Nova’s Guide to Fantastic Forces

Learning objective: To identify and describe the effect of forces such as friction and air resistance on moving objects.

Read the passage below carefully and answer the questions. Make sure to use your science knowledge to explain your reasoning.

Nova the barn owl loves to glide silently through the night sky. She knows that forces are constantly acting on her wings. When Nova flies, the air pushes against her feathers; this is called air resistance. By changing the shape of her wings, she can control how much air pushes back, helping her soar or dive. When Nova lands on the rough bark of an old oak tree, she uses her sharp talons to grip. This creates friction between her claws and the tree surface, which stops her from sliding off. On the ground, Nova notices that a toy car pushed across a carpet travels a shorter distance than one pushed across a smooth wooden floor. This is because the bumpy carpet creates more friction, which acts as a force to slow the object down. Forces are everywhere! Whether it is a ball rolling down a hill or a boat moving through water, invisible pushes and pulls are always at work, changing how things move or stopping them altogether.

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

1. What does Nova use to help her grip onto the rough bark of the oak tree? (2 marks)

2. According to the text, why does a toy car travel further on a wooden floor than on a carpet? (2 marks)

3. Why do you think Nova needs to change the shape of her wings while she is flying? (2 marks)

4. What might happen if there was no friction at all when Nova tried to land on a tree branch? (2 marks)

5. Nova says that forces are 'everywhere'. Do you agree with this statement? Explain your answer using an example from your own life. (3 marks)

Draw: Draw a diagram of Nova the owl flying. Use arrows to show the direction of her movement and label where air resistance is pushing against her wings.

Extension challenge: Design a fair test to see which surface creates the most friction for a toy car. List the equipment you would need and explain how you would keep your test 'fair'.