CLIL

STEAM

TECHNOLOGICAL FIELDS • UDA 5:
Mechanical Technologies

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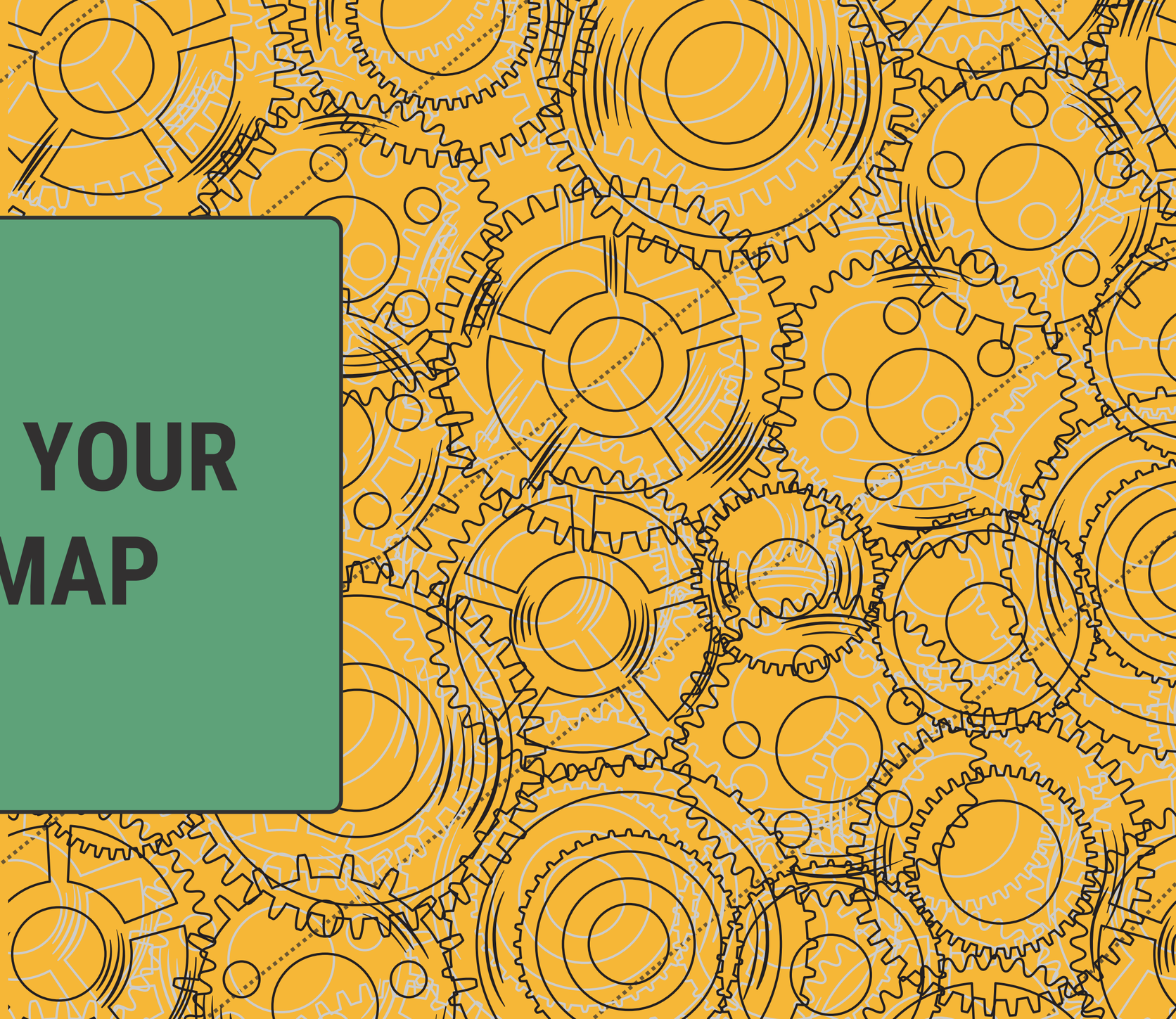
1. CREATE YOUR OWN MAP



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MECHANICS

The study of motion, the equilibrium of bodies, and the forces acting on them

- Kinematics
- Dynamics
- Statics

MECHANICAL TECHNOLOGIES

The practical application of the physical laws of motion and force to **design machines, structures, and devices**

Simple Machines

- Lever (first-class, second-class, third-class)
- Inclined plane
- Pulley
- Winch
- Capstan
- Wedge
- Wheel and axle
- Screw

Complex Machines

Composed of two or more simple machines:

- Car
- Crane
- Bicycle

Prime Movers

Convert one form of energy into mechanical energy (motion or work):

- Internal combustion engine
- Electric motor

Machine Tools

Used to shape, cut, drill, or polish materials

- Often controlled by CNC (Computer Numerical Control)

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Simple Machines

Prime Movers

Mechanical System

A set of connected components working together to perform a function:

- Levers
- Wheels
- Gears
- Motors
- Belts

Transmission and Transformation of Motion

Motion can be:

- Transmitted from one part to another using belts, chains, or gears
- Transformed from linear to rotary motion (or vice versa)

MECHANICAL TECHNOLOGIES

Technological Innovation

Mechatronics

The integration of mechanics, electronics, and computer science to develop intelligent automated systems.

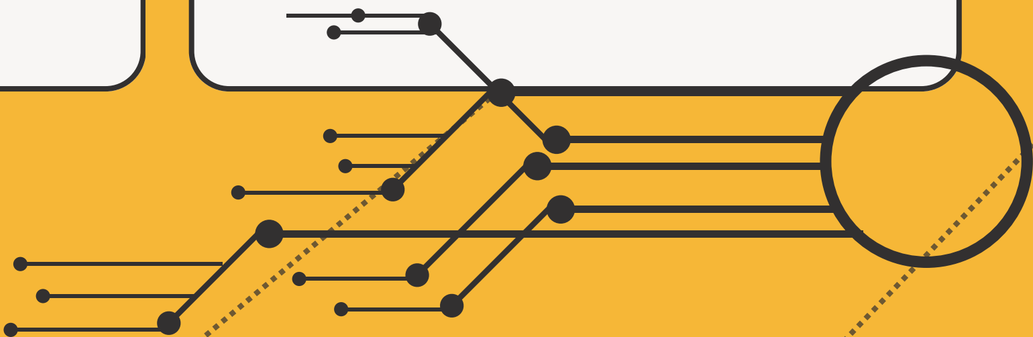
Robotics

The design and construction of robots, often combined with **artificial intelligence** to enhance performance and autonomy.

Sustainability

Environmental impact, including:

- Pollution
- Reduced demand for manual labour due to **increasing automation**



2. CREATE YOUR OWN TEST

a. Indicate whether the following statements are true (T) or false (F).

1. A third-class lever is not always mechanically advantageous.

   T F

2. Complex machines consist of two or more simple machines.

   T F

3. An internal combustion engine is a type of prime mover.

   T F

4. The crank and connecting rod system is used to convert motion.

   T F

5. Machine tools are used to shape and process materials.

   T F

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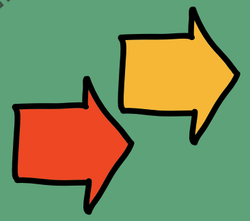
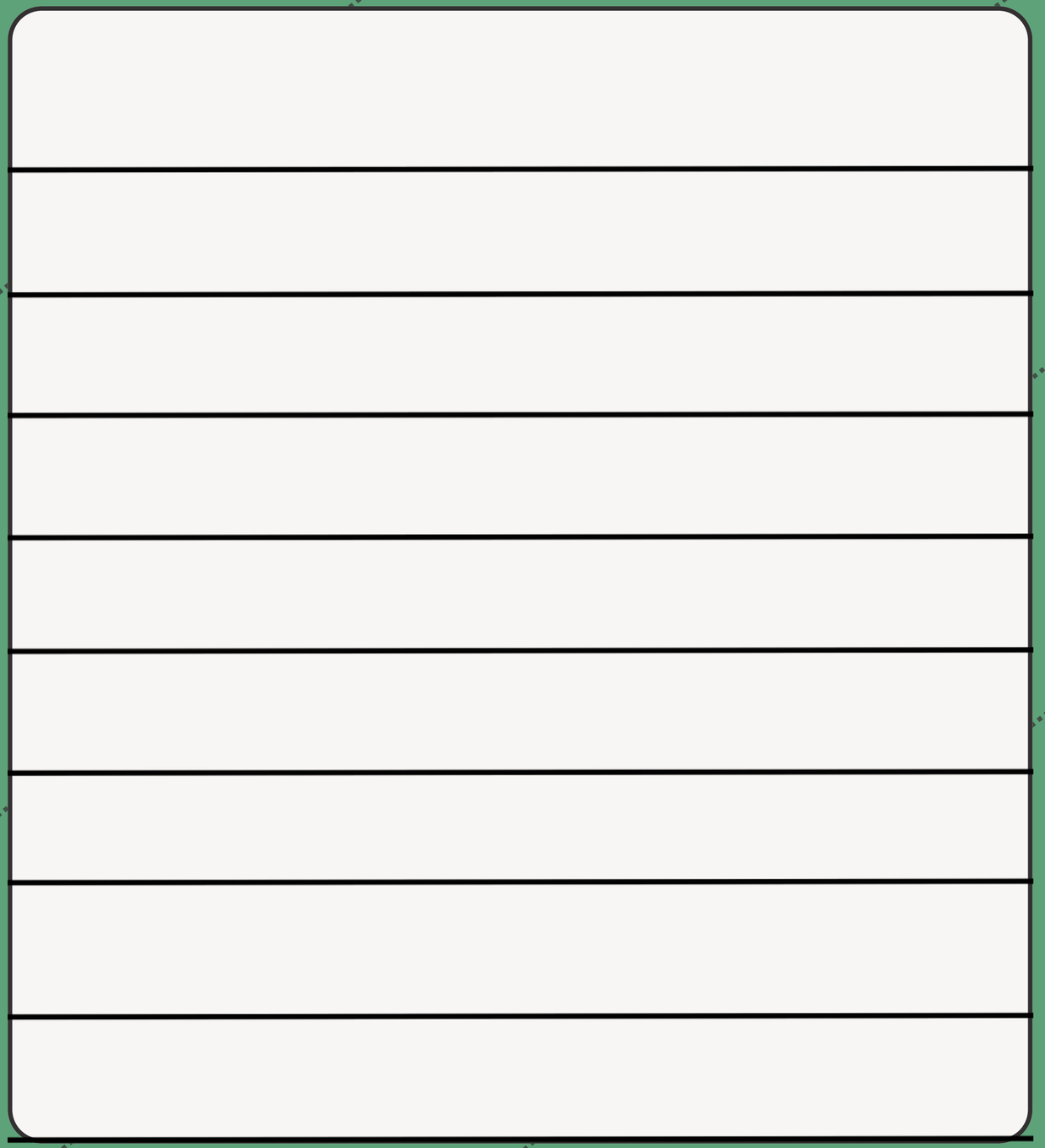
2. CREATE YOUR OWN TEST

b. Create Five New True/False Questions to Share with the Class





3. THE MECHANICAL INDUSTRY IN ITALY AND EUROPE

The table shows **the percentage breakdown of employment in the metalworking and mechanical engineering industry**, divided by sector, in both Europe and Italy.
Represent the data using one or more charts or graphs of your choice. You can draw them on graph paper, millimetre paper, or use a spreadsheet programme such as Excel.

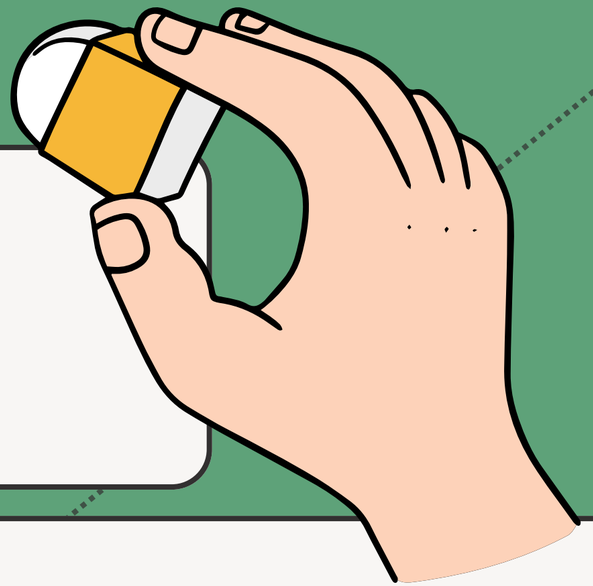
In which sector does Italy have the highest share of workers? And how does this compare with other European countries? In which sectors is Italy's employment share lower than the European average?

Finally, present your findings to the class with the support of your teacher.

Percentage Composition of Occupied Jobs in the Metalworking Sector in the European Union

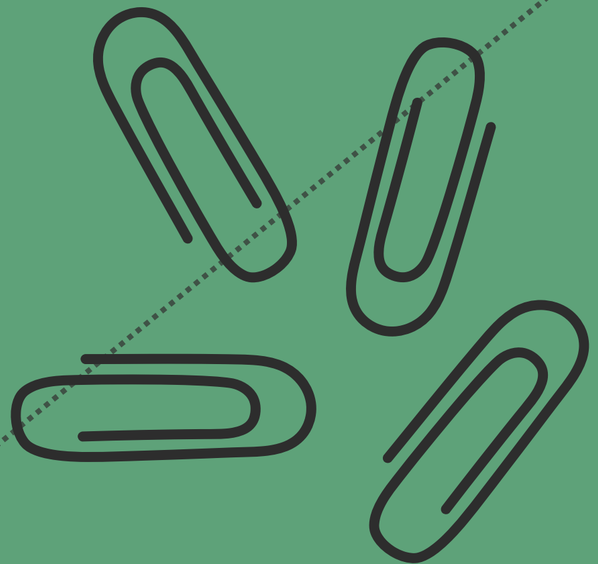
Sector	EU	Germany	Spain	France	Italy
Metallurgy and metal products	31.1	24.7	36.9	33.4	37.7
Computers and electronic and optical products	9.0	8.8	4.0	12.8	7.5
Electrical machinery and equipment	10.0	8.4	8.3	9.2	9.9
Mechanical machinery and equipment	21.8	27.4	18.0	14.9	27.3
Transport equipment	28.1	30.7	32.8	29.7	17.6

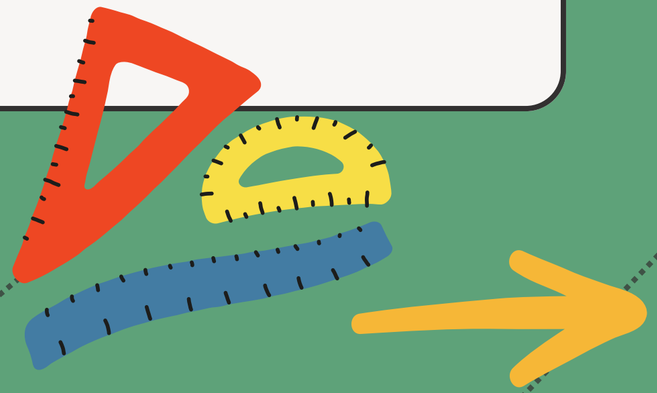
4. LET'S EXPERIMENT WITH LEVERS



Objective:
To understand how levers function and the principle of mechanical advantage.

Materials:
Rulers, pencils, erasers, paper clips, and small objects such as weights.





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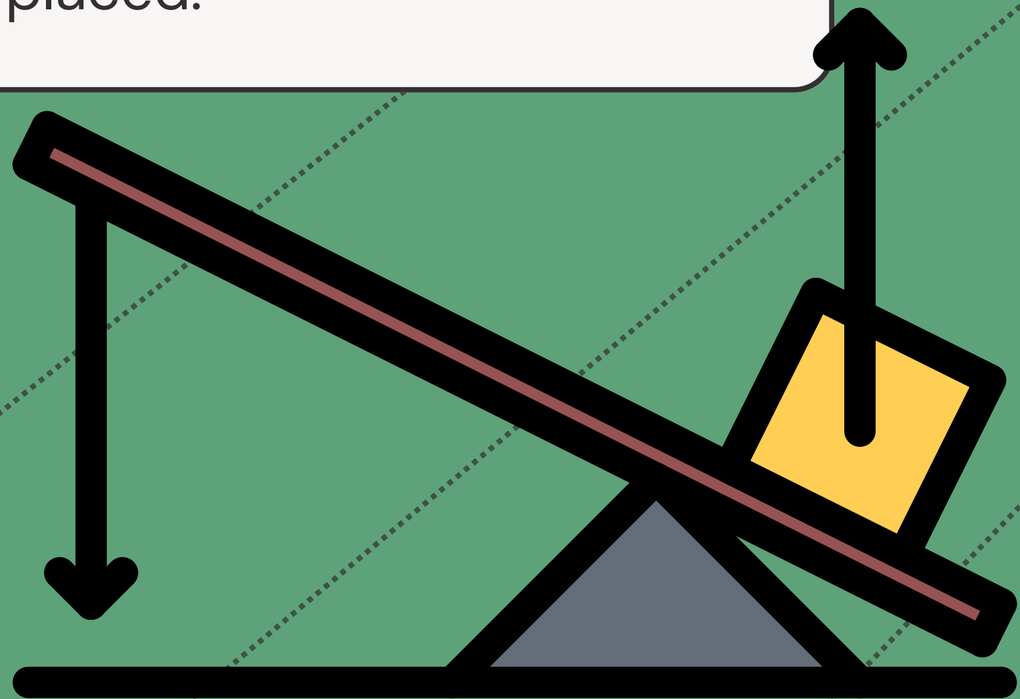
Activity Steps

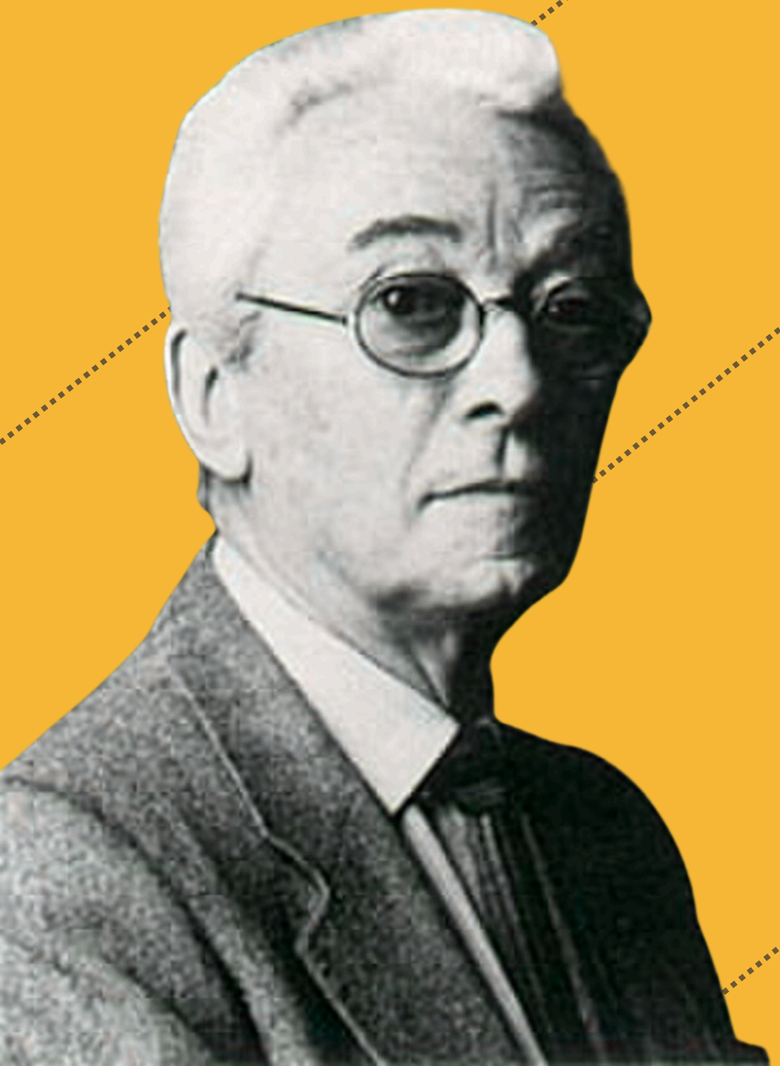
- Build a simple lever using a ruler as the lever arm and a pencil (or an eraser) as the fulcrum.
- Place small objects on either end of the ruler to explore how the position of the fulcrum and the length of the lever arms affect the amount of force needed to lift a weight.
- Try out several different set-ups, then draw a diagram and write a short explanation showing how the required force changes depending on where the fulcrum is placed.

Learning Outcome

Understand how a lever can multiply force and how it can be adjusted to make lifting weights easier.



5.BRUNO MUNARI'S MACHINES



In one of his books, the Italian designer Bruno Munari (1907–1998) presents a series of machines—some useful, others entirely whimsical, but all distinctly original. With a serious tone and great attention to detail, he describes inventions such as a dog-taming machine, an automatic timer for boiling eggs, and a tail-wagger for lazy dogs.

Search online for one of these imaginative creations. Although they may seem playful or absurd, many of them incorporate real, functioning mechanisms. Choose one machine, read about how it works, and describe which mechanical elements it includes.