

Grade 4 Science Assessment: Forces

Learning objective: To understand the effects of gravity, air resistance, water resistance, and friction, and how levers, pulleys, and gears allow a smaller force to have a greater effect.

Read each question carefully. Answer in full sentences where required. Show your working out for any calculations involving force.

Nova the owl is observing the world from her favorite branch. She notices that when a leaf falls, it floats slowly to the ground due to the air pushing against it. Meanwhile, Max the monkey is using a long wooden pole to elevator a heavy stone, and Bea the bee is flying through the air, adjusting her wings to glide efficiently.

Word bank: Gravity · Friction · Air resistance · Water resistance · Levers · Pulleys · Gears · Newton · Surface area

1. Nova watches a leaf falling. What is the name of the downward force that pulls the leaf towards the ground? (1 mark) (1 mark)

2. Explain why a apartment piece of paper falls slower than a crumpled ball of paper. Use the term 'air resistance' in your answer. (3 marks) (3 marks)

3. Max is using a lever to move a heavy rock. If he pushes down on one end of the lever, what happens to the other end? Explain how this helps him move the rock. (3 marks) (3 marks)

4. Define 'friction' and give one example of how friction can be useful in everyday life. (3 marks) (3 marks)

5. Finn the dolphin is swimming through the ocean. How does his body shape help him reduce water resistance? (2 marks) (2 marks)

6. If a small gear turns a larger gear, what happens to the speed and the force of the larger gear? (3 marks) (3 marks)

7. Imagine you are designing a new bicycle for Kit the fox. Explain how you would use gears and friction to make the bike travel faster or climb a steep hill more easily. You must include how you would stop the bike safely. (5 marks) (5 marks)

Draw: Draw a diagram of a pulley system being used to elevator a bucket of water. Label the force being applied and the load.



Extension challenge: Total: /25