

Nova's Forces Investigation: The Great Friction Challenge

Learning objective: To understand the effects of air resistance, water resistance and friction, and how mechanisms like pulleys and levers can be used to move heavy loads.

Nova the owl is testing how different surfaces affect the movement of objects. For the questions below, analyse the scenarios provided. You must justify your scientific reasoning by referencing the force of friction or air resistance acting upon the objects.

Word bank: friction · air resistance · water resistance · surface area · gravity · streamlined · mechanism · newtons

1. Nova pushes a wooden block across a carpet and then across a polished wooden floor. Explain why the block travels further on the wooden floor. Use the term 'friction' in your answer. (2 marks)

2. Max the monkey is designing a racing car. If he wants it to travel as fast as possible, why should he make the shape of the car 'streamlined'? What force is he trying to reduce? (2 marks)

3. Compare and contrast: How does a diver's movement through water differ from a runner's movement through air? Refer to the specific resistance forces involved. (3 marks)

4. If you were asked to move a heavy crate weighing 50kg, suggest one mechanism you could use to make the task easier and justify why it reduces the force required. (2 marks)

5. What might happen if there was zero friction between your shoes and the pavement? Justify your answer using your knowledge of how forces allow us to move. (2 marks)

6. A skydiver is falling towards the Earth. Explain why they reach 'terminal velocity' (a constant speed) once their parachute opens. (2 marks)

Draw: Draw a scientific diagram of a boat showing how its shape helps it move through water. Label the area where water resistance acts against the hull.



Extension challenge: Design an experiment to test which material (e.g., bubble wrap, sandpaper, or felt) creates the most friction. Write a hypothesis, list your variables, and explain how you will ensure the test is fair.