

Moving things with Pressure

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Pneumatics and Hydraulics

Purpose: To reinforce the basics of **Pneumatic and Hydraulic** Systems, and to apply the basic principles of these systems into a construction project.

Objectives:

- A.** To learn the **terminology** related to Pneumatics and Hydraulics.
- B.** To understand how **hydraulic lifts** work by achieving mechanical advantage.
- C.** To **design** a pneumatic system project using a single master cylinder controlling at least two slave cylinders.
- D.** To **build a system** that works pneumatically to solve a problem. Design and build a mechanical model or device that uses the properties of fluids

Portfolio Requirements:

1. A complete list of definitions relating to pneumatics and hydraulics.
2. A drawing of the simple hydraulic system and a brief explanation in your own words about how it works.
3. Drawings of your own created pneumatic system including at least one master cylinder and two slave cylinders. Examples: elevator, sliding doors, dumb waiter.
4. A constructed project that uses the properties of fluids.

Project Outcomes:

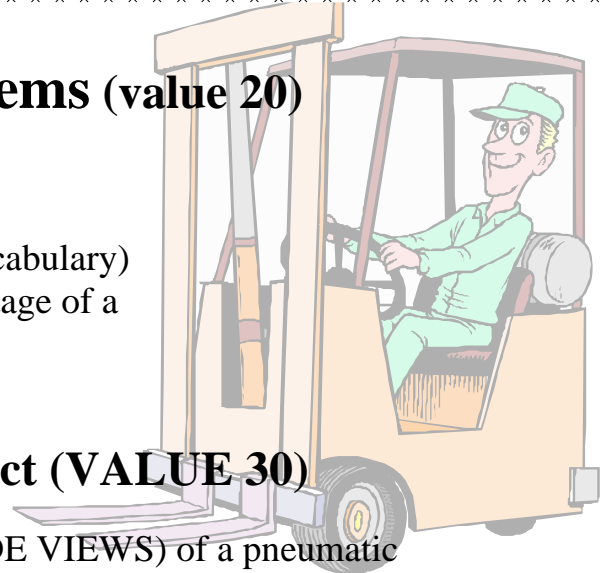
Item		Value
Part A	Hydraulics and Pneumatics Definitions	10
Part B	Drawing of Basic Hydraulic Systems	20
Part C	Draw Scaled diagrams of Pneumatic/Hydraulic Project	30
Part D	Produce a Prototype of Planned Project	40

Part A: Definitions: (value 10)

1. Pneumatic
2. Hydraulics
3. Hoist
4. Piston
5. Pump
6. Valve
7. Master
8. Slave
9. Cylinder
10. Force

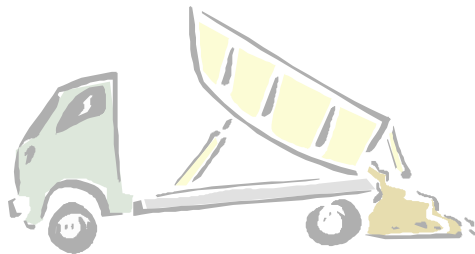
Part B: Basic Hydraulic Systems (value 20)

- A. Draw a simple hydraulic system (value 10)
- B. Explain in your own words (using science vocabulary) how the system works and the mechanical advantage of a Hydraulic system like this. (value 10)



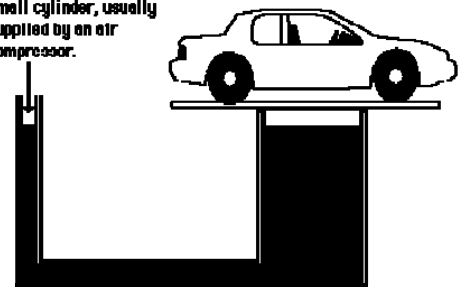
Part C: Scaled Diagrams of Project (VALUE 30)

- Draw scaled diagrams (TOP, FRONT, & SIDE VIEWS) of a pneumatic system using a single master cylinder controlling two or more slave cylinders.
- Create a materials list including the amount of wood you need to construct your project.
- Some examples of projects are:



- Jack in the Box
- Elevator
- Sliding door(s)
- Dump truck
- Human Cannon

Pressure on fluid in small cylinder, usually supplied by an air compressor.



- EACH student is required to have his/her own drawings.

Part D: Construct your Project (VALUE 40)

- ❖ After your diagrams have been approved by your teacher, you may begin the construction of your prototype.
- ❖ Remember to keep strength and operation in mind. This prototype should be a working model.
- ❖ You need only build one project between two group members.

