

Forces in Motion: Nova's Starry Experiments

Learning objective: To identify and describe the effects of forces on the movement of objects, including gravity, friction, and air resistance.

Read the passage carefully and answer the questions below. Use your scientific knowledge to explain your reasoning.

Nova the owl loves to study the night sky from her favourite oak tree. She has noticed that when she drops an acorn, it always falls directly downwards towards the forest floor. Nova knows this is due to gravity, an invisible force that pulls objects towards the centre of the Earth. To test how different surfaces affect movement, Nova rolled a smooth wooden marble across three different paths: polished stone, a bumpy rug, and a patch of dry grass. She observed that the marble travelled the furthest on the stone. This happened because the stone has less friction, which is the force that acts in the opposite direction to an object's motion. Nova also pondered air resistance, noticing how her own wide wings create a drag force that helps her glide gracefully through the air. Whether it is a falling acorn or a gliding owl, forces are constantly at work in our world, pushing, pulling, and slowing things down. By understanding these invisible interactions, Nova can navigate the woodland canopy with precision and safety.

Word bank: gravity · friction · resistance · surface · force · acceleration · motion

1. According to the passage, what is the definition of gravity? (2 marks)

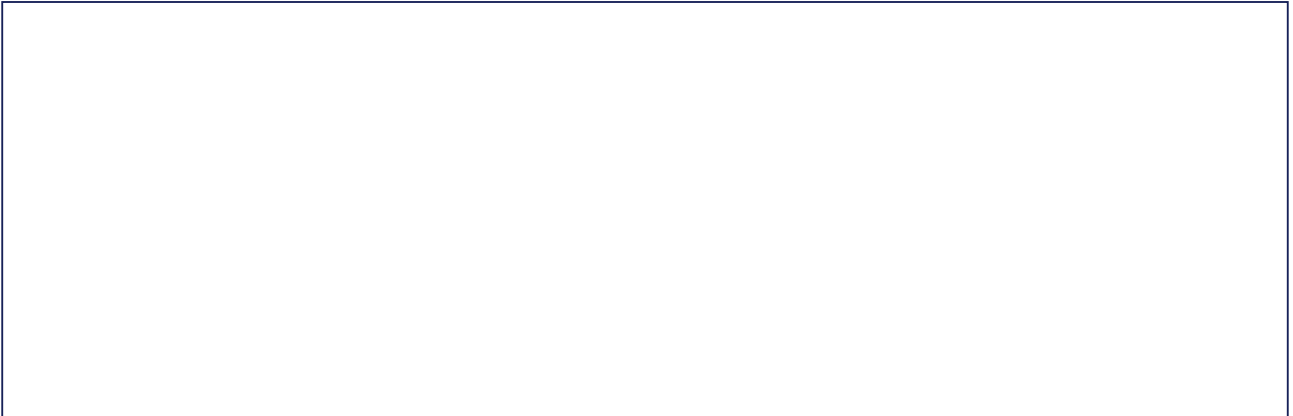
2. Which surface did the marble travel the furthest on, and why? (2 marks)

3. Why do you think the marble travelled the shortest distance on the rug compared to the stone? (2 marks)

4. Explain why Nova's wings might be useful for slowing her down when she lands. (2 marks)

5. If you were to design a race track for a toy car, which material would you choose to make the car go as fast as possible? Justify your answer using the concept of friction. (3 marks)

Draw: Draw a diagram of Nova the owl gliding through the air. Label the forces acting upon her, including 'Gravity' pulling her down and 'Air Resistance' pushing against her wings.



Extension challenge: Nova wants to conduct a new experiment to see how the weight of an object affects how fast it hits the ground. Write a short paragraph explaining how she could conduct this experiment fairly, ensuring she only changes one variable.