



OUT OF THIS WORLD

## Web-Spinning Space Spiders

How would you get a large spacecraft into space without using a big, expensive rocket? How would you overcome gravity and protect the scientific equipment riding the rocket during the bumpy launch? Read *Web-Spinning Space Spiders* to learn more!

### What did you learn?

#### QUESTIONS

- Gravity is a force of attraction between objects that have ...
  - Magnetism
  - Height
  - Mass
  - Electricity
- To reach orbit a spacecraft first must overcome Earth's ...
  - Gravity
  - Magnetism
  - Clouds
  - Weather
- Objects in orbit are actually ...
  - Rising
  - Soaring
  - Flying
  - Falling
- Hoyt's robots would build ...
  - Arches
  - Trusses
  - Rods
  - Structures
- What does NIAC stand for?
- Who is this?



#### TRUE OR FALSE?

- |  |  |
|--|--|
| _____ 1. Launching a craft into space means putting it into orbit. | _____ 4. Engineering imitates art.                                   |
| _____ 2. Crafts in orbit use considerable amounts of energy.       | _____ 5. Hoyt's Trusselator is an example of additive manufacturing. |
| _____ 3. The size of a spacecraft is limited by its weight.        | _____ 6. Many spacecraft get their energy from solar power.          |



## ANSWERS

- 1. c. Mass.** According to section “The trouble with gravity” on page 8, we know that “Gravity is a force of attraction between objects that have mass.” So, the correct answer is C.
- 2. a. Gravity.** According to section “The high cost of space exploration” on page 16, we know that “To reach orbit, spacecraft must overcome the pull of Earth’s gravity.” So, the correct answer is A.
- 3. d. Falling.** According to section “Building in orbit” on page 20, we know that “Finally, remember that gravity continues to pull on objects in orbit, accelerating them toward the ground. So objects in orbit are not really flying—they are actually falling.” So, the correct answer is D.
- 4. b. Trusses.** According to section “Trusses on trusses” on page 32, we know that “But Hoyt has at least one last trick up his sleeve. Rather than build trusses from simple rods or bars ... ” So, the correct answer is B.
- 5.** According to page 7, NIAC stands for NASA Innovative Advanced Concepts.
- 6.** As can be seen on page 6, the illustration shows Robert Hoyt.

## TRUE OR FALSE? ANSWERS

- 1. True.** According to section “Getting into orbit” on page 10, we know that “When people talk about launching a craft into space, they usually mean putting the craft in orbit.” So, the correct answer is True.
- 2. False.** According to section “Getting into orbit” on page 12, we know that “But once a craft reaches orbit, it takes relatively little energy to keep it there.” So, the correct answer is True.
- 3. True.** According to section “Building big, building light” on page 18, we know that “As you have read, the size of a spacecraft is limited by the weight that can be affordably launched.” So, the correct answer is True.
- 4. False.** According to section “Spidery builders” on page 26, we know that “Engineering imitates nature.” So, the correct answer is False.
- 5. True.** According to section “Big idea: Additive manufacturing” on page 34, we know that “Hoyt’s Trusselator is an example of additive manufacturing.” So, the correct answer is True.
- 6. True.** According to section “Settling the solar system” on page 42, we know that “Many spacecraft, for example, get their energy from solar power.” So, the correct answer is True.