Unit - 3

Inventors and Inventions

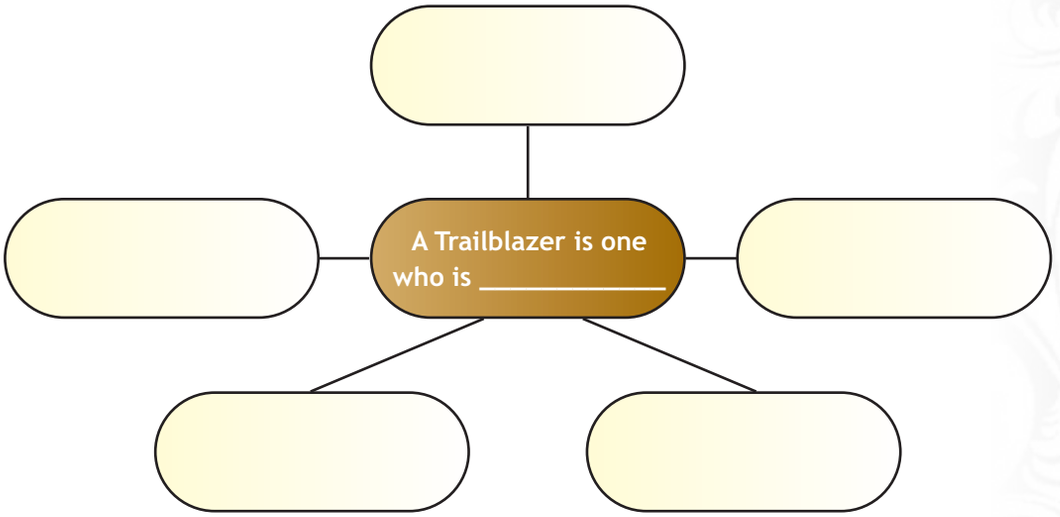
Section - A Trailblazers

1. **Here are some items from our daily life. Who invented them? Match the invention to the inventor.**

Invention	Inventor
computer mouse	Robert Adler
microwave oven	Tim Berners-Lee
compact disc	Johann Vaaler
polyethylene teraphthalateplastic	Douglas Engelbart
zipper	Charles Goodyear
TV wireless remote	Lyda Newman
band-aid	Steve Jobs and Steve Wozniak
telephone	Gideon Sundback
World Wide Web	Earle Dickson
vulcanized rubber	James Russell
paper clip	Percy Spencer
personal computer	Levi Strauss
blue jeans	Nathaniel Wyeth
synthetic hairbrush	Alexander Graham Bell

2. (a) **The dictionary definition of a trailblazer is "a leader or pioneer in a particular field."Who, do you think, would be a trailblazer in the field of science?**

(b) **What do you think are the qualities that go to make a trailblazer?**



(c) **Based on the criteria above and your own views, write your definition of a trailblazer and share it with your partner.**

Does his/ her definition tally with yours?

In my opinion, a hero is someone who .....

.....

.....

3. **READING**

(a) **Now read about some famous people and note the qualities that made them trailblazers.**

1. **Galileo Galilee** was an Italian astronomer and physicist who lived from 1564 to 1642. He was the first to use a telescope to observe the stars and planets. Earlier in the century, another astronomer named Nicolaus Copernicus had theorized that the Earth and other planets travelled around the sun. This was an important theory because it suggested that the earth was not the centre of the universe, as previous generations had assumed.

2. As a result of his own study, Galileo decided to support Copernicus' view of the solar system. At that time, the Catholic Church was as powerful as the most stringent dictatorship today. Everything that was done or said or thought had to be pre-approved by the Church. The Pope allowed Galileo to write a book on his views. Then

one of Galileo's enemies caused him to go before an Inquisition, saying that his discoveries went against the Church's teachings. He spent the rest of his life under house arrest but managed to write another book, which was secretly published in Holland this book. Today we remember that Galileo invented an astronomical telescope. He tried to prove the things he saw to other people. The Church did not want people to believe him.

3. **Madame Curie** was born Maria Sklodowski in Warsaw, Poland in 1867, the youngest of five children. When she was born, Poland was controlled by Russia. Her parents were teachers, and she learned at an early age the importance of education.

4. Manya, as she was called, became a tutor to a family. She enjoyed her time there, and was able to send her father and her sister Bronya in Paris, who was studying medicine some money to support them.

5. Marie studied physics and mathematics at the Sorbonne University, Paris and quickly received her masters' degrees in both subjects. She remained in Paris after graduation and started research on magnetism.

6. For the research she wanted to do, she needed more space than her small lab. A friend introduced her to another young scientist, Pierre Curie, who had some extra room. Not only did Marie move her equipment into his lab, Marie and Pierre fell in love and married.

7. A friend of the Curies, A. Henri Becquerel, had been playing with recently discovered properties of the element uranium. He talked to Pierre and Marie about those properties and they became interested in them too. Marie Curie set about investigating the effect, which she named "radio-activity" for her Doctorate research.

8. Marie Curie checked many other elements to determine whether they too were radioactive. She found one, thorium, and also came across a source of radiation in a mixture called "pitch-blend," which was much more powerful than either thorium or uranium.

9. Working together, it took Marie and Pierre four years to isolate the radioactive source in the pitch-blend. Marie named it radium. For the discovery of radium, Marie and Pierre won a Nobel Prize in Physics in 1903, which they shared with their friend A. Henri Becquerel. Shortly, Marie found that what she had discovered was not pure radium, but she was able to isolate the element itself after quite a struggle. For this work, she was given the Nobel Prize for Chemistry in 1911.

10. During her work, Marie discovered radiation could kill human cells. She reasoned that if it could kill healthy human cells, it could kill diseased human cells and went about isolating radium for use in killing tumours.

11. In 1906 Pierre Curie was offered the position of director of the Physics Laboratory at the Sorbonne. Before he could take the position, however, he was run over by a

carriage and killed. After her husband died, Marie was offered and took the position, the first woman to become director of a research laboratory.

12. During the first World War, Marie Curie went to work for the French building and designing X-ray machines. Knowing that moving soldiers to a hospital before they needed surgery was not always possible, she designed the first mobile X-ray machine and travelled with it along the front lines during the war.

13. On July 4, 1934, Marie Curie died in Paris, killed by her own experiments. She died of radiation poisoning and may have been the first person to do so. Marie Curie had brought herself up from poverty, struggling to get her education and succeeding brilliantly. The work she did, she did with patience, often getting results only after years of careful experimentation, while struggling for money to support her work. For her struggles, she received two Nobel Prizes - the first woman to win even one. Through the knowledge she gained, thousands of lives have been saved.

14. From wheelchair that operates through breathing to anti-theft mechanism for cars, at 20, Susant Pattnaik is a serial entrepreneur. Being a greatly motivated inventor his areas of interest include scientific innovations & research. His first successful invention, Susant's Breathing Sensor Apparatus, a device where disabled person can conduct their daily necessary jobs through breathing actions, which won him numerical national and international awards and considerations.

15. He has already earned the sobriquet of 'serial innovator', having invented several new devices and gizmos since his high school days. Now, he is well on his way to become a serial entrepreneur.

16. Susant Pattnaik, son of a veterinary doctor from Bhubaneswar, has an enviable list of achievements. He has featured in the investors list of MIT, addressed students of IITs and has founded a couple of companies to market his inventions. He even has a supporting NGO for innovators like him.

17. "I have just signed a Rs.50 lakh deal with a company to market the car security system I have developed," Pattnaik informed enthusiastically while showing off his innovations at the exhibition of grassroots innovators at Rashtrapati Bhawan campus. He is among top winners of the seventh National Grassroots Innovation Awards, given by the National Innovation Foundation.

18. A student of integrated M.Sc. degree course in Physics at Indian Institute of Science Education and Research at Bhopal, Pattnaik has ten innovations that have made the critical transition from idea to working prototype. One of them is moving into commercial production soon. He has founded four start ups. Needless to add, he lists Dhirubhai Ambani among his role models.

19. An interesting innovation of his is wheelchair which the paralysed can operate just through breathing. The prototype uses a breathing sensor developed by him and lets users navigate the chair by giving commands just with their breath. "The sensor acts both on air and heat in our breath", explains Pattnaik.

20. The foundation scouts for innovations from all over the country, gives awards to the best ones and also converts technologies with potential into products. So far it has filed 550 patents on behalf of innovators of which thirty nine patents have been granted in India and four in the US. Its Micro Venture Innovation Fund has provided risk capital for 183 projects, which are at different stages of incubation.

(b) What are the qualities that go into the making of a scientist? Complete the table about the three scientists you have read about.

Scientist	Qualities	Revealed in….
Galileo	• _____	• Repudiated the teachings and beliefs of earlier generations
Marie Curie	• Determination	
Susant Pattnaik	• **Committed** • **Creative**	

4. LISTENING

You will now listen to an interview with a group of students from IIT, Mumbai who have developed an underwater vehicle. Listen to the interview, and complete the table .

	What team 'Matsya' says about their product……
Matsya will be used by…	
The three groups that the team was divided into were…	

They wanted a product that was...	
They completed the vehicle in ...	
The Matsya can be used by/for...	a) ..... b) Laying underwater power line c) ..... d) ..... e) Reconnaissance of shipwreck Academic research
IIT Mumbai helped them by...	

SPEAKING

5. Given below is a list of Indian scientists who have been awarded the Nobel Prize.

Indian Nobel Prize Winning Scientists
CHANDRASHEKAR VENKATA RAMAN (1930) : Nobel Prize for Physics
HARGOBIND KHORANA (1968) : Nobel Prize for Medicine
SUBRAMANIAN CHANDRASHEKAR (1983): Nobel Prize for Physics
VENKATRAMAN RAMAKRISHNAN (2009): Nobel Prize for Chemistry

6. Walk the Talk: Working in pairs, choose a scientist from the list and research their life and achievements. Then play the scientist and journalist and act out the interview in class.

WRITING

7. Write an essay on the scientist that you have chosen from the given list. Share his major inventions/contribution to science and the difficulties he faced, in about 200 words.

8. GRAMMAR REVIEW: Tense forms

Verb **tenses** are tools that are used to express time. They refer to the time of action and tell the time and state of an action.

Corresponding to the three divisions of time there are **three** tenses:

The **Present Tense** referring to present time.

The **Past Tense** referring to past time.

The **Future Tense** referring to future time.

Each tense has four forms:

Simple or **Indefinite** – it merely states an action or event. It does not say anything about the completeness of the action.

Continuous or **Progressive** – it indicates that an action is in progress at a given time and is incomplete at the point of reference

Perfect – it indicates that the action is complete

Perfect Continuous – it indicates that an action has been in progress for a period of time

Study the table for use of tenses given below:

We use SIMPLE PRESENT for.....	EXAMPLE
1. Things happening in the present 2. Something that happens repeatedly. 3. A habit or a routine 4. Describe something that is part of a given situation 5. Give instructions or offer advice 6. State a permanent truth 7. To make future time reference when the event is part of a fixed time-table 8. In exclamatory sentences 9. In commentaries 10. Instead of Present continuous with certain verbs	1. He **is** a pilot. 2. Moni **helps** his father. 3. Mehak **goes** to school by bus. 4. In summers days **are** longer than nights. 5. **Shut** the window. 6. The sun **rises** in the east. 7. This year Christmas **falls** on a Sunday. 8. Here **comes** the bus! 9. Dravid **runs** forward and **takes** a catch. 10. I **see** smoke. I **have** a pen.
We use PRESENT CONTINUOUS for.....	**EXAMPLE**
1. To refer to something happening at the time of speaking 2. When we talk about something connected with the present time 3. When we refer to a situation that is more or less temporary 4. For an action that is planned for the near future 5. A persistent habit **VERBS NOT USED IN CONTINUOUS TENSE:** perception: See, hear, smell, notice, recognise appearing: Appear, look, seem	1. Please don't disturb, I **am studying** for an exam. 2. These days more and more people **are learning** use of computers. 3. She **is looking** for her spectacles. 4. I **am going** to visit my grandmother today. 5. My dog is rather silly; she **is always looking** out for an opportunity to run out of the house into the neighbour's yard.

Emotion: want, wish, desire, feel, like, love, hate, hope, refuse, prefer Thinking: think, suppose, believe, agree, understand, remember, forget, know Possession: have, own, possess, belong to	
We use PRESENT PERFECT for.....	**EXAMPLE**
1. To indicate activities completed in the immediate past. 2. To express past actions when no definite time is given 3. To describe past events that have an impact on the present. 4. To denote an action that began in the past but continues up to today *(using for, since etc)*	1. He **has just** gone out. 2. I **have read** 'The Diary of Anne Frank'. 3. He **has eaten up** all the biscuits. I **have cut** my finger. 4. I **have known** him for long.
We use PRESENT PERFECT CONTINUOUS for	**EXAMPLE**
1. To refer to something began in the past but is still happening at the time of speaking	1. I **have been reading** 'The Diary of Anne Frank' for the last one week.
We use PAST INDEFINITE for	**EXAMPLE**
1. An action completed in the past 2. A past habit or a routine	1. She **left** for Chennai yesterday. 2. Last year she **went** to school by bus but now he walks to school.
We use PAST CONTINUOUS for	**EXAMPLE**
1. To refer to something happening at the time of reference in the past 2. When we talk about something that was a persistent habit in the past	1. We **were eating** our dinner when the earthquake occurred. 2. He **was always grumbling**.
We use PAST PERFECT for.....	**EXAMPLE**
1. To indicate the earlier of the two activities that happened in the past.	1. The train **had already left** by the time I reached the station.
We use PAST PERFECT CONTINUOUS for.....	**EXAMPLE**
1. To refer to something began in the past and continued up to a point of reference in the past.	1. **I had been reading** 'Black Beauty' for the last one week when he came to see me.

FUTURE TIME: In English, there no separate Future Tense corresponding to Present Tense and Past Tense. For referring to the future, the modal auxiliaries **shall** and **will** are used with the Bare Infinitive.

Expressing Future Time	EXAMPLE
1. Will/ shall + infinitive to denote future actions 2. Is/ am/ are+ going to + infinitive 3. Is/ am/ are+ to + infinitive 4. Is/ am/ are+ about to + infinitive 5. Simple Present (to express an unalterable plan) 6. Present Continuous (to denote the future) 7. Will/ shall + be+-ing (Present Participle)	1. We **shall** go for a picnic tomorrow. He **will** reach by 5.30 p.m. 2. We **are going to play** football this evening. 3. We **are going to play** football this evening. 4. It is about to rain. 5. The Prime Minister **leaves** for a 10-day tour of the tsunami-affected areas tomorrow. 6. Cremica's **is opening** a new branch in Amritsar. 7. We **shall be going** abroad some time next year.

9. (a) Use the correct form of the words given in brackets to complete the passages given below.

(i) Last Sunday when I _____ (return) home I was shocked to find my house unlocked. Someone _____ (break) into my house in my absence. All the boxes _____ (be) open. I _____ (check) my locker in which I _____ (put) my money, but it was nowhere to be seen. I _____ (report) the matter to the police. They _____ (take) some time to register my case. By that time the thief _____ (run) away.

(ii) A serious accident _____ (take) place yesterday when a speeding bus _____ (collide) with a car near the Yamuna bridge. Two persons _____ (die) on the spot and one _____ (injure). The driver of the bus _____ (run) away from there. The car _____ (crush, almost) to pieces. The people _____ (take) the injured to the hospital. The police also _____ (reach) there.

(iii) A twelve year old boy _____ (die) when he _____ (fall off) the roof this evening. His body _____ (discover) from the central lobby. The policemen who _____ (come) to enquire the matter _____ (say) that they _____ (be) not sure as to which floor the body

_____ (fall) from. The body _____ (send) to the hospital for post-mortem.

(iv) Two persons _____ (rob) some men of Rs. 3 Lakhs at a traffic junction yesterday. The robbers _____ (threaten) them with a knife. The victims _____(keep) the money in the scooter's side box. They _____(withdraw) cash from the branch of a bank located just about a kilometer from there. The robbers _____(be) on foot and _____(take) advantage of the surroundings.

(b) Pavitra Sree, a graphic designer, has applied to an advertising company for a job. She is being interviewed by Arnab Gopal, Managing Director of Picture Perfect. Complete the interview using appropriate tense forms.

Gopal : Do come in, Ms. Sree. Sorry to have kept you waiting. _____ (wait) long?

Pavitra : Not too long. I _____ (look) through the material your assistant gave me.

Gopal : Oh! that's OK then. And _____ my assistant already _____ (show) you around the department?

Pavitra : No, not yet.

Gopal : Well, we'll do that afterwards. Do sit down. Now tell me how long _____ (work) for your present firm?

Pavitra : Mmm. Let's see, for almost five years now.

Gopal : And _____ you ever _____ (work) for an advertising company before?

Pavitra : No, not directly.

Gopal : And how long _____ you _____ worked (work) as a graphic designer altogether?

Pavitra : For about 10 years.

Gopal : Fine. So you _____(have) plenty of experience in the field already. Perhaps you _____(bring along) some specimens of your work?

Pavitra : Yes, here are some ideas from the project I _____ (work on) for the past three months.

Gopal : Excellent! And how long _____ you _____ (earn) the present salary which you mention in your application?

Pavitra : For the last ten months.

Gopal : Well, Ms. Sree, we _____ (have) a good long chat and you _____(give) me an idea of your experience and ability. You'll be hearing from us in a week or two. Goodbye.

Pavitra : Goodbye.

(c) Complete the following passages using the appropriate form of the verb in brackets. Use the Future forms.

(i) "For defying me and coming home late, I _____ (ground) you for a week. Go to your room now! I _____ (let) you know when you can come out," the furious father said to his daughter.

(ii) She _____(sing) in her first major concert next month.

(iii) Megha: Anita_____(go) Kerala for her holidays.
Anita: _____ she _____ (fly)?
Megha: No, she _____(go) by train.

(iv) Aditya: Have you got a ticket for the big match on Saturday?
Faiz: No, I don't even know who _____(play).
Aditya: The Rajasthan Royals_____(play) Kolkata Knight Riders.

(v) _____ he _____ (wash) the car? Yes he will.

(vi) Rajni_____(be) eighteen next month. Yes, her parents _____ _____(give) a party for her. They _____(invite) sixty guests.

Section - B Robots

(a) Choose the correct option.

(i) What is a robot?
- (a) A machine that does work on its own
- (b) A device that gathers information from the environment
- (c) A machine capable of performing or extending human tasks
- (d) All the above

(ii) The development of Robotics is possible because of:
- (a) sci-fi Movies
- (b) computers
- (c) space Travel
- (d) typewriters

(iii) robots cannot be like humans because they lack:
- (a) logic
- (b) strength
- (c) creativity
- (d) memory

(iv) The term 'robot' comes from the Czech word "robota" which means:
- (a) labour
- (b) man made

(c) shiny metal

(d) human being

(v) Choose the jobs robots perform that are dangerous for people

(a) exploring shipwrecks and volcanoes

(b) search and rescue after disasters

(c) diffusing bombs

(d) all the above.

READING

1. When you hear the word 'robot' what do you think of? Most people may imagine metal machines from science fiction that look a lot like human beings and also move, act or work like them.

2. The term “robot” is derived from the Czechoslovakian word 'robota' which means “tedious labour” or hard work! In 1920, the playwright Karel Capek, created the word “robot” in his play RUR or Rossum's Universal Robots. In the play, humanoid machines take over the world by killing all the humans—well, all but one. Not to worry, though, because those kinds of robots don't exist…..yet.

   In reality, robots do not look like human beings. There are already almost a million robots at work in the world. Almost none of them look like the robots in science-fiction movies.

3. Robots are machines. They are machines that are controlled by computers. In car factories, for example, there are robots that look like cranes and are used for welding and painting. Robots that are used to get rid of bombs look like wheel barrows. Most industrial robots are just mechanical arms. They are used for lifting and moving things. These arms are strong enough to carry things across a factory floor. Robot arms can bend. Some robot arms bend like an elephant's trunk. Some robot arms can make themselves longer or shorter.

   Many robot arms have parts on the end that can hold things. The parts are called 'grippers'. They work like a human hand, but they often don't look much like a hand. Special kinds of grippers can handle tools or move things around.

   Robots can, of course, work almost like human beings. They can perform more than one action. Automatic machines can do the same action again and again, but robots are better because they can perform different actions. This is because they have a small computer, which functions as their brain, inside them. This tells them what to do. Some robot arms have sensors. The sensors tell the computer where the arm is. The computer makes the motors move the arm if it is not in the right place.

4. In some ways, robots can work better than human beings: some robots handle chemicals that are dangerous for humans to touch. Some robots go to dangerous places like on top of volcanoes and in burning buildings, without feeling scared. Robots can go deep underwater to search for sunken ships or look for minerals to mine.

5. Robots can move quicker than humans can, and they never get bored. Most robots are designed to do only one specific job. A different robot must be specially made for each job that needs to be done.

   Robots help explore Mars and other planets. They find out what the planets look like and what they are made of. Robot rovers that look like little wagons landed on the planet Mars. They rolled around and examined the rocks and soil.

   How do robots know what to do? Computer programmers write a programme to give the robot a series of instructions for carrying out a task. For example, a programme may tell a robot to pick up an object, do something with it and then put it in the right place. The computer inside the robot has a memory which remembers these instructions. When the programme in the computer is changed, the robot learns to do something different.

6. Some robots can even see. 'Seeing' robots work with the help of a television camera and two computers. The television camera, which is the 'eye', passes the information to one computer; this computer than passes the information to the other computer which controls the robot's movements. These robots help doctors do operations. Robots help replace hips. They help doctors operate on eyes.

   Scientists and engineers are working to make better robots. They are trying to make robots with computers that are smarter. One day there will be robots that make highways and build steel skyscrapers. There may someday be robots that help with many chores around the house. Tiny robots may one day be able to go into clogged blood vessels and clean them out. Tiny robots may be able to go inside broken machines and fix them. Very smart robots may eventually be able to run a whole factory by themselves.

c. On the basis of your reading, complete the following notes. Use suitable abbreviations and provide a key for the abbreviations.

Title: _____ .

(i) Meaning: "robot"

   1. .....
   2. .....

(ii) Working

   1. Mchns. to prfrm. complex tasks
   2. .....

(iii) Today

   1. appearance
      (a) .....
      (b) look like giant arms
      (c) .....

KEY

1. Mchns. – Machines
2. prfrm. – perform
3. prfrm. – programmed
4. vs – versus
5. &-and
6. _____
7. _____
8. _____

2. Functioning

(a) Pgmd by .....

(b) hv grippers to hold & carry things

(c) .....

(d) .....

(e) .....

(f) .....

(iv) Robots vs humans

(a) .....

(b) .....

(c) .....

(d) .....

(v) Imp. uses

(a) .....

(b) .....

(d) Based on your notes, write a summary of about 80-100 words.

VOCABULARY

2. (a) Match the phrases to their meanings.

Phrases	Meanings
take over	*remove something or someone unpleasant from an area*
get rid of	*search for something that is lost or needed*
look for	*conquer; get control of an area*
find out	*do or complete an important task*
carry out	*get information about something*

(b) Use the phrases to complete the given sentences meaningfully.

i) These days Manuj is trying to do his best to _____ his image of a cheat.

ii) Have you seen my pen? I have _____ it everywhere but I can't find it.

iii) Will you call up the picture hall and _____ if that film is still running.

iv) In 1526, Babar defeated Ibrahim Lodi and _____ the throne of Delhi.

(v) No one thought that the kidnappers will ..... their threat and kill the victim.

SPEAKING

3. (a) Conducting a press conference. First, read the news clipping.

School student creates robot with emotional intelligence

A robot created by a 17-year-old Doon School student possesses emotional intelligence and can even dish out answers for unexpected questions with the help of the internet.

The 3-dimension Robo 'iTalk', an award winning working model, talks in English, lisps like a human and understands human moods of happiness and anger with the help of unique programmed algorithms and a 'software development kit' offered by the prestigious Massachusetts Institute of Technology (MIT) in the US.

"The iTalk is a robot capable of communication in a manner similar to humans. By interpreting data in the same manner we do, he is able to emulate human behavioural tendencies," Arjun, a class-12 student at the Doon School, said.

(b) After he created the robot iTalk, Arjun holds a press conference to brief reporters about his achievements. In groups role play the press conference in class.

How to conduct a Press Conference

Most of you would have seen a press conference on TV. Study Arjun's robot and its unique features.

As Arjun, prepare a brief to be read out to the reporters.

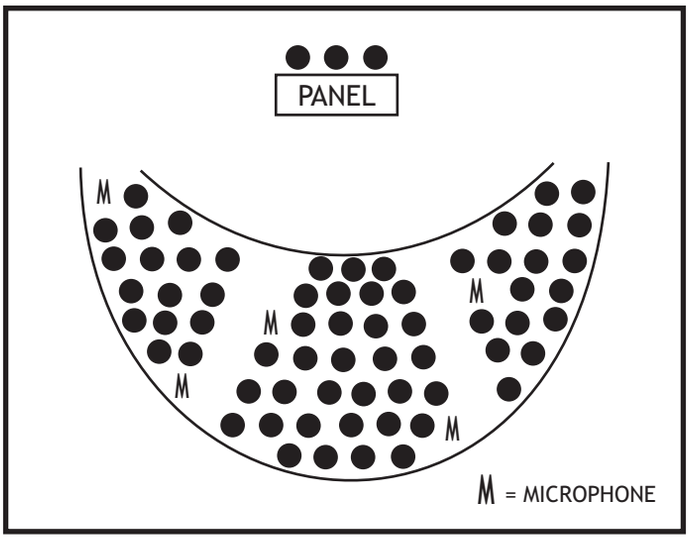
As reporters, prepare a list of questions pertaining to the creation of life and ask Frankenstein the questions.

The Brief: The press release to be given out at the press briefing to identify the main stages in your research, as well as give the media a headline!

The presentation must be no longer than 3 minutes in length, be in powerpoint , must show pictures of your creation.

Press Corps: The press reporters ask questions based on the press release and presentation.

*Set your class for the press conference and follow the decorum of the occasion



WRITING

4. (a) **A newspaper report: Based on the press conference, write a newspaper report about the robot i Talk created by Arjun.**

Review: Components of a newspaper report

Headline: Every report has a headline to attract the attention of the reader, state the topic of the news in a strong, short phrase, or statement. The headline must be

(a) catchy

(b) brief—leave out articles, prepositions, etc. and where possible, use abbreviations / shortened word-forms

Byline: Since this is your report, let the reader know who wrote it. The line with your name on it is called the 'Byline'. Write the word 'By' followed by your first and last name. On the next line, write the name of your school and city.

Lead Paragraph (Para 1): Answers the questions: Who? What? Where? When? Why?

Remember to write about the following points:

- name / names of the person/s or thing/s that the news is about;
- the place where the incident took place;
- the day, date, and time of the day when it took place;
- the details of the incident;
- the reasons why it happened.

Paragraph 2: Informs the reader about details of the incident. Narrate the incident in chronological order.

Paragraph 3: Eyewitness accounts add to the authenticity. Also, they may interest the reader. Include some quotes from the eyewitnesses' comments. Also describe what they felt about the incident.

Paragraph 4: The future course of action being planned.
Note: Remember to use simple, clear but formal language.

Section - C The Machine

1. **As part of the school's Science Week celebrations, there is a slogan writing competition. Study the slogans given. Working with a partner,, write two slogans about the use of machines in the space provided.**

Nothing is impossible
Solutions for a smart planet
Quality never goes out of style
(a)
(b)

A **cliche** is a common turn of phrase which you may or may not like, but reflects something about someone. For example: *Knowledge is Power.*

Characteristics of a good slogan.

i) a single sentence, phrase or word.

ii) A longer slogan should not be too long. About half a dozen words is a good limit .

iii) The content should get to the root of the issue or express your position at the simplest yet deepest level possible.

iv) Write in block letters.

v) Use powerful language. State a point of view clearly, concisely and without making apologies for a particular point of view.

If you want a slogan for the masses, use terms understood by most .

vi) Use a quotation or some turn of phrase that may summarise some common attitude/ view.

1.2 Read the headline. Choose if the statements given below are True or False.

(a)	A new technology could help jeans clean polluted air.	
(b)	The new technique came from a fashion expert and a scientist.	
(c)	The new jeans could break the ground because of their strength.	
(d)	The jeans turn harmful emissions into harmless chemicals.	
(e)	The inventors placed a pair of their jeans in a showcase.	

READING

1.3 **Fashion as a Cleaning Machine**

An innovative blend of fashion and science has resulted in the design of a new technology in jeans that cleans the air. Helen Storey, professor of fashion and science at The London College of Fashion, teamed up with Dr Tony Ryan, Pro-vice-chancellor for the Faculty of Science at the University of Sheffield, to create what could be a ground-breaking solution to our environmental problems. They discovered that when denim is coated with tiny particles of the chemical titanium dioxide, it reacts with air and light to absorb and break down harmful emissions in the environment. The emissions become harmless and are washed away when the jeans are cleaned. This means we can help clean the air simply by going for a walk.

Ms Story and Dr Ryan have created a company to showcase their invention, called Catalytic Clothing. Their website says: "Catalytic Clothing seeks to explore how clothing and textiles can be used as a catalytic surface to purify air, employing existing technology in a new way." The technology is similar to how a catalytic converter in a car helps clean the fuel mix. Ryan makes bold claims about how effective the innovation could be. He maintains that if all of Sheffield's half a million residents wore the jeans to become walking air filters, the dangerous chemical nitrogen oxide in the city would disappear. The improvement in air quality could significantly reduce deaths and respiratory illnesses such as asthma.

WRITING

2. (a) Write a magazine article in about 150-200 words about the air quality of your city, town and how the new innovative jeans could make a difference. Include an imaginary interview with Ms Story and Dr Ryan.

(b) As Abeer Tiwary, who has bought a pair of the innovative pollution combating jeans. However, you discover that the article of clothing has no such properties. Write a letter of complaint to the company with a request to look into the matter, in about 120-150 words.

SPEAKING

3. **(a) Share in pairs / groups, decide which of these topics/words/phrases from the article are the most interesting and which are the most boring. Discuss the topics you liked.**

innovative / design / professor / environmental problem / emissions / going for a walk / showcase / invention / purify / air filters / air quality / reduce deaths / jeans

(b) How useful could a pair of jeans? Complete this table with your partner(s). Change partners and share what you wrote.

Jeans and….	An unusual and innovative use	How it can improve our life
computers		
walking		

studying		
sleeping		

(c) **POLLUTION:** Students [Group A] **strongly** believe we can find ways to make pollution a thing of the past; Students [Group B] **strongly** believe this is impossible. Discuss and make a 3 minute presentation to the class.

Section - D Humans Against Virus

1 (a) **A recent opinion poll listed the following items as the ten most important inventions that have made our lives better. Working in groups, number these inventions according to their importance.**

(a) telephone ☐

(b) computers ☐

(c) television ☐

(d) automobile ☐

(e) cotton gin ☐

(f) camera ☐

(g) sewing machine ☐

(h) steam engine ☐

(i) light bulb ☐

(j) penicillin ☐

(b) **Share your views with your partner. Change your choice if required. Share with the class.**

READING

Humans Against Virus

1. Two men held a struggling, crazed bulldog down on a table. Its mouth was smothered with saliva, and a bite from its jaws might cause death. Beside them stood Louis Pasteur, holding a narrow glass tube in one hand.

   Hold the head, please,' he said calmly.

   He put one end of the tube between his lips and lowered the other toward the foam-covered jaws. As the animal writhed, he carefully sucked some of the saliva up the tube. The men watched him, awe-struck. If he sucked too hard and got some saliva in his mouth……..

2. But he did not suck too hard. When he had all the saliva he wanted, he stepped back, holding one finger over the top of the tube. He nodded, and then the men lifted the dog and carried it back to the cage. Meanwhile, Pasteur released the saliva into a sterile, germ-free test-tube and closed the mouth of the tube with cotton. Then he held it up to the light and looked at it.

3. Somewhere in there, he thought, must be the microbe that he was trying to isolate: the rabies microbe that made the dog mad and brought people an agonizing death. He remembered how, when he was a child, a mad wolf had been abroad near his home. Everyone was afraid of being bitten by it. Several people had been, and had died as a result. The only way to try to stop the infection from a bite was to cauterize the wound by pressing a red-hot iron on it. This was said to purify the flesh. Terrible though the treatment was, anyone who had been bitten was ready to endure it rather than suffer torments of rabies.

4. Pasteur still remembered the day when, as a boy, he had seen a crowd outside the blacksmith's forge near his father's house. He had run to see what was happening. The onlookers had pushed him roughly away, but not before he had heard the moans of the villager and the hiss of the blacksmith's red-hot iron burn his skin. Pasteur had never been able to forget the horror of that moment.

   Now, fresh from his triumph over anthrax and chicken cholera, he was determined to find a similar treatment for rabies. That is why he had taken saliva from the jaws of a mad dog.

5. But although he and his assistant Roux looked at that saliva under the microscope until their eyes ached, they found nothing that they could identify as the rabies germ.'I don't understand this,' said Pasteur. 'If a bite from a mad dog cases rabies, the microbe must be in the saliva.'

   'Well, we don't seem to find it,' said Roux. 'Let's try injecting the saliva into animals and see if it gives them rabies. Then at least we'll know if the germ is really in the saliva. We can try with blood taken from mad dogs, too. Paul Bert has been doing that.'

6. 'Good luck to him,' muttered Pasture. 'The more of us there are fighting rabies, the better. But what chance have we if we can't find the microbe that causes it? How can we attempt to make vaccine?'

7. In spite of their discouragement, he and Roux experimented with injections of saliva and blood taken from mad dogs. They found that the saliva sometimes caused rabies, but quite often did not. And the blood had no effect at all.

8. 'Confound it,' exclaimed Pasteur, limping up and down the laboratory in the EcoleNormale. 'I have a feeling that we're on the wrong track. What happens to the rabies germ—for I'm sure there is one, even if we can't see it—what happens to it when it infects an animal? It can't be in the blood or those injections of blood would have worked.'

9. 'You mean it may not travel in the blood at all?' asked Roux. It was a daring idea, for every germ they had found so far lived in the blood.

'That's right,' said Pasteur impatiently. 'Yet where else, where else.....'

He stopped and stared absently at the cage that was full of rabbits.

'Wait a minute!' he cried, suddenly. Think of the symptoms of rabies. The mad dog rushes about biting, foaming at the mouth. But later, months later, the poor creature becomes paralyzed and then dies. Paralysis could mean that not only are the muscles affected but also the nerves that order the muscles to move. The rabies germ must affect the nervous system! I can see now. First it makes the animal terribly excited, and then it attacks the nerves so that paralysis results. Roux, I believe that we should look in the brain and the spinal cord for this germ!'

Eagerly, he and Roux began a series of experiments to test the new idea. They took samples of the brain of a dog that had died of rabies and injected them under the skins of experimental animals. Then they waited anxiously for the results.

It was a long wait because the symptoms of rabies often did not appear for weeks. But finally many of their experimental animals definitely developed signs of rabies.

'We're on to something,' said Pasteur. 'This is a much surer method than using saliva. I think the rabies germ does attack the brain and spinal cord; it prefers to live there, in fact. It we want to grow it, we will have to give it the right surroundings. Broth won't be of any use here.'

Roux suggested that it would be better to inject the germ straight into the brain, if that was where it travelled anyway.

10. By now they had discovered that rabbits as well as dogs could have rabies. So they took a small piece of the brain of another rabbit. After only seven days, this rabbit developed rabies.

'This is a much faster method than injecting under the skin,' said Pasteur. 'Evidently the rabies germ does live in the brain. The sooner it gets there, the sooner it has an effect.'

Then they tested the strength of the germ, by noting how quickly a rabbit developed rabies after the germ was injected into its brain. They found that strength varied depending on what kind of animal it had been living in. Germs from the laboratory rabbits were, surprisingly much more virulent than germs taken from stray mad dogs.

'We will use the most virulent kind in trying to make a vaccine,' Pasteur announced. 'Then the vaccine is bound to be a protection against all different strengths of germs.'

11. The next move was to try a weakening of the germ. As they could not see it or find a way of growing it outside the brain, they had to work with infected brains. The germ seemed to favour a region of the brain called medulla, so they used samples from there. Roux put these into a sterile solution which he then closed. As days went by, the pieces of medulla shrivelled.

12. 'Let's see if the rabies germ is still living in these pieces,' Pasteur said finally. The only way they could test it was to grind up the pieces and inject them into healthy animals. When they did this, the animals appeared to get rabies; but instead of getting really sick, they rapidly recovered.

13. When Pasteur saw what had happened, he was immediately hopeful.

'It looks as if we may have found the way to weaken the rabies germ,' he said eagerly. 'Roux, we shall conquer it yet. Why should those animals have recovered unless the germs they got were weak ones? Let's test infected medullas each day and see if their effect lessens.'

14. Roux prepared a whole series of infected medullas and tested them by injecting an extra dose from the first after it had aged one day, from the second after it had aged two days and so on. The first -day medullas always produced rabies. But the longer the medullas had dried and shriveled, the less effect they had. By the time a piece of medulla was fourteen days old, it was harmless.

This meant that the rabies germ of any strength could be prepared. If the weakened rabies germs could safely stimulate an animal's defences, a way of making a vaccine had been found.

15. The men began the experiment to test their ideas. First they injected a dog with a fourteen-day old medulla. The next day, they injected a thirteen-day old medulla. They went on this way until on the fourteenth day they injected a one-day old medulla which, they knew, would ordinarily give their dog rabies. It did not. Weeks later the dog frisked about as happily as ever.

'We've done it,' whispered Pasteur, hardly daring to believe it. 'They're immune. They're safe.'

Navin Sullivan

Answer the following questions briefly.

1. What was the horrible memory of Pasteur's childhood what made him determined to find a cure for rabies?
2. Where does the rabies microbe reside? How did Pasteur discover this fact?
3. Why did he inject the germs into the rabbits' brain?
4. Who was Paul Bret? What information did Roux give about him?
5. How did Pasteur discover the seat of the most virulent germ?
6. Why did he select the most virulent germs for the anti-rabies vaccine?

VOCABULARY

2. **There are a number of medical terminologies in the passage. Find one word in the passage that fits each of the given descriptions.**

   (i) Free from all bacteria : _____

   (ii) Moisture secreted from the glands in the mouth, essential for digestion: _____

   (iii) Minute living organisms visible only under a microscope: _____

   (iv) A carefully prepared substance, usually liquid, that contains a relatively harmless version of a serious disease : _____

   (v) Fill air or body with dangerous germs : _____

   (vi) A state of helplessness : _____

   (v) To force a liquid into the body with a syringe : _____

   (vi) Special room for experiments : _____

   (vii) To sear and render insensitive : _____

   (viii) When a person/animal becomes incapable of moving : _____

3. **SPEAKING**

   Prepare a Powerpoint Presentation on **A World Without Disease** and make a 3-4 minute presentation to the class.

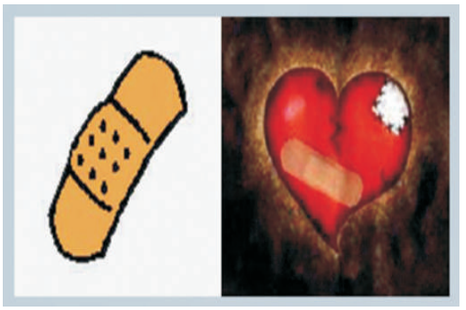
4. **LISTENING**

   There are countless inventions that have significantly changed our lives. We often take them for granted when we should really be thankful to the inventors of these amenities.

   As you listen to the passage about some of these inventions, write about them in the spaces provided.

Who invented this _____
When was it invented?_____
It helped by _____
_____

Who invented this _____
When was it invented?_____
It helped by _____
_____



Who invented this _____
When was it invented?_____
It helped by _____
_____

Who invented this _____
When was it invented?_____
It helped by _____
_____

Who invented this _____
When was it invented?_____
It helped by _____
_____

WRITING

5. (a) **As Louis Pasteur, prepare a report on the discovery of the anti-rabies vaccine for presentation at a Seminar in about 200-250 words.**

How to write a Scientific Report - review

1. Title: Concise and informative, not vague and general, but encapsulates the essence of the research. e.g. Onset of Autism not linked to Vaccination

2. Introduction: Let the readers/ audience know why the report is important and what exactly the report is about. Answer questions such as- What do you hope to learn from the research? What question is being asked? Why is this research important? Start generally, introducing the broad context within which your research fits and end with a statement of your specific hypothesis or hypotheses.

3. Method: Precisely describe method and materials used to conduct the experiment with enough detail so that someone else can repeat the same procedure. Explain and sometimes justify why you chose a particular method. Finally, it is important to add any extra information or observations of events during the study that may have happened accidentally.

   Write in paragraph form, with few repetitions. Divide it into subsections such as
   - participants
   - materials
   - procedure.

   Use the past tense forms and furthermore, as the focus in this section is on what was done rather than who did it, use the passive voice forms.

4. Results: Describe but not explain your results; it provides the reader with a factual account of your findings.

5. Discussion: Two fundamental aims:
   - to explain the results
   - to explore the significance of the findings.

   Therefore, here,
   - interpret and explain your results
   - examine whether and how the questions raised in the introduction section have been answered;
   - show how your results relate to the literature;
   - qualify and explore the theoretical importance/significance of your results; outline any new research questions or areas for future research that your results have suggested.

6. References: It is essential to include a reference list or bibliography of the reference material consulted during the research for the report.

7. Appendices: Information that is not essential to explain the findings, but that supports the analysis (especially repetitive or lengthy information), validates your conclusions or pursues a related point should be placed in an appendix/ appendices.

(b) A pharmaceutical company has manufactured a new vaccine for the prevention of polio. As the Head of the Marketing Department, design a brochure for the company in about 80-100 words.

How to design a brochure

Purpose: Companies often write simple instruction sheets or brochures that outline how to assemble their product or how to use it properly, how to do something / explain how something works using simple descriptions, diagrams, or lists of steps. They are a marketing tool that can take the place of a number of expensive marketing media, allowing you to cut your budget without cutting marketing presence.

Steps:

- First, write down what you need to accomplish with your brochure. What product are you selling? What task should the reader be able to accomplish after reading this brochure?
- Identify the style or format based on how much detail you wish to include.

How to design:

- Research your topic. If explaining a process, decide what background information the reader will need. If selling a product, what are the main features of the product to highlight.
- List the major components of the brochure from those listed below.

  *Name of business / organization

  *Address/ Phone Number/ Fax Number/ Email Address.

  *Slogan that creates curiosity, states a major benefit, or otherwise entices the reader to open and read the brochure.

  *Heading that states the name of the product, project, or described process.

  *Subheads/ short, easy- to -read blocks of text.

  *Key Benefits (2-3).

  *Features.

  *Logo.

  *Image/ Photographs of product, place, people.

  *Diagram, flow chart.
- Appearance-including any graphics , different formats to fit the text. [Edit your text to fit your layout].
- Print the final design and fold as necessary.

Listening Text - 01

Sneh Vaswani,Chintan Raikar, Biswajit Parida, Siddharth Chinoy, Ashish Kumar Budhiraja, Amit Kumar, Naman Sandeep Kothari, Ranjeet Singh Banthiya, Shivendra Singh, Anay Joshi, Pallav Dhobley, Dharmik Patel, Satwik Kottur, Mohit Beswal, and Mihir Gupta are a team of 20 students from IIT-Bombay who have invented an underwater vehicle that nobody has ever heard of. They belong to various disciplines of engineering namely Aerospace, Electrical, Mechanical, Metallurgy etc., in different years ranging from first to final year under graduation. complete the team. Surya Ragunaathan chats with team 'Matsya'.

What is this underwater vehicle all about?

It is called 'Matsya' or fish in Sanskrit. It is an autonomous underwater vehicle designed and developed to localize itself in an underwater environment and perform real life navy based tasks. The vehicle will take feedback from visual, inertial, acoustic and pressure sensors which are used to control the thrusters and pneumatic actuators. The current prototype has 5 degrees of freedom and is a test bench for integration of all basic systems of mechanical (namely hull and frame), electronics (namely power management, motion controller, SBC and sensors) and software(Image processing, Real time framework and control systems).

How did you guys think of this idea (any anecdotes?) How did you all come together?

We all as a team have been participating at ABU Robocon for the past two years. The team has won awards of "Best Autonomous Machine" and "Best Design Award" at Robocon 2011. Just that, the

team felt they must venture into a new dimension of Robotics and further upgrade their skills. Of all the options Robosub, an annually organized competition in San Diego, California by AUVSI foundation was the most attractive choice.

Can you describe step-by-step how you built this?

Since we were building an underwater vehicle for the first time, we wanted to build a very basic one that navigates from one place to the other and see all issues that we face in building one. The team is divided in to three divisions: Mechanical, Electronics and Software. Discussions began on an abstract level and slowly each sub-division started with the designing of their subdivisions. The basic architecture in each subdivision was designed keeping in mind that later complexities could be easily added in them. Modularity and Robustness were given utmost priority in this process. After the basic designs were made, they were prototyped and tested. For example, waterproofing took a month to test and get it perfect etc. All electronic boards were extensively tested before mounting them in the vehicle. All software modules were tested on test benches before the hardware team was ready with the vehicle.

How long did you take to build it? Did you bunk lectures and work on it? Or was it done only in your spare time?

It took us six months and still the vehicle is in the testing phase. All the concepts that we had learned in classrooms were seen being implemented in practical. We work after class hours. In the evening, after 5 pm everyone meets up and work the entire evening, most often right up to 4 am.

In what ways can one make use of the vehicle commercially?

As far as applications of 'Matsya' are concerned, there are various options:

a) Defence
   - Reconnaissance
   - Monitoring
   - Detection
   - Surveillance

b) Underwater power lines
   - Line monitoring

c) Oil and Gas Industry
   - Seabed survey
   - Pipeline monitoring

d) Marine Science Research
   - Marine Biology Research
   - Oceanography Studies

e) Shipwreck Reconnaissance

f) Academic

- Research
- Development
- Teaching

Do you see it as a commercial viable product in its present state? How do you plan to market it?

The entire vehicle was built as an exercise for the team towards developing a final product. Ease for the user to control the vehicle was the primary objective. But we feel the next version, which we plan to release next year will be a much advanced version, as far as features are concerned and also commercially. Marketing the vehicle commercially is not in the 'To Do' list currently but definitely an option the team is currently thinking on.

How has being at IIT-Bombay helped you with this whole thing?

We have received financial support from our deans at IIT Bombay. The project is mentored by Prof. Hemendra Arya from Aerospace Engineering department and Prof. Leena Vachhani from the System and Controls Engineering department. They have been a constant source of motivation for all of us all along.

What do your parents and faculty members have to say about the same?

Everyone seems to be very happy and proud with the output of the team. We feel bad we have to stay away from our homes in vacations and be in lab working on the vehicle, but fortunately our parents realize our passion and support us in every form possible.

Listening Text : 02

1. **Earmuff s "Baby, Its Cold Outside":** "Baby, Its Cold Outside" may have been the song running through 13 year old Chester Greenwood's head one cold December day in 1873. To protect his ears while ice skating, he found a piece of wire, and with his grandmother' shelp, padded the ends. In the beginning, his friends laughed at him. However, when they realized that he was able to stay outside skating long after they

   had gone inside freezing, they stopped laughing. Instead, they began to ask Chester to make ear covers for them, too. At age 17Chester applied for a patent. For the next 60 years, Chester's factory made earmuff s, and Earmuff s made Chester rich.

2. **Windshield Wipers:** It was a snowy day in New York City in 1902, and it was Mary Anderson's first trip on a streetcar. Mary watched the driver shiver as he reached out to clear the snow that had piled up on the windshield. Mary took out her notebook and began to draw. She designed an arm that would swing back and forth on the windshield. The arm would be controlled by a lever near the driver inside the streetcar. Windshield wipers have changed over the years. Today, every kind of vehicle has windshield wipers so that the driver can drive safely on a rainy or snowy day and keep warm at the same time.

3. **Band-Aid:** At the turn of the century, Mrs. Earle Dickson, an inexperienced cook, often burned and cut herself. Mr. Dickson, a Johnson and Johnson employee, got plenty of practice in hand bandaging. Out of concern for his wife's safety, he began to prepare bandages ahead of time so that his wife could apply them by herself. By combining a piece of surgical tape and a piece of gauze, he fashioned the first crude adhesive strip bandage.
4. **Ice cream Cones:** In 1904, Arnold Fornachou was selling ice cream at the World's Fair in St. Louis, Missouri. It was a hot summer day, and he had so many customers that he ran out of ice cream dishes. The baker next to Arnold was named Ernest Hamwi. Ernest was selling very thin pastries. Arnold and Ernest decided to work together. They rolled Ernest's pastries into a cone shape and filled them with ice cream. Arnold's and Ernest's idea led to a new invention – the ice cream cone.
5. **Velcro:** In 1948, while George de Mestral was hiking in the woods, he noticed small, prickly burrs sticking to his clothes. Later, George looked at one burr under a microscope. He saw it was covered with hundreds of tiny hooks. He realized that he could use this idea to fasten two things together. Unlike other fasteners, Velcro can work on many different types of materials and in many different places. In 1948, George de Mestralinvented Velcro and though people laughed at first, he stuck by his invention.