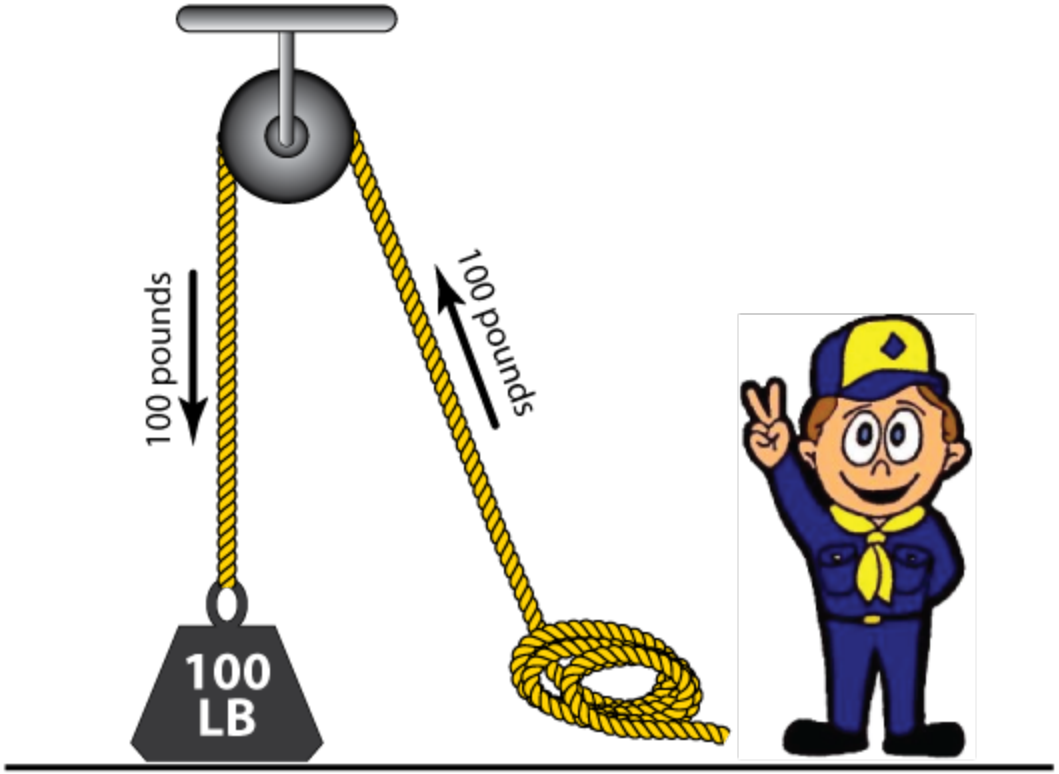
What is Block and Tackle?

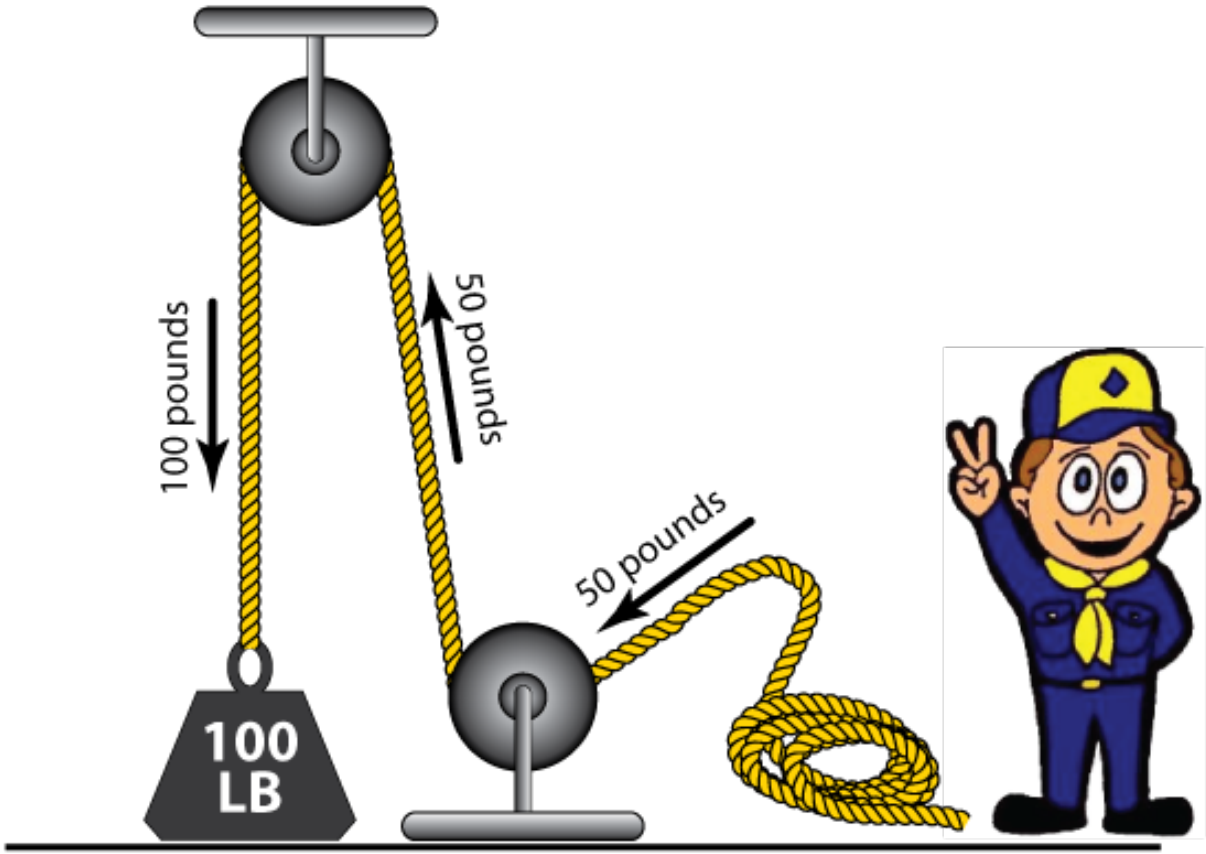
- It is a “compound machine” made up of pulleys and rope.
- A pulley is a “simple machine.”
- The parts with the pulleys form the “block.” The rope is the “tackle.”

OK, what's a pulley?

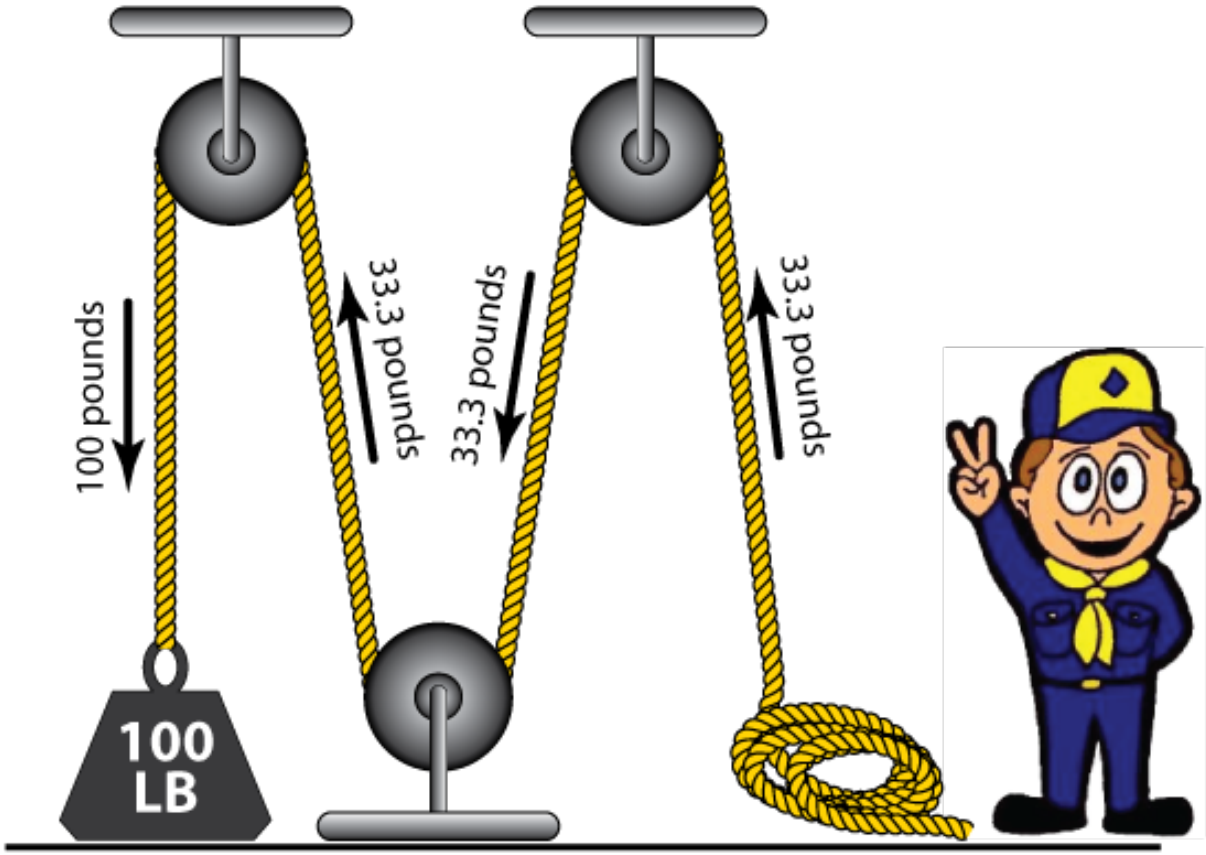
- A simple machine that changes the direction of a force in a rope.



Block and Tackle – how it works…



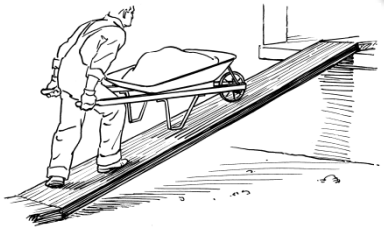
Block and Tackle – how it works…



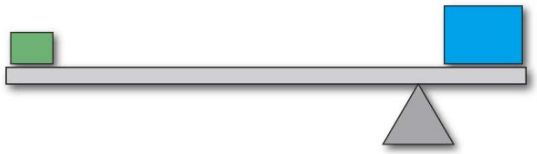
What it looks like from the side…

What are the other "simple machines?"

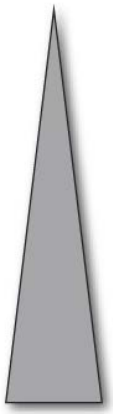
- Inclined Plane



- Lever (and fulcrum)

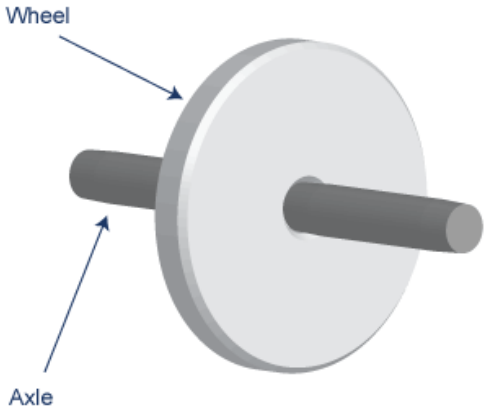


- Wedge



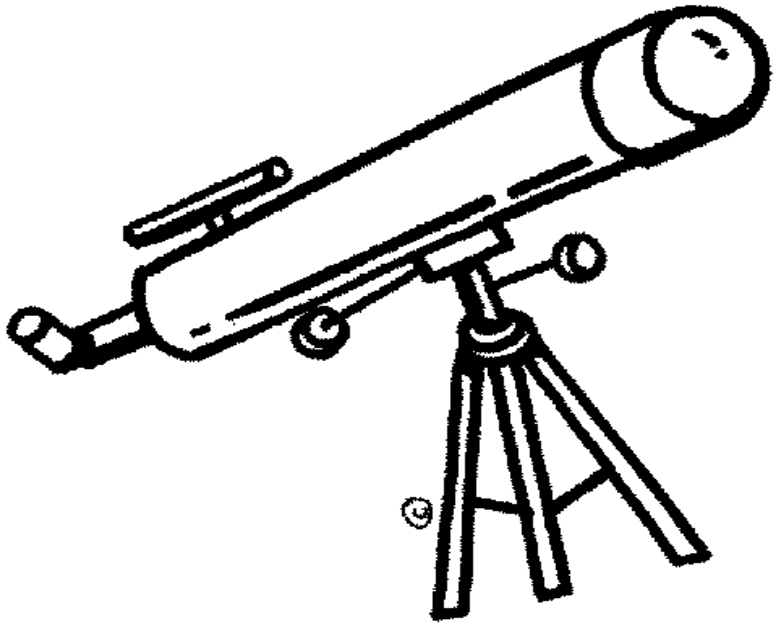
- Screw

- Wheel and axle



Astronomy Technology

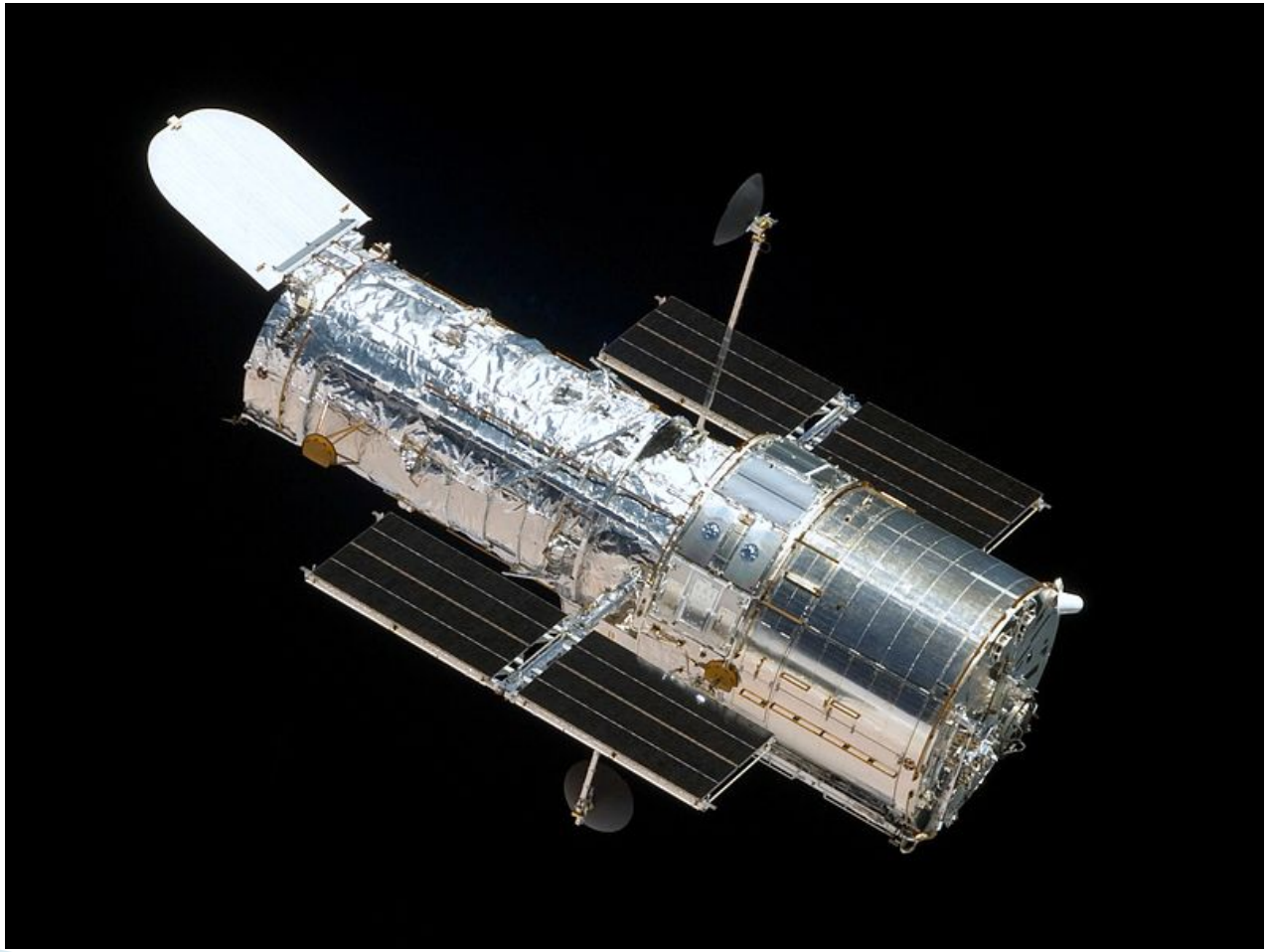
Space Telescopes



Why put a telescope into space ?

- Earth's atmosphere distorts the light from space
- Air/water/dust absorb UV/IR light

Hubble Space Telescope



Hubble Features

- If the main mirror was the size of the earth bumps would only be 6 inches big
- UV/IR cameras
- Solar Powered
- Cannot use rockets to steer – uses “reaction wheels”
- Exposure time – up to 37 hours

How much did it cost ?

- In 1978 Congress approved funding for $38,000,000
- At launch in 1990 the cost was $2,800,000,000
- Total cost to date about $10,000,000,000

How do you fix it ?

What needs fixing ?

- Hubble was build from the start to be modular – old cameras can be removed and new ones installed “easily”
- Gyroscopes need to be replaced every few years

What happens at the end of its life ?

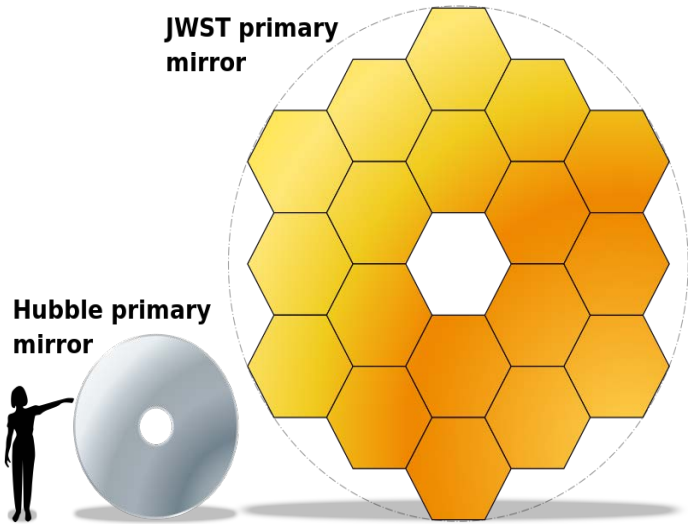
- Due to retire in 2014
- The original plan was to retrieve it using a shuttle and put it in the Smithsonian Museum
- It will fall to earth and burn up between 2019 and 2023

What has the HST done for science ?

- Accurately measures distances to stars
- Calculate the age of the Universe
- “Count” black holes
- Expansion is acceleration (dark energy)

James Webb Space Telescope

- Will only observe in Infrared
- $3,000,000,000 spent so far (expected cost is $8,000,000,000)
- 17 “small mirrors” acting as one large mirror
- Due to launch in 2018



What a funny looking telescope !!