

A Truly Beautiful Mind

Answers to NCERT Questions

THINKING ABOUT THE TEXT

1. Here are some headings for the paragraphs in the text. Write the number(s) of the paragraphs for each title against the heading. The first one is done for you.

Ans:

- (i) Einstein's equation (9)
- (ii) Einstein meets his future wife (7)
- (iii) The making of a violinist (3)
- (iv) Mileva and Einstein's mother (10)
- (v) A letter that launched the arms race (15)
- (vi) A desk drawer full of ideas (8)
- (vii) Marriage and divorce (11)

2. Who had these opinions about Einstein?

- (i) He was boring.
- (ii) He was stupid and would never succeed in life.
- (iii) He was a freak.

Ans:

- (i) His playmates found him boring.
- (ii) His headmaster said that he was stupid and would never succeed in life.
- (iii) Einstein's mother thought that he was a freak.

3. Explain what the reasons for the following are:

- (i) Einstein leaving the school in Munich for good.
- (ii) Einstein wanting to study in Switzerland rather than in Munich.
- (iii) Einstein seeing in Mileva an ally.
- (iv) What do these tell you about Einstein?

Ans:

(i) Einstein left the school in Munich because he did not like the regimental environment of his school life. He always argued with his teachers as he always had an opinion that was different from theirs. He felt so stifled and therefore, managed to convince his parents to take him out of there.

(ii) Schools in German speaking Switzerland were more liberal than in Munich, that's why, he preferred to study further in Switzerland.

(iii) Einstein had a special interest in Mileva as he thought she was intelligent and clever. She showed interest in fine arts like music and literature unlike people in his family and at the university.

(iv) All these indicate that Einstein was a visionary. He was intelligent and clever. He never hesitated to voice his opinion. Once, he was sure of his decision and went into action without any hesitation. He left Munich to further his education in Switzerland simply because they were liberal and amenable. He liked to mingle with like-minded people.

4. What did Einstein call his desk drawer at the patent office? Why?

Ans: Einstein worked as a technical expert in the patent office in Bern. He called his desk drawer at the patent office the, "bureau of theoretical physics! He called it so because while he was assessing other people's inventions, he was simultaneously developing his own ideas in secret.

5. Why did Einstein write a letter to Franklin Roosevelt?

Ans: When the Nazis came to power in Germany, Einstein emigrated to U.S. The American physicists were in an uproar because of the discovery of nuclear fission in Berlin. They feared the Nazis could now build and use an atomic bomb. Einstein's associates feared that the Americans too might try to make a similar invention. Einstein wrote to the American President, Franklin D. Roosevelt to warn him of the dire consequences of an atomic explosion.

6. How did Einstein react to the bombing of Hiroshima and Nagasaki?

Ans: Einstein was shocked, grieved and shaken by the bombing of Hiroshima and Nagasaki, and the extent of destruction. What he feared came true. The letter to Roosevelt had the undesired effect of America developing the atomic bomb. He therefore, urged the United Nations to make a world government. This did not have any impact. But over the decade, he travelled worldwide, campaigning for peace and democracy and an end to the arms race.

7. Why does the world remember Einstein as a 'world citizen'?

Ans: Einstein is remembered as a 'world citizen' because of his geographical and scientific contribution. His theories of relativity changed the perspective through which

scientists saw the universe earlier. He also worked towards world peace and nuclear disarmament.

8. Here are some facts from Einstein's life. Arrange them in chronological order.

- [] Einstein publishes his special theory of relativity.
- [] He is awarded the Nobel Prize in Physics.
- [] Einstein writes a letter to U.S. President, Franklin D. Roosevelt, and warns against Germany's building of an atomic bomb.
- [] Einstein attends a high school in Munich.
- [] Einstein's family moves to Milan.
- [] Einstein is born in the German city of Ulm.
- [] Einstein joins a university in Zurich, where he meets Mileva.
- [] Einstein dies.
- [] He provides a new interpretation of gravity.
- [] Tired of the school's regimentation, Einstein withdraws from school.
- [] He works in a patent office as a technical expert.
- [] When Hitler comes to power, Einstein leaves Germany for the United States.

Ans:

1. Einstein is born in the German city of Ulm.
2. Einstein attends a high school in Munich.
3. Einstein's family moves to Milan.
4. Tired of the school's regimentation, Einstein withdraws from the school.
5. Einstein joins a university in Zurich, where he meets Mileva.
6. He works in a patent office as a technical expert.
7. Einstein publishes his special theory of relativity.
8. He provides a new interpretation of gravity.
9. He is awarded the Nobel Prize in Physics.
10. When Hitler comes to power, Einstein leaves Germany for the United States.
11. Einstein writes a letter to US President, Franklin D. Roosevelt, and warns against Germany's building of an atomic bomb.

12. Einstein dies.

THINKING ABOUT LANGUAGE

Here are some sentences from the story. Choose the word from the brackets which can be substituted for the italicised words in the sentences.

1. A few years later, the marriage faltered. (failed, broke, became weak).

Ans: (i) failed

2. Einstein was constantly at odds with people at the university. (on bad terms, in disagreement, unhappy)

Ans: (ii) in disagreement

3. The newspapers proclaimed his work as “a scientific revolution. (declared, praised, showed)

Ans: (iii) declared

4. Einstein got ever more involved in politics, agitating for an end to the arms buildup. (campaigning, fighting, supporting)

Ans: (iv) campaigning

5. At the age of 15, Einstein felt so stifled that he left the school for good. (permanently, for his benefit, for a short time)

Ans: (v) permanently

6. Five years later, the discovery of nuclear fission in Berlin had American physicists in an uproar. (in a state of commotion, full of criticism, in a desperate state)

Ans: (vi) in a state of commotion

7. Science wasn't the only thing that appealed to the dashing young man with the walrus moustache. (interested, challenged, worried)

Ans: (vii) interested

Complete the sentences below by filling the blanks with suitable participial clauses. The information that has to be used in the phrases is provided as a sentence in brackets.

1. _____, the firefighters finally put out the fire. (They worked round the clock.)

Ans: (i) Working round the clock

2. She watched the sunset above the mountain, _____. (She noticed the colours blending softly into one another.)

Ans: (ii) noticing the colours blending softly into one another

3. The excited horse pawed the ground rapidly, _____. (While it neighed continually.)

Ans: (iii) neighing continually

4. _____, I found myself in Bangalore, instead of Benaras. (I had taken the wrong train.)

Ans: (iv) Having taken the wrong train

5. _____, I was desperate to get to the bathroom. (I had not bathed for two days.)

Ans: (v) Having not bathed for two days

6. The stone steps, _____ needed to be replaced. (They were worn down).

Ans: (vi) being worn down

7. The actor received hundreds of letters from his fans, _____. (They asked him to send them his photograph.)

Ans: (vii) asking him to send them his photograph

WRITING NEWSPAPER REPORTS

Here are some notes which you could use to write a report.

21 August 2005 — original handwritten manuscript of Albert Einstein unearthed — by student Rowdy Boeynik in the University of the Netherlands — Boeynik researching papers — papers belonging to an old friend of Einstein — fingerprints of Einstein on these papers — 16-page document dated 1924 — Einstein's work on this last theory — behaviour of atoms at low temperature — now known as the Bose-Einstein condensation — the manuscript to be kept at Leyden University where Einstein got the Nobel Prize.

Write a report which has four paragraphs, one each on:

- What was unearthed.
- Who unearthed it and when.
- What the document contained.
- Where it will be kept. Your report card begins like this.

Ans: Student Unearths Einstein Manuscripts

21 August 2005. An original handwritten Albert Einstein manuscript has been unearthed at a university in the Netherlands by a student named Rowdy Boeynik. He was researching on the papers belonging to his old companion Einstein. The reason why these documents are important is because they contain Einstein's works on his theory; the cause and effects of the making of atoms at very low temperatures, which came to be known as the Bose-Einstein Condensation. It is proved that this document was made by Einstein as his fingerprints were found all over the papers. The university has decided to keep this original manuscripts for further research by scholars. The manuscript will be kept at Leyden University where Einstein got the Nobel Prize.

Additional Questions

Extract Based Questions

Read the following extracts carefully and answer the questions that follow: (4 Marks each)

1. She was also bothered by Mileva's intelligence. "She is a book like you, his mother said. Einstein put the wedding off. The pair finally married in January 1903, and had two sons. But a few years later, the marriage faltered.

- (a)** Who is being referred to in the lines above? Who is speaking?
- (b)** Why did Einstein put off the wedding?
- (c)** What was the outcome of the marriage?
- (d)** Was his mother's judgement right?

Ans:

- (a)** Einstein's mother is speaking about Mileva.
 - (b)** Einstein put off the wedding because his mother was against it.
 - (c)** A few years later, the marriage faltered.
 - (d)** The outcome of the marriage indicates that perhaps her judgment could have been right.
- 2. A headmaster once told his father that what Einstein chose as a profession wouldn't matter, because "he'll never make a success at anything. Einstein began learning to play the violin at the age of six, because his mother wanted him to; he later became a gifted amateur violinist, maintaining this skill throughout his life.**
- (a)** What did the headmaster tell Einstein's father?
 - (b)** Why did Einstein learn to play the violin?

(c) Do you agree to the statement, the headmaster made about Einstein, according to the given extract?

(d) What do you think Einstein would have felt on hearing the Headmaster's remark?

Ans:

(a) The headmaster told Einstein's father that his son would never be successful in any profession he chooses.

(b) Einstein learned to play the violin because his mother wanted him to do so.

(c) I do not agree with the headmaster's statement about Einstein because he proved to be a success even as a violinist.

(d) I feel that Einstein would have been utterly disappointed on hearing a remark of such a nature.

3. But Albert Einstein was not a bad pupil. He went to high school in Munich, where Einstein's family had moved when he was 15 months old, and scored good marks in almost every subject. Einstein hated the school's regimentation, and often clashed with his teachers. At the age of 15, Einstein felt so stifled there that he left the school for good.

(a) How can you say Einstein was not a bad pupil?

(b) What did Einstein not like about the school?

(c) Where did Einstein do his high school education?

(d) Which word in the passage means 'suffocate'?

Ans:

(a) We can say so because he scored good marks in almost every subject.

(b) Einstein did not like the school regimentation and often clashed with his teachers.

(c) Einstein did his high school education in Munich.

(d) Stifled

4. The Americans developed the atomic bomb in a secret project of their own and dropped it on the Japanese cities of Hiroshima and Nagasaki in August 1945. Einstein was deeply shaken by the extent of the destruction. This time, he wrote a public missive to the United Nations. In it, he proposed the formation of a world government.

(a) What did the Americans do with the secret project?

(b) How did the American's action affect Einstein?

- (c) What was the secret project?
- (d) Which word in the passage is synonymous to 'memorandum'?

Ans:

- (a) The Americans dropped it on two Japanese cities, namely Hiroshima and Nagasaki.
- (b) Einstein was extremely shaken by the extent of destruction and suffering caused by the dropping of the atomic bomb.
- (c) The secret project was the development of the atomic bomb.
- (d) Missive

5. After years of constant fighting, the couple, finally divorced in 1919. Einstein married his cousin Elsa the same year. Einstein's new personal chapter coincided with his rise to world fame. In 1915, he had published his General Theory of Relativity, which provided a new interpretation of gravity.

- (a) What were the consequences of constant fighting in Einstein's personal life?
- (b) How did Einstein become world famous?
- (c) How did a change in his personal chapter affect his life?
- (d) What did his new theory provide?

Ans:

- (a) The result of constant fighting in Einstein's life led to divorce.
- (b) He became famous by the publication of 'General Theory of Relativity'.
- (c) Einstein came to be recognised world over.
- (d) His new theory provided a different interpretation of gravity.

Short Answer Questions (30-40 words: 2 Marks each)

1. Why did Einstein play by himself as a child?

Ans: As a child, Einstein found it difficult to interact with children of his age as he did not know what to do with them. He had started talking at the age of two and a half and he repeated every word twice. His playmates called him 'Brother Boing'. Therefore, he played by himself most of the time. He loved playing with mechanical toys.

2. Why did Einstein want to go to Switzerland to further his studies?

Ans: Einstein was a bright student and scored good marks in almost every subject but he did not like the strict discipline in the school at Munich. Students were not allowed to express themselves freely. As a result, Einstein often clashed with his teachers. He

therefore, wanted to study in German-speaking Switzerland, a city that was more liberal than Munich.

3. How did Einstein's private life unfold after he completed his studies?

Ans: Einstein met Mileva at a university in Zurich. He wanted to marry her but his mother was against the idea. She did not like the alliance because Mileva was three years senior and found her too intelligent to be a housewife. They however, married in 1903 and had two sons. After a few years, their marriage faltered. They were finally divorced in 1919 and the same year, he married his cousin Elsa.

4. What is Einstein's special theory of relativity?

Ans: According to Einstein's special theory of relativity, time and distance are not absolute. From this, followed the world's most famous formula which describes the relationship between mass and energy.

$$E = mc^2$$

5. What extraordinary incident happened in the life of Einstein in 1921?

Ans: Einstein was honoured with the Nobel Prize for Physics in 1921, for having published his General, 'Theory of Relativity'. This theory involved an accurate calculation in advance, the extent to which the light from the stars would be deflected through the sun's gravitational field. He was showered with honours and invitations from all over the world, and his work was referred to as a 'scientific revolution' by the media.

6. How did the world recognise Albert Einstein?

Ans: Albert Einstein who was initially considered as a 'freak' and 'failure', turned out into being one of the scientific revolutionaries, the world has ever known. The Nobel Laureate who died in 1955 at the age of 76, was celebrated as a visionary and world citizen, and was accepted by the world as a scientific genius.

Long Answer Questions (100-150 words: 8 Marks each)

1. Why did Einstein and his associates write to President Roosevelt? How did he respond?

Ans: Einstein and his associates feared that the Nazis could build and use the atomic bomb for destructive purpose to gain super power. So on 2nd August 1939, he wrote a letter to American President, Franklin D. Roosevelt to warn him about the impact of such bombs. The letter took no heed of the warning. Instead, the Americans developed the atomic bomb in a secret project of their own. They dropped the bomb on the Japanese cities of Hiroshima and Nagasaki in August 1945, causing large scale of destruction.

2. What were some of Einstein's scientific achievements?

Ans: Einstein developed his idea on Relativity secretly assessing other people's inventories. The Special Theory of Relativity was published when he was just aged 26 years. This theory gave a revolutionary concept of the relationship between time and distance. This followed the famous formula which describes the relationship between mass and energy $E = mc^2$. It was the General Theory of Relativity that earned him the Nobel Prize in 1915.

3. The headmaster once told Einstein's father, "he'll never make a success at anything. Do you think a headmaster should have said such words to the father of a small child?"

Ans: It is indeed unfortunate that the head of an educational institute should give such remarks about a child. In school, his teachers did not find him especially talented even though, he got high marks. He hated the strict protocols followed by the teachers. He demanded more freedom of expression, which explains his desire to move from Munich to German-speaking Switzerland to further his studies. He liked some subjects better than others but again he scored high marks in all subjects. He was highly gifted in Mathematics and Physics. Einstein had a different perception about education that was not accepted by the authorities. However, he had the conviction to follow his mind, and eventually proved the assessment of the Headmaster wrong.

Self- Assessment Test

Extract Based Questions

Read the following extracts carefully and answer the questions that follow.

1. "This young Serb had come to Switzerland because the University in Zurich was one of the best in Europe where women could get degrees. Einstein saw in her an ally against the 'philistines'.

- (a)** Who was the young Serb?
- (b)** What was the purpose of coming to Switzerland?
- (c)** Where is Zurich? What was special about Zurich?
- (d)** Explain, 'ally against the philistines'.

2. Nazis came to power in Germany in 1933, Einstein emigrated to the United States. Five years later, the discovery of nuclear fission in Berlin had American physicists in an uproar. Many of them had fled from Fascism, just as Einstein had, and now they were afraid the Nazis could build and use an atomic bomb.

- (a)** Why did Einstein leave for the United States?
- (b)** What did Einstein fear the Nazis would do?

(c) What did the German scientists discover in 1938?

(d) Find a word from the passage which is opposite to 'democracy'.

Short Answer Questions

1. Write a short paragraph on "Einstein at school."
 2. Why was Einstein's mother against his marriage with Mileva?
 3. How does he prove himself to be a man of humanitarian considerations?
 4. How do you judge the action of Roosevelt?
 5. How did Einstein react to the bombing of Hiroshima and Nagasaki?
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Long Answer Questions

1. Make a diary entry, as Albert Einstein, on your feelings after receiving the Nobel Prize.
2. Einstein's mother thought he was a 'freak' and the headmaster said, "he'll never make a success at anything. On the basis of these comments and after reading the lesson, write an article for your school magazine, on the topic, "Don't judge a book by its cover."
3. If Einstein had been a very sensitive and emotional person, what do you think would have happened to the world of science?