

**SECTION 1-3**

**SECTION SUMMARY**

# Rockets and Satellites

**Guide for Reading**

- ◆ How do rockets travel in space?
- ◆ What are satellites and space stations used for?

**N**o space mission could be accomplished without rockets. **A rocket moves forward when gases expelled from the rear of the rocket push it in the opposite direction.**

Early rockets used gunpowder for fuel. Gunpowder burns quickly and explosively. A rocket used to travel out of Earth's atmosphere needs a fuel that burns more slowly and continuously. Dr. Robert H. Goddard experimented with liquid fuels and found that liquid fuels can provide continuous power.

Konstantin Tsiolkovsky came up with the idea of multistage rockets. As each stage, or section, of a rocket uses up its fuel, the empty fuel container drops off. Then the next stage ignites. The development of multistage rockets made it possible to send rockets to the moon and farther into space.

A **satellite** is any natural or artificial object that revolves around an object in space. The first artificial satellite to orbit Earth was *Sputnik 1*. The Soviet Union launched it in 1957. In 1961 a Soviet cosmonaut named Yuri Gagarin orbited Earth, becoming the first person in space. Since then, many artificial satellites have been sent into orbit by rockets or shuttles.

**Satellites and space stations are used for communications, navigation, collecting weather data, and research.** Some satellites move in **geosynchronous orbits**, which means that they revolve around Earth at the same rate that Earth rotates. Geosynchronous satellites are used to broadcast and relay television signals and map weather patterns.

A space station is a large satellite in which people can live for long periods of time. Sixteen countries, including the United States and Russia, are now cooperating to build the International Space Station.

The rockets that carried astronauts to the moon were very expensive and could not be reused. Since that time, the National Aeronautics and Space Administration (NASA) has developed the reusable space shuttle. They are called shuttles because they can go back and forth, or shuttle, between Earth and space. Since 1981, space shuttles have been the main way the United States launches astronauts and equipment into space.

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**SECTION 1-3**

**REVIEW AND REINFORCE**

## Rockets and Satellites

### ◆ Understanding Main Ideas

Answer the following questions in the space below.

1. What causes a rocket to move forward?

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2. What is the difference between a multistage rocket and a single-stage rocket?

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3. Name at least three uses of satellites and space stations.

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4. What is the difference between space shuttles and other rockets?

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### ◆ Building Vocabulary

Write a brief description of each of the following.

5. geosynchronous orbit

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6. satellite

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