British Science Week 2024 Time - Pendulum

National Curriculum links

Working scientifically, pupils should:

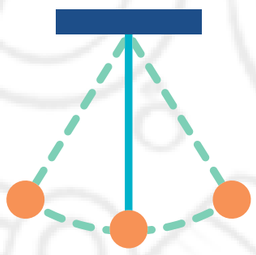
- Set up simple practical enquiries, comparative and fair tests
- Make systematic and careful observations
- Use straightforward scientific evidence to answer questions or to support their findings

Resources/equipment

- String or wool
- A small, heavy object to attach to the string (a key, weight, padlock, ball of blu-tak, marble, coins etc)
- card
- sticky tape
- scissors
- timer

Key Vocabulary

- pendulum
- bob
- swing, angle
- stable, fixed point
- accurate
- air resistance



Video link

Teacher knowledge

- Taken in its simplest form, the pendulum is a weight strung at the end of a wire or string which, when swung, never twists or spins. Italian scientist and astronomer Galileo was the first to discover that the swing of a pendulum is a constant. It always takes the bob the same amount of time to swing out and back again, The swing will get shorter eventually but the time to swing out and back will be constant. The length of the swing is determined by the length of the string holding the bob
- Horologists (clock makers) used the pendulum in clocks from the 1600's and we still use them inside some clocks today. Because the pendulum swings at a regular rate, it ensures the other parts such as the hands on the clock face move at the same rate
- In 1851 a French scientist named Jean Foucault used a huge pendulum to prove that Earth rotates. He strung a heavy weight on thick wire inside a dome. As the bob moved, it traced a line in the air which moved as the days passed. As the pendulum could not be swinging it had to be the movement of the Earth underneath it that had caused this change

Suggested practical tasks

- Discuss a simple pendulum and model this to the children. Can they think of any examples where they have seen these in their everyday lives? Some children may have a grandfather clock in their home. They may also link this to a metronome used in music lessons. They may think about playground equipment such as a swing or a wrecking ball in a construction site
- Create a pendulum following the steps in the video. Attach a small, heavy object to a piece of string 50cm long. Find a stable, fixed point for it to be attached to - for example, the underside of a chair or table. Time how long it takes for the pendulum to come to a stop. If you are timing multiple swings, ensure you start from the same angle. Next, attach a piece of card to the pendulum and time again. Experiment with different sized pieces of card and explore the results
- Challenges - can the children create a pendulum that swings 10 times in exactly 30 seconds?
- Think about the forces that are acting on the pendulum as it swings and explore this further
- Find out more about the famous polymath Galileo and his discoveries

Talk time

- How could you make your pendulum go more slowly? Quickly?
- Does it make a difference if you use a heavier weight? What about a shorter or longer piece of string?
- Why do you think the card made the pendulum swing more slowly? What force is acting upon the card? What do you predict will happen if you add a bigger piece of card?
- What did you notice? What have you found out? Can you explain why that happened?