

P.7 SCIENCE CLASSWORK NOTES

P7:WEEK 2: 15th JUNE 2020.LESSON ONE

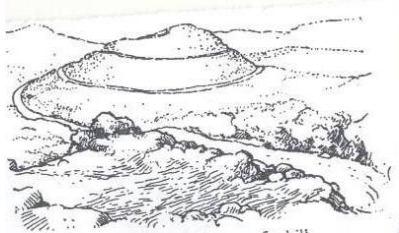
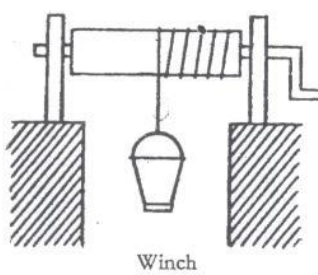
The inclined plane (slope)

An inclined plane is a slanting surface.

Importance of an inclined plane.

- It enables heavy loads to be raised using a lesser effort.

Examples of inclined plane

1	Winding road	3	Winch
			
2	Stairs/ steps.	4	Ladders
			

Mechanical Advantage of machines.

Mechanical Advantage is the ratio of the load to effort. i.e. $M.A = \text{Load/effort}$.

M.A is the number of times a machine simplifies work.

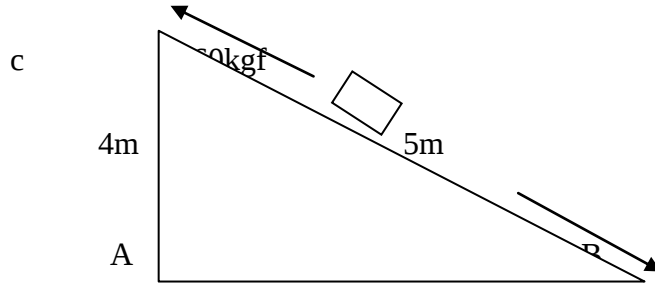
M.A has no units since it is a ratio.

Friction lowers M.A.

Example;

John used a slope to raise a load of 60kgf from the ground to the higher level as shown

below.



Work out the following

The effort distance

$$= 5\text{m}$$

The load distance

$$= 4\text{m}$$

Work done

$$W = F \times D$$

$$M.A = \frac{\text{Load}}{\text{Effort}}$$

$$= \frac{\text{Distance effort moves}}{\text{Distance load moves}}$$

$$= \frac{5}{4}$$

4

Work

Work is a product of force and the distance moved.

Work = Force x Distance moved.

Work done by the effort = effort x effort arm.

Work done by the load = load x load arm.

The unit of work is a joule.

The unit of force is the Newton.

The standard unit of distance is the metre.

$$1 \text{ kgf} = 10\text{N}$$

1 joule(of work) is done when one newton (of force) moves through one metre(of distance)

$$1 \text{ joule} = 1 \text{ N} \times 1 \text{ m}$$

$$1 \text{ joule} = 1 \text{ Nm}$$

Questions

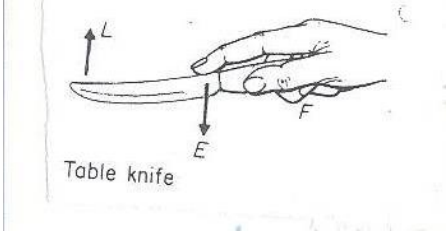
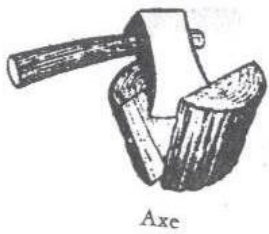
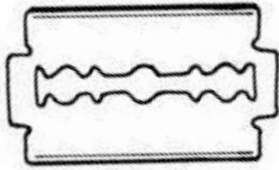
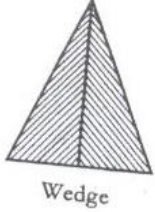
From comprehensive science book seven.

LESSON TWO

WEDGES

A wedge is a cutting tool. It is double inclined plane/slope.

Examples of wedges

1	Knife edge.	5	Axe blade
			
2	Hoe	6	Razor blade
			
3	Nail.	7	Needle.
			
4	A wedge		
			

LESSON THREE

SCREWS

DIAGRAM SHOWING A SCREW.

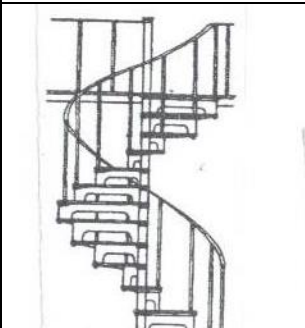
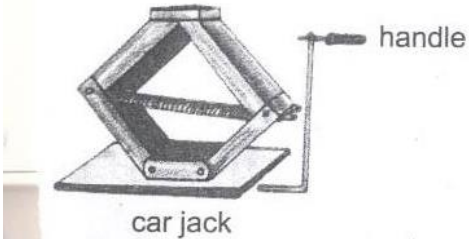


A screw is an inclined plane wound round
We use it to make our work easier.

USES OF SCREWS

1. Lifting very heavy things e.g. screw jack.
2. It makes movement upstairs easier e.g. using a spiral staircase
3. Used to fasten things together.

EXAMPLES OF SCREWS

1	Spiral staircase	3	Screw jack
			
2	Screw nails		
			

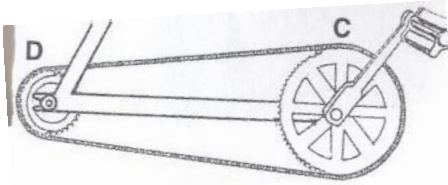
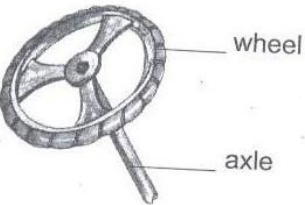
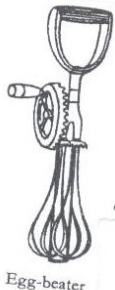
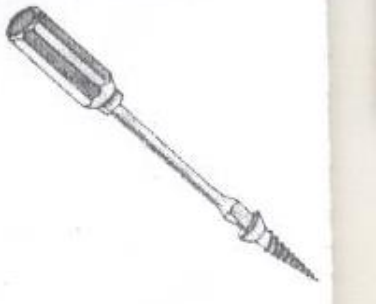
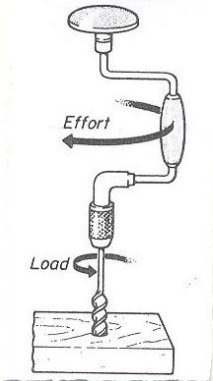
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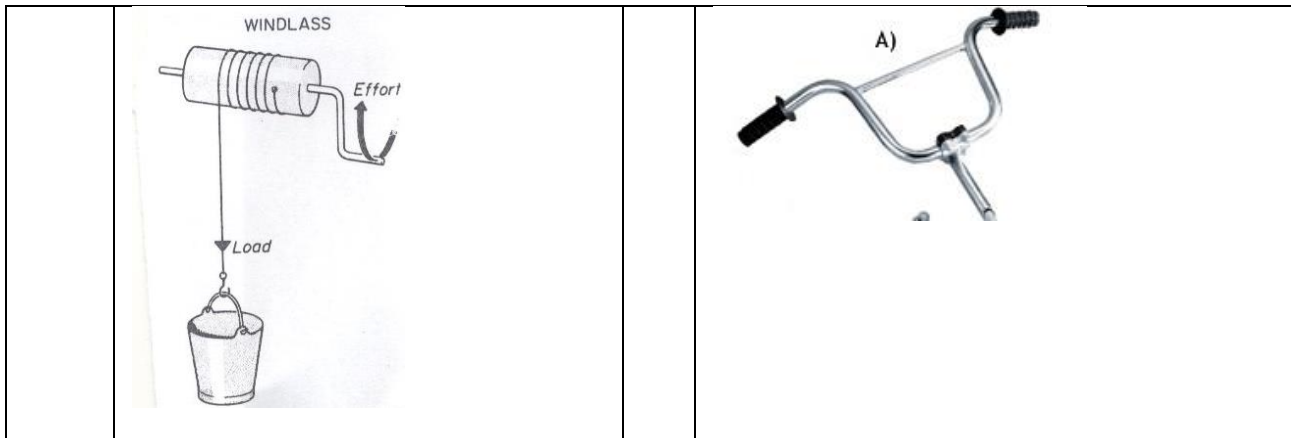
Wheel and axle

An axle is a rod passed through a wheel.

The wheel rotates on an axle.

Examples of devices that use wheels and axles.

1	Door Knobs	5	Pedal wheels
			
2	steering wheel	6	Egg beaters
			
3	Screw drivers	7	Brace
			
4	Windlass		Handles of a bicycle.



USES OF WHEEL AND AXLE

1. Drawing water from underground tanks using windlass/winch.
2. Drilling holes in wooden materials using the brace
3. Turning screws to fix things together using a screw jack.
4. It helps in loosening the screws.
5. Preparing eggs for frying using egg beaters.

Questions

1. **Give any two examples of each of the following:**
 - a) **Wheels and axles**
 - b) **screws**
2. **How are screws important to people?**
3. **Give any two uses of screws.**
4. **Give any two examples of screws.**
5. **How are inclined planes important to human beings?**

LESSON FOUR

PULLEYS

A pulley is a wheel with grooved rim that rotates freely about an axle through a centre. A rope or chain passes over the pulley and is prevented from slipping by the grooved

The frame which holds the pulley is called block.

IMPORTANCE OF PULLEYS.

1. They help in lifting objects from the lower level to higher level.
2. They help in lifting heavy loads during building.
3. They help in off loading heavy vehicles.
4. They help in towing vehicles.
5. They are used to raise flags on the poles.

6. Help to move window curtains.

TYPES OF PULLEYS.

1. Single fixed pulley
2. Single movable pulley.
3. Block and Tackle system.

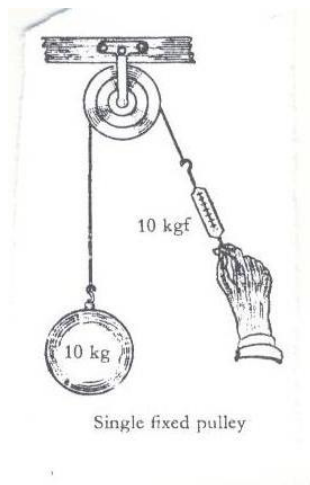
SINGLE FIXED PULLEY.

The effort applied is equal to the load.

It changes the direction of force

Boy applying the down ward force, work becomes easier.

The M.A of a single fixed pulley is one (1).



Example;

If a load of 30kgf is to be raised using a single fixed pulley, find the effort needed

$$M.A = 1$$

$$L = 30\text{kgf}$$

$$E = ??$$

$$M.A = \text{load/Effort}$$

$$1 = 30/E$$

$$E \times 1 = 30$$

$$E = 30\text{kgf.}$$

LESSON FIVE

SINGLE MOVABLE PULLEY

It is supported on two ropes.

The rope is pulled up wards.

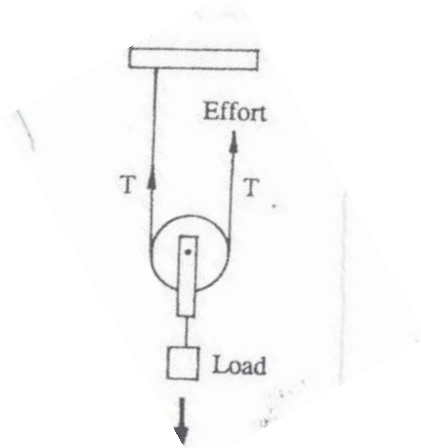
The pulley moves with the load.

Each of the ropes share a half of the effort needed.

The rope moves twice as far as the load.

The M.A advantage of single movable pulley is 2 (two)

Effort applied is half the load force. (It reduces the effort needed)



Example. If a load of 30kgf is to be raised using a single movable pulley, Find the effort needed.

$$M.A = 2$$

$$L = 30\text{kgf}$$

$$E = ??$$

$$M.A = L/E$$

$$2 = 30/E$$

$$2 \times E = 30$$

$$\frac{2E}{2} = \frac{30}{2}$$

$$E = 15\text{kgf.}$$

DIFFERENCES BETWEEN FIXED AND MOVABLE PULLEY

Fixed pulley	Movable pulley
Work is done faster	Work is slower
Change direction of force	No change of in direction of force
Force used is equal to the load.	Effort applied is half the load force.

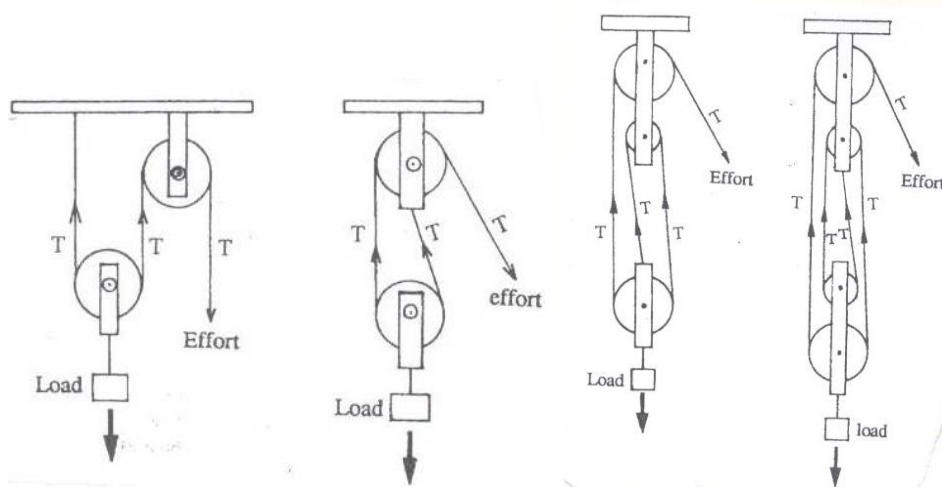
BLOCK AND TACKLE SYSTEM.

It does work more easily because it is a combination of both fixed and movable pulleys.

It changes direction of force.

It reduces effort needed.

The ratio of load to Effort is determined by the number of pulleys.



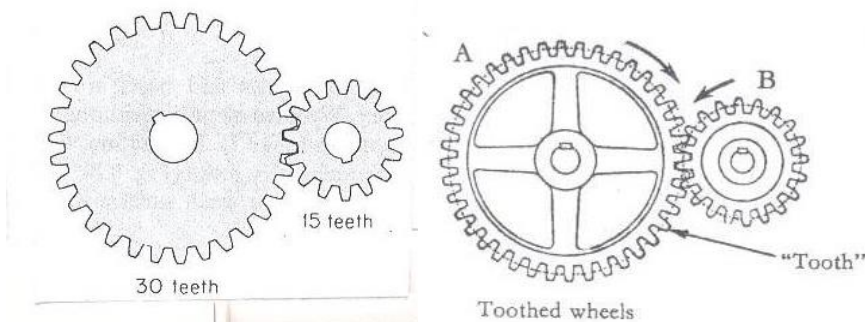
GEARWHEELS/COG WHEELS OR TOOTHED WHEELS

A gearwheel is a special form of the wheel

It has teeth around its edge.

These teeth interlock with the teeth of another gear wheel.

When one turns it causes the other one to turn.



If A has 30teeth and B has 15 teeth, how many rotations does B make in one revolution?

30divided by 15

=2 turns.

Questions.

1. Give any two types of pulleys.
2. How are pulleys important at school?
3. Calculate the Mechanical Advantage of a machine that needs an effort of 20kg to overcome a load of 60 kg.
4. State one difference between a single fixed pulley and a single movable pulley.

5. Cite any two importance of the rope on a pulley.