

## VISIONARY TEACHERS AND SCIENTISTS

Note: The transactional processes suggested in CISCE curriculum are highlighted in grey.

### Learning Outcomes

- To identify with and be inspired by real-life heroes
- To recognise the importance of hard work, cooperation and coordination
- To inculcate the habit of dreaming and striving to achieve our dreams

### Pre-reading



This section focuses on *assessment for learning* as it indicates to the reader that the text is about a person who inspires.

#### Group Discussion

A. "Whatever you can do or dream you can, begin it. Boldness has genius, power and magic in it. Begin it now."

1. What does this saying mean?

2. List out some people who have demonstrated this in their lives.

3. Explain their achievements.

B. *Pair discussion*

Encourage pairs to discuss the question given in Pre-reading section of the Reader.

## READING

*Students comprehend, scan and list*

Draw the given table with the names and the headings on the board. Tell students that they will have to help you fill in the details during the course of the reading session. Let them work in pairs and scan for details.

Read the author-note and tell the class that the text is an extract from APJ Abdul Kalam's book, *Ignited Minds*.

Play the audio track / Let students read the text in parts.

Stop to explain, discuss or check comprehension

	Who is he?	What did he contribute?
Aryabhata		
Brahmagupta		
Bhaskaracharya		
C. V. Raman		
Prof. S. Chandrasekhar		
D. S Kothari, Dr Homi J Bhabha and Dr Vikram Sarabhai		
Dr APJ Abdul Kalam		

- *The great minds of the country ... in 1975, Aryabhata.*

Explain the significance of the introductory paragraph 'The great minds ... upon their dreams.' (Kalam begins by telling us that the great people of the country possessed the capacity in them to inspire the people of their country to work towards the goal they were focussing on. For these people, the development of their country was of great importance and they strove to work towards its progress.)

Ask students:

*Who was Totadri Iyengar? What did Kalam see in him? (He saw glimpses of the great mathematicians) Who was Aryabhata? Why is he famous even today? How did the country honour him?*

- *Brahmagupta was born in ... factor for Sir CV Raman.*

Talk to the class about:

1. Brahmagupta's and Bhaskaracharya's contributions.

*An 'intellectual' is an intelligent and learned / famous and important person.*

(Ans: intelligent and learned)

2. How ISRO honoured Bhaskaracharya.
3. Sir CV Raman and how he influenced GH Hardy.
4. What Kalam means by 'it was Hardy who discovered Ramanujam for the world'. (Hardy was a famous mathematician and when he was all praise for Ramanujam, the world got to know that Ramanujam was no ordinary man.)

*Briefly explain the first line of this paragraph.*

(Ans: Suggested answer (accept any logical answer): 'Every integer is a personal friend of Ramanujan' means that Ramanujan knew numbers very well and could work with them as easily as with friends.)

5. Raman's early career and the support he received.

*What is meant by 'probing for answers'?*

(Ans: 'Probing for answers' means to ask a lot of questions, examine and research to find out certain answers.)

- *The same is the case ... brilliance in this field.*

Ask students:

*Who was S Chandrasekhar? What did he mention in his biography? What does 'subject country' mean? What is the significance of the mention of this phrase?*

*Pick out the line that explains the importance of science as a subject.*

(Ans: Another important message they convey is that basic science is vital for the growth of technology and for developing new leaders in science.)

*Who are the visionary scientists of recent times? What has been their contribution? What is the tone of the ending? (Hopeful and optimistic)*

### Post-reading

Let students fill in the details and share with the class.

Qualities I think I have	Qualities I would like to have

## GRAMMAR

## Present and past participles

As students have done the present continuous (*-ing* form) and the simple past tenses, they will be familiar with the present and past participles used as part of the verb.

This activity is to practise present and past participles as adjectives.

### Activity

Divide the class into two groups. Give each group member a number. Instruct each student from the first group to write a noun on a slip of paper. Ask the second group to write verbs in their *-ing* form.

A member from Group 1 calls out the noun she/he has written and a student from Group 2 with a suitable verb, which could be used as an adjective, joins the first student. They make a pair. Continue this activity till the students are unable to find a match.

Now analyse these verbs and put them up on the board. Try to elicit a suitable noun for these verbs. (*falling rain, sparkling water, speaking parrot*) You may be left with some words, which cannot be put together in this manner.)

Tell them that all present participles cannot be used as adjectives.

Follow the same procedure for past participles.

Ask students:

*What are the two tense forms of participles?* (Present and past)

*Can they be used as adjectives?* (Yes)

Write the sentences on the board. Ask students to identify the present and past participles in the sentences.

*The geese were flying south. The bus has arrived on time. We were concerned about him.*

Write the given words with the blank spaces. Brainstorm for participles used as adjectives and fill in the words. *idea (interesting/ amazing ...)* *animal (frightened / shivering ...)* *glasses (reading)*

Tell students:

A participle is used

- in passive forms. (*The engine was repaired by Shyam.*)
- to form the perfect tense. (*He has/had repaired the engine.*)
- as an adjective. (*The repaired engine was handed over to the owner.*)

## VOCABULARY

## Prefix and suffix

### Prefix

Write the word "Prefix" on the board, and ask students what it means.

Elicit answers from students, then explain that:

A **prefix** is

- a group of letters placed before a word,
- it changes the meaning of the word.

Example: *Extra – More, Beyond Auto – By oneself Sub – Under*

**Suffix**

Write these words on the board

*Careless Faultless Hatless Harmless Fearless Flawless*

Ask the students what they notice about these words. Students will most likely say that words all end with “less.”

Explain to students that they noticed a suffix in all of the words.

Example: *-cian, -ence, -ity, -ment*

A **suffix** is

- a group of letters that comes after a root or base word.
- a special group of letters because it can change the meaning of the root word and make an entirely new word.

Emphasise that the root word is a word that is a word on its own.

Point out how the meaning of these words changes when a suffix is added to each of them.

## LISTENING

### While-listening – short note

Tell students to listen to about some instructions on how to take part in a debate. Allow them time to read the lines before listening to the audio.

Play the audio track and let students do the task.

Play the recording a second time so that students check their work / fill in the details they had missed out the first time. Review the answers.

## SPEAKING

### Debate

This task can be used for *assessment as learning*. Students take charge of all that they have learnt and debate on a given topic, while using words, expressions and body language to communicate effectively.

Recap the rules of a debate.

Divide the class into two teams and allow them time to prepare for / against the topic.

Allow a student to be the moderator and another as the timekeeper.

Monitor the activity.



## WRITING

## Linkers

*Note:* Help students set their objectives (Why do I want to write this?) Guide students through every step. Share the sample passage and guidelines with them but encourage them to write their own story.

*Why do I describe an incident using simple linkers?*

- to show the order of events of an incident
- to tell readers about the relationship between ideas/things
- to combine shorter simpler sentences into longer complex ones

*How do I use linkers?*

**Step 1:** Make a list of linkers and sequencing expressions:

*and, but, although, yet, even though then, after that, ...*

**Step 2:** Write an outline of an incident you would like to describe:

Example: Teacher came to the class – announced a surprise singing competition that afternoon – students very happy – Raju very sad – very shy to sing in front of others – bell rang – teacher entered – singing started – one by one students came to front of class to sing – some sang very well – most went off-tune – others laughed and had fun – class very noisy – Raju's turn – stood in front and looked nervous – class waited – pin drop silence – teacher encouraged Raju – began to sing – students surprised – the best voice in class.

**Step 3:** Flesh out the outline with relevant details, adding linkers wherever required:

Sample: Our class teacher came to the class during the lunch break (*introduce the situation*) and (*adding more information about what the teacher did*) announced a surprise singing competition that afternoon.

All the students were happy but (*contrasting the earlier idea*) Raju alone was sad. This was because... (*continuity of an action*) The break bell rang and (*two independent sentences joined*)... Everything went silent...

Then it was Raju's turn. (*sequence of events*)... After ten minutes, he picked up the courage to sing. (*sequence of events*) The students were shocked and... Finally, all the students realised... what a wonderful singer Raju was. (*end on a note connected with the opening sentence*).

## PRONUNCIATION

## Falling tone in wh- questions

This task can be used for *assessment as learning*. Students practise to use the falling tone for wh- questions. Pairs assess each other while they communicate using the right intonation.

Tell students:

*Wh-* question sentences, questions that begin with the words '*who, what, where, when, why*' and '*how*'—typically end in a falling pitch. This is opposite of the pattern for *yes/no* questions, whose pitch boundaries normally rise.

*Pair work*

Play the audio and conduct a choral drill. Then, allow pairs to practice the given questions till they are able to use the correct intonation. Monitor the activity.





## PROJECT

This task can be used for *assessment as learning*. Students develop *logical intelligence, visual-spatial intelligence, verbal intelligence and interpersonal Intelligences*.

### Group work

Guide pairs to refer to the right web sites or books that can be used to collect their information.

Steps to follow:

- Choose any three women achievers and research for information.
- Organise the information in order and prepare a fact file using the following guidelines:
  - ✓ Name/s and age/s
  - ✓ Nature of service/work
  - ✓ Where work done
  - ✓ Problems faced, if any
  - ✓ Achievements
  - ✓ Reason for doing the work
  - ✓ Future plans
  - ✓ Any other inspiring details
- Insert pictures, drawing or any other useful information.

Allot time for each group to make a presentation in class.

## STUDENTS' BOOK ANSWER KEY

### Visionary Teachers and Scientists

#### Pre-Reading

*Free response*

#### Comprehension

- A.**
- |                           |   |                   |              |
|---------------------------|---|-------------------|--------------|
| 1. 'Calculus' Srinivasan  | 2. Professor T Totadri Iyengar                                |                   |              |
| 3. a. Kusumapura          | b. <i>Aryabhaticyam</i>                                       | c. <i>pi</i>      | d. satellite |
| 4. a. Brahmagupta         | b. Rajasthan  | c. astronomy      |              |
| 5. a. Bhaskaracharya      | b. zero   |                   |              |
| 6. a. Srinivasa Ramanujan | b. and c. <i>Sample answers:</i> prime numbers; magic squares |                   |              |
| 7. Nobel Prize            | 8. a. black holes   | b. <i>Chandra</i> |              |
| 9. a. Kothari             | b. Bhabha   | c. Sarabhai       |              |
- B.**
1. a. Hardy or Professor G H Hardy was a mathematician of Trinity College, Cambridge.
  - b. *Suggested answer (accept any logical answer):* Prof Hardy found out just how intelligent and talented Ramanujan was, and made it known to the world, or helped Ramanujan to utilise and develop his abilities.

- c. Hardy suggested that for Ramanujan, only the value of 100 (on a scale of 100) would fit.
2. a. It could be surprising that the Raman Effect did not come out of a grand and expensive establishment because Sir C V Raman won the Nobel Prize for that work—so the work was extremely important.  
 b. According to Kalam, it was a deep wish to show the excellence of Indian minds to the world that really encouraged C V Raman to do this work.
3. The line refers to the great success of people like J C Bose, C V Raman, Meghnad Saha, Srinivasa Ramanujan and Rabindranath Tagore. The time referred to is when the struggle for India's independence was going on, roughly around 1920–1925.
4. a. The remarkable phenomenon referred to here is the fact that between 1920 and 1925, India suddenly had five or six internationally well-known men.  
 b. *Suggested answer (accept any logical answer):* During the national movement, the country was trying to gain independence, and many Indians were trying to prove that they were in no way less than the British who were ruling the country—that Indians were just as capable, talented and intelligent. Indians wanted to find their own voice, live and work and progress in their own way. That is what has been referred to as the need for self-expression.
- C. *Suggested answer (accept any logical answer):*** Kalam traces the development of mathematics and science in India in order to prove that India has had a rich heritage of scientific and mathematical research. This heritage—this storehouse of knowledge—can easily be utilised to take scientific and technological research further ahead, and to benefit the entire country. It is also a reminder to the readers that we have much to be proud of in these fields.

### Grammar

- A.** 1. bought    2. learned    3. singing    4. travelled    5. helping    6. boiling
- B.** 1. present participle: creaking – A; past participle: complained – V  
 2. past participle: receded – V                      3. present participle: walking – A  
 4. present participle: sleeping – A  
 5. present participle: cooling – V; past participle: baked – A  
 6. past participle: played – V

### Vocabulary

1. pre-booked                  2. inter-school                  3. musician                  4. accompaniment  
 5. anti-social                  6. responsibility                  7. prominence                  8. extraordinary

### Listening

Listening text:

Things to remember while participating in a debate—

- Research your topic well.
- Prepare a strong introduction.

- Listen carefully to your opponents' arguments.
- Provide evidence for your own arguments.
- Be polite and respectful.
- Appear confident, but not over-confident.
- Speak clearly and within your time limit.

Answers:

- |              |                    |                        |                         |
|--------------|--------------------|------------------------|-------------------------|
| 1. Research  | 2. topic           | 3. strong introduction | 4. opponents' arguments |
| 5. evidence  | 6. arguments       | 7. polite              | 8. respectful           |
| 9. confident | 10. over-confident | 11. clearly            | 12. time limit          |

### Writing

*Free response*

### Dictionary Work

All the words can be used as both nouns and verbs. *Free response*

## ANSWER KEY TO WORKSHEET 10

- A.**
1. present participle: swimming (A)
  2. present participle: talking (A)
  3. present participle: looking (V); past participle: recognised (A)
  4. present participle: frightening (A)
  5. past participle: written (A); present participle: trying (V)
  6. present participle: hoping (V), nesting (A)
  7. past participle: invited (V), elected (A)
  8. present participle: devastating (A); past participle: described (V)

**B. ACROSS:**

- |              |                    |                  |
|--------------|--------------------|------------------|
| 1. STATEMENT | 6. EXTRACURRICULAR | 8. INTERNATIONAL |
|--------------|--------------------|------------------|

DOWN:

- |               |               |               |
|---------------|---------------|---------------|
| 2. TECHNICIAN | 3. PREPLANNED | 4. EXCELLENCE |
| 5. ANTIBIOTIC | 7. AUDACITY   |               |

**C. Free response**

## QUESTION BANK

### Visionary Teachers and Scientists

**A. Answer in brief.**

Why did the narrator have great respect and admiration for Prof. Totadri Iyengar?

**Ans:** Prof. Totadri Iyengar was a unique and divine looking personality. The narrator, as the member of the Mathematics club, was privileged to listen to his lectures. It was by listening to those lectures that the narrator, at a young age, understood the contribution of ancient Indian mathematicians and astronomers to mathematics and astronomy.



**B. Answer in detail.**

How was Prof. Hardy of Trinity College responsible for exposing Ramanujan's genius to the world?

**Ans:** The greatest of geniuses who lived within our present memory was Srinivasa Ramanujan. Though he did not have any practical formal education, his love for his subject enabled him to contribute to the field of mathematics. Ramanujan's work covers vast areas including prime numbers, hyper geometric series, modular functions, elliptic functions apart from geometry of ellipses squaring the circle and so on. He was such a unique Indian genius that he could impress a rigorous mathematician as Prof G. H. Hardy of Trinity College, Cambridge. Prof Hardy while rating geniuses rarely gave above 30 on a scale of 100 to even geniuses. But for Ramanujan, he said that only the value of 100 would fit. But for Prof Hardy's admiration for Srinivasa Ramanujan, the world would have never known him, who died very young.

**C. Choose the correct answer.**

*The intellectual who evolved value to zero from the concept based on Aryabhata's discovery:*

- a. Professor G H Hardy
- b. C V Raman
- c. Bhaskaracharya

**Ans:** c

**D. Read the lines and answer the questions.**

*Fortunately, he was supported by the great educationist Ashutosh Mukherjee.*

- a. Who was supported by Ashutosh Mukherjee?
- b. Where was the person working at that time?
- c. Why did he need support?

**Ans:** a. Sir C. V. Raman was supported by Ashutosh Mukherjee.  
b. Sir C. V. Raman was working in the Office of the Accountant General, Calcutta.  
c. Though he was working in the office, his scientific mind was always probing for answers for some scientific problems. Hence, he needed support from like-minded people.

**D. Answer in brief. (Think and answer)**

How did the movement of Independence impact the leaders in arts and science?

**Ans:** During the movement of Independence there not only emerged leaders in science but also in economics, history and literature. They have all proved as the best in the world. This could possibly be because their great success in the struggle for Independence helped in creating an atmosphere of creativity.

**E. Answer in detail. (Think and answer)**

How was it possible to prove to the west that Indians were equal to them in the realm of Science?

**Ans:** Dr. Kalam, in the text speaks of ancient mathematicians and scientists whose contribution in the field of science, mathematics and astronomy have made India proud. Later during the time when India was struggling for independence, many, by their scientific and artistic achievements became national heroes. Dr. Kalam quotes Chandrasekhar who observed that between 1920 and 1925 India had suddenly five or six internationally well-known men. India at that time was talked of only as a country under the British rule. But with the achievement of many Indian scientists and mathematicians, we could show the west that we were equal to them in the realm of science and literature.