

ACTIVITY TWO: PARACHUTE INVESTIGATION**Learning Objectives:**

To investigate whether there is a relationship between the **size of a parachute** and **how fast an object falls**.

ALL: To be able to describe a simple relationship as a conclusion (the bigger the parachute the slower it falls)

MOST: To be able to complete a results table, graph and write a simple conclusion

SOME: To be able to write a clear plan with independent, dependent and control variables clearly stated

HSW:

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary;
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate;
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.

Resources for each team:

- Material to make a parachute: eg paper/bin bags or plastic bags (each practical group should have enough for the following dimensions (cm): 10 x 10, 20 x 20, 30 x 30, 40 x 40, 50 x 50)
- String: to attach the parachute to the 'soldier'
- Sticky-tape to attach items (limit this so that it does not add to much extra mass to experiment)
- A 'soldier': this can be play-dough or plasticine (to make sure it is a fair test – try to keep the 'soldiers weight the same (use kitchen scales if necessary)
- Stopwatch: To measure the time taken for the fall
- A meter rule/ standard distance to drop 'soldier from (eg a table)
- A boiled egg for each team to use on their slowest decent at the end if wanted

STARTER:

Show a diagram or picture of a soldier using a parachute with the question: what forces are involved?

INTRODUCTION

Discuss the use of parachutes to escape from observation balloons in the trenches (parachutes were not used in aeroplanes until WWII)

Key Questions:

What would happen if a soldier tried to jump out of a hot air balloon without any extra equipment?

HINT: Try to link back to connecting activity – large force downwards caused by gravity acting on soldier, little air resistance to slow him down. This leads to injury or death when he reaches the ground.

What two factors would be the most important for a soldier to survive this fall?

Steer the discussion towards reducing speed when touching the ground from previous question and also link in a targeted area for him to land (he doesn't want to end up behind enemy lines).

MAIN TASKS

Complete investigation

Use investigation writing frame in resources or questions below to help differentiate tasks for ability and/or time allowed for investigation.

The following questions can help you structure the lesson if you do not wish to print out resources:

Variables:

1. Make a list of the variables that could affect how fast the parachutist will fall
2. E.g.: length of string between parachutist and parachute, material for parachute, distance to fall, shape of parachute (suggest a square), amount of sticky backed plastic to attach materials together, weight of parachutist
3. Which one will you change? Parachute size (cm) - *independent variable*
4. Which one will measure? Time taken to fall (ins seconds) - *dependent variable*
5. List three that you will control to make sure it is a fair test – *control variables*
6. Write a prediction: (**SUPPORT statements**: *As the size of the parachute increases/decreases, the soldier will land more quickly/slowly*)

Method

Describe how you are going to test your prediction.

1. How are you going to change your variable that you are investigating?
2. What are you going to measure?
3. How are you going to measure it?
4. How many measurements are you going to take?
5. How are you going to keep the other variables the same to make this a fair test?
6. Explain why you measure the time taken to fall by each parachute, three times and not once.

Extension task: If students have completed the investigation early they could do another mini investigation to see how they could adapt their best parachute width to make sure it lands on a specific target.

Results

All: Complete a results table (remind them to include units)

Most and Some: draw a line graph and circle any anomalous points

REVIEW

Conclusion

All: *As the parachute got larger the flight time became shorter. All/Most of my results agree with this.*

Most: Use graph or data to back up conclusion

Some: Try to explain why you got any anomalous results. How could you improve your method or extend your investigation?

Final thought:

Can the students attach their parachute to the boiled egg and the have the egg *survive* the fall?