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SPACE TECH SERIES

Robert H. Goddard

Pioneer of Liquid-Fueled Flight

From a Backyard to the Stars

Robert Hutchings Goddard was an American physicist whose experiments laid the foundation for modern space travel. Fascinated by the possibility of reaching high altitudes, he studied how rockets could be made far more powerful and controllable than the simple solid-fuel fireworks known for centuries.

His breakthrough came on March 16, 1926, on his Aunt Effie's farm in Auburn, Massachusetts. There he launched the first rocket ever powered by liquid propellant, burning gasoline and liquid oxygen. The rocket climbed about 41 feet, traveled 184 feet downrange, and stayed aloft for roughly 2.5 seconds before crashing into a frozen cabbage field.

Liquid fuel was a crucial advance because it can be throttled, stopped, and restarted, and it packs more energy for its weight than early solid fuels. Over his career Goddard earned 214 patents and pioneered ideas still essential today, including multistage rockets and gyroscopic guidance systems that keep a rocket pointed on course.

Recognition was slow during his lifetime, and some newspapers even mocked his ideas. But after his death in 1945, his contributions were celebrated. NASA named its Goddard Space Flight Center in Maryland after him, honoring the man whose small farm launch helped begin the Space Age.

Part 1 · Reading Comprehension

1. What two propellants did Goddard's 1926 rocket burn?

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_____

2. Name two advantages of liquid fuel over early solid fuel that the passage describes.

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3. What are two rocketry ideas Goddard pioneered besides liquid fuel?

4. How was Goddard treated during his life compared to after his death?

Part 2 · Critical Thinking

Some newspapers mocked Goddard, claiming a rocket could not work in the vacuum of space because it had 'nothing to push against.' Using Newton's third law (every action has an equal and opposite reaction), explain why the critics were wrong.

Part 3 · STEM Challenge

Analyzing the 1926 Flight

Goddard's first liquid-fueled rocket rose 41 feet high, traveled 184 feet downrange, and stayed in the air for about 2.5 seconds.

1. Find the rocket's average downrange speed in feet per second. Divide the downrange distance (184 ft) by the time (2.5 s).
2. If the rocket had kept that same average speed for 4 seconds, how far downrange would it travel? Multiply.
3. Convert the downrange distance (184 ft) to meters. Use 1 ft = 0.3048 m and round to the nearest tenth.
4. Convert the average speed of 73.6 ft/s to feet per minute. Multiply by 60.