TECHNOLOGY

education
Department of Education
FREE STATE PROVINCE

MEMORANDUM

GRADE 7

PRACTICAL ASSESSMENT TASK: TERM 1 (Revised Annual Teaching Plan 2025)

Name		Possible mark	Learner's mark
Investigate (15 Marks)	Investigate: Pneumatic s and Hydraulics	8	
	Design considerations	7	
Design (20 Marks)	Design brief, specifications, and constraints	8	
	Draw a 3D drawing of the idea in oblique projection	12	
Make (35 Marks)	Draw a working drawing in 2D showing one view with dimensions to scale	20	
	Learners make a simple working model	15	
TOTAL		**70**	

Jaws of life: Rescue system

Investigate [15]

READ AND INVESTIGATE. THEN ANSWER THE QUESTIONS

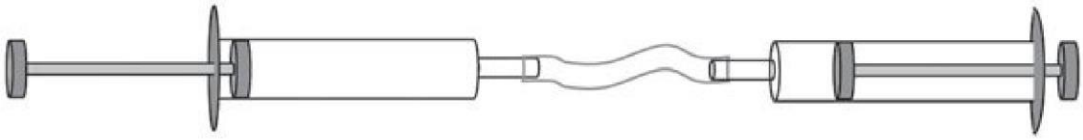
Pneumatics

You can use syringes to make things move and use it to control and change movement.

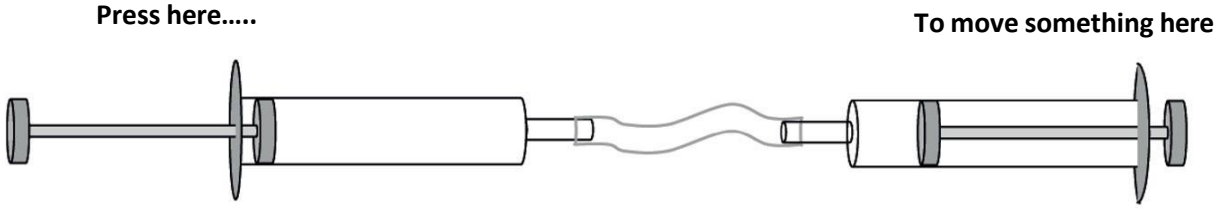
1. Grip a syringe so that you can push the plunger in with your thumb.
2. Close the outlet tube tightly with a finger, then try to push the plunger in.

To compress means to make something smaller. When you pressed the plunger in while keeping the outlet closed, you compressed the air inside the syringe. That means you forced the air molecules to move closer together.

Connect two syringes with a plastic tube, as shown below.



Find out whether you can move small objects by pushing one plunger in.



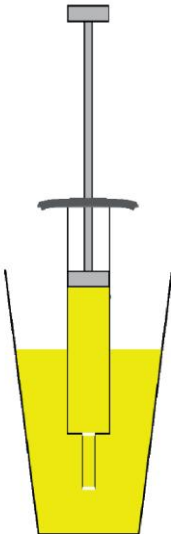
A pushing device made with syringes and a pipe filled with air is called a **pneumatic mechanism.**
The word **pneumatic** is used to indicate that **gas** is used to push something.

When you use a **pneumatic** pushing device to try move an object, you cannot press very hard, because only a small force is needed to compress the air. You can only press with a big force once the air is already very much compressed, when the plunger is pressed almost fully in. Do you think the same thing will happen if there is **water** in the cylinders instead of gas?

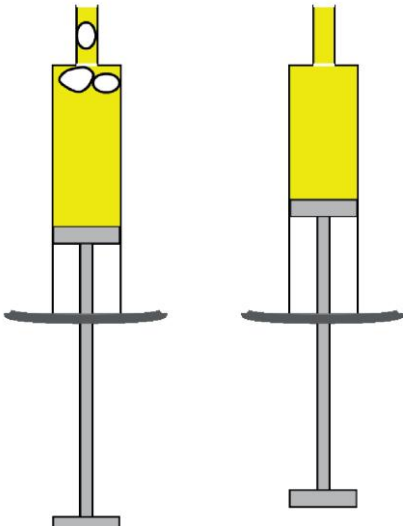
Hydraulics

Fill a syringe with water to investigate this.

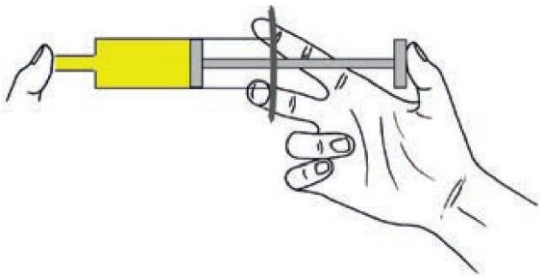
Step 1: Some air bubbles may get caught in



Step 2: Hold the syringe upside down and push the air bubbles out.

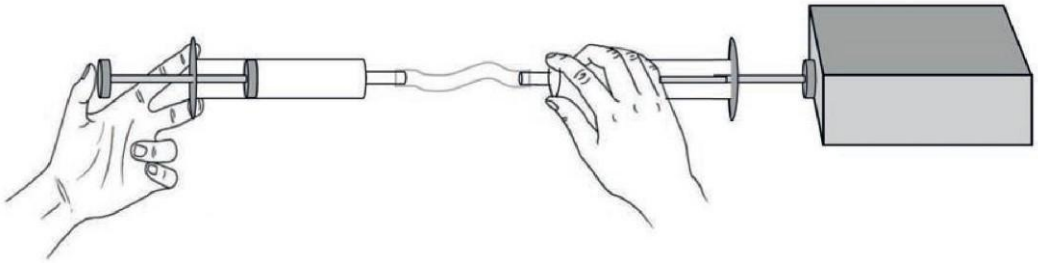


- Do you think you can compress the water just like you compressed the air? Try it.
- Describe the difference you notice between using air in the syringe, and water in the syringe.



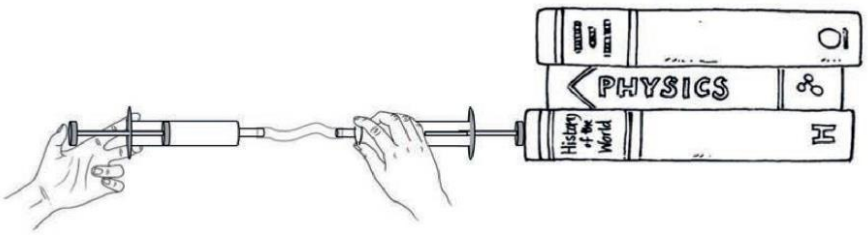
A liquid cannot be compressed.

Fill two connected syringes with water and try to push an object illustrated below.



When there is air or other gases in a device like this, it is called a pneumatic mechanism. When there is **water or some other liquid like oil** (oil is usually used in hydraulic system) in the cylinders and connecting pipe, it is called a **hydraulic** mechanism.

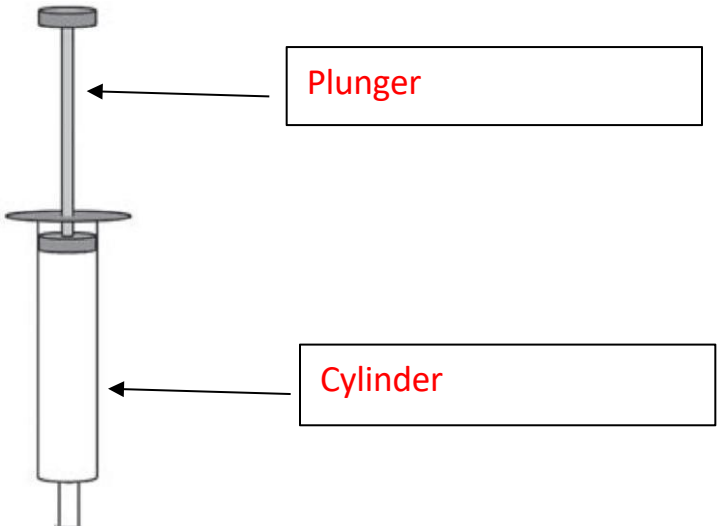
Test to see which system gives you the strongest push (A pneumatic or hydraulic system). Use books to see if you can move it with the syringes. Start with one book, then add another. Test both and then see which is stronger. See the image below.



The hydraulic system should give you the strongest push, because water cannot be compressed.

<u>Investigate:</u> Read through page 2 and 3 again and answer the questions. **(8)**

1. True or false: Syringes can be used to make things move. True (1)
2. Label the syringe below: (2)



3. What is the difference between a pneumatic and hydraulic mechanism? (2)
   A pneumatic mechanism works with air or gas and hydraulic mechanism works with water or a liquid. ✓✓

4. Instead of water what type of liquid is usually used in a hydraulic system? (1)
   Oil

5. What would give the strongest push with the same two syringes, air or water? Why? (2)
   Water. Because water cannot be compressed like air.

Design considerations **[7]**

Study the design considerations of the following two rescue tools and answer the questions below.

1. Who is it for? (1)
   Who will be using them?

   Rescue workers use them to rescue people trapped in cars as a cause of an accident

2. What is it for? (2)
   Explain how the function of the two tools differ.
   The cutter on the left can cut through metal like doorframes to release passengers while
   The spreader on the right can be inserted into a narrow gap the arms are opened and the metal is pushed apart ✓✓

3. Is it cost effective? (1)
   Can the cost of the tool be compared to the cost of the people's life's it safes?

   The cost of a human life can never be compared to the cost of a tool to save it. ✓

4. Is it easy to use (ergonomics)? (1)
   What part of the tools design make it easier for the user to operate/handle it?

   The handlebar around the middle of the tool acts as a pivot point allows the user to move the tool around and to balance it in use. ✓

5. Does it look good (aesthetics)? (1)
   What makes the tools look good?

   The orange colour of the tool gives the tool an attractive appearance ✓

6. Will it affect society? (1)
   How are captured people in accidents benefiting from the use of these tools?

   Injured people have a much better chance of getting medical help and saved because they are being release by these tools ✓

Scenario

The rescue services in your area need a rescue tool. The rescue tool will be used at the scene of an accident next to the road. It will be used to cut open car wrecks to save injured people trapped in the wreck. It will be used by rescue workers. Design a model of a Jaws of Life rescue tool for them.

Your model should:

- operate to cut or prise open crumpled metal,
- must work with linked levers,
- be attached to a flat piece of card that will act as a base,
- and be powered by a hydraulic system.
- You will use syringes and tubing for the **hydraulic system.**
- The syringes should have different thicknesses.

Design

Complete the Design Brief, Specifications and Constraints **(8)**

***Read the scenario to find the answers.**

1. Write a **design brief** by looking at the design aspects. (1 x 3= 3)
    - What is needed?
    - Who will use?
    - What it is for?

Design a rescue tool ✓ (what is needed?) for the rescue services ✓ (who will use it?) that will used to rescue people trapped in wreck ✓ (what is it for?).

*** Read through the scenario again and identify the specifications and constraints.**

2. List 3 **specifications**. (1 x 3 = 3)

    - Must be able to cut and open crumpled metal ✓
    - Must work with linked levers ✓
    - Must be powered by a hydraulic system ✓

3. List 2 **constraints** on the materials (1 x 2 = 2)

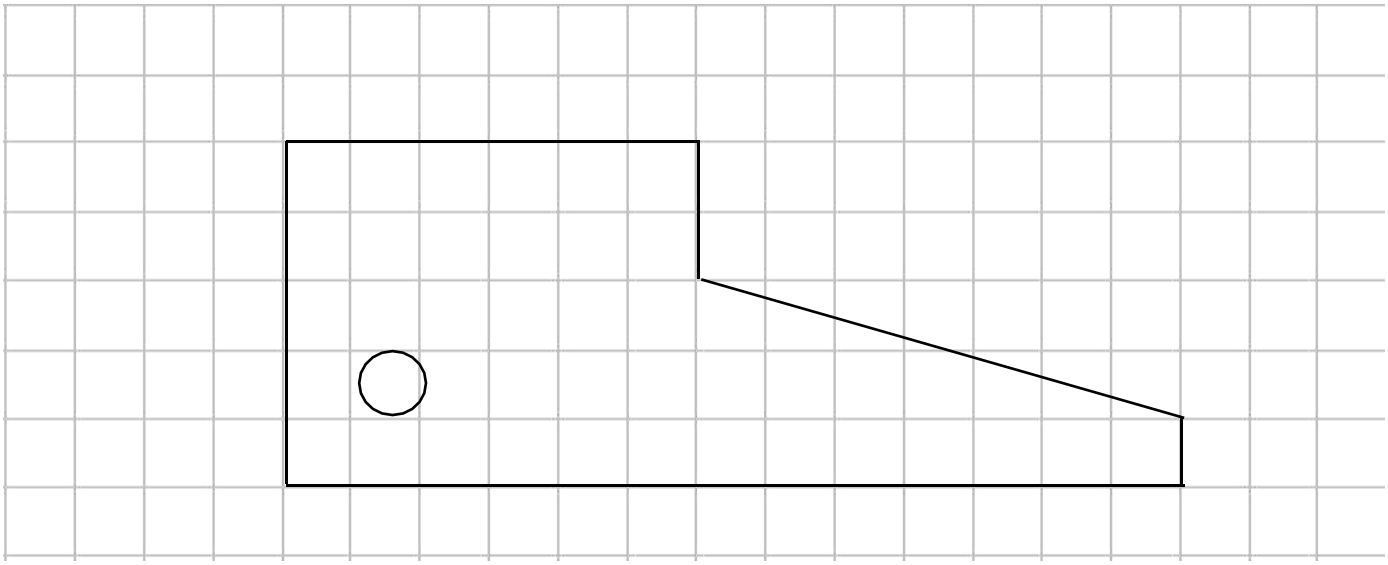
    - Must make use of syringes ✓
    - Must make use of tubing ✓
    - Must make use of a flat piece of card for the base ✓
    - OR Syringes should have different thicknesses
      (any 2)

4. Initial idea sketches [not for assessment]

Learners draw different types of jaws as initial idea sketches in 2D in their workbooks indicating with notes the different materials they are selecting.

1. **Draw a 3D drawing in oblique projection.** **(12)**
   You are going to complete the drawing of the **spreader jaw** of the rescue tool.

    1. Complete the front view of the spreader jaw below in the space provided.
    2. Draw an oblique 3D drawing by projecting the lines at 45°.
    3. Use a pencil and ruler
    4. Depth = 1 block



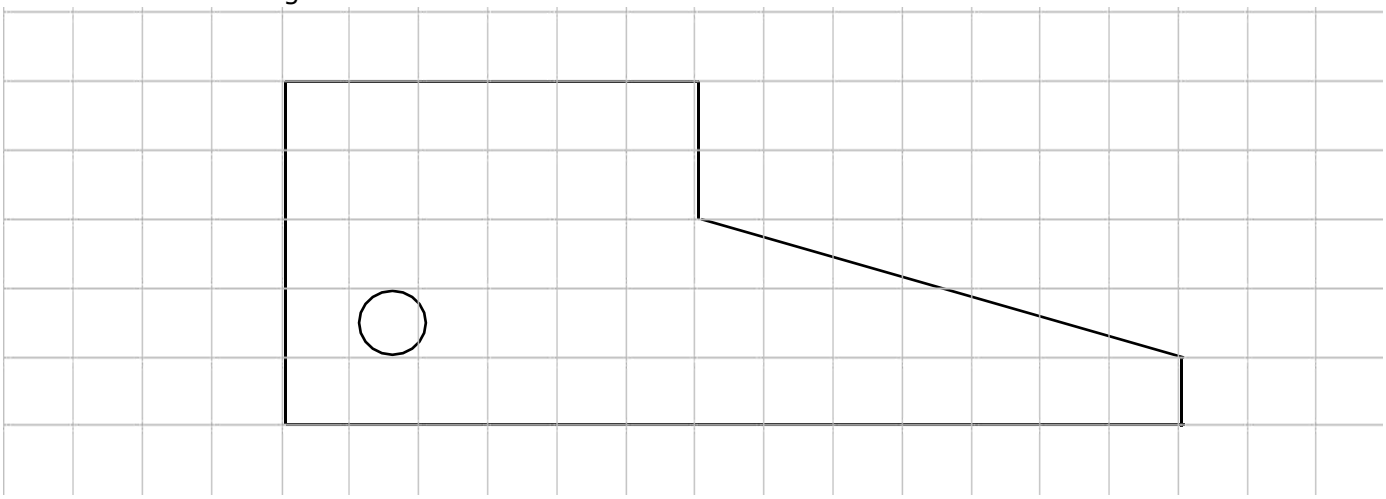
Assessment rubric for the oblique drawing	Good	Adequate	Elementary	Poor
	4	3	2	1
Projected all the corners backward at 45°				
The rear lines were drawn in correctly				
Used dark accurate outlines				
Total	**/ 12**			

Good - all aspects are correctly done; **Adequate** – most of the aspects are correctly done
Elementary – half of the criteria is met; **Poor** – less than half of the criteria is met

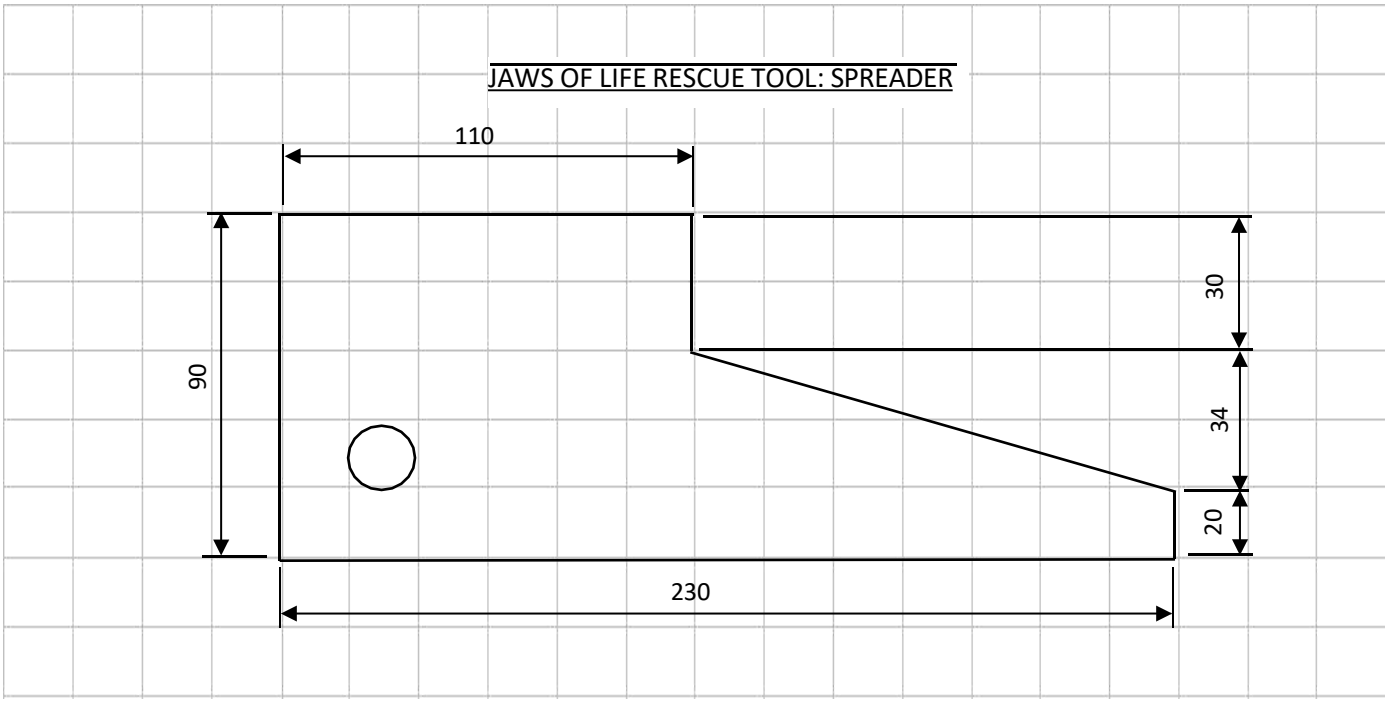
5. **Make**

2. Draw a working drawing in 2D showing one view with dimensions **(20)**

- Copy the drawing of the spreader jaw below in space provided.
- Use a ruler and a pencil only
- Measure any 2 sides and draw in the dimension lines with the measurement indicated. (only 2)
- Give it a heading.



Draw your drawing in the space below:



Assessment rubric for the working drawing	**Good**	**Adequate**	**Elementary**	**Poor**
	4	**3**	**2**	**1**
Wrote a heading				
Copied the drawing correctly				
2 Dimensions done neatly and correctly				
Line quality (Dark outlines, light dimension lines)				
Neatness and accuracy of the drawing				
Total	**/ 20**			

Good - all aspects are correctly done; **Adequate** – most of the aspects are correctly done
Elementary – half of the criteria is met; **Poor** – less than half of the criteria is met

2. Learners develop a working model **(15)**

Assessment rubric for the model	Good	Adequate	Poor
	3	2	1
Design meets the specifications			
The model is working			
Is neatly constructed			
Tools are used correctly and safely			
Neatness and accuracy of making			
Total	**/15**		

Good - all aspects are correctly done; **Adequate** – most of the aspects are correctly done
Poor – less than half of the criteria is met