

**Exploring Space** ▪ *Reading/Notetaking Guide***The Science of Rockets** (pp. 502–507)

*This section explains how rockets were developed and how they work.*

**Use Target Reading Skills**

*Read about how rockets work on pages 504 and 505. As you read, fill in the cause-and-effect graphic organizer to show the series of causes and effects that make a rocket work.*

Cause	Effect
Fuel burns	
	Rocket moves forward
Moving gases have great mass and speed	
Rocket has great thrust	
	Rocket orbits Earth
Rocket reaches velocity of 40,200 kph	

**A History of Rockets** (p. 503)

1. Rocket technology originated in
  - a. China.
  - b. Russia.
  - c. the United States.
  - d. Germany.
2. When were modern rockets first developed?

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**Exploring Space** ▪ *Reading/Notetaking Guide*

3. Rank the following events in the history of rockets from earliest in time to latest in time. Rank the earliest event as 1.

- |       |  |
|-------|--|
| _____ | The British used rockets against American troops in the War of 1812. |
| _____ | Rockets carried explosives during World War II.                      |
| _____ | The Chinese coated arrows with a flammable powder.                   |
| _____ | Rockets launched astronauts to the moon.                             |
| _____ | The Chinese used gunpowder inside their rockets.                     |
| _____ | Scientists such as Goddard first designed and tested modern rockets. |

4. Describe the contribution of the German scientist von Braun to the U.S. space program.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**How Do Rockets Work?** (pp. 504–505)

5. Why does a rocket move forward?

\_\_\_\_\_

\_\_\_\_\_

6. For every force, or action, there is an equal and opposite force, or \_\_\_\_\_.

7. Circle the letter of each sentence that is true about velocity, orbital velocity, or escape velocity.

- a. A rocket must move faster than orbital velocity to establish an orbit.
- b. The force that propels a rocket forward is its velocity.
- c. A rocket must reach escape velocity to leave Earth's orbit.
- d. Escape velocity is greater than orbital velocity.

8. What are the three main types of rockets that power modern spacecraft?

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_

Exploring Space ▪ Reading/Notetaking Guide

# The Science of Rockets *(continued)*

## Multistage Rockets (pp. 506–507)

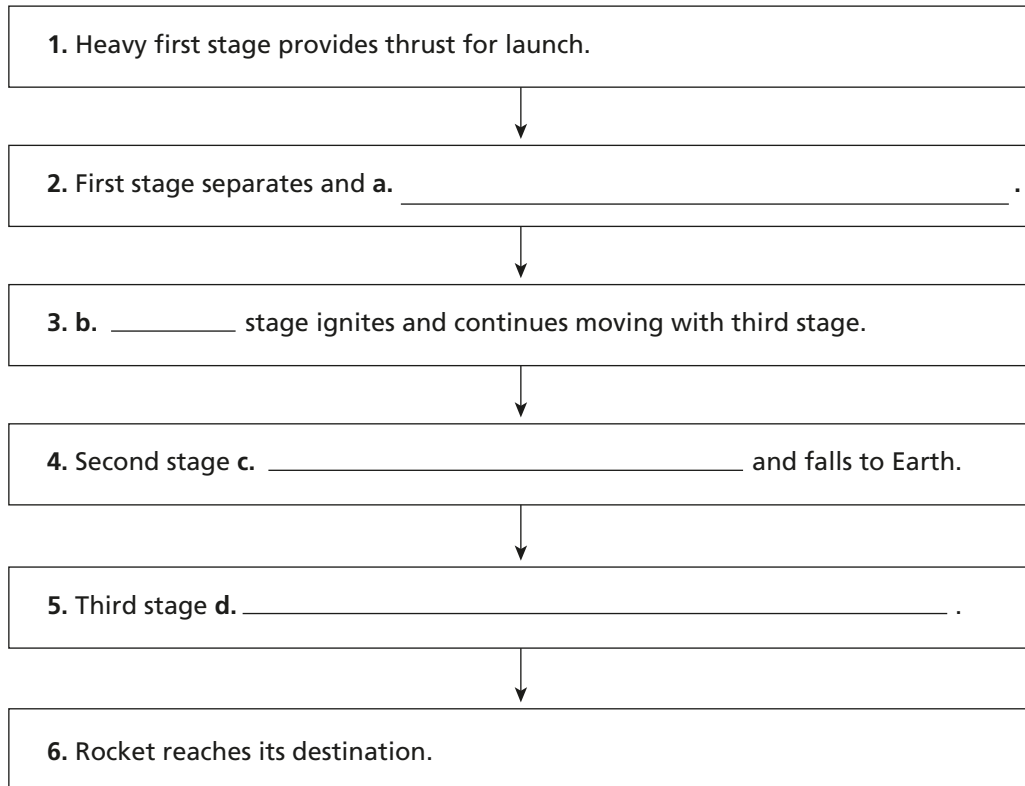
9. What happens to the first stage of a multistage rocket?

\_\_\_\_\_

10. What happens to the second stage when the first stage uses up its fuel?

\_\_\_\_\_

11. Complete the flowchart to show the sequence of events in a multistage rocket.



12. What is the main advantage of a multistage rocket?

\_\_\_\_\_

\_\_\_\_\_

13. What did the development of multistage rockets make possible?

\_\_\_\_\_

\_\_\_\_\_