholesterol and examining the structure of penicillin, essential to creating a synthetic version of it.

Her work led to many industrial contracts and, from the 1950s onwards, she focused her research on the structure of insulin, building the first model of the insulin molecule.

In 1964, Dorothy won the Nobel Prize for Chemistry for "her determinations by X-ray techniques of the structures of important biochemical substances". She was only the third woman to have won a Nobel Prize for Chemistry after Marie Curie and her daughter Irène Joliot-Curie, and the fifth woman to win a science Nobel Prize.

She is still the only British woman to be awarded a Nobel Prize in any of the three sciences it recognizes. In 1965, Dorothy was the second woman, after Florence Nightingale, to be appointed to the Order of Merit by a British monarch. - JC

READING COMPREHENSION 3

Cecilia Payne-Gaposchkin: Astronomer who discovered the composition of stars

Payne-Gaposchkin was a woman of many firsts: the first to receive a PhD from Radcliffe College, the first to be professor at Harvard, and the first to discover the composition of stars.

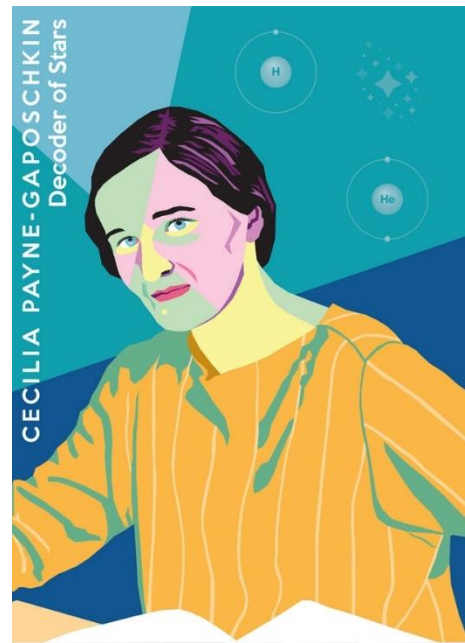
Cecilia Helena Payne started life on 10 May 1900 in the town of Wendover, 40 miles northwest of London. Early on, she displayed a relentless curiosity. Before she could read, she could look up and point to Charles's Wain (also known as the Big Dipper) and Orion's Belt.

Hers was a restless mind with a vivid imagination. After a summer thunderstorm, she noticed that the ground of the family's English garden was rippling like the surface of a beautiful pond. Racing outside for a closer look, she saw that the rain had churned the soil to reveal a sea of wriggling black slugs. She cried bitterly to think that the world could create something so revolting.

Though she was expelled from her high school at 17, she was accepted to the demanding St. Paul's School for Girls in London. After a frenzied year of study – Newtonian equations of motion, thermodynamics, astronomy – she was accepted to Cambridge.

When she enrolled in 1919, she studied at Newnham, one of just two colleges for women. She dutifully complied with the tradition at the time: men studied mathematics; women studied botany.

All that changed, however, on the night of 2 December when [Arthur Eddington](#), the head of the Cambridge Observatory, gave a lecture in Cambridge's Trinity Hall, recounting his recent solar expedition that proved



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Einstein's Theory of Relativity.

Cecilia was one of four women in the audience. She was done with botany; she changed her major to physics, with all the astronomy she could pick up on the side.

After graduation, with no prospects for an astronomy job in England, Cecilia secured a fellowship at the Harvard College Observatory in another Cambridge, the one in the USA. Cecilia immediately began putting her Cavendish Lab training to work. By looking down through a jeweller's loupe, she was able to do what centuries of astronomers had tried to do by looking up through telescopes: determine what stars are made of. It was the birth of astrophysics.

And it's where the trouble started. She determined that hydrogen was far more prevalent in the Universe than the established astronomical community believed. Like a *million* times more. No one believed that a female graduate student could make such a fundamental discovery.

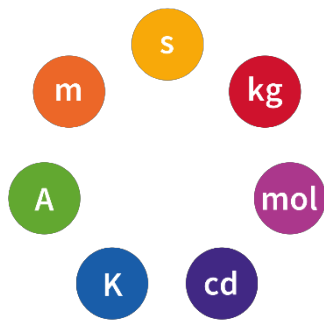
The dean of American astronomers at the time was Henry Norris Russell, the head of the Princeton Observatory; he wrote to Cecilia that her findings were "clearly impossible." As a result, in her book *Stellar Atmospheres*, she concluded that her results were "almost certainly not real." (Years later, Russell acknowledged that she was correct, but he buried it toward the end of his paper.)

Through it all, she persevered. She was the first woman to receive a PhD from Radcliffe College; the first woman to receive the American Astronomical Society's "lifetime of eminence" award; and, after Lowell finally retired, the ultimate first.

The *New York Times*, June 21, 1956: "Harvard University announced today the appointment of Dr. Cecilia Payne-Gaposchkin as Professor of Astronomy. She is the first woman to attain full professorship at Harvard through regular faculty promotion."

READING COMPREHENSION 4

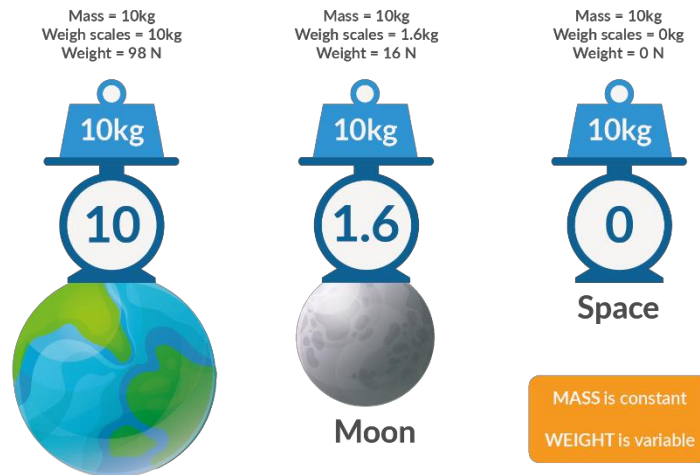
SI UNIT



The common name, SI Units, is short for the International System of Measurements. Back in 1960, the SI units were adopted as the universal measurement system. This modern metric system helps scientists and doctors worldwide keep consistent data that is easy to compare and analyze. For scientific findings to be accepted and understood without confusion, scientists had to accept a method of measurement that would be concise and universally used. In this unit, your student will be introduced to the importance of the International System of Measurements and what it is. The SI UNITS unit includes a slideshow, video clips, articles, and a number of hands-on measurement activities.

READING COMPREHENSION 5

MASS OR WEIGHT



Though the terms weight and mass are used interchangeably in common language, in science there is distinct difference between the two terms. The weight of an object = force of gravity felt by that object, but the mass of an object is the amount of matter the object has. Mass is a measure of the object's resistance to acceleration: a push on a skateboard will make it roll away quickly but the same push on a more massive car will barely budge it. An object's weight depends on the pull of the gravitating object but the object's mass is independent of the gravity. For example, Joe Average weighs himself on the Earth's surface and then on the Moon's surface. His weight on the Moon will be about six times less than on the Earth but the number of atoms in his body has not changed so his mass is the same at the two places. In the old English unit system, there is a "pound" of force and "pound" of mass. On only the Earth's surface, an object's pound of mass = the number of pounds of force felt by the object due to the Earth's gravity. In the metric system there is no confusion of terms. A kilogram is a quantity of mass and a newton is a quantity of force. One kilogram (kg) = 2.205 pounds of mass and 4.45 newtons (N) = 1 pound of force. If someone uses "pounds", be sure you understand if s/he means force or mass!

READING COMPREHENSION 6

CHEMICAL CHANGES



Chemical changes occur when a substance combines with another to form a new substance, called synthesis or, alternatively, decomposes into two or more different substances. These processes are called chemical reactions and, in general, are not reversible except by further chemical reactions. Some reactions produce heat and are called exothermic reactions and others may require heat to enable the reaction to occur, which are called endothermic reactions. Understanding chemical changes is a major part of the science of chemistry.

When chemical reactions occur, the atoms are rearranged and the reaction is accompanied by an energy change as new products are generated. An example of a chemical change is the reaction between sodium and water to produce sodium hydroxide and hydrogen. So much energy is released that the hydrogen gas released spontaneously burns in the air. This is an example of a chemical change because the end products are chemically different from the substances before the reaction.

Chemists categorize chemical changes into three main classes: inorganic chemical changes, organic chemical changes and biochemical changes.

An inorganic change describes the reactions of elements and compounds that, in general, do not involve carbon. The changes typically take place in laboratories or industries. Typical types of change include neutralization, and oxidization including combustion.

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Organic changes are concerned with the chemistry of carbon and the elements and compound with which it reacts. These compounds include mineral oil and all of its products and much of the output of industries manufacturing of pharmaceutical, paints, detergents, cosmetics and fuels. Typical examples of organic chemical changes include cracking heavy hydrocarbons at an oil refinery to create more gasoline from crude oil.

Biochemical change deals with the chemistry of the growth and activity of living organisms. It is a chemistry where most reactions are controlled by complex proteins called enzymes and are moderated and limited by hormones. This chemical change is always highly complex and is still not fully understood. Decomposition of organic material is also within the scope of biochemistry although in this case it is the growth and activity of fungi and bacteria and other micro-organisms that is involved. Typical types of change include all the process involved in photosynthesis. This is a process where carbon dioxide and water are changed into sugars and oxygen by plants.

There are several ways by which the evidence can be seen that a chemical change has taken place. Change of odor and color reveals change. Change in temperature or the energy level of materials reveals that a chemical change has occurred. When there is a change of composition, where light or heat is produced, or a formation of gases is produced, all are evidence that a chemical change has taken place. Some examples of everyday chemical changes include rusting iron, burning wood, cooking an egg, baking a cake, explosion of fireworks, rotting bananas, or grilling hamburgers.

Chemical changes are reactions involve combining different substances. The chemical reaction produces a new substance with new and different physical and chemical properties. Matter is never destroyed or created in chemical change. The particles of one substance are rearranged to form a new substance. The same number of particles that exist before the reaction exist after the reaction.

READING COMPREHENSION 7

SCIENCE EXPERIMENTS



Many of the different things people do to learn about something may be called experiments. An experiment is a procedure used to make a discovery, test something, or demonstrate a fact. Experiments are often used by scientists to learn new things.

An example of making a discovery occurred when explorers long ago traveled across the ocean to America, they were making a discovery. They did not know what they would find in the New World. Scientists discover new medicines to treat diseases. Discovering things is experimenting.

To test something a cook might test recipes by adding different amounts of ingredients. The cook is experimenting. A scientist may help a car company build safer cars when testing the strength of seatbelts. Testing things is called experimenting.

Finally, everyone knows if you drop something it will fall to the ground or floor. This is called gravity. Scientists may drop different things to demonstrate gravity, proving that the fact is true. Demonstrating a scientific fact is experimenting.

Experiments are used by many kinds of scientists. In class, students might do experiments too. Often, they are done in science class, but in art class, they might mix different colors of paint to create a new color. It is experimenting

SCIENCE AND TECHNOLOGY ESP BOOK 1

when the colors are mixed, and a person learns something new about colors. The steps of doing science experiments are part of the scientific method, which are the rules for doing experiments. Step one involves a problem, such as what is being investigated or what problem needs to be solved? Step two includes a statement called a hypothesis, which is a statement of explanation that can be tested with an experiment. An example of a hypothesis might be: *Students believe Brand A paper towels are better than Brand B paper towels because the price is higher.* The hypothesis can then be tested.

The next step would be to design the experiment to test the hypothesis, and then conduct and control the experiment. The experiment may begin, but control variables are those things that can be changed during the experiment, such as using different paper towels in the previous example. As the experiment is conducted, it is important to make observations.

Observing and recording means to write down the procedure of the experiment, the amounts of substances, sizes of things, and other information other scientists would need to know if they want to repeat the experiment.

Finally, once the experiment has been conducted and completed, it is important to analyze the results. Analyze the recorded and observed information, reflect and think about the completed experiment. Once the results are analyzed, all scientists draw a conclusion. What is learned by the results of the experiment? This can also include a discussion with other scientists as well.

Often, it may be necessary to repeat the experiment. If the first or original experiment was done correctly, the results should be the same. All experiments will follow the basic scientific method steps. The only changes will include the type of experiment conducted, the supplies used, or how often the experiment may be repeated. Every experiment will include variables, the things that can be changed or controlled during an experiment.

The best experiments will often lead to more questions about the things you will want to learn, more experiments, and usually more research. Real scientists follow these steps for their experiments, and when they conduct one experiment, it may lead to several other experiments with small changes.

SPEAKING SECTION

SPEAKING 1

- What do Chemical Engineers do?
- What are the activities of a chemical engineer?
- What are 5 things created by chemical engineers?
- What are the 4 categories of chemical engineering?
- What are engineer's activities?
- What skills does a chemical engineer need?

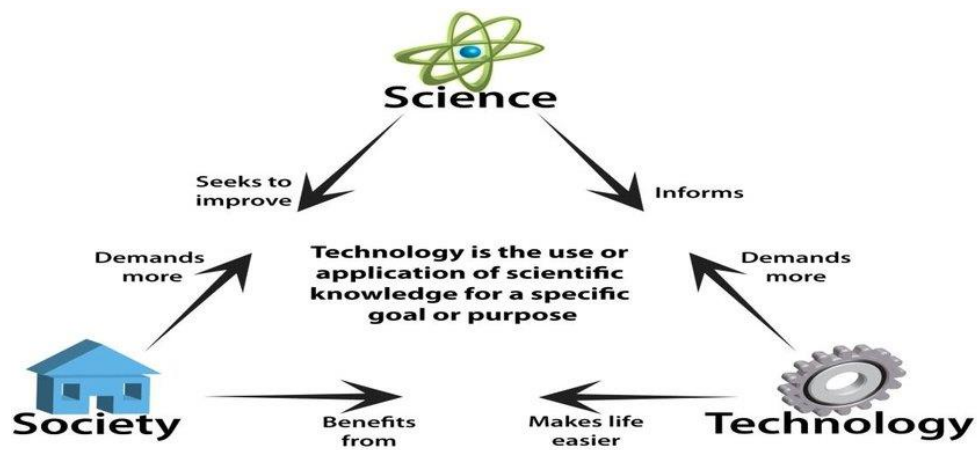
SPEAKING 2

ROLE OF SCIENCE AND TECHNOLOGY IN OUR DAILY LIFE: LOOK AT THE PICTURES AND TALK ABOUT THE TOPIC

- Today science and technology is our daily need.
- With the help of technology, cooking is a minute job.
- Technologies helped to reduce our daily traveling time.
- The necessity and usefulness of smartphones are speechless.
- Technology is providing us with safe, secure, and comfortable living.

SPEAKING 3

THE RELATIONSHIP BETWEEN SCIENCE, TECHNOLOGY, AND THE SOCIETY: LOOK AT THE PICTURES AND TALK ABOUT THE TOPIC



- It is important to establish a common understanding of the key terms of _____

SCIENCE AND TECHNOLOGY ESP BOOK 1

SPEAKING 4




ADVANTAGES AND DISADVANTAGES ABOUT TECHNOLOGY: LOOK AT THE PICTURES AND TALK ABOUT THE TOPIC



SPEAKING 5

INVENTORS AND INVENTIONS

LOOK AT THE PICTURES AND TALK ABOUT THE TOPIC

<p>Johannes Gutenberg</p>  <p>printing press</p>	<p>Benjamin Franklin</p>  <p>lightning rod</p>	<p>Thomas Edison</p>  <p>lightbulb</p>	<p>Alexander Graham Bell</p>  <p>telephone</p>	<p>George Washington Carver</p>  <p>300 uses for peanuts</p>
<p>James Naismith</p>  <p>basketball</p>	<p>Nikola Tesla</p>  <p>fluorescent lighting</p>	<p>Steve Jobs</p>  <p>iPhone</p>	<p>Tim Berners-Lee</p>  <p>The World Wide Web</p>	<p>Hedy Lamarr</p>  <p>radio-guidance system</p>

SPEAKING 6

SAFE LAB PRACTICES: LOOK AT THE PICTURES AND TALK ABOUT THE TOPIC



SPEAKING 7

ADVANTAGES AND DISADVANTAGES OF INTERNET: LOOK AT THE PICTURES AND TALK ABOUT THE ADVANTAGES AND DISADVANTAGES



Advantages and Disadvantages of Internet

- Instant access to almost any information. ...
- Easy communication with friends and family. ...
- Building a digital identity. ...
- Information about services and products. ...
- Stay in touch with friends from school and work. ...
- Increased risk of cyber-bullying. ...
- Risk of identity theft.

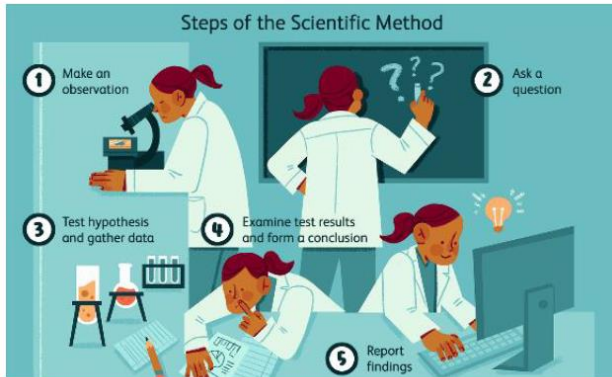
SPEAKING 8

FEMALE IN SCIENCE: LOOK AT THE PICTURES AND TALK ABOUT THE ADVANTAGES AND DISADVANTAGES

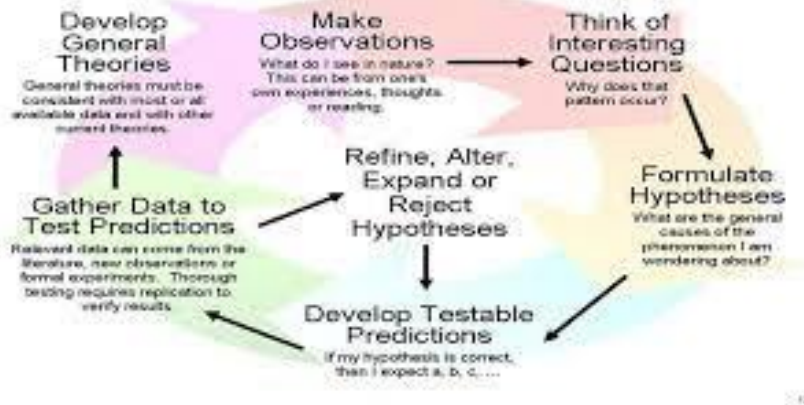


SPEAKING 9

SCIENTIFIC METHOD EXPERIMENTS: LOOK AT THE PICTURES AND TALK ABOUT THE SCIENTIFIC METHOD HAS FOUR MAIN STEPS



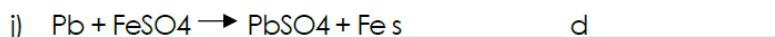
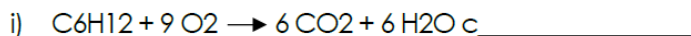
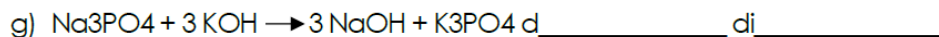
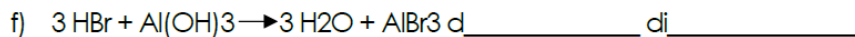
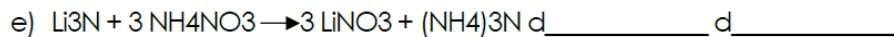
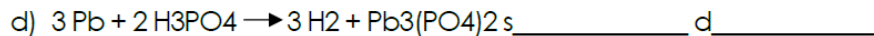
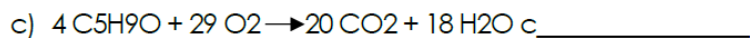
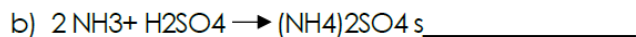
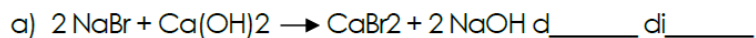
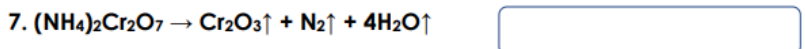
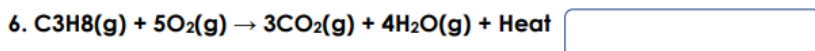
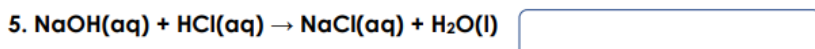
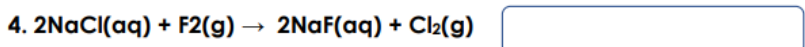
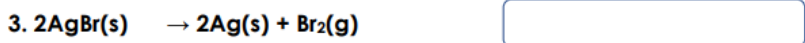
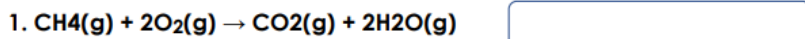
The Scientific Method as an Ongoing Process



- Observation and formulation of a question.
- Data collection and hypothesis.
- Testing the hypothesis.
- Analysis and conclusion.

SPEAKING 10

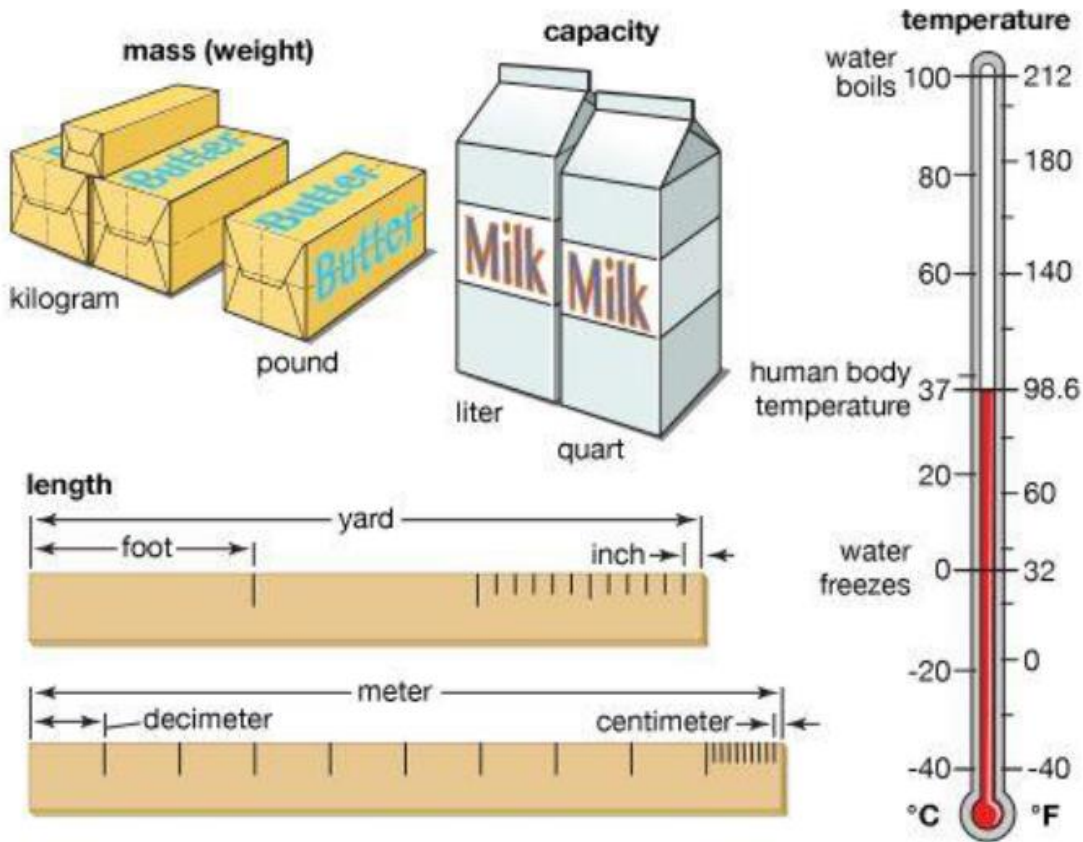
IDENTIFY THE TYPES OF CHEMICAL REACTIONS AND TALK ABOUT THE NAME OF CHEMICAL REACTIONS.



SPEAKING 10

DESCRIBE THE ADVENTAGES OF THE SI SYSTEM

Customary and international system (SI) units



It is an absolute system of units. The SI system of units assigns only one unit to a particular quantity. Thus, it is a rational system of units. It is a coherent system of units, i.e., it has a set of fundamental units, from which all other units can be derived.

AUTHORS

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