

Y7 DTE

KNOWLEDGE

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HT3 – WALKING TOY PROJECT

The Year 7 walking toy project is a simple, hands-on introduction to design, technology and engineering where students create a wooden toy that "walks" without the use of gears or complex mechanics. Using basic materials like wood & dowels, students focus on crafting a design that uses gravity and basic motion principles to achieve movement. The toy typically relies on carefully balanced shapes or a rocking motion to mimic walking. This project develops fundamental skills in measuring, cutting, sanding, and assembling wood, while encouraging creativity and problem-solving.

ENGINEERING EXPLANATION

The walking toy operates on principles of gravity, balance, and momentum, combined with the rocking motion of its curved feet. Here is the physics behind its movement:

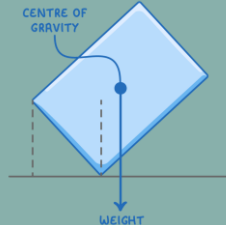
Gravity as the Driving Force:

Gravity pulls the toy down the inclined ramp, providing the energy needed for movement. As the toy tilts forward, **the centre of gravity shifts, causing the swinging leg to move..**



CENTER OF GRAVITY AND BALANCE

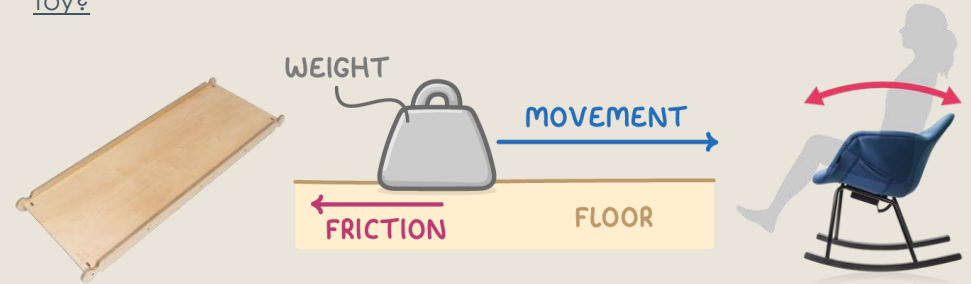
The toy's centre of gravity (the point where its mass is balanced) shifts as it moves. The curved feet play a crucial role in maintaining balance by allowing the toy to rock gently from one foot to the other. **This shifting creates the illusion of walking.**



MOMENTUM AND ROCKING MOTION

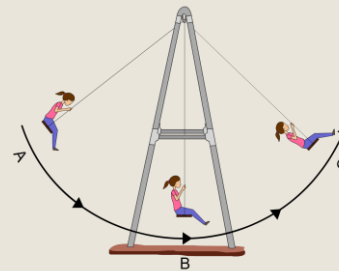
The curved feet allow the toy to convert the **downward pull of gravity into a rocking motion**. When the stationary leg contacts the ramp, the toy rocks forward, transferring momentum to the swinging leg. This motion repeats as gravity continues to act on the toy.

What effect does the use of material have on the physics of the walking toy?



FRICTION AND SURFACE INTERACTION

Friction between the ramp and the toy's feet ensures controlled movement. While too much friction would stop the toy, **the smooth curve of the feet reduces resistance**, allowing a steady rocking and sliding motion.



ILLUSION OF WALKING

The combination of a stationary leg, a swinging leg, and the rocking motion **mimics the gait of walking**. The curved feet exaggerate this effect, making the movement appear natural and rhythmic as the toy progresses down the ramp.

KEY WORDS

Fret saw, Coping saw, Tenon saw, Pillar Drill Disc sander, Rod file, Half rounded file, Fille, Mechanical engineering and automation, Plywood, Chisel, drill, PVA glue, Acrylic paint, Double sided tape, forces and motion



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HT3 – PRACTICAL SKILLS

Fret Saw Description

A fret saw is a machine with a thin, narrow blade. It is designed for cutting intricate and detailed shapes in materials like wood, plastic, or thin metal. The thin blade allows for tight curves and precision cutting, making it ideal for delicate or decorative work.



DISC SANDER

A disc sander is a stationary power tool with a rotating abrasive disc mounted on a flat surface. It is used to shape, smooth, and finish materials like wood, metal, or plastic. The flat sanding table beneath the disc provides support for the workpiece, allowing for precise angle adjustments and consistent results. Disc sanders are ideal for removing rough edges, shaping curves, and refining surfaces quickly and efficiently.



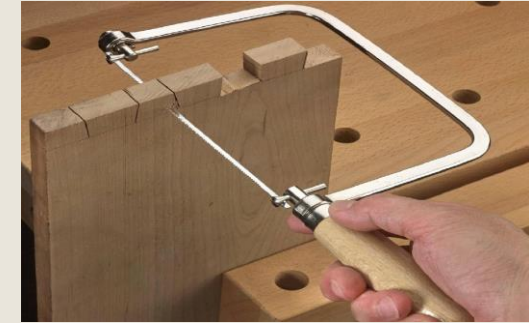
PILLAR DRILL

A pillar drill, also known as a drill press, is a stationary power tool used for drilling precise holes in various materials such as wood, metal, or plastic. It consists of a vertical column, a motorised drill head, and an adjustable table to support the workpiece. The drill head moves vertically in a controlled manner, ensuring accurate and consistent drilling.



COPING SAW

A coping saw is a hand tool with a thin, flexible blade attached to a C-shaped metal frame. It is specifically designed for cutting intricate curves, detailed shapes, and internal cut-outs in materials such as wood, plastic, or light metal. The blade is held under tension and can be easily removed or rotated to cut from different angles. The coping saw is lightweight and portable, making it ideal for detailed craftsmanship..



FILE

A file is a hand tool used to shape, smooth, and refine the surface of materials like wood, metal, or plastic. It consists of a hardened steel blade with a textured or grooved surface, designed to remove material in a controlled manner. Files come in various shapes, such as flat, round, or half-round.



SANDPAPER

Sandpaper is an abrasive material used for smoothing and finishing surfaces. It consists of a paper or cloth backing coated with abrasive particles, such as aluminium oxide or silicon carbide. Sandpaper comes in different grits, ranging from coarse (low grit numbers) for heavy material removal to fine (high grit numbers) for detailed finishing and polishing. It is a versatile and easy-to-use tool for preparing surfaces for further work or finishing.

