TECHNOLOGY

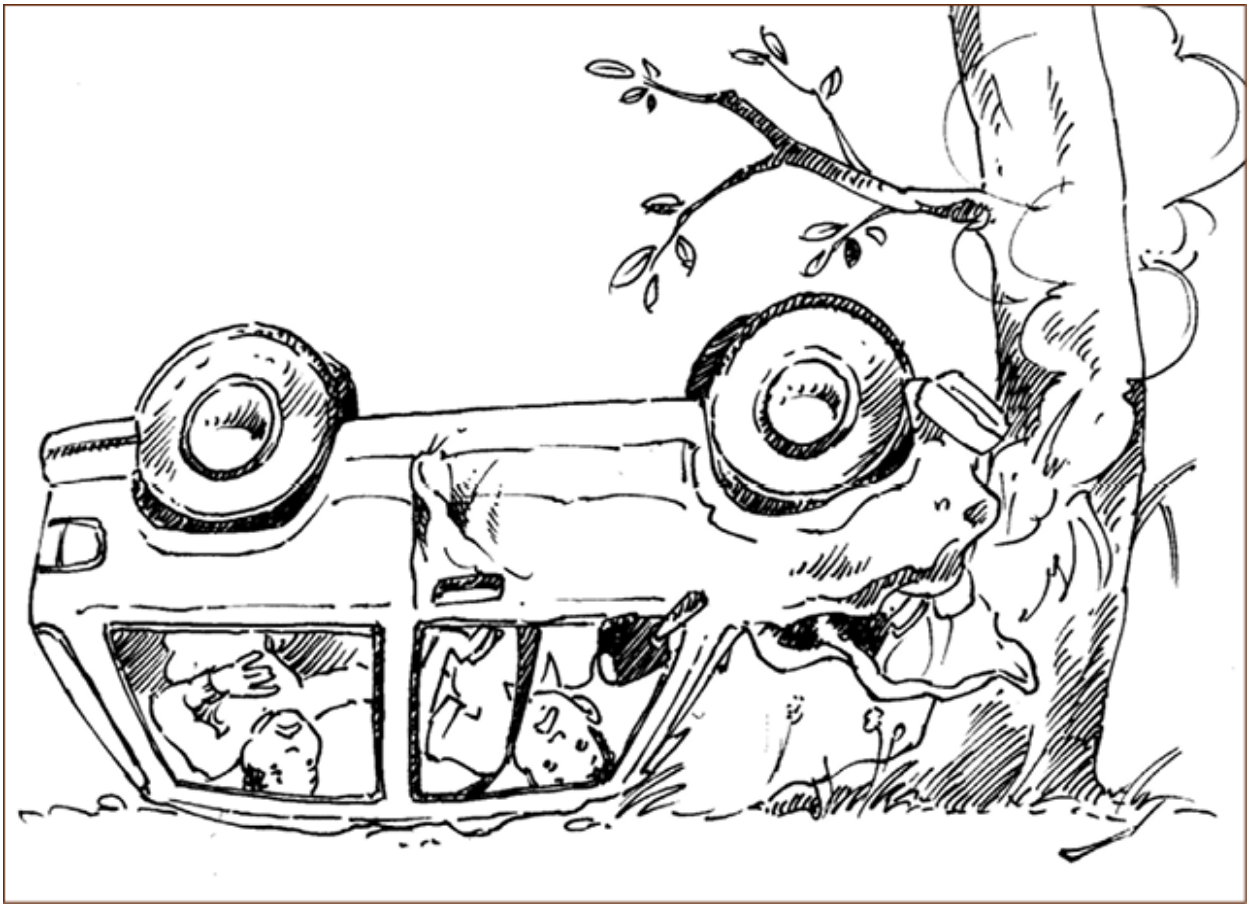
GRADE 7 PRACTICAL ASSESSMENT TASK 1

MARKS: 70

TOPIC: Mechanical Systems and Control

CONTEXT: Jaws-of-life: Rescue System

CONTENT: Levers, linkages, hydraulics, pneumatics



SCHOOL : _____

CLASS : _____

SURNAME AND NAME : _____

Allocation of marks

	MARKS	MARKS OBTAINED
INVESTIGATIONS	**15**	
DESIGN	**20**	
MAKE	**35**	

All activities should be done under the supervision of the teacher.

TECHNOLOGY

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Activity 1 **Date: _____**

Investigations

Pneumatics and hydraulics (Week 4)

Another way to move objects from a distance

You will now learn how you can use syringes to make things move. This will help you to design tools that can be used by rescue workers at accident scenes.
When you worked with levers, you learnt the following:
A push can be made stronger or weaker by using a lever. In other words, a lever can give you mechanical advantage. A movement can be made smaller or bigger by using a lever.

The direction of movement can be changed by using a lever. You can also change and control movement by using syringes.

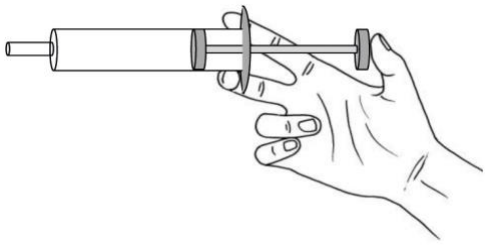

Figure 1

Figure 1: *This is how you should grip a syringe so that you can push the plunger in with your thumb.*

Now you do it.

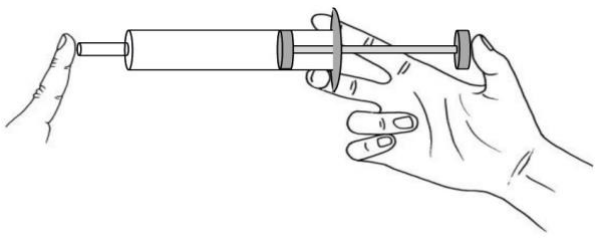

Figure2: *Close the outlet tube tightly with a finger, then try to push the plunger in.*

1.1 Explain the feeling when you push the plunger in figure 2? (2)

_____

_____

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1.2 Name the substance you think is in the cylinder that you cannot see and prevents the plunger from going all the way in even when you push the plunger hard? (1)

_____

1.3 Motivate your answer in QUESTION 1.2. (1)

_____

_____

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.

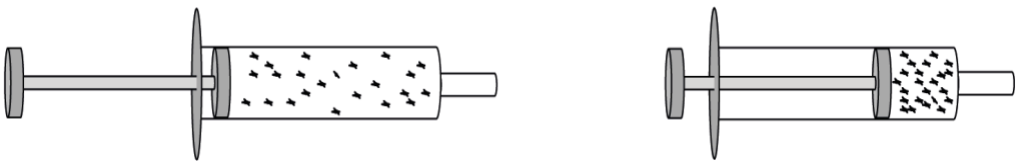


Figure 3

Do you think you can use a syringe to push something without touching it? Try to do it.
Connect two syringes with a plastic tube, as shown below.

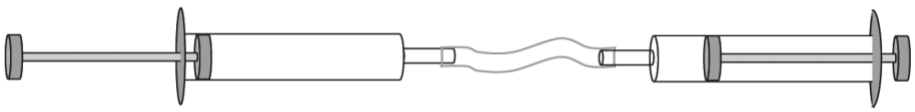


Figure 4

Find out whether you can move small objects by pushing one plunger in.
Press here… to move something here ….

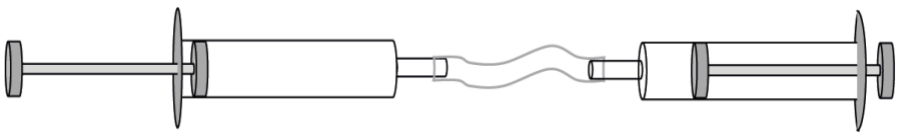


Figure 5

All activities should be done under the supervision of the teacher.

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

1.4 Explain the feeling when you press the plunger in and try to move the pile of books with your pneumatic mechanism? (1)

_____

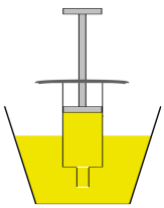
When you use a pneumatic pushing device to try to move an object, you cannot press very hard, because only a small force is needed to compress the air. You can only press with a big force once the air is already very much compressed, when the plunger is pressed almost fully in. Do you think the same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

Fill a syringe with water to investigate this.

Figure 6

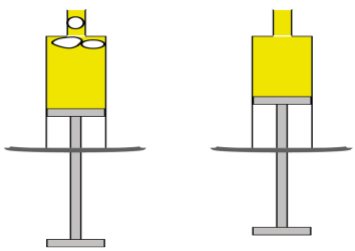
Step 1

Some air bubbles may get caught inside.



Step 2

Hold it upside down and press the air bubbles out.



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The word “hydraulic” is used to indicate that *liquid* is used to push something.

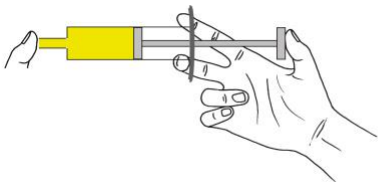

Figure 7

1.5 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. (2)

_____

_____

_____

_____

A liquid cannot be compressed. It is slightly difficult to get the air bubbles out when you fill two connected syringes with water.

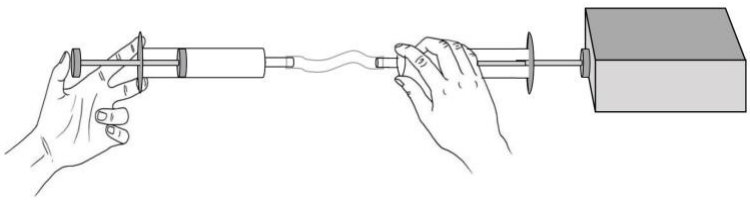

Figure 8

1.6 Investigate force transfer between two equal syringes.

- Two equal syringes filled with air (pneumatic system).

1.6.1 Record your observations (What happens when you use syringes of the same size?). (1)

_____

_____

- Two equal syringes filled with water (hydraulic system).

1.6.2 Record your observations (What happens when you use syringes of the same size?). (1)

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_____

_____

1.7 Add some pressure on the slave cylinder. Complete the right column by

Underlining/circling the correct word/words. (2)

Equal syringes	**Force transfer from master to slave**
Air: 10ml master to 10ml slave cylinder	More/ less /remains the same
Water: 10ml master to 10ml slave cylinder	More/ less /remains the same

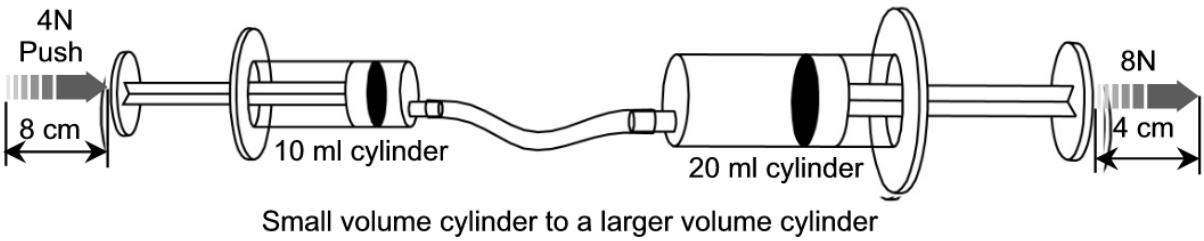

Figure 10: Unequal syringes

1.8. Investigate force transfer between two unequal syringes.

- Two unequal syringes filled with air.

1.8.1 Record your observations. (2)

_____

_____

- Two unequal syringes filled with water.

1.8.2 Record your observations. (2)

_____

_____

Total Marks Investigate: 15

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Scenario

(The teacher will provide the scenario)

ACTIVITY 2 **Date:** _____

Design skills

Design brief, specifications and constraints (Week 5)

2.1 Identify the need/ problem/ want from the scenario. (2)

_____

_____

2.2 Write a design brief (a short statement explaining what you should design to solve the problem and the purpose it will serve). (3)

_____

_____

_____

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2.3 Identify **FOUR** specifications (exact requirements of the solution). (4)

_____

_____

_____

2.4 Identify **THREE** constraints (things/obstacles that limit your choices in solving the problem) (3)

_____

_____

_____

(12)

TECHNOLOGY

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ACTIVITY 3

Design skills **Date: _____**

3D and 2D working drawings (Week 7)

3.1 Draw a 3D drawing of the idea in oblique projection using dark and feint lines.

Use the squared grid paper provided to draw the chosen idea in oblique drawing

Allocation of marks

The drawing is in 3D/oblique	(2)
Line work:	(2)
The drawing represents Jaws of Life	(2)
Neatness	(2)

Total Marks Design: 20

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Making skills **Date:** _____

Learners make a simple working model (Weeks 8 & 9) **(group work)**

Activity 4 Marking Rubric **(35)**

Outstanding Achievement	**Meritorious**	**Adequate**	**Moderate**	**Not achieved**	**Achieved**
Outstanding correlation between the model and the design brief **Marks: 5**	Admirable correlation between the model and the design brief **Marks: 4**	Adequate correlation between the model and the design brief **Marks: 3**	Moderate correlation between the model and the design brief **Marks: 2**	No correlation between the model and the design brief **Marks: 0-1**	
Outstanding evidence of incorporating hydraulic, pneumatics and linked levers. **Marks: 9-10**	Admirable evidence of incorporating hydraulic, pneumatics and linked levers. **Marks: 7-8**	Adequate evidence of incorporating hydraulic, pneumatics and linked levers. **Marks: 5-6**	Moderate evidence of incorporating hydraulic, pneumatics and linked levers. **Marks: 3-4**	No evidence of incorporating hydraulic, pneumatics and linked levers. **Marks: 0-2**	
Demonstrated outstanding understanding of the making process and personal role. **Marks: 5**	Shows a very good understanding of the making process and personal role. **Marks: 4**	Shows a general understanding of the making process and personal role. **Marks: 3**	Shows some understanding of the making process and personal role. **Marks: 2**	Shows little understanding of the making process and personal role. **Marks: 0-1**	

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Takes outstanding care when working, using tools and materials safely and accurately. **Marks: 5**	Takes care when working, using tools and materials safely and accurately. **Marks: 4**	Takes reasonable care when working, using tools and materials safely and accurately. **Marks: 3**	Takes some care when working, using tools and materials safely and accurately. **Marks: 2**	Not able to use tools and materials safely or accurately. **Marks: 0-1**	
Works outstandingly well with others, making a very good contribution **Marks: 5**	Works confidently with others, making a very good contribution. **Marks: 4**	Works easily with others, making a good contribution. **Marks: 3**	Works with others, making a reasonable contribution. **Marks: 2**	Finds it difficult to work with others, making little or no contribution. **Marks: 0-1**	
Produces an outstanding working model **Marks: 5**	Produces an excellent working model. **Marks: 4**	Produces a good working model. **Marks: 3**	Produces a satisfactory working model. **Marks: 2**	Produces a poor working model. **Marks: 0-1**	
TOTAL: 35 MARKS					

_____ Total Marks PAT 1: 70 _____

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