

MODULE 4

ROCKETS

Chapter 1 - History of Rockets

Learning Outcomes

After completing this chapter, you should be able to:

Identify historical facts about the Greeks, Chinese and British, and their roles in the development of rockets.

Describe America's early contributions to the development of rockets.

List the early artificial and manned rocket launches and their missions.

Chapter 2 - Rocket Principles

Learning Outcomes

After completing this chapter, you should be able to:

Define acceleration. Define inertia. Define thrust.

Describe Newton's Laws of Motion.

Chapter 3 - Rocket Systems and Controls

Learning Outcomes

After completing this chapter, you should be able to: Identify the four major systems of a rocket. Describe the purpose of each of the four major systems of a rocket. Define payload.

Chapter 1 - History of Rockets

1. A Greek named _____ developed the first rocket engine. It was propelled by _____.
2. The _____ were the first people to develop gunpowder.
3. In the 1200s, the Chinese and Mongols used rockets as _____ of _____.
4. In England, _____ increased the range of rockets.
5. In France, _____ achieved more accuracy by launching rockets through tubes.
6. In the 17th century, _____ laid the scientific foundations for modern rocketry when he developed his laws of _____.
7. In the 18th century, _____ designed rockets for military use.
8. _____ conducted many practical rocket experiments and became known as the Father of Modern Rocketry.
9. Goddard's first successful flight was fueled by _____ and _____.
10. The V-2 rocket was built under the directorship of _____.
11. On October 4, 1957, the _____ launched the first artificial satellite. It was called _____.
12. The United States' first artificial satellite was called _____.
13. A Russian, _____, was the first man to orbit Earth.
14. _____ was the first American in space.
15. _____ was the first American to orbit the Earth.
16. On July 20, 1969, Apollo 11 astronaut _____ became the first man to walk on the Moon.
17. The United States' first space station was called _____.

18. The space transportation system used for transporting to space and returning to Earth is called the _____.
19. A _____ is the rocket system that lifts the spacecraft.
20. When John Glenn orbited the Earth he was launched by the powerful _____ rocket.
21. The _____ was the launch vehicle for the Apollo 11 mission.

Chapter 2 - Rocket Principles

22. _____ is the rate of change in velocity with respect to time.
23. Newton's _____ Law of Motion states that a body at rest remains at rest and a body in motion tends to stay in motion at a constant velocity unless acted on by an outside force.
24. _____ is the tendency of an object at rest to stay at rest and an object in motion to stay in motion. *
25. _____ is defined as the amount of push used to get the rocket traveling upwards.
26. Newton's Second Law of Motion states that the rate of change in the _____ of a body is _____ to the force acting upon the body and is in the direction of the force.
27. Newton's _____ Law of Motion states that to every action, there is an equal and opposite reaction.
28. Newton's Second Law of Motion can be explained by a mathematical formula. The formula has three parts - $F = ma$.

Chapter 3 - Rocket Systems and Controls

29. Modern rockets consist of four major systems: _____, _____, _____ and _____.
30. The _____ provides the shape of the rocket.
31. The airframe of a rocket must be lightweight, yet structurally _____.
32. The _____ is defined as whatever the rocket is carrying.
33. The astronauts and their data are also part of the _____.
34. The _____ is the brain of a rocket.
35. The _____ system is responsible for getting the rocket to its destination.
36. A computer is programmed to guide the rocket on a desired _____.
37. The _____ system steers the rocket and keeps it stable.
38. The _____ system consists of everything directly associated with propelling the rocket.
39. There are two rocket propellants, _____ or _____.
40. In a solid propellant, the fuel is usually a mixture of _____ compounds and _____. The oxidizer is made up of _____ compounds.
41. Liquid propellants are carried in compartments separate from the _____, one for the _____ and one for the _____.
42. The liquid propellant is usually _____ or _____; the oxidizer is usually _____.
43. The _____ propellant is what is commonly used today.
44. The _____ system takes information from the guidance system, and keeps the rocket in the proper position and makes any needed corrections.
45. The _____ system is small compared to the rest of the rocket. It is a self-contained electronic unit with a computer.

46. The _____ is the skin of the rocket and serves as the wall of the propellant tanks.