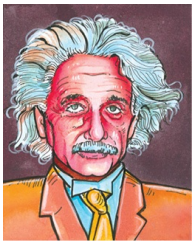
Unit -2

C.V. Raman, the Pride of India

Look at the pictures and answer the questions that follow:



1. Can you name these scientists?
2. Tell your class what you know about them.
3. Are scientists special people? How?
4. Do you want to be a scientist? Why?
5. How many of them received the Nobel Prize?
6. Who was the first Indian scientist that received the Nobel Prize?

A. Reading

Read the following passage and answer the questions that follow:

Talk about him/her and his/her field of science.

On the busy Bowbazaar Street in Calcutta there was an old building. It was the headquarters of the Indian Association for Cultivation of Science. In December, on a fine evening in 1927, there was much excitement in one of its laboratories. Chandrasekhar Venkata Raman was showing a visitor some of his instruments when a young man, K.S.Krishnan, rushed in and announced, "Professor Compton has won the Nobel Prize."

Raman was equally delighted. "Excellent news," he said, smiling at the visitor and then he was lost in thought. "But …. look here, Krishnan," he said turning to the young man, "if this Compton Effect is true of X-rays, it must be true of light too."

A few years earlier, A.H.Compton had shown that the nature of X-rays changes when passed through matter. The change was dependent on the kind of matter. This effect was called the 'Compton Effect.'

Could light also change its nature when passed through a transparent medium? That was the question that Raman asked himself. For five years he had been doing research in optics, the science of light. No sophisticated equipment was available in his laboratory, but Raman was confident that he could find the answer with some modifications in his equipment.

Four months later, on March 16, 1928, Raman announced his discovery of 'new radiation' (describing the behaviour of a beam of light passing through a liquid chemical) to an assembly of scientists at Bangalore (now called Bengaluru).

The world hailed the discovery as the 'Raman Effect'. For scientific research in this country, it was a red-letter day. His discovery caught the attention of the world. With equipment worth hardly Rs. 200/- and limited facilities, Raman was able to make a discovery which won him the Nobel Prize in physics in 1930.

Raman was born on November 7, 1888, at Tiruchirapalli in Tamil Nadu. His father was a college physics teacher. He was a brilliant student right from the start. When Raman passed his matriculation, his parents were keen to send him abroad for higher studies. But on medical grounds, a British surgeon advised them against it and Raman stayed in the country to do the M.A. course at Presidency College in Madras (now called Chennai).

Science had already made an impression on him and he began to write research papers for science journals. When he was only 19, he became a member of the Indian Association for Cultivation of Science. Meanwhile, respecting his parents' wishes, he took up an administrative job in the Finance Ministry in Calcutta. His interest in science, however, did not flag. He used to spend his hours after office in the lab of the Association working throughout the night.

In his youth, Raman was mainly interested in acoustics, the science of sound. He studied how stringed instruments like the violin and the sitar could produce harmonious music.

He was elected to the Royal Society of London in 1924 and the British Government made him a knight of the British Empire in 1929. It was a high honour for any great scientist.

His advice to young scientists was to look at the world around them and not to confine themselves to their laboratories. "The essence of science," he said, "is independent thinking and hard work, not equipment."

C.V.Raman was the first Indian scholar who studied wholly in India and received the Nobel Prize. He was the first Asian and the first non-white to win such a great award in science. He passed away in 1970 on November 21. But his memories are with us. February 28, the day on which he discovered the 'Raman Effect', is celebrated as National Science Day to commemorate his remarkable achievement in science.

(Adapted from SCIENTISTS OF INDIA published by Children's Book Trust, New Delhi)

Glossary

lost in thought: giving all your attention to something so that you do not notice
what is happening around you
transparent (adj): allowing you to see through it

sophisticated (adj): advanced and capable
equipment (n): the things that are needed for a particular activity
modification(n): change
discovery (n): the process of finding something that was not known about before
red-letter day (idiom): an important day
surgeon (n): a doctor who is trained to perform surgery
abroad (adv): in or to a foreign country
flag (v): decline, become less
stringed instrument (n): any musical instrument with strings (eg. the violin, the sitar etc.)
harmonious (adj): very pleasant
knight (n): a man of high social rank / a person with the title
confine (v): to restrict

How well did I read?

Fill in the boxes using yes/ somewhat/ no.

I enjoyed reading the passage.
I got the idea of the passage on my own.
I got the idea with the help of my friends in the group.
The teacher helped me to understand the passage.
I used the glossary given at the end of the passage.

I. Answer the following questions:

1. Why was Raman happy when he learnt that Professor Compton had won the Nobel Prize?
2. What does the "Compton Effect" tell us?
3. What was Raman's advice to young scientists?
4. Which paragraph tells about the ill health of C.V. Raman?
5. What was the challenging situation when Raman started his experiment on light?
6. What was the unseen force working behind Raman for reaching great heights?
7. What was "Raman Effect"?

*8. If A.H. Compton had not discovered the Compton Effect, do you think Raman would have discovered the Raman Effect? Give your reasons.

9. In what way was Raman different from other Indian scientists? List them and justify your answer.

*10. If you were a scientist, what would you like to invent / discover?

II. Say whether the following statements are true or false. Correct the false statements.

1. C.V. Raman was born in Calcutta. ( )
2. The Compton Effect was a discovery made by C.V.Raman. ( )
3. Raman's mother was a college physics teacher. ( )

4. Raman was an average student at school. ( )

5. Raman studied how the drum could produce music. ( )

6. Raman spent only two hundred rupees to win the Nobel Prize. ( )

7. Raman was only 42 when he won the Nobel Prize. ( )

Vocabulary

I. The following sentences are from your lesson. Read them carefully and tick (⊔) the correct meaning of the underlined word in each sentence.

1. His parents were keen to send him abroad for higher studies.

(a) particular (b) eager (c) worried

2. The world hailed the discovery as the 'Raman Effect'.

(a) admired (b) called (c) thought

3. In his youth Raman was mainly interested in acoustics.

(a) primarily (b) simply (c) certainly

4. The British made Raman a knight of the British Empire.

(a) appointed (b) managed (c) placed

5. Raman passed away on November 21, 1970.

(a) was killed (b) died (c) left

II. Read the following sentence.

Raman was equally delighted.

The underlined word ***'delighted'*** is a verb and has been used to express a feeling of joy or happiness. Its noun form is *'delight.'*
Now, look at the following verbs and write their corresponding noun forms.

S.No.	Verb	Noun or the feeling expressed
1.	enjoyed	**enjoyment**
2.	surprised	_____
3.	disappointed	_____
4.	worried	_____
5.	satisfied	_____

Now fill in the blanks with the suitable noun forms of the underlined words in each sentence.

1. He was shocked to see a snake in his room but he recovered from his _____ in no time.
2. He pretended to look relieved but, in fact, he did not have any _____ .
3. I can understand your _____. But do not be so excited that you have health problems.
4. Raju, an auto driver, was very honest. His _____ was known to everybody when he returned the bag of jewellery a passenger had left in his auto.

III. (1) Read the following sentence and notice the underlined part.

Raman stayed in the country to do the M.A. course.

The underlined letters in capitals denote an abbreviation. The full form of this abbreviation is 'Master of Arts'.

Here is a list of some common abbreviations. Write their full forms.

Abbreviation	Full form
B.A.	_____
A.D.	_____
B.C.	_____
C.M.	_____
C.D.	_____
D.V.D.	_____
a.m.	_____
p.m.	_____

(2) Read the following sentence and notice the underlined word.

He used to spend his hours after office in the *lab*.
The underlined word "lab" is the short form of "laboratory."

Look at the following list of short forms and write their full forms. The first one is done for you. (Use a dictionary)

Short form of the word	Full form of the word

plane **aeroplane**

kilo _____

para _____

specs _____

photo _____

bike _____

mike _____

IV. In the paragraph 4 you have learnt that 'optics' is the study of light. Do you know the word for the *study of living beings*? It is 'biology'. It comes from *'bio'* (means '*life*') + '*logus' / 'logy*' (means '*study or science*'). So the suffix '-logy' adds the meaning 'the study of'.

Guess the meanings of the words under Column A and match them with the phrases under Column B.

A B

1. Archaeology ( ) (a) the study of the mind
2. Physiology ( ) (b) the study of animals
3. Psychology ( ) (c) the study of earth
4. Geology ( ) (d) the study of the cultures of the past
5. Zoology ( ) (e) the study of the bodies of living things.

Grammar

I. Read the following sentences from your lesson and observe how the underlined words are used before dates, years and the names of places.

1. Raman was born <u>on</u> November 7, 1888. (Para 6)
2. Raman passed away <u>in</u> 1970 <u>on</u> November 21. (Para 11)
3. Raman did his M.A. course <u>at</u> Presidency College <u>in</u> Madras. (Para 6)
4. <u>In</u> December, on a fine evening in 1927, there was much excitement. (Para 1)

Note: **'on', 'in'** and **'at'** are prepositions of time and place. In sentence 1 & 2 **'on'** is used before a date. In sentence 2, 3 & 4 **'in'** is used before a year (in 1970), before the name of a big city (in Madras) and before the name of a month (In December). In sentence 3 **'at'** is used before the name of a small place / area.

Now fill in the blanks with *'in'*, *'on'* and *'at'*.

Sarathchandra and Keerthana are brother and sister. Sarathchandra was born _____ 25th April _____ 2000. Keerthana was born _____ December 2, 2001. They are with their parents. They live _____ Kondamudusupalem, a small village _____ Prakasam District. They play games _____ school. It is usually very hot _____ May _____ their village. So they spend their summer _____ Hyderabad _____ their uncle's house. Mr. Srisailam is their uncle. He resides _____ High Court Colony _____ Hyderabad with his wife, Jagadeeswari and his daughter, Vishnu Priya.

II. Revision of 'Articles'.

1. 'a' is used *before singular common nouns /in noun phrases* beginning with *consonant sounds*.

2. 'an' is used *before singular common nouns / in noun phrases* beginning with vowel *sounds*.

3. 'the' is used

(a) before words / phrases that indicate unique things ("It was the headquarters of **the Indian Association** …')

(b) in situations where the sentence itself contains a clue to identity of the thing or the person referred to (e.g. His advice to young scientists was also to look at **the world around them)**

(c) in social situations where the identity of the person / object is understood ("But … look here, Krishnan," he said turning to **the young man** …").

(d) before the names of 'musical instruments (" He studied how stringed instruments like **the violin** ...")

III. List 20 phrases from the text that begin with 'a'/ 'an' or 'the'. Then put 1,2, 3(a), 3(b), 3(c), or 3(d) against them depending on how 'a'/ 'an' or 'the' is used. One is done for you.

<u>an</u> old building – 2

Now fill in the blanks with *'a'*, *'an'* or *'the'*.

1. In 1987, M.S. Swaminathan was awarded _____ Ramon Magsaysay Award.
2. We dined yesterday at _____ Maurya Sherton hotel.
3. Tejaswini lent me _____ interesting book.
4. My father is _____ school teacher.
5. M.S.Swaminathan worked at _____ Indian Agricultural Research Institute.
6. Rekha bought _____ long notebook yesterday.
7. Sravani is eating _____ mango now.
8. Ganesh always carries _____ umbrella with him.
9. Rambabu is _____ English teacher in a high school.
10. Manjula and Sruthi play_____ guitar well.

Writing

I. Write a paragraph on J.C. Bose using the hints given below. You must use the right linkers to join the sentences.

J.C. Bose – Indian scientist – born 30-09-1858 – St. Xavier's School, Calcutta – abroad for higher studies – returned in 1885 – published a monograph, Response in the Living and Non-living – became famous – Fellow of the Royal Society in 1920 – wireless telegraphy in 1895 – the Crescograph – plants have life – the Bose Institute in Calcutta – devoted to the study of plants – died 23-11- 1937.

Share your draft with your partner and refine your draft in the light of the suggestions offered by him.

How well did I write?

Fill in the boxes using yes/ somewhat/ no.

I was able to explain / describe / narrate well.----------
The sentences I used were properly connected.----------
I was able to express my ideas in apt words.----------
The ideas were arranged in proper sequence.----------
I used proper punctuation marks.----------

How well did I edit my work?

Fill in the boxes using yes/ somewhat/ no.

I deleted the excess words.----------
I corrected the wrong forms of words.----------
I corrected the punctuation errors.----------
I added new words wherever necessary.----------
I corrected the misspelt words.----------

II. The passage given below has some errors in the use of capital letters, verbs, prepositions and articles. Edit the passage by underlining the incorrect parts and writing them correctly over the space available. The first one is done for you.

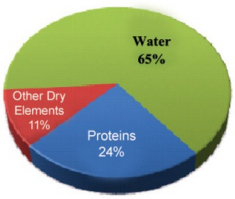
Raman was borne on November 7, 1888, in tiruchirapalli at tamil nadu. He finishes his m.a. course at Presidency college in chennai. He became member of the indian association for cultivation of science. He took up a administrative job in the finance ministry in Calcutta. He was elected to the royal society of London in 1924 and the british government made him a knight of the british empire in 1929. He was first indian scholor who studied wholly in india and received the nobel prize.

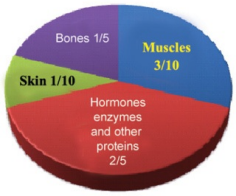
born

Study Skills

I. Study the pie charts and answer the questions given below them.

Distribution of Weight in Human Body





1. Which of the following constitute most of the weight in the human body? ( )

(a) water (b) proteins (c) dry elements (d) bones

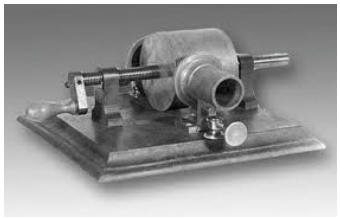
2. Which of the following statements is correct? ( )

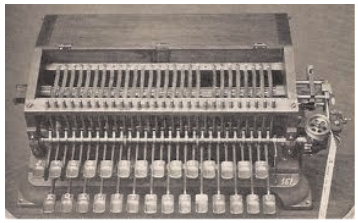
(a) Proteins constitute 11 per cent of the human body.
(b) Dry elements constitute 15 per cent of the human body.
(c) Hormones, enzymes and other proteins constitute 2/5 of the human body.

3. If a person's weight is 100 kilograms, how much do his bones weigh?
4. If the proteins in a person weigh 12 kilograms, what will be his weight?
5. Are the bones in our body heavier than the water in our body? Support your answer.

Listening and Speaking

Your teacher will read the passage 'The Inventor of Inventors.' Listen carefully and answer the questions given below:





I. Say whether the following statements are true or false.

1. When Edison was twelve, he established a school. ( )
2. Edison discovered an important scientific principle known as the Edison Effect. ( )
3. Edison was a poor observer. ( )
4. Edison's father was a school teacher. ( )
5. Edison loved to mix liquids and powders to observe the reaction. ( )

II. Here is a list of inventions. Put a (⊔) against them if it was invented by Edison.

Name of the Invention	
light bulb	⊔
aeroplane	.....
electric engine	.....
watermark pen	.....
phonograph	.....
pedestal fan	.....
printing machine	.....

radio .....

kinetograph .....

computer .....

power generator .....

III. Group work

1. Thomas Alva Edison invented electric bulb. If there were no electric bulbs, how would be our life?

2. Debate the following proposition:

'Science has proved to be more a curse than a blessing.' Divide the groups into two sets. One set of students speak in favour of the motion and the other against it. They may use the words / expressions listed in the box.

at the outset	may I begin by saying that	in his speech Mr. X said that
first of all	I look at it this way	I now draw your attention to
secondly	I'd like to explain	on the one hand / on the other hand
thirdly	the subject before us today	now because of this we have to support
lastly	I must add that	and for all these reasons, I propose
to conclude	I must take strong exception to	and there are similar cases such as

IV. Listen to the conversation between Sindhu and Mary.

Sindhu : Mary, where have you been all the week?
Mary : Um…I have been to Hyderabad.
Sindhu : Hyderabad? Why? Why did you go there?
Mary : You know, my uncle lives there. I went there to visit him.
Sindhu : That's nice. But did you visit any place?
Mary : Oh!Yes, I visited a museum . It's wonderful.
Sindhu : Really! What kind of museum is it?
Mary : It's a science museum.
Sindhu : Science museum? But it should be boring.
Mary : Not a bit. I learnt a lot about many interesting things. You must see it.
Sindhu : Is it that much interesting? Could you tell me something more about it?
Mary : Oh! It takes a long time. Now I am in a hurry. I will talk about it later.

Now work with your partner and ask and answer questions about the science fair that might have been organised in your school or district. Use the following questions too.

1. When did you go to the science fair?
2. What things did you see there?
3. Which was the most interesting thing you noticed there?

B. Reading

Read the following poem:

It's Change…….

Mum, I don't want to go to school today,
'Cause I fear our world is in decay.

I feel my teachers are part of the plot,
I'm the only one who sees through the rot.

Scientists are cloning pigs and sheep,
Saying, it's change –- a quantum leap.

Biologists are making stem cells grow,
Saying, it's change –- the way to go.

Geologists are finding cracks in our earth,
Saying, it's change –- predicting its birth.

Archaeologists are digging up fossils and bones,
Saying, it's change –- time for clones.

Yes, scientists are causing me great concern,
Giving us kids too much to learn!
- *Emma Gorrie*

Glossary

plot (n): a secret plan made to do something wrong
see through (phrasal v): understand
the rot (n): (here) the situation is getting worse
cloning (v): producing an exact copy of an animal
quantum leap (n): a sudden, great and important change
stem cell (n): a basic type of cell from which all other cells develop
fossil (n): the remains of an animal or a plant which have become hard and turned into rock
concern (n): worry

How well did I read?

Fill in the boxes using yes/ somewhat/ no.

I enjoyed reading the poem.
I got the idea of the poem on my own.
I got the idea with the help of my friends in the group.
The teacher helped me to understand the poem.
I used the glossary given at the end of the poem.

I. Answer the following questions:

1. Who is the speaker of this poem? Guess her age. Support your answer.
2. What is the speaker's complaint?
*3. How would you feel if a scientist cloned you?
4. What is the speaker's concern? Which line in the poem shows it?
*5. 'Yes, scientists are causing me great concern.' –
How is this statement true in view of the speaker's view? What is your view?
6. Pick out the word that describes the person who studies the life of plants and animals.
7. What does an archaeologist do?

II. Read the following lines from your poem and notice that the underlined words end with the same sound. Such words are called rhyming words.

Mum, I don't want to go to school *today*,
'Cause I fear our world is in *decay*.

Now match the following words that rhyme. One is done for you. Add two more words to each pair that rhyme with them.

Part –A	Part – B	Correct Pair of Words			
plot	go	***plot***	***rot***	***cot***	***lot***
sheep	rot	_____		_____	
grow	leap	_____		_____	

earth	birth	_____	_____
bones	learn	_____	_____
concern	clones	_____	_____

Project

I. Collect information about ten world famous Indian scientists and write it in your notebooks in the format given below:

Sl. No.	Name of the Scientist	Indian State	Discovery / Invention	Award
1				

***II. Now talk to other members of your group about one scientist whose discovery /invention has changed our life.**

C. Reading

Read the following story:

Susruta, an Ancient Plastic Surgeon

It was midnight when Susruta was awakened by a frantic knocking at the door.

"Who's out there?" asked the aged doctor, taking a lighted torch from its socket in the wall and approaching the door.

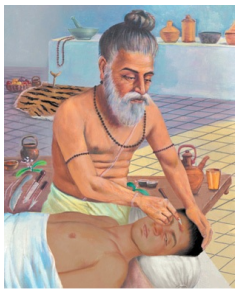
"I'm a traveller, my revered Susruta," was the anguished reply. "A tragedy has befallen me. I need your help…."

Susruta opened the door. What he saw was a man kneeling before him, tears flowing from his eyes and blood from his disfigured nose.

"Get up, my son, and come in," said Susruta. "Everything will be all right. But be quiet, now."

He led the stranger to a neat and clean room, with surgical instruments on its walls. He washed his face with water and the juice of a medicinal plant. He then offered him a mug of wine and began preparing for the operation.

With a large leaf of a creeper brought from the garden, he measured the size of the stranger's nose. Taking a knife and forceps from the wall, he held them over a flame and cut a strip of flesh from the stranger's cheek. The man moaned, but the wine had numbed his senses.



After bandaging the cut in the cheek, Susruta cautiously inserted two pipes into the stranger's nostrils and transplanted the flesh to the disfigured nose. Moulding the flesh into shape he dusted the nose with powdered liquorice, red sandalwood and an extract of Indian barberry. He then enveloped the nose in cotton, sprinkled some refined oil of sesame on it and finally put a bandage.

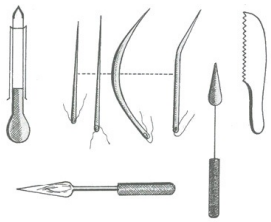
Before the traveller left, he was given instructions on what to do and what not to and a list of medicines and herbs he was to take regularly. He was also asked to come back after a few weeks to be examined.

In this manner Susruta mended a nose some 26 centuries ago. And what he did is not greatly different from what a plastic surgeon would do today. In fact, Susruta is today recognised as the father of plastic surgery all over the world. His treatise, *Susrutasamhita*, has considerable medical knowledge of relevance even today. It indicates that India was far ahead of the rest of the world in medical knowledge.

Born in the sixth century B.C., Susruta was a descendant of the Vedic sage Viswamitra. He learnt surgery and medicine at the feet of *Divodasa Dhanvantari* in his hermitage at Varanasi. Later, he became an authority in not only surgery but also in other branches of medicine.

He was the first physician to advocate what is today known as the 'caesarean' operation. He was also an expert in removing urinary stones, locating and treating fractures and doing eye operations for cataract. His suggestion to give wine to patients about to be operated upon makes him also the father of anaesthesia.

In his treatise, Susruta lists 101 types of instruments. His *Samdamsa Yantras* are the first forms of the modern surgeon's spring forceps and dissection and dressing forceps. In fact, his system of naming surgical tools after the animals or birds they resemble in shape, for example crocodile forceps, hawksbill forceps, is adopted even today.



Surgical instruments used by Susruta

Susruta was also an excellent teacher. He told his pupils that one could become a good physician only if one knew both theory and practice. He advised his pupils to use carcasses and models for practice before surgery.

(Adapted from SCIENTISTS OF INDIA published by Children's Book Trust, New Delhi)

I. Answer the following questions:

1. Why did Susruta offer the traveller a mug of wine?
2. Why was Susruta recognized as the father of plastic surgery today?
3. What made him the father of anaesthesia?
4. Who could become a good physician according to Susruta?
5. What was his advice to his pupils?

Do You Know?

1. It takes about 20 seconds for a red blood cell to circle the whole body.
2. It has been proven that people can lessen reactions to allergies by laughing.
3. Six-year-olds laugh on an average of 300 times but adults laugh only 15-100 times a day.
4. Water freezes at 32^0F and boils at 212^0F . There are 180 degrees between freezing and boiling because there are 180 degrees between the north and the south.

Share This Joke

The surgeon told his patient who woke up after having been operated: "I'm afraid we're going to have to operate on you again. Because, you see, I forgot my rubber gloves inside you."

"Well, if it's just because of them, I'd rather pay for them if you just leave me alone."

Do You Know?

1. The average human body contains enough Sulphur to kill all fleas on an average dog, Carbon to make 900 pencils, Potassium to fire a toy cannon, Fat to make 7 bars of soap, Phosphorus to make 2,200 matchheads, and enough Water to fill a ten gallon tank.
2. Your fingernails grow four times as fast as your toenails.
3. Babies are born with 300 bones and adults have 206.
4. The smallest bone in your body is in your ears.
5. A sneeze blows air out of your nose at 100 miles per hour.
6. Children have more taste buds than adults.
7. Bones are 4 times stronger than concrete.
8. The human body has approximately 37,000 miles of capillaries.
9. A square of human skin has 32 million bacteria on it!
10. The liver is the body's chemical factory. It has over 500 functions!