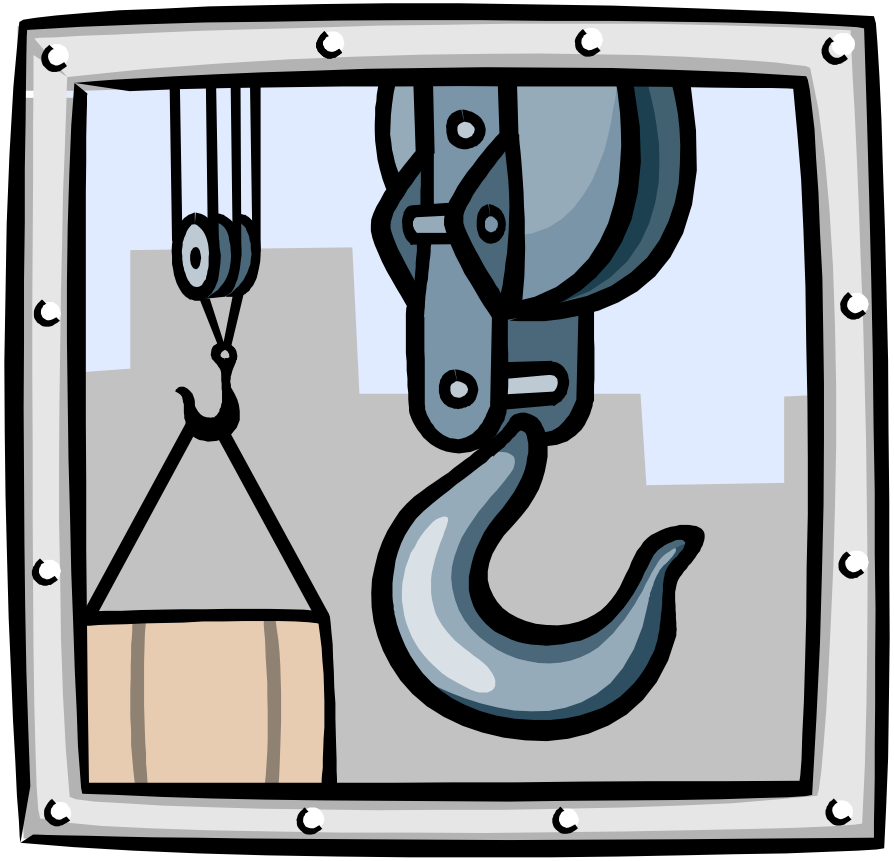


Mechanics

Machines

- Machines help us work more easily.
- Machines use energy to do work and can transfer the energy from one machine to another.
- **Simple machines** have only a few parts. **Compound machines** are made of two or more simple machines.

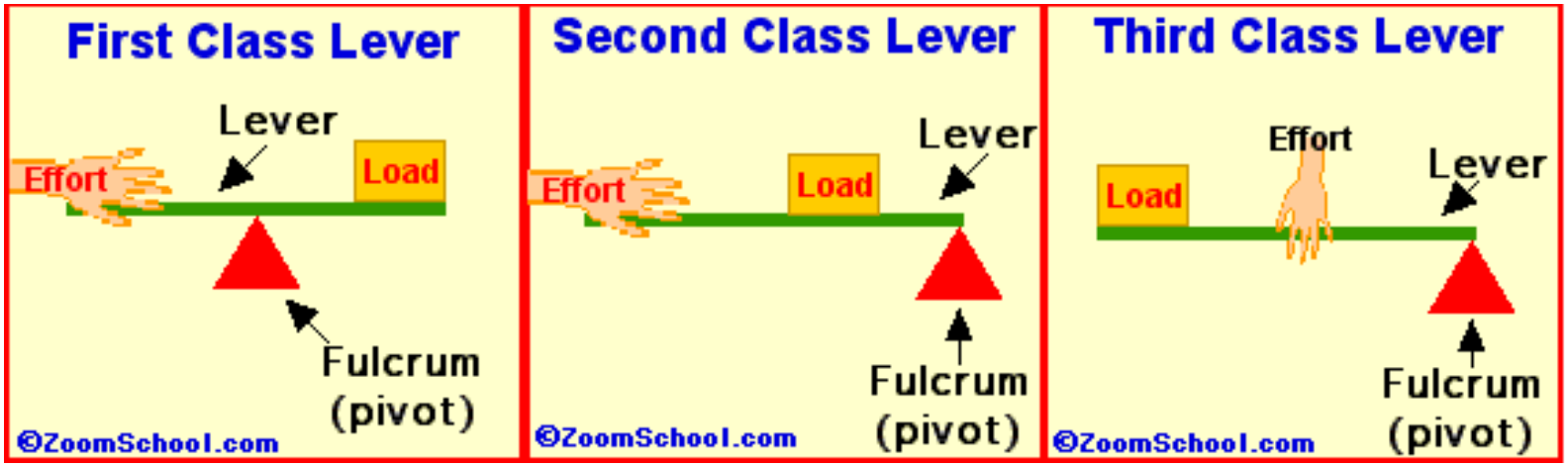
Lever

- **A lever** is a stiff bar that rests on a support called a **fulcrum.**
- They are simple machines that lift, move or pry things by changing the strength and direction of a force.
- **A lever** needs4 things to do work: a bar, a fulcrum, a load, and an effort.

Lever

- The **load** is the object you are trying to move.
- The **effort** is the force applied to move the load.
- The **fulcrum** (or **pivot**) is the point where the load is pivoted.

Types of Levers



Examples:

1st class levers- hammer, scissors

2nd class levers- wheelbarrow, nutcrackers

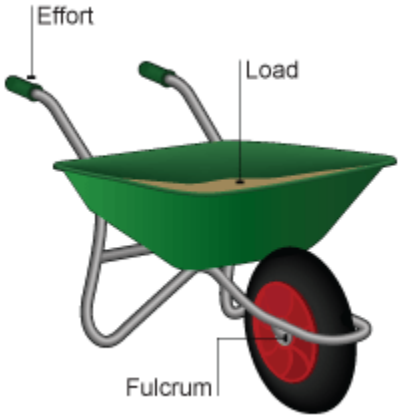
3rd class levers- shovel, broom, arm

The mechnical **effort** of a lever is calculated by:

1) **Mechanical Effort= Load:Effort**

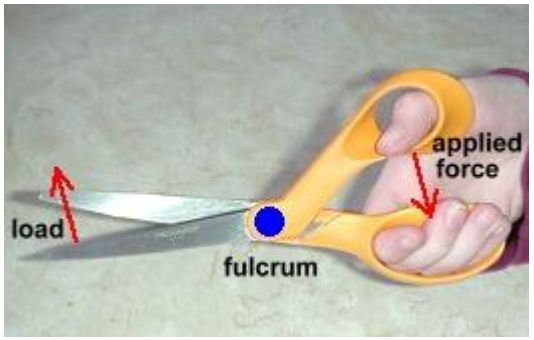
2) **Mechanical Effort = Effort Distance: Load Distance**

Name the class of lever

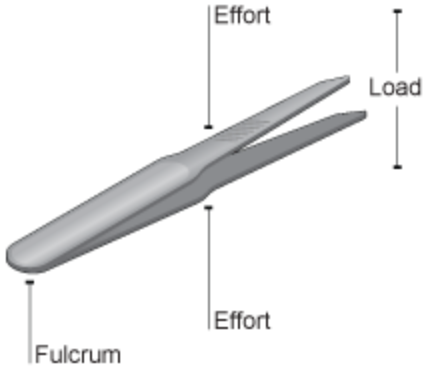


#1?

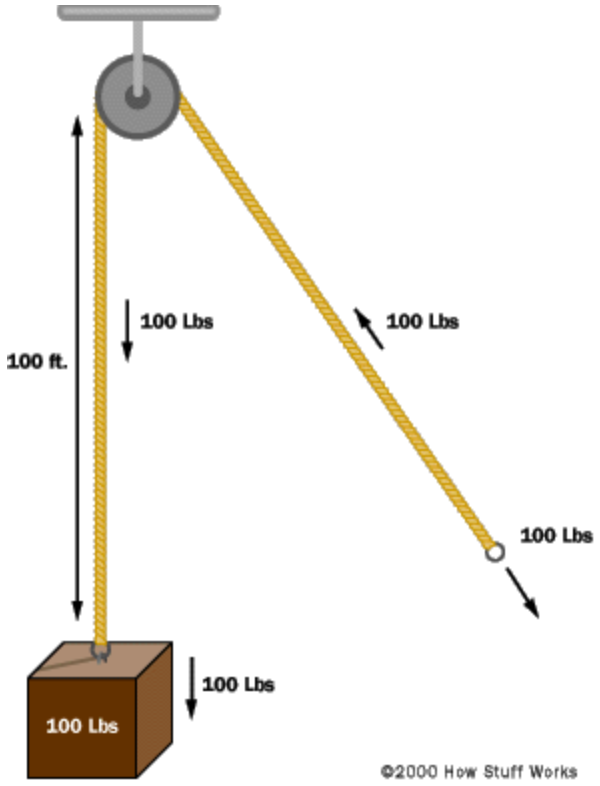
#2?



#3?



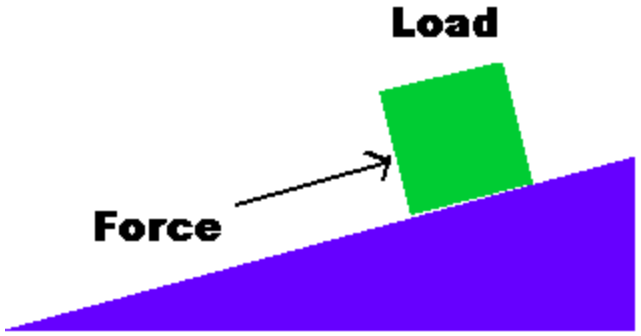
Pulley



- A **Pulley** is a simple machine that uses grooved wheels and a rope to raise, lower or move an object.
- It is easier to move a load using a pulley than moving it by hand.

Inclined Plane

- An **inclined plane** is a slanting surface connecting a lower level to a higher level.
- It is a simple machine that reduces the effort needed to raise or lower an object vertically.
- Examples: Ramp, stairs

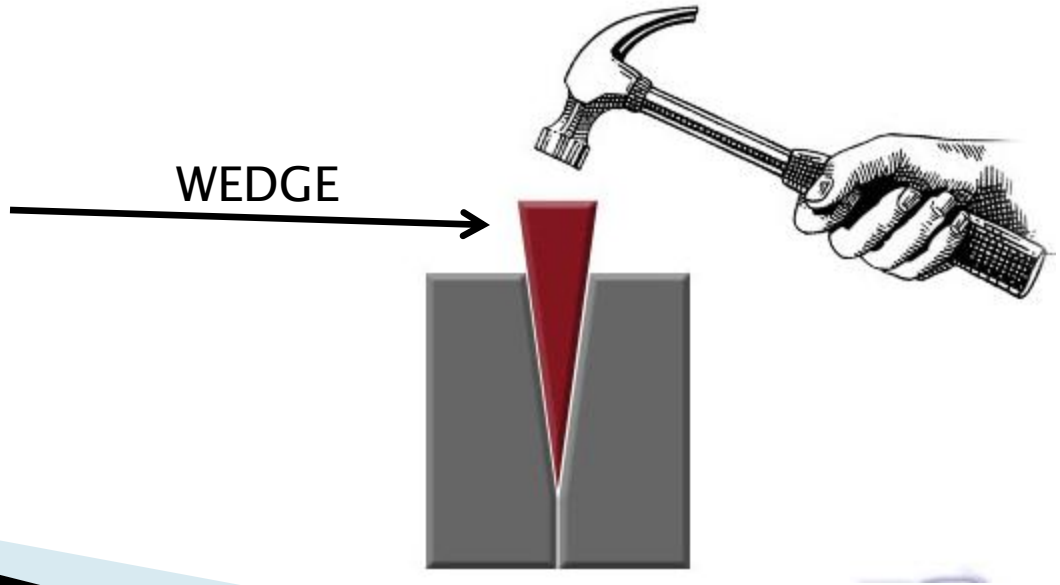


Inclined plane

Wedge

- A **wedge** is an object with at least one slanting side ending in a sharp edge which cuts material apart.

- An **ax** is an example of a wedge used to do work.



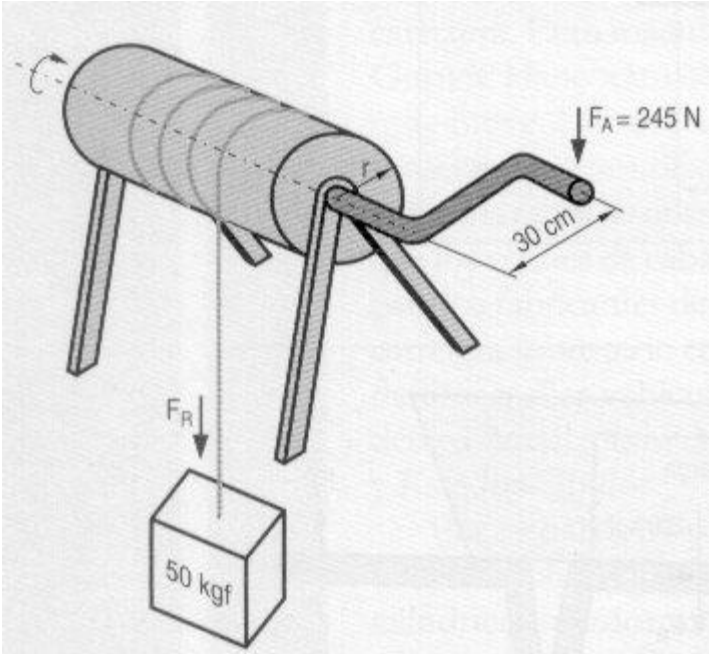
Screw

- A screw is an inclined plane too. But, it is wrapped around a pole which holds things together.

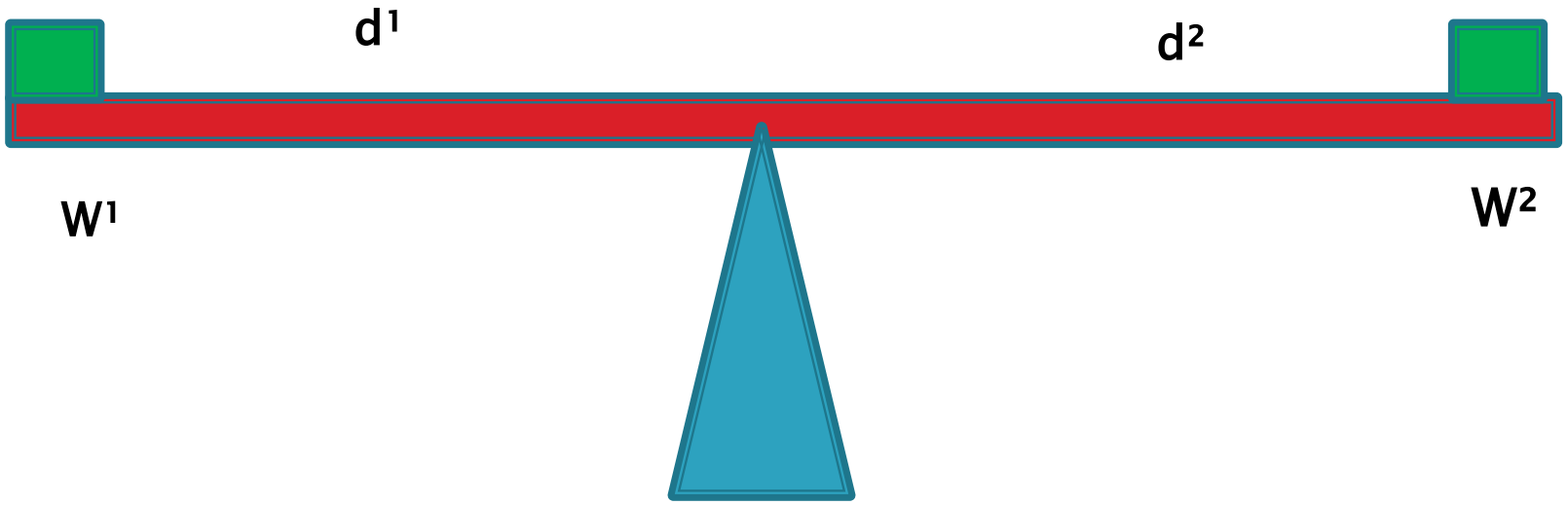
Wheel & Axle

- A wheel with a rod is called an axle. It lifts and moves loads.

- You can work more easily using a wheel and axle.



Lever Problem Equation

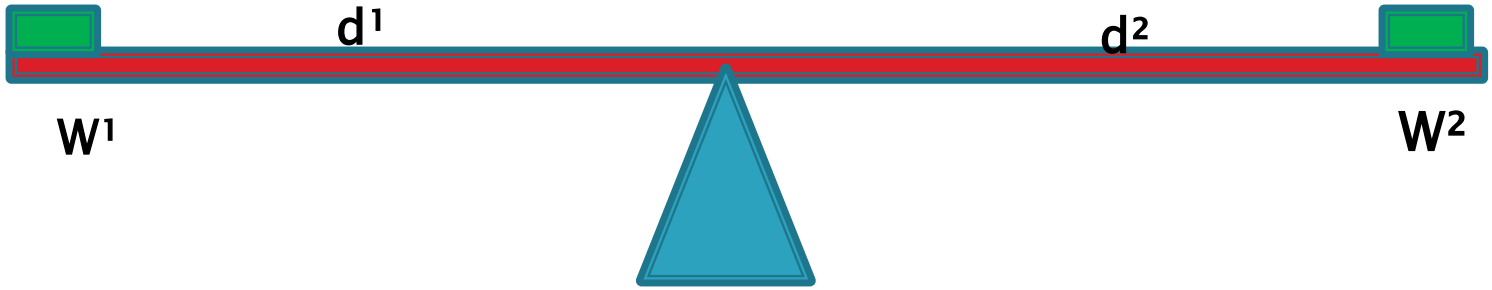


To keep the lever balanced, we must satify the equation:

$$W^1 \times d^1 = W^2 \times d^2$$

Sample Problem

- John weighs 90 kg and Jane weighs 60 kg. They are both on the seesaw. If John is seat 10 meters away from Jane, how far should each sit from the fulcrum of the seesaw?



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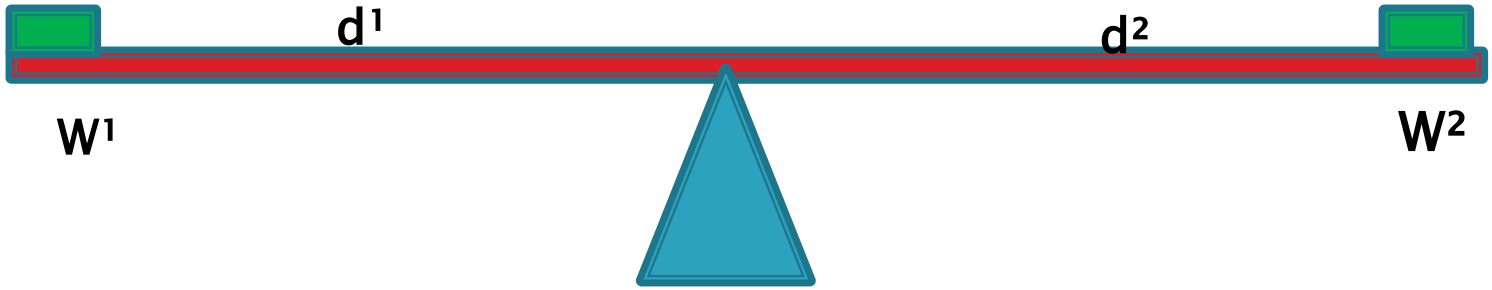

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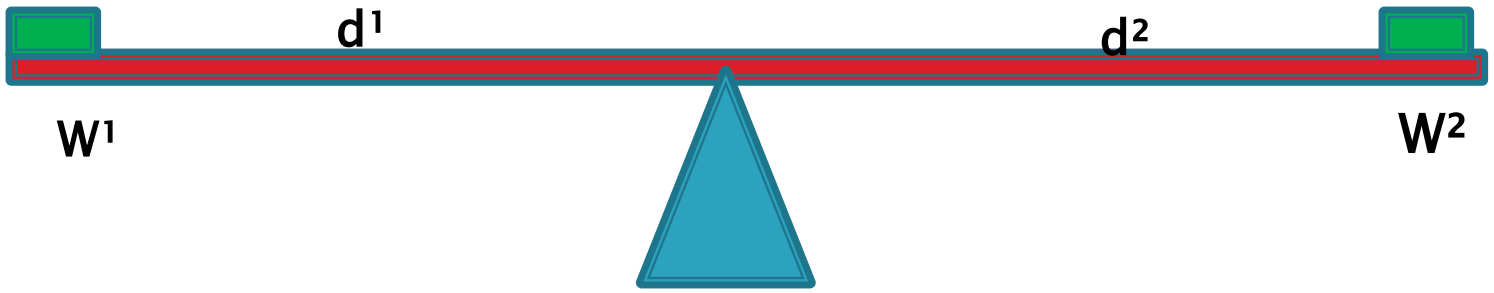


STEP 1: Assign Variables

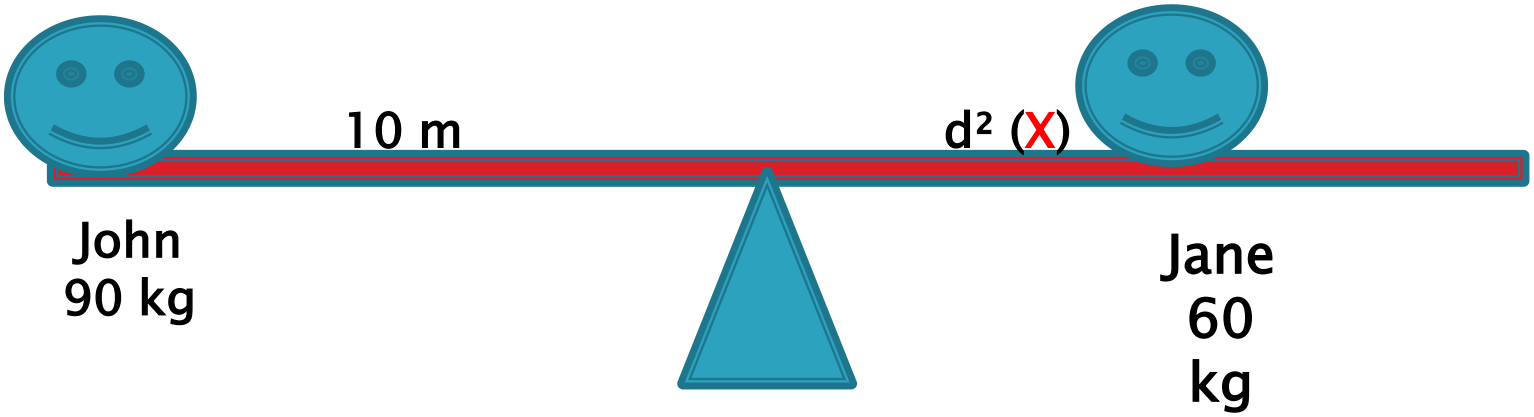
W^1 = John (90kg)

d^1 = John's distance (10m)

W^2= Jane (60kg)

d^2 = We don't know! "X"

- STEP 2: Draw the diagram.



- STEP 3: Obtain equation from the diagram.
- STEP 4: Isolate 'X' and solve.

(90 kg) * (10m) = (60kg) * 'X'

900 kgm = 60kg (X)

900 kgm/60kg =X

15m= X