

**ENGLISH PRACTICE TEST 2: NON-FICTION**  
**'The Hubble Story' from the website of NASA**

**PART A**

**COMPREHENSION EXERCISE (50 marks) - SUGGESTED ANSWERS**

(The marking scheme is a recommendation. The marker must of course use his/her own discretion on appropriate marking, deducting marks for spelling and grammatical errors, or adding marks for points that do not appear below.)

1. What does the acronym HST stand for in lines 78 and 81? (1 mark)  
Hubble Space Telescope
2. Line 62 refers to '21 states and 12 other countries'. To which country do these 'states' belong? (1 mark)  
USA (or America)
3. What was the original launch date of the Hubble Space Telescope? (1 mark)  
December 1993
4. Which other space agency, besides NASA, became involved in the project to build Hubble? (1 mark)  
European Space Agency (ESA)
5. What was the surname of the man who made the moon landing in 1969? (1 mark)  
Armstrong
6. Who first suggested that a telescope could be sent into space by a rocket? (1 mark)  
Hermann Oberth
7. In that year did the Soviets launch a satellite into space and what was its name? (1 mark)  
1957, Sputnik
8. What was the date on which the Hubble was finally released into space? (1 mark)  
April 25, 1990
9. What are the names of the two NASA space centres mentioned in this article? (1 mark)  
Johnson Space Centre, Kennedy Space Centre
10. Before the telescope was named the Hubble, what was it called? (1 mark)  
Large Space Telescope (LST)
11. How would astronomers of the year 1900 have described the universe, according to the writer? (2 marks)

One mark each for any of the following:

- consisted of a single galaxy, the Milky Way
- that Galaxy consisted of stars, dust and gas
- around that Galaxy was the vastness of space

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Part A: Suggested Answers to Comprehension Questions

12. Why does the writer refer to the Earth's atmosphere as a 'soup' in line 19? (2 marks)

One mark each for any of the following:

- the word is used as a metaphor
- trying to express the idea that the Earth's atmosphere is thick and fluid
- the Earth's atmosphere is like soup in that light cannot pass through it

13. Find two details in the writer's description of 'astronomers like Hubble' which indicate that the writer thinks they were devoted to their work. (2 marks)

One mark each for any of the following:

- they 'toiled long nights'
- they worked in 'frigid', uncomfortable observatories
- they 'yearned' to obtain the best possible images of space

14. Which of Hubble's discoveries lead in time to the Big Bang Theory? (2 marks)

One mark each for any of the following:

- Hubble noted that the many galaxies he observed appeared to be moving away from each other
- this led to questions about the beginning and end of the universe
- the Big Bang theory tries to answer such questions

15. Which words in this article suggest that the writer thinks of space as a marvellous thing? (2 marks)

One mark each for any of the following:

- speaks (twice) of the 'vastness' of space
- speaks of the 'heavens'
- speaks of astronomers as 'yearning' for a vision of space
- speaks of the 'distant, exotic cosmic shores' of unknown space

16. Explain, in your own words, how the telescope contributed to the Scientific Revolution in the 16th and 17th centuries (line 4). (4 marks)

One mark each for any of the following, or similar:

- by looking through the telescope, astronomers saw the cosmos, beyond the earth
- Copernicus, Galileo and Kepler realised that Earth was not the centre of the universe
- made man abandon the conceited idea that he was at centre of the universe
- expanded interest in world outside our world
- this new attitude was necessary for Scientific Revolution

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Part A: Suggested Answers to Comprehension Questions

17. What, according to the writer, was the most significant obstacle faced by the astronomers of Hubble's generation? (4 marks)

One mark each for any of the following, or similar:

- the 'major obstacle' of these astronomers was the obstacle of the Earth's atmosphere
- the Earth's atmosphere is thick - a 'soup' - which stops light from reaching the telescope
- the Earth's atmosphere blurs visible light
- it absorbs other wavelengths of light, such as infrared and X-rays
- can place telescopes on high mountains (where the atmosphere is thinner) but it does not totally resolve the problem.

18. Explain, in your own words, the dilemma that the Hubble's designers faced in balancing cost against capability (lines 47-51). (4 marks)

One mark each for any of the following, or similar:

- Hubble project faced budgetary constraints and therefore had to be built as cheaply as possible
- the whole point of the Hubble is to carry expensive instruments to conduct scientific experiments
- if it does not contain enough instruments, it will not be scientifically useful
- if it contains too many, it will be too expensive, and so will not be funded

19. Explain, in general terms, why the Challenger accident not a total disaster for the Hubble project (lines 76-82). (4 marks)

One mark each for any of the following, or similar:

- the Challenger accident meant the Space Shuttle fleet had to be grounded
- this time was used wisely; many important things were done in the Hubble program
- e.g., solar panels were improved, the 'aft shroud' was remodelled and communication systems upgraded
- the whole telescope was subjected to stress tests
- no time was wasted while Shuttle fleet was grounded

20. Across this article, the writer makes clear that a number of different organisations or groups were involved in the Hubble Project, beyond NASA itself. Identify four such groups and briefly state what their role was. (4 marks)

One mark each for any of the following, or similar:

- other scientific agencies: e.g. National Academy of Sciences - gave approval for the project
- other space agencies: e.g., European Space Agency (ESA) - helped pay for Hubble
- government: e.g., Congress - approved funding for the Hubble Project
- universities: e.g., the Johns Hopkins University, Baltimore - established the Space Telescope Science Institute (STScI) to evaluate proposals for telescope time
- contractors, engineers, industrial groups - all mentioned, provided expertise to build scientific instruments

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Part A: Suggested Answers to Comprehension Questions

21. Giving references to the text, outline some of the difficulties encountered during the course of the project to get the Hubble into space. (5 marks)

One mark each for any of the following, or similar:

- feasibility studies - had to satisfy the scientific community that the Hubble was achievable, worthwhile (lines 39-40)
- budgetary constraints - had to build a vehicle to take the telescope into space and bring it back again (lines 40 and following)
- also had to limit size and quality of scientific instruments (lines 49-51)
- delays caused by underestimating cost and engineering difficulties (lines 66-67)
- many scientific instruments, such as the Wide Field/Planetary Camera, needed to be redesigned (lines 69-70)
- Challenger accident - grounded the Space Shuttle fleet, so Hubble could not be send into space (lines 76-77)
- huge scale of project - had to coordinate contractors, universities, and NASA centres, worldwide (lines 61-62)

22. What is meant by these words, as used in the article? (5 marks)

One mark each for:

- |                       |  |
|-----------------------|--|
| versatility (line 8)  | ability to adapt to a range of functions                 |
| seminal (line 13)     | fundamental, influencing later thought                   |
| feasibility (line 39) | achievability, the possibility of something's being done |
| myriad (line 45)      | many and varied; countless                               |
| aft (line 80)         | at the rear or back                                      |

(Total marks: 50)

PART B: COMPOSITION EXERCISE (50 marks)

Divide the marks in this way:

- roughly one third of the marks should be given for written expression (correct spelling, grammar and punctuation).
- roughly one third of the marks should be given for the sophistication of the writing in broader terms (the quality of the vocabulary, the variation in the sentence structure, the use of varied punctuation, the use of appropriate language, the paragraph structure, etc.).
- roughly one third of the marks should be given for the inventiveness of the ideas behind the composition (the imagination required to come up with the ideas expressed in the piece of writing, the way this imagination is expressed in the details of the writing, etc.).

(Total marks: 50)

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