

chamber and flowing out a nozzle in the rear of whatever is propelled. When chemicals burn very fast, they push against everything around them, which causes the rocket to move.

The rocket engine carries its own oxygen, while a **jet engine** must get its oxygen from the surrounding air. A rocket engine is faster and can go into outer space where there is no air. The liquid oxygen in a rocket engine enables the rocket to carry its own fuel and burn beyond Earth's atmosphere. A jet engine, however, is easier to control.

Rockets can be divided into two categories, solid and liquid, based on the type of fuel used. **Solid rockets** use gunpowder, which the Chinese developed in the thirteenth century. Gunpowder is packed in one end of the cylinder, called the nozzle; the other end is closed. When the gunpowder is lit, the expanding gases push out the nozzle, causing a force that raises or pushes the cylinder (or rocket) high into the air. Solid rockets are like a big firework.

Robert Goddard (1882–1945), a physicist, launched the first liquid rocket in 1926. **Liquid rockets** have more controllable motors than solid rockets. The first liquid rocket burned

lifted off briefly but successfully. The flight lasted two and a half seconds, and the rocket rose forty-one feet above the snowy field. The rocket was four feet tall and six inches in diameter. Goddard's experiment was the first major step toward putting a human on the moon.

In order for humans to explore space, they must wear a special suit that creates a safe environment for them because in space there is no oxygen or atmospheric pressure. A **space suit** provides oxygen and protects the astronaut from flying objects. It also insulates the astronaut from the heat of the sun and the cold of dark space. The side of the space suit facing the sun might get as hot as 120 degrees Fahrenheit, while the side facing away from the sun might get as cold as -160 degrees Fahrenheit.

Modern space suits cost about two million dollars. They are called EMUs (Extra-vehicular Mobility Units) because they function like a one-person spacecraft when the astronaut is outside the actual spacecraft. The suits are almost weightless in space but weigh about 250 pounds on Earth. They are modular, which means they are made of parts that the astronauts can choose to fit their bodies.

Exercise:

1. What are two types of rockets? _____

2. What type of fuel does a solid rocket use? _____
3. Why are liquid rockets an improvement over solid rockets? _____

4. What three tasks must a space suit accomplish? _____
