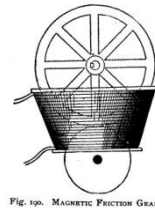


# I-Linking in Technical Objects

## 1. What is linking? Give examples.

- Hammer-handle and head
- Calculator case and calculator
- Brush hair and handle on paintbrush



## 2. Characteristics of Links

- A) Direct versus Indirect Links. What's the difference?
- A direct link only features the two parts being joined. An indirect link has a third part that helps link them together.

**Examples** Classify as direct or indirect.

a) Link between tire and wheel **direct**

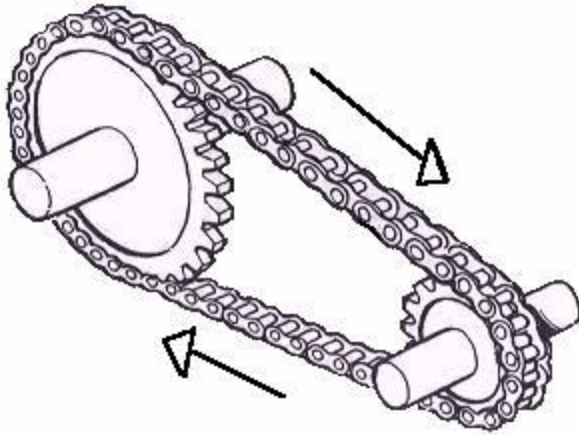


b) link between blade  
& shoe  
**indirect(due to screw)**

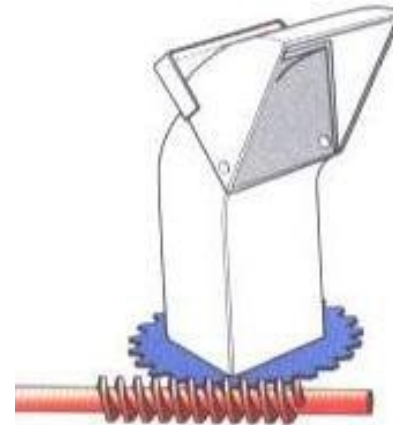


**More Examples** Classify as direct or indirect.

c) The link between the two gears  
**indirect**



d) The link between the two gears  
**direct**



B) **Rigid versus Flexible Links.** What's the difference?

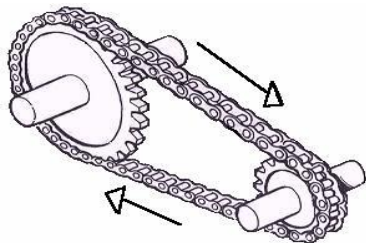
The rigid link cannot be bent. The flexible link is bendable like rubber.

**Examples** Classify as rigid or flexible.

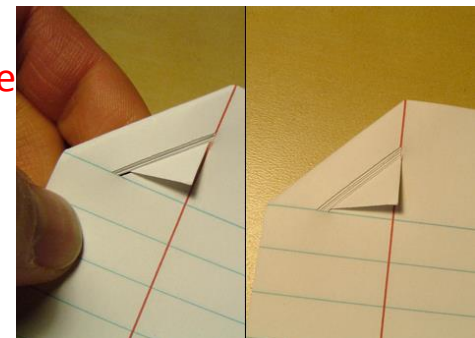
a) Link between tire and wheel (**flexible**) b) link between blade and shoe (**rigid**)



c) The link between the two gears **flexible overall**



d) The link between the two papers **flexible**



C) **Removable versus Nonremovable Links**. What's the difference from the point of view of destruction? **The nonremovable link cannot be removed without wrecking what's linked.**

**Examples** Classify as **removable** or **nonremovable**.

a) Link between tire and wheel  
**the tire flap is the link and permanent**



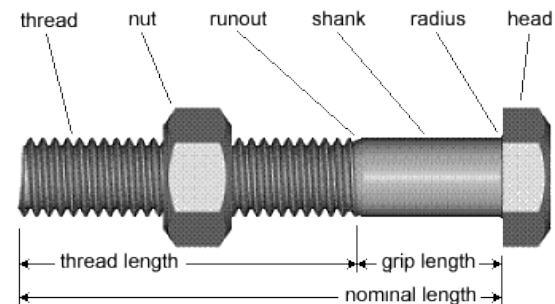
b) link between blade and shoe  
**removable**



c) Link between shoe top and sole  
**non removable**



d) link between nut and bolt  
**the threads are the link = permanent**



D) Complete Versus Partial Links. What's the difference?

A partial link allows one component to move without necessarily moving the other. A complete link has both parts moving together.

**Examples**

Classify as complete or partial links and explain why.



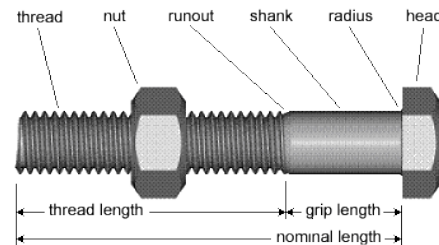
**Complete**



**Complete**



**partial**



**partial**

# II-Transformation Systems: these turn rotational motion into a translation (**linear**) or vice versa

1) **Rack (straight part) and Pinion** convert rotational motion into linear motion(translation)

a) Where is this system found?

In conveyor belts ; in steering systems and in new wine-bottle openers



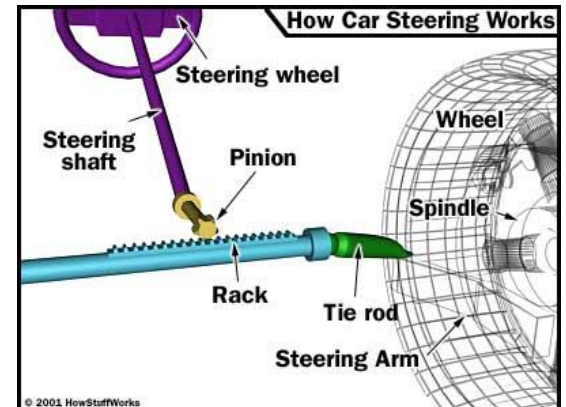
a) **Characteristics**

(1) Teeth must **match**

(2) To prevent wear and tear, the system needs to be **oiled(lubricated)**

(3) What can be done to pinion to slow movement of rack?

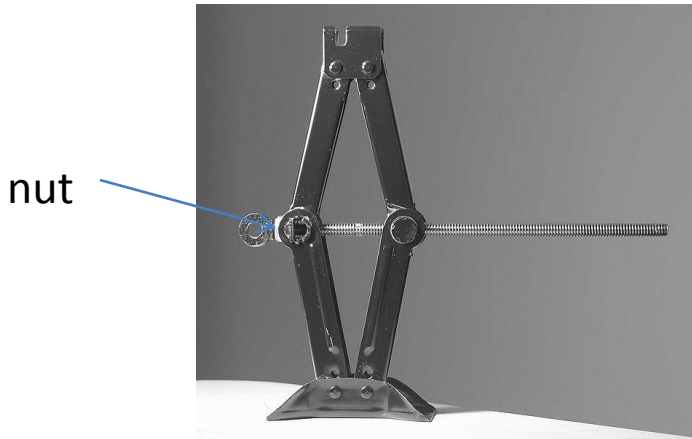
**Have less teeth**



## 2) Screw Gear System

a) What are the two types of screw gear systems?

Car jack and wrench



### b) Characteristics

- (1) Can the nut rotate with the screw in the jack? no
- (2) In which system(s) should the screw's threads match those of the nut? both
- (3) In the wrench is the nut being held in place? yes



3) Cam and Follower System: the “follower” part has a repetitive up and down motion. The cam is the teardrop shape.

A) Where is this system used?

In engines to open and close valves and also in toys where the head goes up and down.

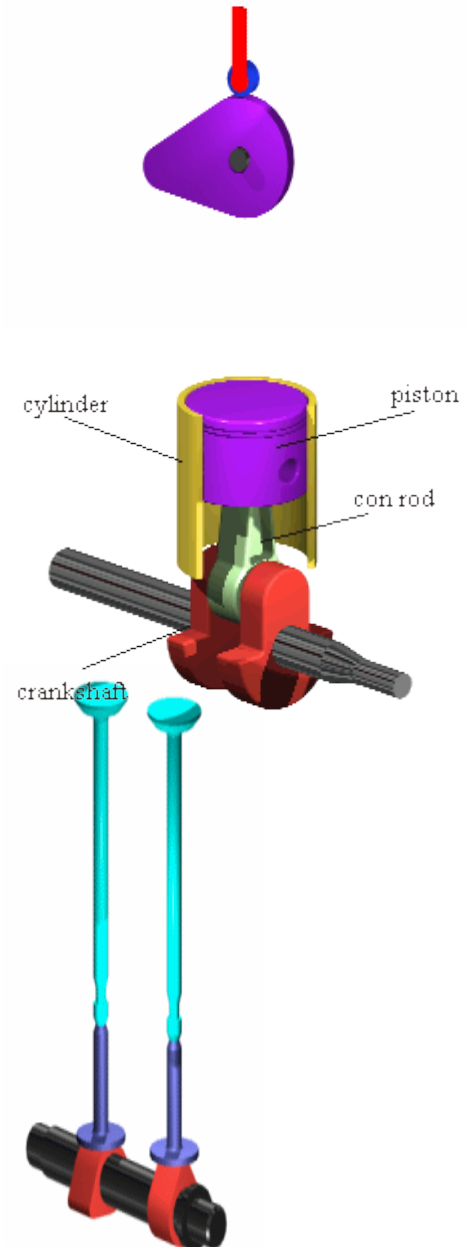
A) Characteristics

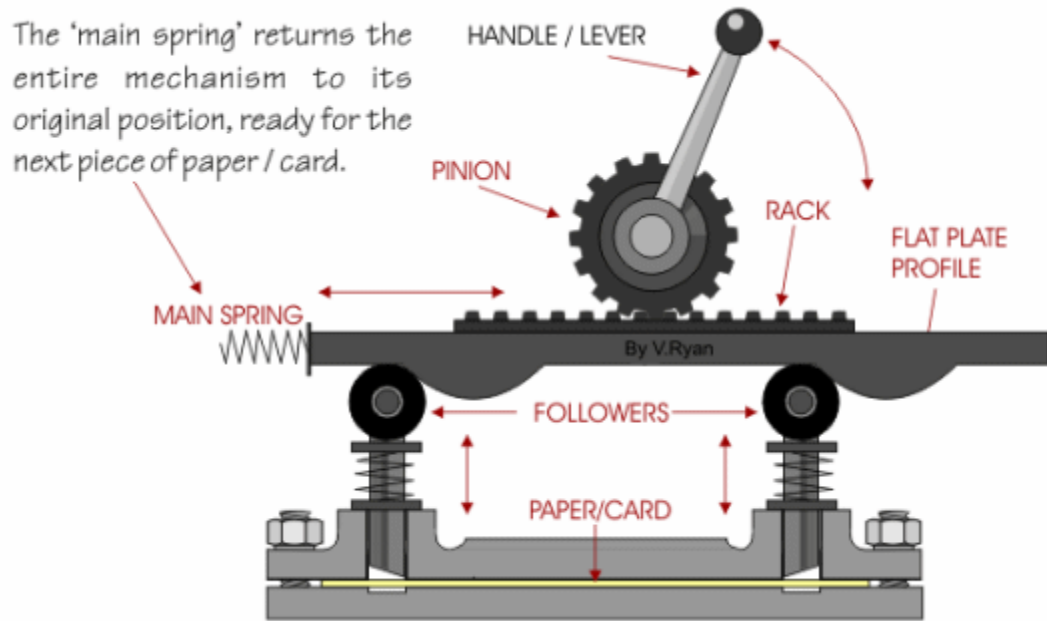
(1) Must the follower be “guided? yes\_\_

(2) Is the cam’s shape important? yes.

Without the tear drop part , the follower would not move up. But in toys you could make the cam circle-shaped but off-centered and it will have the same effect.

(3) How do you make sure that the cam and follower remain in contact? \_\_\_\_\_ A partial link is needed.





In the above, the lever turns the pinion, which moves the rack. The rack is the top part of a cam-follower system. When the teardrop part moves over the round follower, it presses it down, and this punches holes into the card. Because of the distance travelled by the rack, it lowers the force needed to do the same work that would be required with a simpler but inferior setup.

4) Slider-Crank System: an up and down motion of a piston is turned into a circular motion

A) Where is this system used?

It's what makes a car engine work. The hot gases from the combustion of gasoline push the piston, which eventually powers the wheels to turn.

A) Characteristics

(1) What connects the piston to the crank? \_\_\_  
\_\_\_\_\_ **arm or rod** \_\_\_\_\_

(2) What part of the engine keeps the piston in place ("guides it")? \_\_\_ **cylinder** \_\_\_\_\_

(3) How do you prevent wear and tear between the guiding part and the piston? **By lubricating it with oil**

