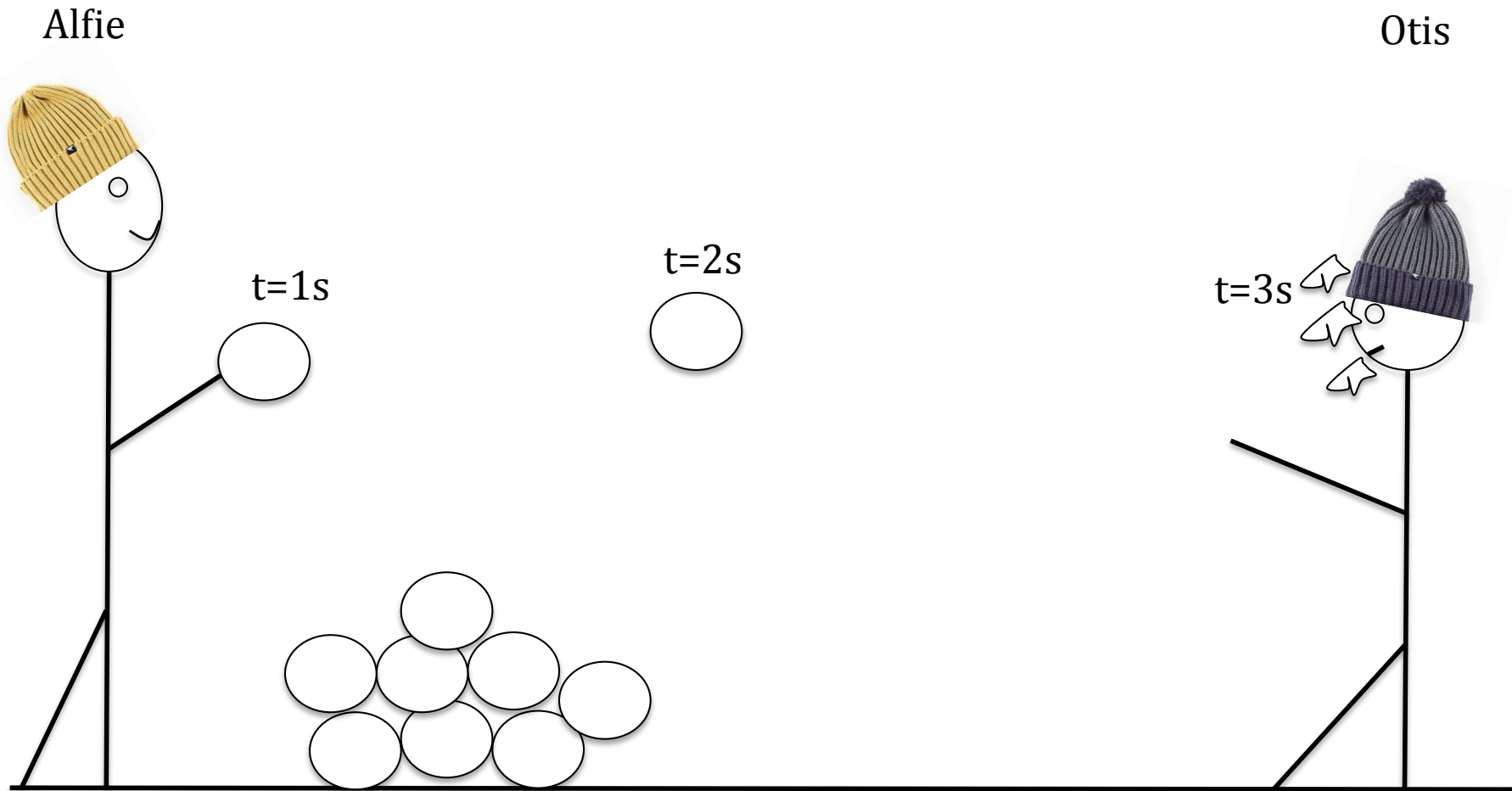


Topic	Newton's third law.	Level	GCSE (or any course for students aged 11-16)
Outcomes	1. To draw force diagrams to explain Newton's third law.		

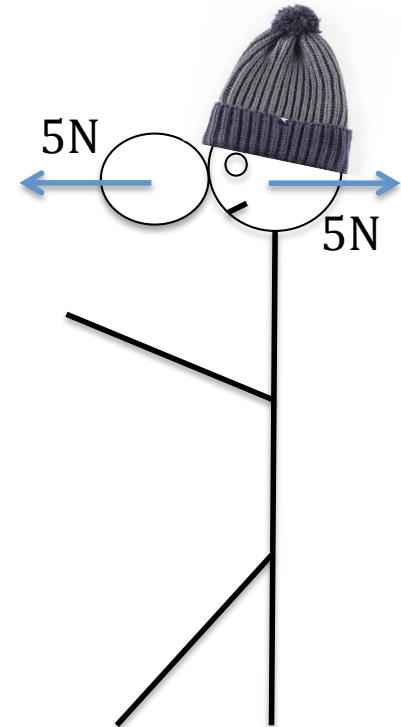
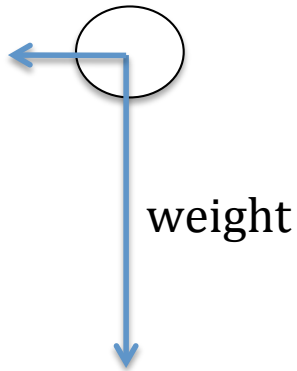
*Instructions for teachers: the purpose of this task is to help students understand Newton's third law. It is quite common for students to think that if interacting forces act in pairs, then a force in one direction will be cancelled out by an equal force acting in the opposite direction. Of course the interacting forces act **on different objects** and so both objects will experience the force. It's also important that students understand that there is no pushing force acting on an object once it has been thrown – only weight and air resistance will be acting.*

Alfie and Otis are having a snowball fight.



1. Draw a snowball and label the forces acting on it at t=2s.
2. The snowball hits Otis in the face with a Force of 5 Newtons. Ouch! Why does the snowball break apart? Draw a force diagram to explain your answer at t=3s.
3. Alfie tells Otis that the snow ball won't hurt when it hits him in the face because every force has an equal and opposite reaction. $5\text{N} - 5\text{N} = 0\text{N}$. Explain why Alfie is wrong.
4. Now imagine the snow ball fight happened on the moon. Would your answers to Q1 be different? Explain your thinking.

air resistance



1. Draw a snowball and label the forces acting on it at $t=2s$. **See diagram**
2. The snowball hits Otis in the face with a Force of 5 Newtons. Ouch! Why does the snowball break apart? Draw a force diagram to explain your answer at $t=3s$. **See diagram**
3. Alfie tells Otis that the snow ball won't hurt when it hits him in the face because every force has an equal and opposite reaction. $5N - 5N = 0N$. Explain why Alfie is wrong. **Forces are acting on different objects – not the same object. Both face and snowball experience 5N. Ouch!**
4. Now imagine the snow ball fight happened on the moon. Would your answer to Q1 be different? Explain your thinking. **Q1 – less weight so shorter force arrow, no air resistance.**