

**GRADE 7****PRACTICAL ASSESSMENT TASK: TERM 1**

(Revised Annual Teaching Plan 2025)

**70 MARKS**

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

**Jaws of Life: Rescue system**

Jaws of Life rescue tools can easily cut through the metal of a car body. They can also be used to bend or open the metal body of a car. Rescue workers must work very carefully to ensure they do not hurt the passengers inside. So, the rescue tools should make small movements, compared to the large movements made by the rescue workers operating them. There are four types of Jaws of Life rescue tools:

- a spreader to pull pieces of metal apart and tear out chunks of metal,
- a cutter to cut metal,
- a combination tool that can cut and spread, and
- a ram, which makes large openings to free people who are trapped.

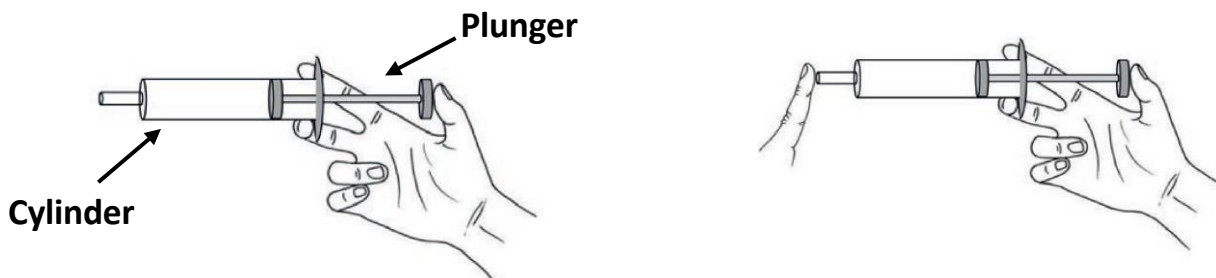


## READ AND INVESTIGATE. THEN ANSWER THE QUESTIONS

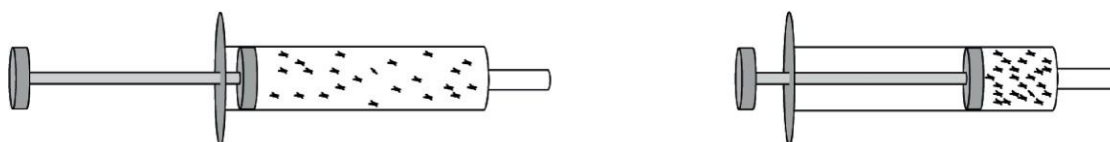
### Pneumatics

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

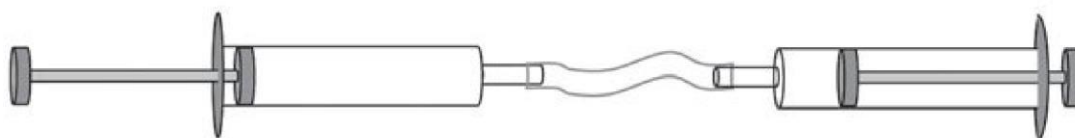
1. Grip a syringe so that you can push the plunger in with your thumb.
2. Close the outlet tube tightly with a finger, then try to push the plunger in.



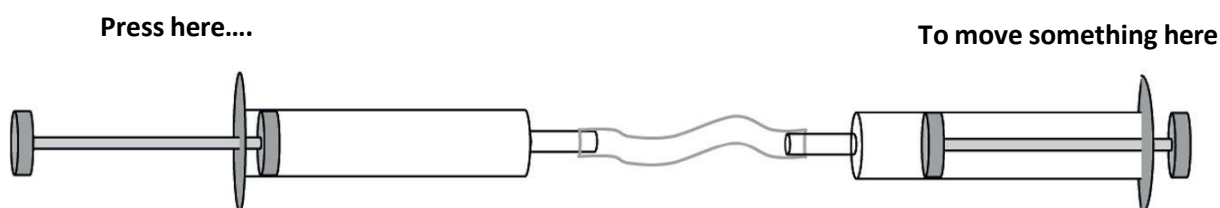
To compress means to make something smaller. When you pressed the plunger in while keeping the outlet closed, you compressed the air inside the syringe. That means you forced the air molecules to move closer together.



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



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



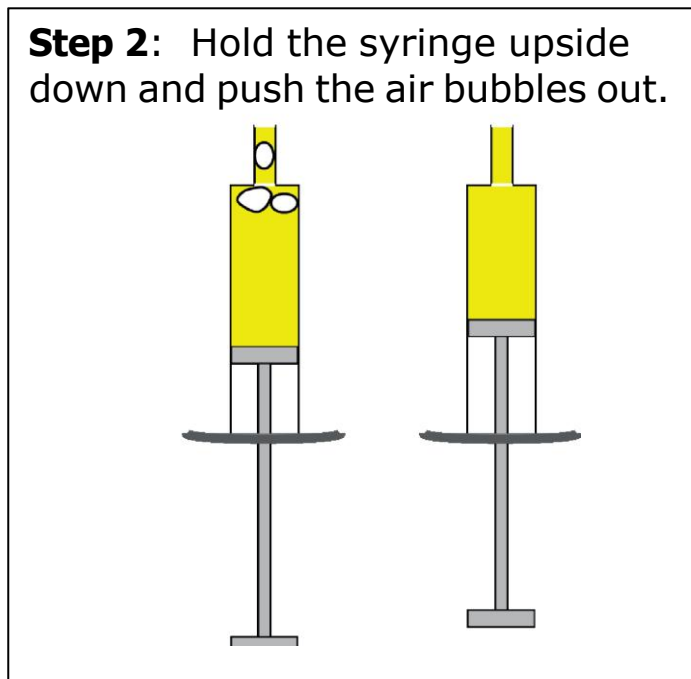
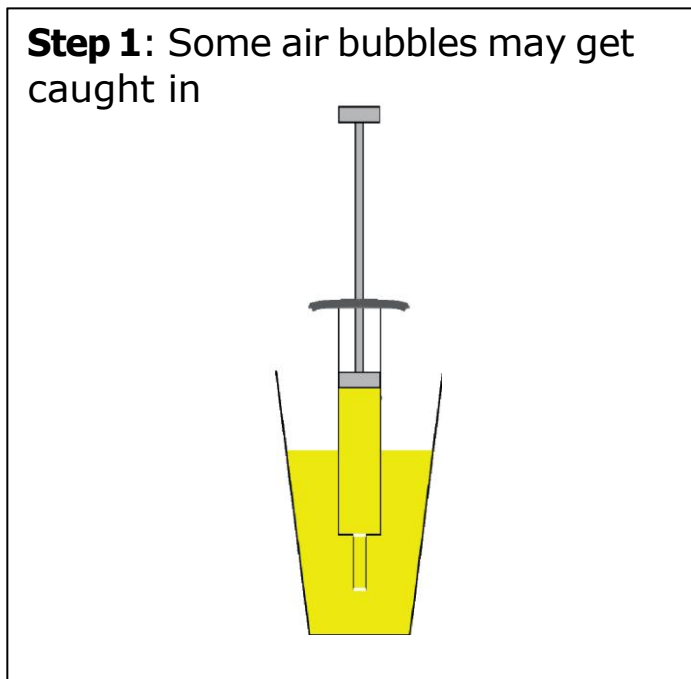
A pushing device made with syringes and a pipe filled with air is called a **pneumatic mechanism**. The word **pneumatic** is used to indicate that **gas** is used to push something.

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

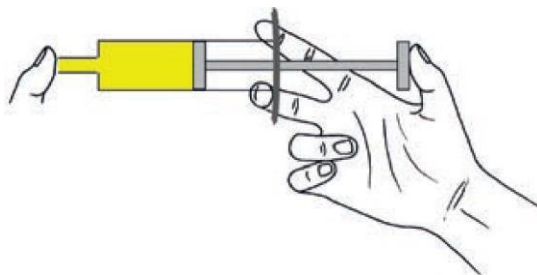
the air is already very much compressed, when the plunger is pressed almost fully in. Do you think the same thing will happen if there is **water** in the cylinders instead of gas?

## Hydraulics

Fill a syringe with water to investigate this.

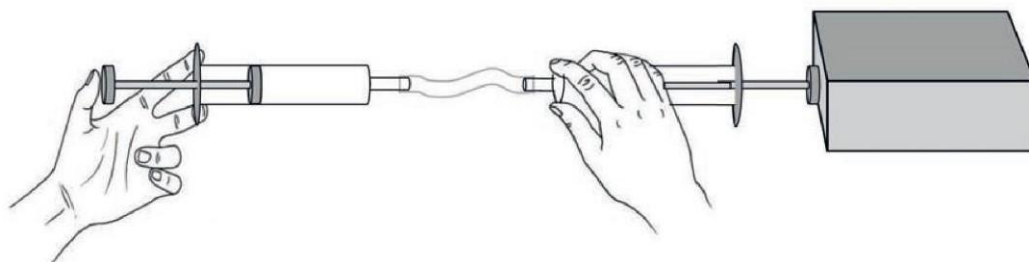


- Do you think you can compress the water just like you compressed the air? Try it.
- Describe the difference you notice between using air in the syringe, and water in the syringe.



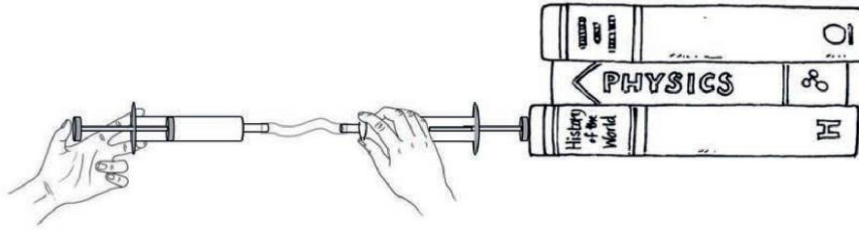
### **A liquid cannot be compressed.**

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.

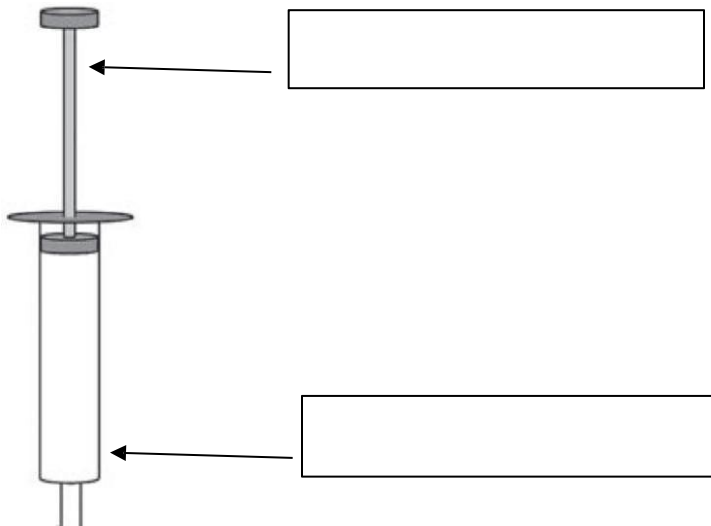


The hydraulic system should give you the strongest push, because water cannot be compressed.

**Investigation:**

**Read through page 3 to 5 again and answer the questions that follow: (8)**

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



3. What is the difference between a pneumatic and hydraulic mechanism? (2)

.....  
 .....

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

.....

5. What would give the strongest push with the same two syringes, air or water? (2)

.....

**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?

.....

2. What is it for? (2)  
Explain how the function of the two tools differs.

.....

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?

.....

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

.....

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

.....

6. Will it affect society? (1)  
How are captured people in accidents benefiting from the use of 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. (3)
- What is needed?
  - Who will use it?
  - What it is for?

Design a .....(what is needed?) for the.....(who will use it?)  
that will be used to..... (what is it for?).

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

2. List 3 **specifications**. (3)
- .....
  - .....

• .....

3. List 2 **constraints** on the materials (2)

- .....
- .....
- .....

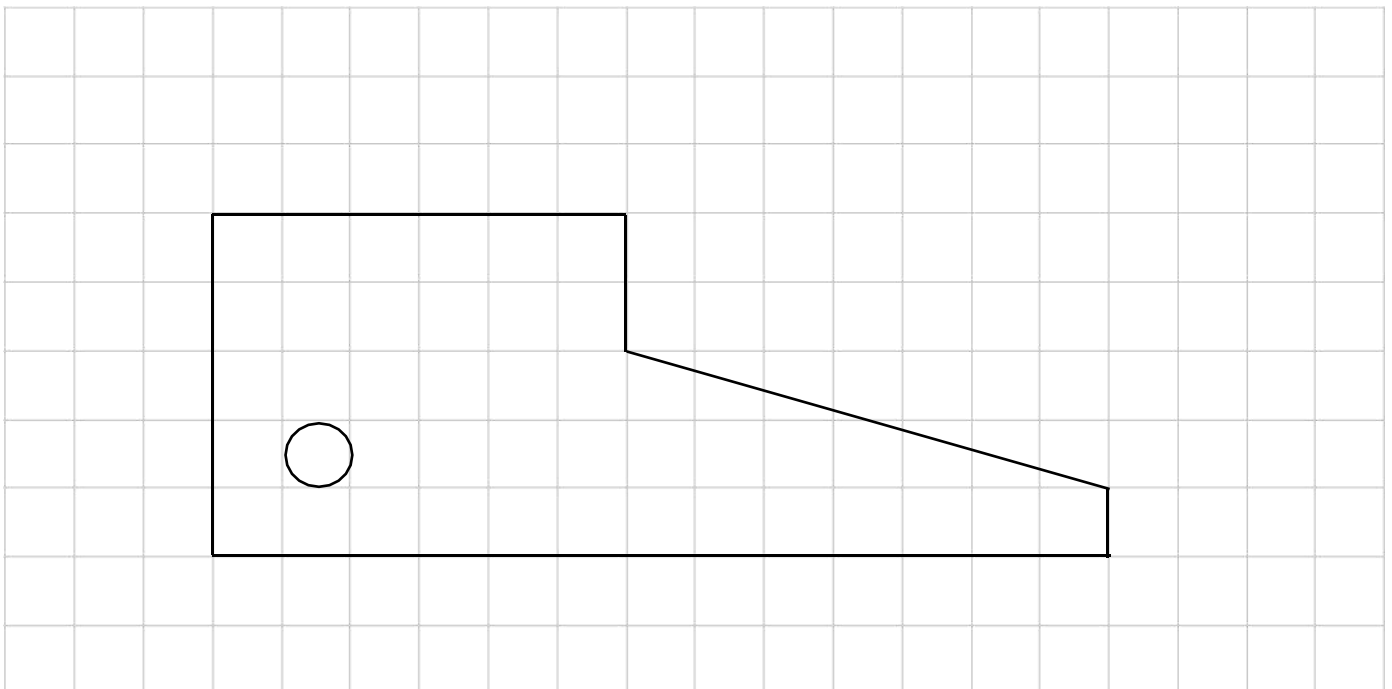
4. **Initial idea sketches** [not for assessment]

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

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





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				
<b>Total</b>	<b>/ 20</b>			

**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

### Learners develop a working model

**(15)**

Assessment rubric for the model	Good	Adequate	Poor
	3	2	1
Design meets the specifications			
Design meet the constrains			
The model is working			
Tools are used correctly and safely			
Is finished off			
<b>Total</b>	<b>/15</b>		

**Good** - all aspects are correctly done; **Adequate** – most of the aspects are correctly done

**Poor** – less than half of the criteria is met