Unit 2

Name:

Date:

2-4: Designing Things That Fly

Design: Designing Things That Fly

Question: How are parachutes, hot air balloons, helicopters and rockets designed?

Instructions

Parachute

Your task is to design and build a parachute that will support the weight of a fragile, uncooked egg. (Note: You may refer to Activity 13 Parachute Plunge.)

Manipulated Variable

1. What is one thing you will be changing to protect your egg? (For example, canopy type and size, shroud line length, type and amount of packing in the basket) (/2 marks)

Materials

2. Make a list of materials will you need to build your parachute and protect your egg. Be specific. For example, what kind of egg, padding, and box will you use. (/2 marks)

3. Draw a diagram of your parachute. Label all its parts. Include the top vent, canopy, shroud lines, control lines, and forces of drag and gravity. (/4 marks)

You will be building three parachutes. All parachutes must be exactly the same except for the manipulated variable that you chose.

A. Make the canopies.

B. Attach the shroud lines.

C. Do not attach the baskets (or loads) to the shroud lines until you are ready to drop your egg.

D. Insert the egg with packing. How much does it weigh?

E. Test your designs.

F. Your first test is to drop your test object WITHOUT the parachute attached. Time how long it takes to fall. What happens to the egg? Record this on the Parachute Testing section of your Assessment Sheet.

G. Now, attach parachute 1 to the load. Drop it from the same height and record the time. What happens to the egg?

H. Attach parachute 2 to the load. Drop it from the same height and record the time. What happens to the egg?

I. Attach parachute 3 to the load. Drop it from the same height and record the time. What happens to the egg? (/6 marks)

Observations

4. **Parachute Testing**

Test #	Observations (height from which it was dropped; time to descend; description of descent)
No Parachute	
1	

2	
3	

Conclusions

5. Which parachute protected the egg the best? Explain modifications you made to your parachute and how they improved its performance. For example, if your parachute shook back and forth as it fell, what did you do to provide stability? Was your hypothesis correct? (/4 marks)

Hot Air Balloon

6. A large plastic bag and a hair dryer are used as a model for a hot-air balloon. When the hair dryer is turned on, it blows hot air into the bag. The moment the hair dryer is turned off, the plastic bag is released and floats upward. Why does this happen? (/2 marks)

7. How could a hot air balloonist make the balloon rise more quickly? (/1 mark)

Helicopter

8. How does the helicopter produce lift? (/2 marks)

Rocket:

9. Which gas must be present in the atmosphere for a rocket engine to burn its fuel? (/1 mark)

Your Completed KWL Chart (/4 marks)

What Do I Know About Aerodynamics and Flight?	What Do I Want to Learn About Aerodynamics and Flight?	How Can I Learn About Aerodynamics and Flight?	What Did I Learn About Aerodynamics and Flight?

Total: /28 marks

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