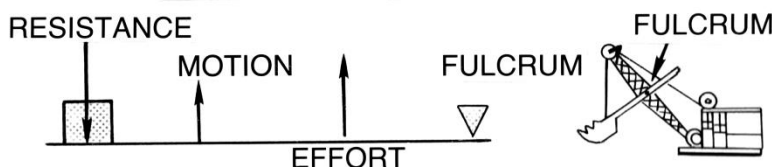
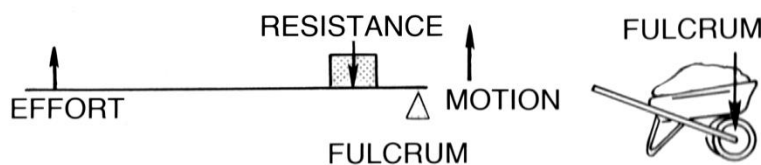
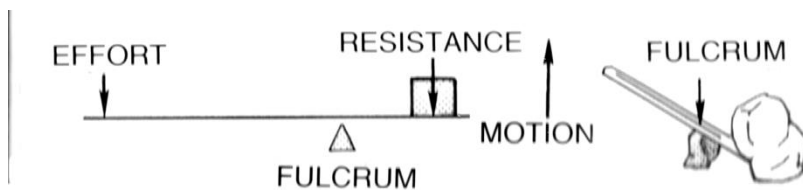


SCIENCE FORM 2

CHAPTER 10 SIMPLE MACHINE

Lever

- A lever is a simple machine. It consists of a rigid rod which can turn about a fixed point called the fulcrum (F) when a force called the effort (E) is applied to overcome a resisting force known as the load (L)
- Levers are classified into first-class, second-class and third-class levers based on the position of fulcrum, effort and load



Moment of a force

- A force can be used to produce a turning effect to do work
- For example, a nut can be tightened or loosened with a turning effect by using a spanner
- It would be much easier using a long spanner than a short spanner. This is because more turning effect of force is produced at the nut (pivot) with less effort
- The turning effect of a force around the pivot is called the moment of a force.
- The turning effect can be increased into two ways

- Increase the applied force
- Move the force further away from the turning point (pivot)
- Moment of force = Applied force x Perpendicular distance from the turning point
- The moment of force can be clockwise or anticlockwise, depending on which way they turn

Principle of moments

- In a lever, the two forces that act on it are the effort and the load
- These two forces produce opposing moments, which is a pair of clockwise and anticlockwise moments
- The principle of moments stated when a lever is balanced, the two moments are equal
- When a lever is balanced about the turning point, the total clockwise moment is equal to the total anticlockwise moment
- The relationship between the effort and the load and their respective distance from the turning point (fulcrum) is as below
 - $\text{Load (N)} \times \text{Distance of load from fulcrum (m)} = \text{Effort (N)} \times \text{Distance of effort (N) from the fulcrum (m)}$
- A see-saw will balance if the moments on each side of the pivot are equal. A person might have to adjust their position on the see –saw if they are a different weight from the person on the other end

Appreciating innovative efforts in the design of machines to simplify work

- Machines are simple tools invented by human beings to make work easier
- Devices such as bottle opener, stapler, scissors, pliers, paper cutter used in our daily life. These devices simplify our work
- Most machines we use today are compound machines, created by combining several simple machines