

### Unit 3: Mechanical Efficiency

#### Textbook Scavenger Hunt (important pages: 148-149, 164-165, 174-175, 150-153)

1. What are machines designed to do? How does the machine do this?

- WORK, get things done \* make things easier for us

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com → transform energy  
transfer forces  
change direction of a force  
change magnitude of a force  
↑ or ↓ speed

2. What kind of mechanisms might a machine have to help it perform specific tasks?

- levers                      - wheel - axle                      - gears  
- pulleys                      - inclined plane

3. Define each of the following calculations: (with a formula and a couple of words to explain the term)

Mechanical Advantage (MA) =  $\frac{\text{load force (N)}}{\text{effort force (N)}}$  or  $\frac{\text{length of effort arm}}{\text{length of load arm}}$

P151-52

measures usefulness of "tool". If MA is greater than 1, it allows larger loads to be moved (class 2 levers)

Velocity Ratio =  $\frac{\text{distance effort force moves}}{\text{distance load force moves}}$  \* NO UNITS

required for (P152)

Percent Efficiency =  $\frac{MA}{VR} \times 100\%$

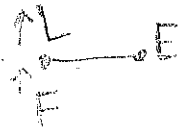
Pressure =  $\frac{\text{Force}}{\text{Area}}$

refers to a force distributed across a certain area

1. Fulcrum, Load, Effort Force

4. How many different types of levers are there? (briefly explain each)

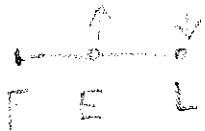
P.150



Class 1 - lifts heaviest with smallest effort



Class 2 - lifts heavy loads  
ex: wheelbarrow



Class 3 - no MA, makes things harder to lift  
ex: fishing rod

5. What does the term ERGONOMICS mean? Why would this type of study be important for a school?

study of designing products intended to maximize safety, efficiency and ease

various =  
aspects =

6. What is friction? How can friction be considered a good thing?

Force that resists movement

- walking/running
- on ice
- brakes

7. How do gears work together to produce a mechanical advantage?

idea of shifting gears to make it easier to ride

MA: Gear Ratio

P.160

up Hill → small gear at front makes it easier for you to pedal but requires more "pedalling" or revolutions to get to the top