



# Fluid Power

## Day one

### Today's learning target:

To determine what you already know about fluids and their power and what you would hope to learn

- Fill out the pre knowledge worksheet (K-W-L) to determine prior knowledge. Consider the following points as you fill in the worksheet.

#### Pre knowledge

- What do you already know about this subject?
- What have you heard about this subject?
- What do you want to know about this subject?

Find the booklet from back of this binder entitled:

"Fluid Power"

Read the booklet to answer worksheet entitled "Energy and Power Utilization" (25pts)

- Complete activity on page six of fluid power book (5pts)
- On page six is a cylinder exercise. Get a set of syringes from your teacher to complete this exercise. Be prepared to answer the questions to your instructor.
- The experiments on pages 13, 14, and 15 will NOT be used. We will be substituting a hydraulic arm in at this point.

### Day closure:

In your technology journal write down one thing that you discovered today.

## Day Two

### Today's learning target

To understand the basic terminology associated with the use of hydraulics and pneumatics.

- Use your design concept skills to sketch ideas for a hydraulic system.
- Day two define the following (10 pts)
  - Pneumatics
  - Hydraulics
  - Air Compressor
  - Fluid Motors
  - Valve Actuators
  - Mechanical Advantage
  - Charle's Law
  - Boyle's Law
  - Pascal's Law
  - Atmospheric pressure
- Once your terms are defined locate the booklet in the back of the binder called Hydraulic pet.
- Look at the pictures and materials they used to build a hydraulic pet in the book.
- Brainstorm with your group or by yourself what your pet would look like. Using household items and one set of syringes sketch some working ideas you would have for creating a moving pet. (5 pts)

□ Things to consider

- How do you get the system to roll forward?
- How can you best use the fluid power?
- What materials can I realistically use from home?
- Look at pictures and components list to get an idea of what you will need. Why did they choose these items?

**Day closure:**

In your technology journal write down one thing that you discovered today

## Day Three and Four

### Today's learning target:

Today you will use your problem solving skills to fix a hydraulic arm.

Apply your systems knowledge to fixing and using a Hydraulic Arm

#### Problem

- The hydraulic arm is not working properly. Determine what is wrong with the arm to make it functional again. When it is done you will be trying some challenges
- To solve this problem locate the Hydraulic arm assembly booklet and or DVD. Go thru the arm assembly step by step to determine if it is put together properly. Explain to your instructor any issues you found and resolved.
- Fill the Syringes by following the step by step process in the back of the assembly booklet.
- Once all problems are resolved measure the arm for the **Work Envelope** - The surface bounding the maximum extent and reach of a robot's wrist, excluding the tool tip.

**Challenge.** Set an object at one end of the envelope and a ring at the opposite end. Time each other to see who can pick up the object and get it to the circle the fastest.

**Extension.** Think of a challenge you can have another team member do.

## **HOMEWORK**

You should be gathering household items to build a hydraulic pet of you own.

Bring them all in by Day 5

### Day closure:

In your technology journal write down one thing that you discovered today

## Day 5 through 9

### Today's learning target:

Based on what you know about linear fluid power and the research you have done on hydraulic racers; construct your pet racer of household items to move 5 feet in the fastest time.

- These next five days are to be spent constructing your pet. Your pet must be able to move 5 feet solely under the power of the hydraulics system.
  - You may want to reference the Hydraulic pet building book again.
  - Look at the retracting system they put in place as well as the ratcheting system.
  
- You may use the scrap box as well but you want to keep it as lightweight and balanced as possible.

### Day closure:

In your technology journal write down one thing that you discovered today

## Day 10

### Today's learning target:

Apply knowledge of the hydraulics system to move a pet racer 5 feet.

- Today if your system fails at any time you will have to problem solve to resolve the issues.
- Remember you are qualifying for distance AND speed.
- Today's distance is the grade that will be recorded for the project.  
(40 pts)
- The fastest pet of the year earns bonus points and bragging rights.
- Tomorrow is your Post Test, insure that all worksheets are complete and you know all of your terms.
- Make sure your technology journal is written in completely.