

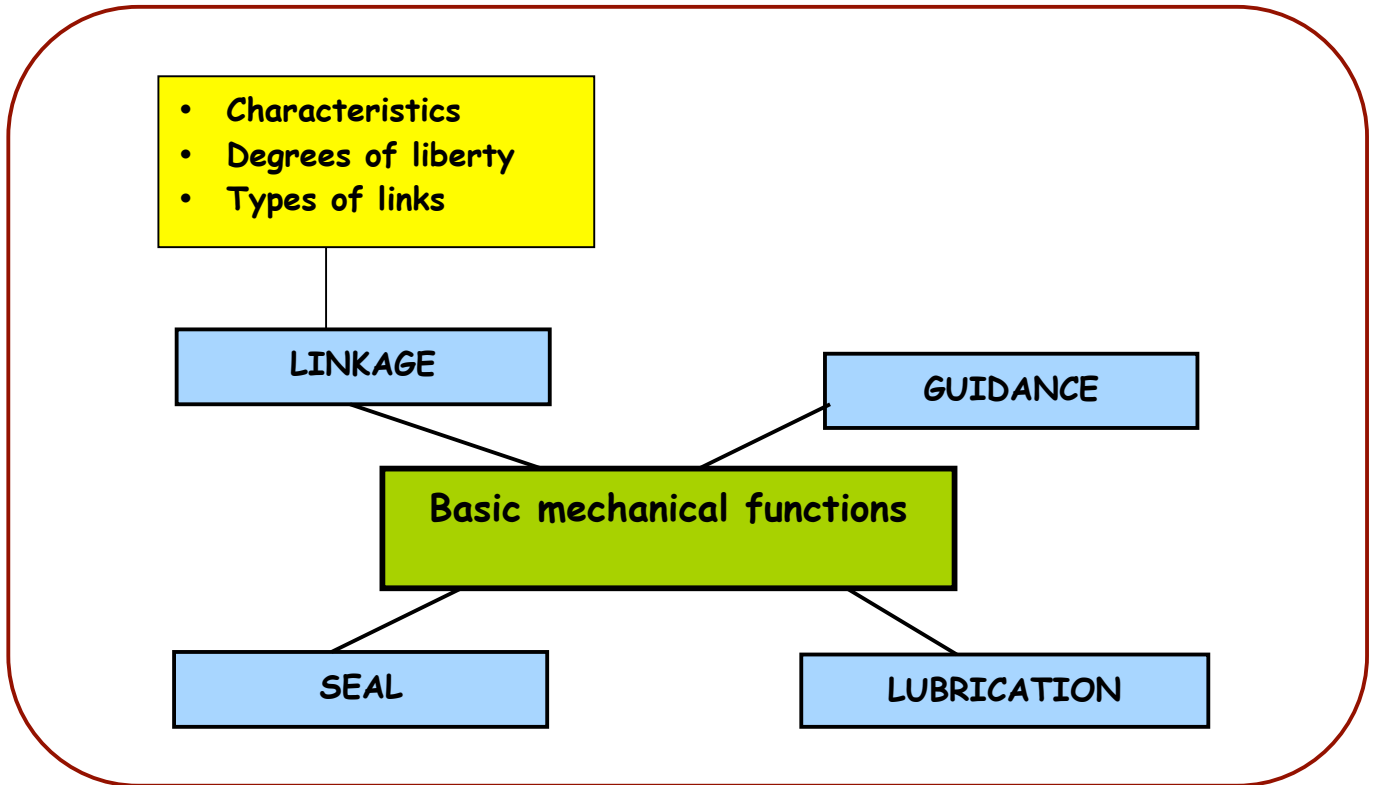


## BASIC MECHANICAL FUNCTIONS

Document to accompany the animation « Mechanisms 5.0 » available on the  
Centre de développement pédagogique's web site

<http://www2.cslaval.qc.ca/cdp/UserFiles/File/previews/mechanisms/>

Let's position ourselves a little...



TEACHER'S DOCUMENT

## BASIC MECHANICAL FUNCTIONS

All parts or **organs** that make up a technical object have a **mechanical function**: the role this part plays inside the object.

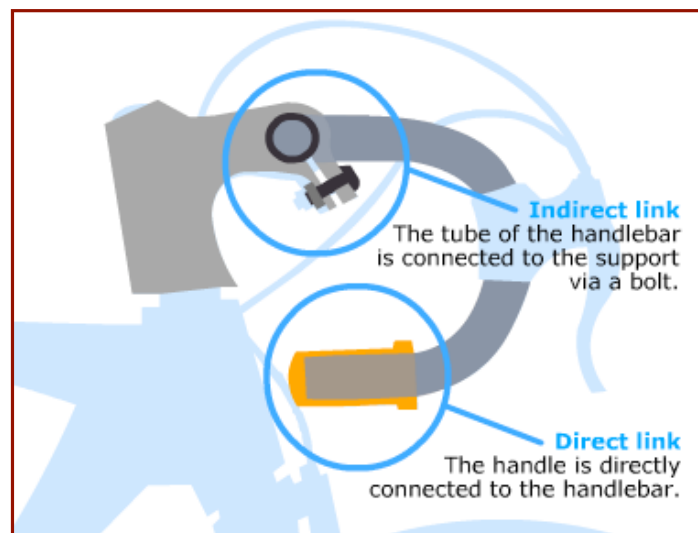
The four **basic mechanical functions** are: linkage, guidance, lubrication and seal.

### 1. LINKAGE

This is the function of a **part or organ** which joins pieces of an assembly together. It may also occur by the **complementary shape of parts**.

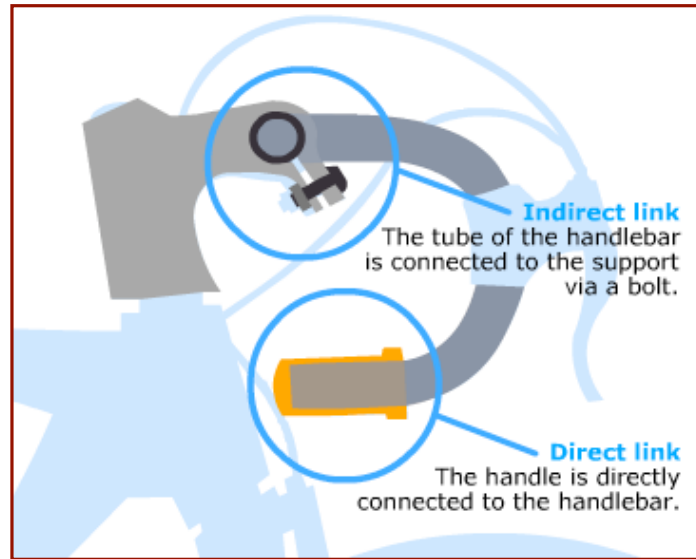
Links are analysed using their **characteristics**. A link may include four of the eight characteristics listed below.

1) A link may be **DIRECT** or **INDIRECT**.



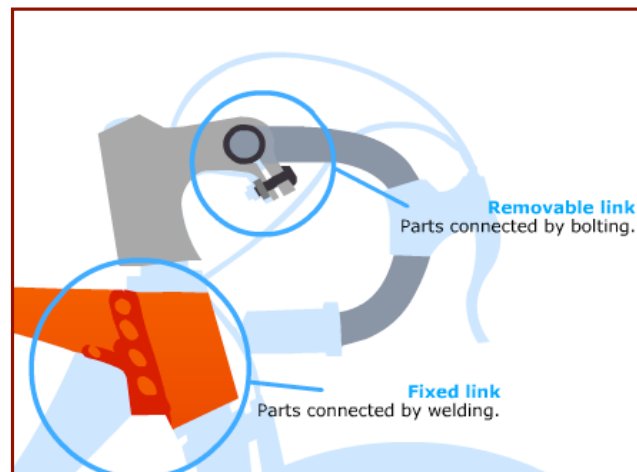
- **Direct:** a link is direct when the parts are designed to hold together without the intermediary of another organ.
- **Indirect:** : a link is indirect when the parts need an intermediary organ (nail, screw, glue, etc.) to hold together.

## 2) A link may be RIGID or FLEXIBLE.



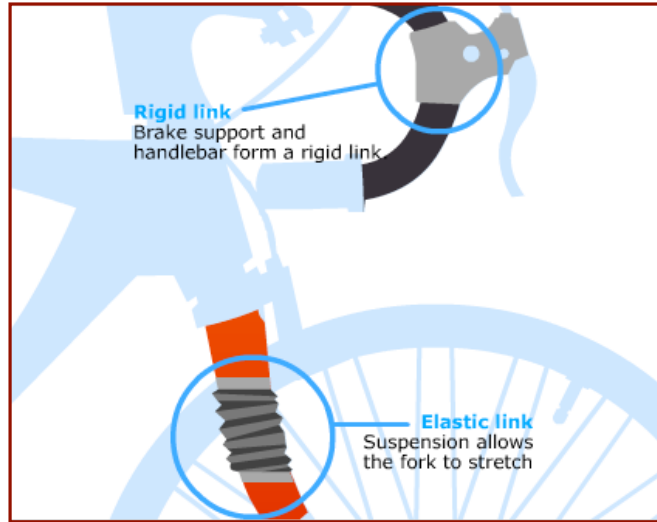
- **Rigid:** a link is rigid when it entails a rigid linkage organ OR when the surface of the parts is rigid and their complementary shapes ensure the link.
- **Flexible:** a link is flexible when there is a flexible linking component or flexible material. It ensures that the parts will return to their initial position if the object works properly.

## 3) A link may have the ability to be REMOVABLE or may be PERMANENT.



- **Removable:** The link is removable when the parts can be taken apart without damaging the surfaces or the linkage organ.
- **Permanent:** The link is permanent when separating the parts entails the deterioration of their surfaces or of the linkage organ.

4) A link may be PARTIAL or COMPLETE



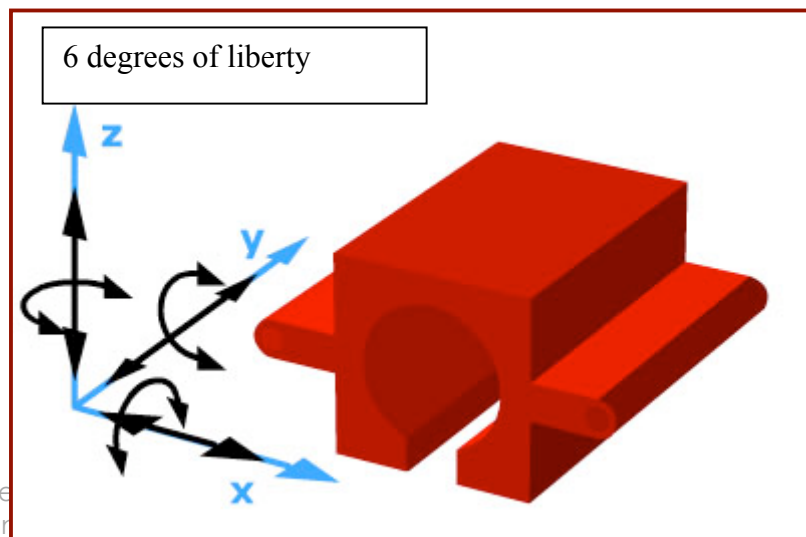
- **Complete:** The link is complete when there is no possibility for movement between the linked parts.
- **Partial:** The link is partial if the parts must move in relation to one another for the object to work properly.

Degrees of liberty of links

In space, an organ which is not linked to another could be moved and would do so in all directions.

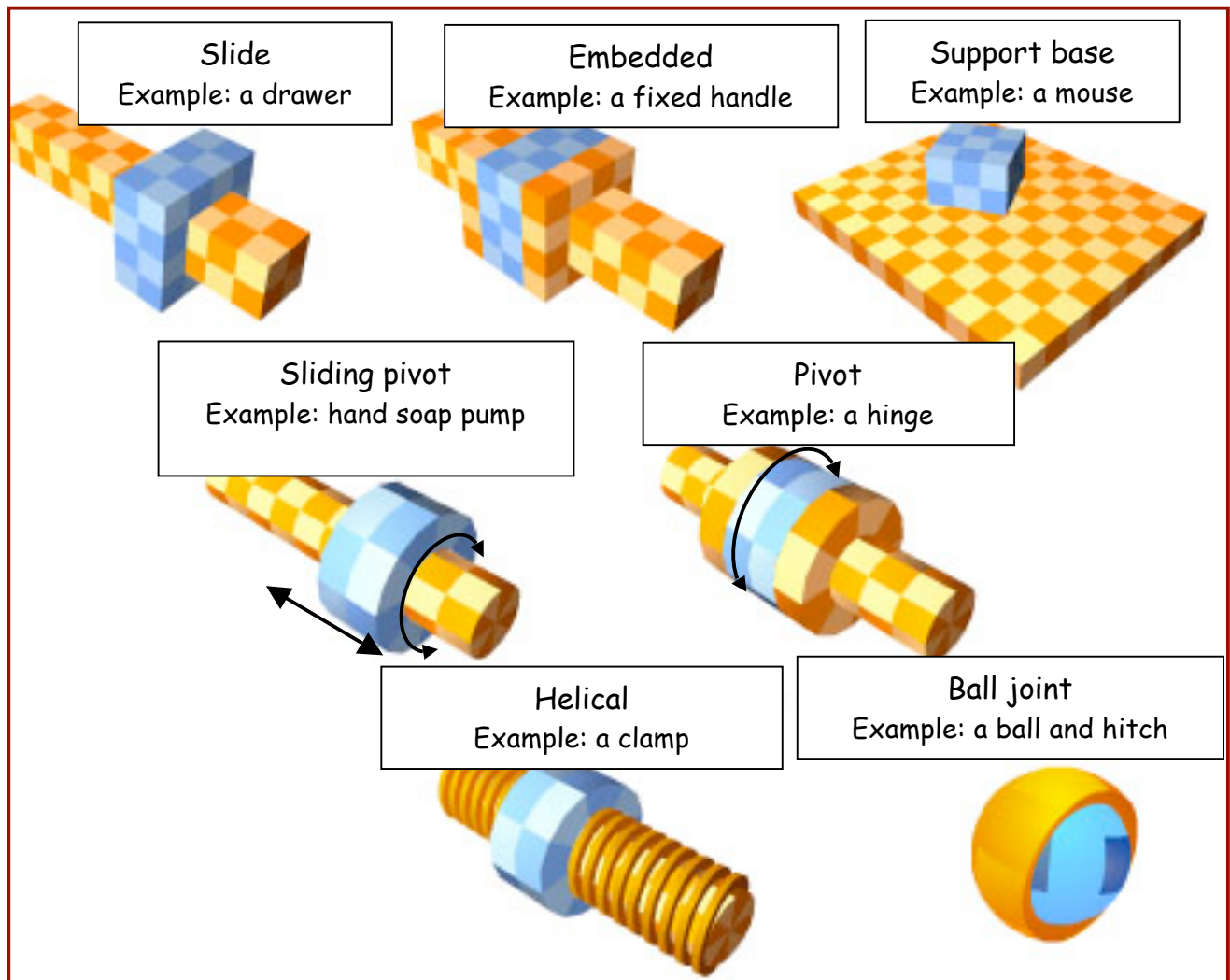
According to this image of a Cartesian plane, there are 6 degrees of liberty and 12 possibilities for movement.

Represent them on the axes.



## Types of links

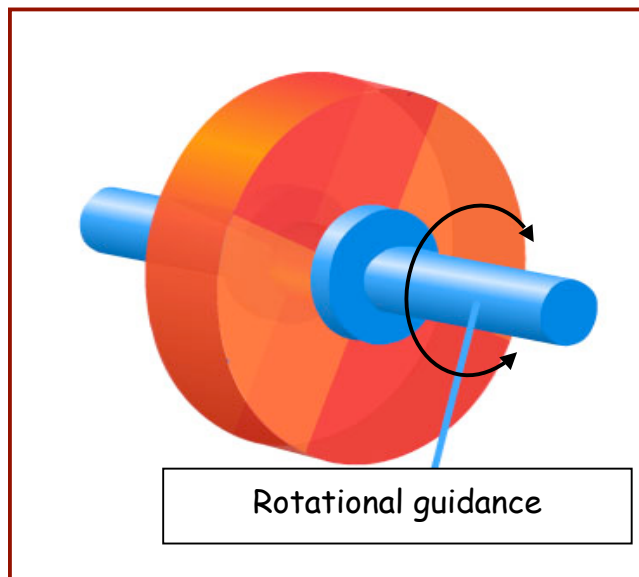
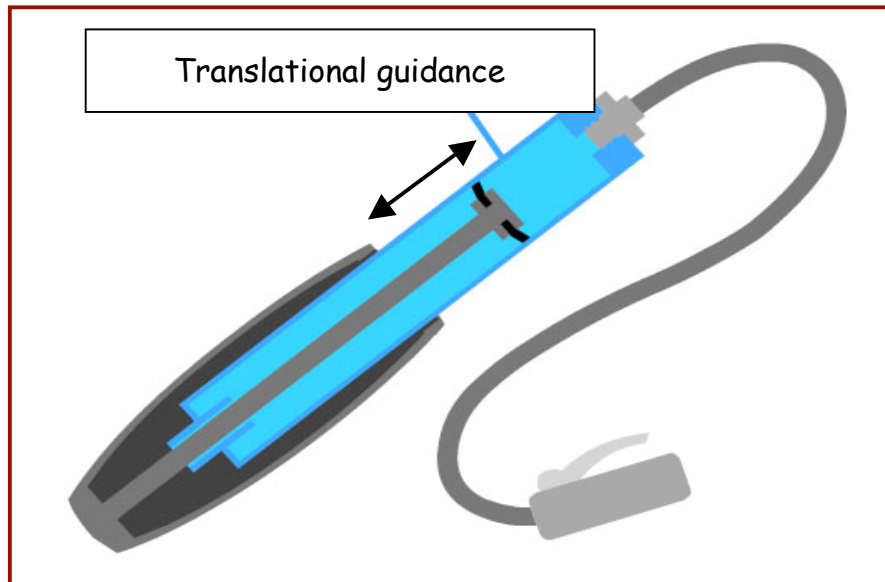
On the diagram below, identify the main types of links and give an example for each.



## 2. GUIDANCE

This is a function of a part which directs another part along a precise trajectory.

There are two types of guidance:



Linkage and guidance allow for the suppression of possibilities of movement that would impede the proper function of a mechanism or object.

### 3. LUBRICATION

This is the function of a **substance that reduces friction.**

There are 3 forms of lubricants: liquids, semi-liquids and solids.



### 4. SEAL

This is the function of an organ that **prevents a fluid (liquid or gaseous) from escaping** its container.

A seal may be obtained by simple contact, but is more often ensured by using a compressible material.

Examples of organs often used to ensure seal:

