

# 1.5 MECHANISMS

## Motion



**Rotary** – An Object that **turns** around a **fixed point** (a fan or hands on a clock)



**Oscillation** – An Object that **swings** from a **fixed point** (a child on a swing)



**Linear** – An Object that moves in **one direction** along a **fixed path** (a child on a slide)



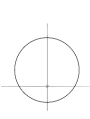
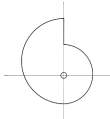
**Reciprocation** – An Object that moves **backwards & forwards** along the **same path** (a draw or a saw)

## Cams

Snail

Eccentric

Pear



**Follower** – A device that **follows** the movement of a **Cam** profile to provide a desired **output motion** in a connecting part.

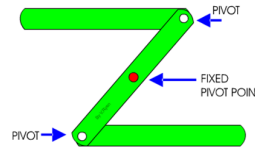
## Linkages

Linkages are levers that are connected by **moving pivot points** and **fixed pivot points**. They allow forces and motion to move through them. Linkages can **reverse** the motion or **change its direction**.

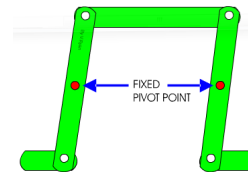
**Fixed Pivot Point** – A point the linkage/mechanism **moves around**

**Moving Pivot Point** – A point that **moves with** the linkage/mechanism

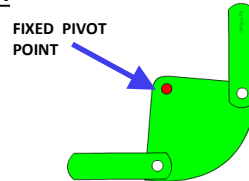
### Reverse Motion Linkage:



### Parallel Motion Linkage:



### Bell Crank Linkage:



## Levers

Levers are simple **mechanisms** that come in 3 different **classes**. Using **effort** and a **fulcrum** to provide **mechanical advantage** to move a **load**.

**Effort** – The amount of force put in by the user (input)

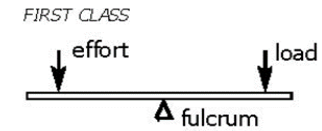
**Fulcrum** – The point at which the lever pivots

**Load** – The weight/force needing to be moved by the user (output)

**Mechanical Advantage** – Moving a large load (output) with a small effort (input)

**Velocity Ratio** – This is the ratio of the distance the effort has to move compared to the load

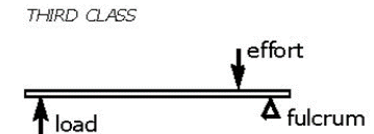
**Class 1 Lever:** example - Pliers or Crowbar



**Class 2 Lever:** example - Wheelbarrow or Nutcracker



**Class 3 Lever:** example - Tweezers or Spade



## Gears

Are a toothed wheel that is fixed to a shaft that connects to another gear to change the speed or direction of rotation. A **simple gear train** reverses the rotation motion. When gears are different sizes and have either more or less teeth the speed will be increased or decreased. A more complex set of gears is known as a **Compound Gear Train**. An idler gear will make the driver and the driven gear rotation in the same direction.

