

## MULTIPLE CHOICE QUESTIONS

1. A wet shirt is put on a clothesline to dry on a sunny day. The shirt dries because water molecules
  - A. gain heat energy and condense
  - B. gain heat energy and evaporate
  - C. lose heat energy and condense
  - D. lose heat energy and evaporate
2. When an acid is added to a base it produces a
  - A. salt only
  - B. salt and water only
  - C. salt and gas only
  - D. gas and water only
3. All of the following statements are correct except
  - A. liquids of lower densities float in liquids of higher densities
  - B. the density of a substance is its mass per unit volume
  - C. substances become denser when they are hotter
  - D. the mass of a substance cannot be changed by the location and shape of the substance
4. When the temperature of a liquid is decreased, the particles slow down, the attractive forces between them become stronger and stronger until their positions become fixed. This change in the arrangement and motion of particles is referred to as
  - A. melting
  - B. freezing
  - C. condensing
  - D. boiling
5. A mixture contains particles of solids suspended in a small volume of liquid. Heating will decompose the solid. What process is most effective for separating the particles in this suspension?
  - A. Evaporation
  - B. Heating
  - C. Freezing
  - D. Filtration

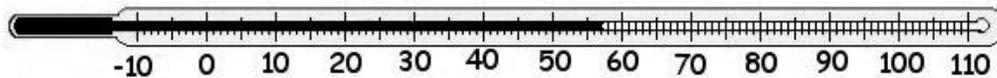


Fig. 1

6. What is the range of the thermometer in fig. 1?
- A. 57 degrees Celsius
  - B. 0 degrees Celsius to 110 degrees Celsius
  - C. -10 degrees Celsius to 110 degrees Celsius
  - D. 110 degrees Celsius
7. The reading of the thermometer in fig. 1 will drop most if the bulb is
- A. exposed to sunlight
  - B. exposed to steam
  - C. placed in tap water
  - D. placed in ice water
8. Temporary hardness of water can be removed by
- A. filtering
  - B. boiling
  - C. addition of aluminum
  - D. addition of scum
9. Which class of elements best conducts electricity?
- A. Metals
  - B. Non metals
  - C. Semi metals
  - D. Noble (inert) gas

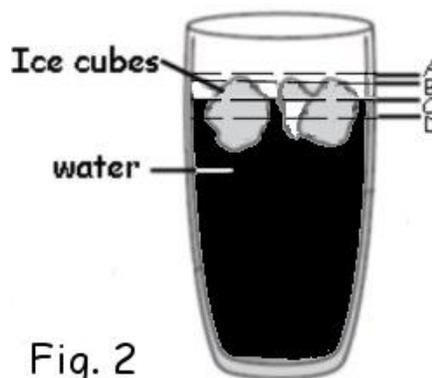


Fig. 2

10. When the ice cubes in Fig 5 are completely melted, the water level in the glass will
- A. increase to A
  - B. increase to B
  - C. remain at C
  - D. decrease to D

11. Which one of the following statements best describes the particles in a gas? They
- A. are moving very fast and are far apart
  - B. are very close together and are able to vibrate and rotate
  - C. are moving very slow and are far apart
  - D. are stationary and able to vibrate and rotate
12. Which one of the following is NOT a property of solids?
- A. Definite shape
  - B. Definite volume
  - C. Incompressible
  - D. Flow
13. As the gas in a rigid sealed container is heated, its
- A. pressure increases
  - B. temperature decreases
  - C. pressure decreases
  - D. volume decreases
14. Which of the following is NOT a physical property of a material?
- A. Color when viewed
  - B. Burn when heated
  - C. Odor when smelt
  - D. Texture when felt
15. A teacher sweeps the floor near the grinding machine to collect iron filings in the metalwork shop. How does she separate iron filings from the 'dirt'?
- A. Sieving with a fine wire mesh
  - B. Hand picking the filings
  - C. Evaporating to dryness
  - D. Using a strong magnet
16. Which of the following is an example of a homogeneous mixture?
- A. Compound
  - B. Colloid
  - C. Suspension
  - D. Solution
17. According to the scientific definition of work, pushing on a rock accomplishes no work unless there is
- A. an applied force greater than its weight
  - B. a net force greater than zero
  - C. an opposing force
  - D. movement in the same direction as the force

18. Mary-Ann records the length, tension and thickness of a rubber band and the pitch of the sound when plucked in an investigation of how its length affects the pitch of the sound. The manipulated variable is

- A. thickness of the rubber band
- B. tension on the rubber band
- C. length of the rubber band
- D. pitch of the sound

19. Most energy comes from the sun and leaves the earth in the form of

- A. sound energy
- B. gravitational potential energy
- C. electromagnetic energy
- D. mechanical kinetic energy

20. A student lowers one end of his pencil in a glass of water and to his amazement he observes that it looks bent. Which statement below best explains the behaviour of light waves that accounts for the student's observation?

- A. Some materials absorb light waves of certain frequencies.
- B. Some materials reflect some of the waves and absorb some.
- C. Light waves change direction when they meet a new medium.
- D. Light waves are emitted by some materials

21. The Law of Conservation of Energy is a statement that

- A. energy must be conserved and you should not waste energy
- B. the supply of energy is limited so we must conserve
- C. energy cannot be created or destroyed
- D. energy cannot be used faster than it is created

22. Which of the following is a renewable source of energy?

- A. Coal
- B. Hydropower
- C. Natural gas
- D. Petroleum

23. If you are using biomass as a source of energy you might be cooking with

- A. coal
- B. natural gas
- C. petroleum
- D. wood

24. When natural gas is burnt to produce electricity, the electrical energy produced is less than the chemical energy of the coal because some of the chemical energy is

- A. destroyed by the moving parts of the turbine and the generator
- B. destroyed by the intense heat required to release its chemical energy
- C. is converted into heat and sound energy
- D. is converted into nuclear energy

25. Sublimation is a change directly from a

- A. solid to a gas
- B. solid to a liquid
- C. liquid to a solid
- D. liquid to a gas

### SECTION B

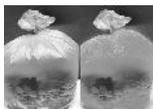
1. (a) Your standard four class has compiled a list of observations. Explain in detail, with the aid of diagrams, any FIVE (5) of the following using the kinetic theory of matter: (20 marks)



(i) Liquid candle wax solidifies as it drips down the side of the candle.



(iii) The sweet smell from the perfume tree can be smelt by neighbours, even when there is no wind.



(v) Clear drops of water form on the outside of a cold bottle of coloured drink.

(vi) Sealed plastic bags inflated with air decrease in volume when placed in the freezer.

(ii) A wet pavement in the sun dries faster than one in the shade.



(iv) Crystals of orange powder 'disappear' when clean water is added to make an orange coloured liquid.

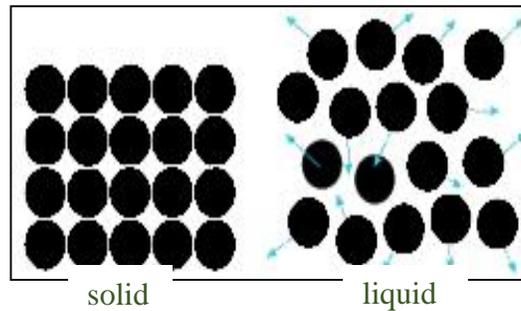


(b) Anna's family uses rain water at home and she notices that the soap makes a lot of lather and is difficult to wash off. She is intrigued that the tap water on campus uses more soap to make the same amount of lather and washes off much easier.

- (i) Explain fully why the soap works differently on campus. (3 marks)
- (ii) Write down a word equation for your explanation in part (i) (2 marks)

Answer Points:

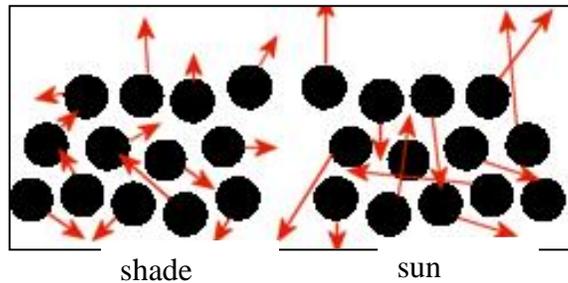
(a) (i)



Any three of the following:

- Liquid wax particles move about within the bulk of the liquid
- Solid wax particles cannot move about within the bulk of the liquid
- Liquid wax particles have more energy than solid wax particles
- Liquid loses heat to the air
- Liquid loses heat to solid wax it drips over
- Loss of heat results in less energy of the wax particles

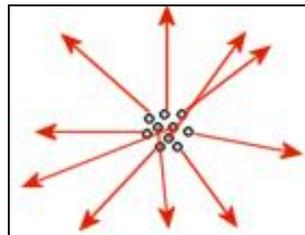
(ii)



Any three of the following:

- Liquid particles have a range of energy
- Collisions between particles result in exchange of energy
- Some particles gain enough energy to escape the forces in the liquid
- Some particles from the liquid through its surface
- Gaseous particles have more energy than liquid particles
- Sun gives energy to the liquid particles

(iii)

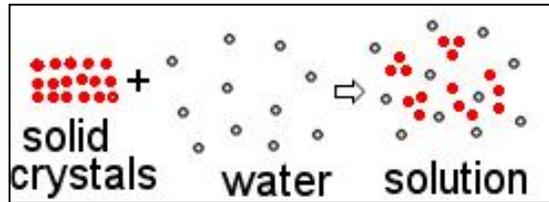


Any three of the following:

- Perfume is in the gaseous state

- High concentration of perfume particles in air near the flowers
- Low concentration of perfume particles in air far the flowers
- Particles diffuse from high to low concentration

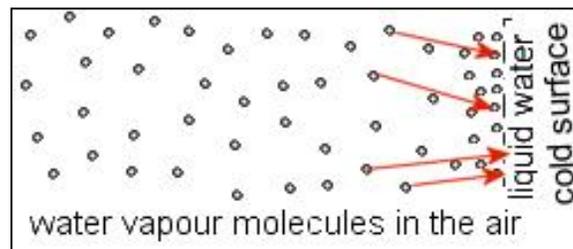
(iv)



Any three of the following:

- Solid materials have strong bonds between the particles
- Water breaks the bonds between the solid particles
- The particles of the powder are now like a liquid
- The 'dissolved' particles move in the spaces between the water molecules
- The orange colour of the solution is due to the particles from the crystals

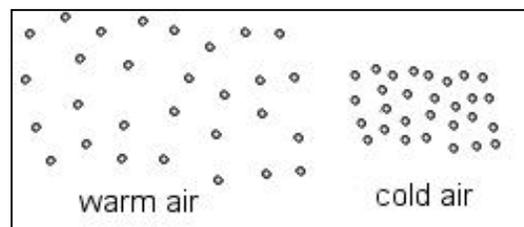
(v)



Any three of the following:

- Gas materials have weak or no bonds between the particles
- Liquid materials have stronger bonds than gases between the particles
- Cooling the air results in the particles of water vapour slowing down
- When cooled the bonds between particles in the water increase strength
- The particles in the water vapour may slow down enough to become liquid

(vi)



Any three of the following:

- Gas materials have weak or no bonds between the particles
- Gas particles move very quickly
- Gas particles have large spaces between them
- When cooled gas particles slow down
- When cooled the spaces between gas particles decrease

(b) (i) Any three of the following:

- Tap water has chemicals which react with soap to diminish lathering
- Calcium salts reacts with react with soap
- Calcium salts with react with soap
- Magnesium salts reacts with react with soap
- Rain water does not have chemicals which react with soap

(ii) Any one of the following:

- calcium hydrogen carbonate + sodium stearate (soap) = calcium stearate (scum) + sodium hydrogen carbonate
- calcium sulphate + sodium stearate (soap) = calcium stearate (scum) + sodium sulphate
- magnesium hydrogen carbonate + sodium stearate (soap) = magnesium stearate (scum) + sodium hydrogen carbonate
- magnesium sulphate + sodium stearate (soap) = magnesium stearate (scum) + sodium sulphate

2. (a) Vidya helps her mother to make guava syrup. She notices that her mother boils the ripe guavas in water and then strains the mixture through a fine cloth to obtain a yellow liquid extract. After she adds sugar to the cold guava extract, Vidya was only able to get a little sugar to dissolve by stirring vigorously. Her mother explains, “When we heat it all the sugar will melt into the mixture.” On cooling, Vidya notices that some sugar crystals reappear in the syrup.

- (i) Explain, with a diagram, the science of the straining process used to produce the liquid extract. (3 marks)
- (ii) Explain fully how some sugar crystals dissolved into the liquid. (4 marks)
- (iii) Explain Vidya’s mother misunderstanding of the process melting. (2 marks)
- (iv) Why must the liquid be heated for all the sugar to disappear? (3 marks)
- (v) Why do sugar crystals appear on cooling the syrup? (2 marks)

(b) Copy and complete the following table in your answer booklet to indicate whether solutions A to E are acidic, basic or neutral and give an example of a common household material for each solution: (6 marks)

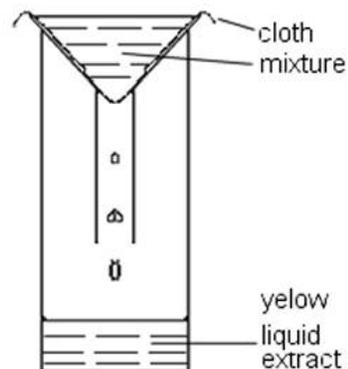
Solution	pH value	Acid/ Base / Neutral	Common household material
A	4		
B	7		
C	12		

- (c) (i) What are the active ingredients in baking powder which makes bakes and sada roti rise? (2 marks)
- (ii) Explain fully how the active ingredient in (c)(i) works. (3 marks)

Answer Points:

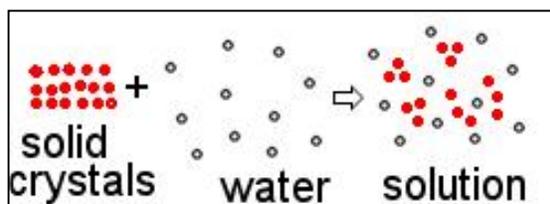
(a) (i) Any three of the following:

- Diagram showing cloth, filtrate and residue
- Diagram of particles in a solid and a liquid
- The cloth has fine holes
- Liquid particles move throughout the bulk of the liquid
- Solid particles are held firmly in a structure
- Liquid particles can pass through the fine holes
- Solid particles cannot pass through the fine holes
- Cloth separates the solids from the liquids



(a) (ii) Any four of the following:

- Diagram of particles in a solid and a liquid
- Diagram sugar particles between the water molecules
- Sugar (solid material) has strong bonds between the particles
- Water breaks the bonds between the solid particles
- The particles of the sugar is now like a liquid
- The 'dissolved' particles move in the spaces between the water molecules



(a) (iii) • Melting is changing from solid to liquid

- Melting involves only one substance

(a) (iv) Any three of the following:

- Liquid particles move throughout the bulk of the liquid
- Solutions become saturated when there is no more space between the water molecules
- Heating causes the particles to move faster
- Heating allows saturated solutions to become unsaturated

(b)

Solution	pH value	Acid/ Base / Neutral	Common household material
A	12	Base	Any one of the following: 1. Sodium bicarbonate (used in cooking and for the relief of acid reflux) 2. Sodium hydroxide (caustic soda, found in some oven and drain cleaners) 3. Household bleach is a base since it contains sodium or calcium hypochlorite. Pool chlorine also contains the same or similar compounds) 4. Most washing detergents contain mild bases

			5. Ammonia (used in some cleaning products) 6. Washing soda (sodium carbonate) 7. Slaked Lime (calcium hydroxide) or quicklime (calcium oxide) 8. Milk of magnesia (magnesium hydroxide) 9. Borax
B	7	Neutral	1. Water 2. Oil 3. Sodium chloride (cooking salt) 4. Magnesium sulphate (Epsom salts)
C	4	Acid	1. Vinegar (~5% acetic acid) 2. Battery acid (~33% sulphuric acid) 3. Citric acid (found in lemon juice and also used in crystal form for cooking) 4. Tartaric Acid (also used in powdered form for cooking) 5. Lactic acid (found in sour milk, yogurt) 6. Hydrochloric acid (used as a lead or tin soldering flux or muriatic acid cleaner) 7. Ascorbic acid is Vitamin C. (found in citrus fruits as well as some other fruits and juices) 8. Aspirin (Acetylsalicylic Acid) 9. Carbonated drinks 10. Phosphoric acid (found in some cleaners)

(c) (i) Sodium bicarbonate and a dry acid, such as cream of tartar

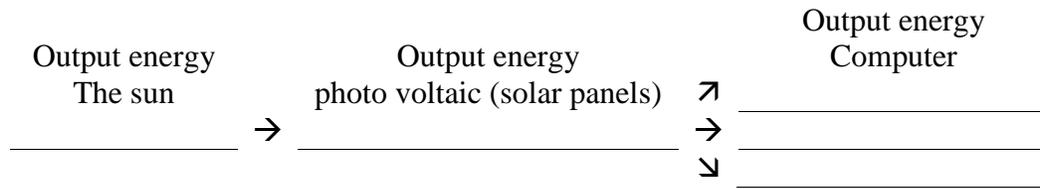
(ii) Any four of the following:

- When water is added the acid and base produces carbon dioxide
- The acid and base reaction continues when heated
- Sodium bicarbonate decomposes when heated to produce carbon dioxide
- Carbon dioxide is trapped in the flour
- Carbon dioxide expands when heated

### SECTION C

3. (a) Define the term energy. (1 mark)
- (b)(i) Draw a diagram of a circuit with two cells, and one switch to control three bulbs in parallel. (5 marks)
- (ii) What is the minimum number of additional switches that would be needed to modify the circuit to control each bulb independently? Draw the modified circuit. (5 marks)
- (c)(i) Electricity is carried from the mains to the outlet plugs by wires made of plastic and copper. Describe the function of the plastic and the copper. (2 marks)
- (ii) What materials which can replace the copper and plastic? (2 marks)
- (iii) What safety device is placed in circuits to prevent overloading the circuit? (1 mark)
- (d) Describe how you would determine if an iron nail is a magnet. (4 marks)
- (e) The sun shines on photo voltaic cells (solar panels) which are used to power a computer which can play music, show video on a screen and feels quite warm. Copy and complete the following diagram to indicate the forms of energy which are output from each stage:

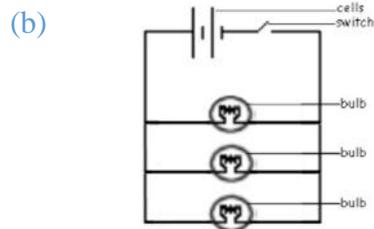
(5 marks)



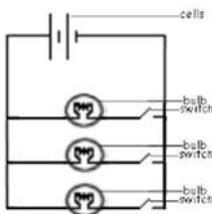
Answer Points:

3. (a) Any one of the following:

- The ability to do work
- When a force moves an object in the direction of the force
- When work is done energy is expended



(b) (ii) TWO (2) additional switches



(c) (i) Copper is a conductor and allows electricity to flow through it.

Plastic is an insulator and prevents electricity from flowing from the copper to walls or people to cause shocks or fires.

(c) (i) Copper - any metal or metal alloy e.g. aluminium, silver, gold, iron, steel, brass, bronze

Plastic – rubber, glass, asphalt, fiberglass, porcelain, ceramic, dry cotton, dry paper, dry wood

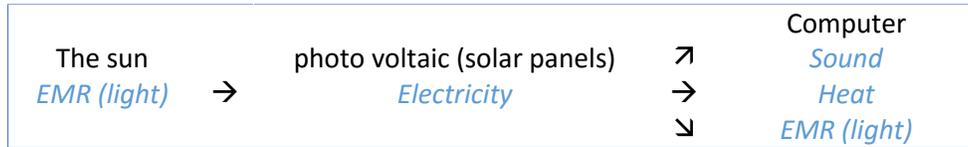
(c) (iii) Any one of the following:

- Fuses
- Circuit breakers

(d) Any four of the following:

- Obtain a known magnet
- Bring each end of the nail to one pole of the magnet
- Observe if one end is repelled
- Repulsion is the only true test
- Attraction is not a test as magnets will attract both ends of magnetic material.

(e)



4. (a) A covered pot of water is heated by a gas burner on a stove.

(i) Explain with a diagram how heat travels from the inside to the outside of the metal pot cover. (3 marks)

(ii) Describe, with a diagram, how the top of the water in the pot gets hot. (4 marks)

(iii) Why does my face feels the heat from the burner when I am at the oven level? (2 marks)

(b) Name and explain a suitable material for the following parts of the pot:

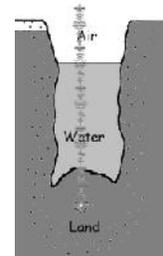
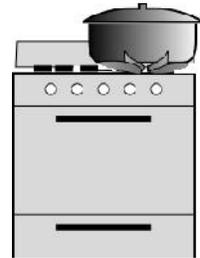
(i) the handle (2marks)

(ii) the body of the pot (2 marks)

(c) Give three characteristics of the image in a plane mirror. (3 marks)

(d) Sound waves from an underground explosion travel through the ground, then through a pool of water and finally emerge into the air. Compare the speed of the sound in all three media. (3 marks)

(e) Using a diagram, explain how people are fooled when a pool of water looks shallower than its actual depth. (6 marks)



Answer Points:

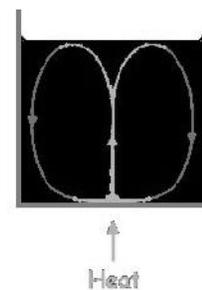
4. (a) (i)   
HEAT moves from particle to particle

Any three of the following:

- Diagram of heat travelling from particle to particle
- Process of conduction
- Best seen in solids
- From high temperature (inside pot cover) to low temperature (inside pot cover)

(a) (ii) Any four of the following:

- Diagram of convection current
- Water at the bottom gets hot
- It expands
- It gets less dense
- It rises
- Cold water from the surface takes its place
- It completes a convection current



- (a) (iii) Any two of the following:
- Heat travels as EMR (infra red) or radiation
  - Does not need a medium
  - Burner emits heat as radiation

(b) (i) Non-metal e.g. (plastic, rubber, glass, fiberglass, porcelain, ceramic, wood) is an insulator to prevent heat from burning the hand

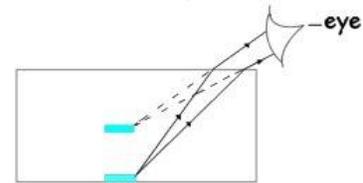
(b) (ii) Metal (e.g. aluminium, iron, steel, copper, brass, bronze) is a conductor to allow heat to best reach inside the pot

- (c) Any three of the following:
- Upright
  - Same size as object
  - Same distance behind the mirror
  - Virtual
  - Laterally inverted (left to right)

(d) Fastest to slowest speed: Land, water, air

(e) Diagram:

- Two rays from the bottom
- Two rays bent at the surface
- Two rays projected backward



Explanation

- Refraction occurs when light moves from one medium to another
- Light travels in straight lines – 1 mark
- The eye projects the rays from the direction in which they enter the eye

## SECTION D

5. (a) Define the term Technology. (3marks)
- (b) Describe the SIX (6) universal elements of technology. (12 marks)
- (c) With reference to two appropriate examples discuss the statement that "Form follows Function". (6 marks)
- (d) State two ways in which technology is similar to science and two ways in which it is different from science. (4marks)

Answer Points:

5 (a) Human activity which produces tools, materials, systems and knowledge to change / improve / enhance the natural and human made environment.

- (b) • Tools – stone tools → metal tools → power and electronic tools.
- Materials – natural material for e.g. clothes and shelter → working natural materials → synthetic materials
- Processes – Cycle of Identify the problem → Define the goal → Explore possible solutions → Assess the alternatives → Take action → Evaluate the outcome
- Energy – Human power → animal power → waterwheels and wind mills → steam engine → modern internal combustion engine and electric motors
- Information – oral traditions → writing → printing press → electronic data
- Humans – apply scientific discoveries to crafting technology

(c) Any two of the following:

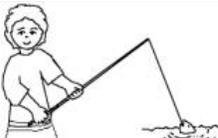
Similar	Different		
		Science	Technology
Human Activities	Nature	Science is knowing about the natural world	Technology is doing activities which modify, change or control the natural world
Use research	Goals	The search for and theorizing about cause driven by curiosity	The search for and theorizing about new processes driven by needs and wants
Use cyclic activity	Value	Making virtually value-free statements	Activities always value-laden
Have processes	Evaluation Methods	Observation, hypothesis, testing hypothesis and creation of theories	Analysis and synthesis of design
Study the world around us to create new knowledge	Goals achieved through	Corresponding Scientific Processes	Key Technological Processes
	Focus	Focuses on understanding natural phenomena	Focuses on understanding and improving the man-made environment
	Development Methods	Discovery (controlled by experimentation) and sometimes serendipity	Design, invention, production
	Strength	Drawing correct conclusions based on good theories and accurate data	Taking good decisions based on incomplete data and approximate models
	Skills needed to excel	Experimental and logical skills	Design, construction, testing, planning, quality assurance, problem solving, decision making, interpersonal and communication skills

6. (a) Give a brief explanation with an example of how ANY THREE (3) of the following simple machines work: (9marks)

- (i) pulley
- (ii) wedge
- (iii) wheel and axle
- (iv) inclined plane

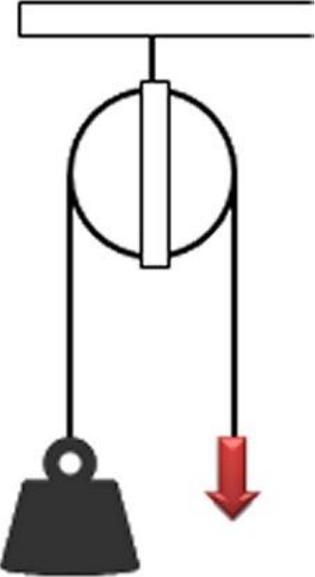
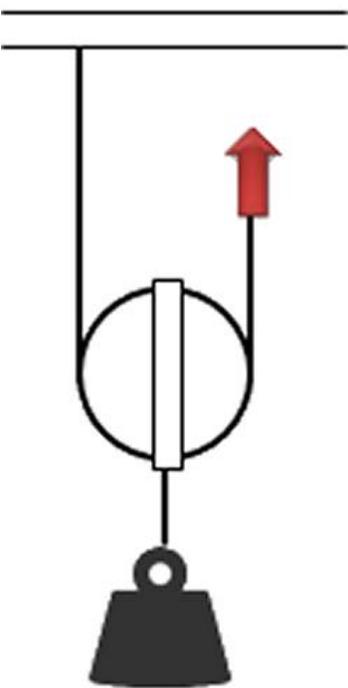
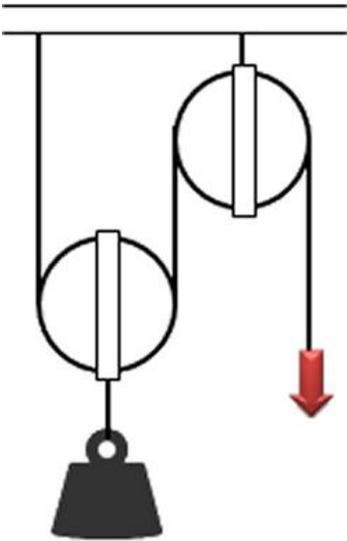
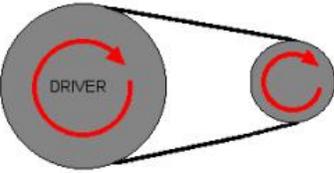
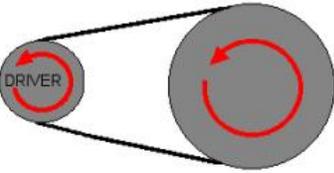
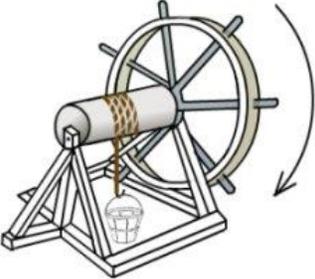
(b) Discuss with diagrams the THREE classes of levers. (9 marks)

(c) Copy the following table in your answer booklet and complete it. (7 marks)

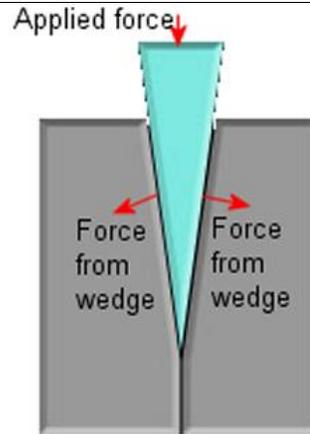
Device		Lever class
Scissors		
Pliers		
Wheelbarrow		
Tongs		
Crowbar 1		
Crowbar 2		
Fishing rod		

**Answer Points:**

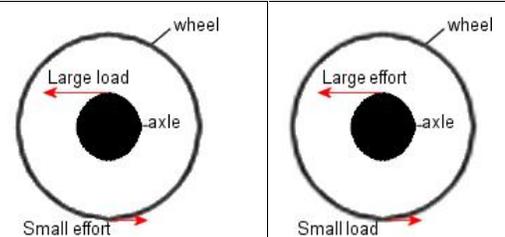
6 (a) (i) Pulley – used in a lifting pulley system or driving systems to change the direction of the applied force The force can be multiplied, diminished or remain the same. Similarly, the distance moved may be can be multiplied, diminished or remain the same.

		
<p>Changes direction of force only.</p>	<p>Changes direction of force and multiplies it. Distance move by load is smaller.</p>	<p>Changes direction of force and multiplies it. Distance move by load is smaller.</p>
		
<p>Changes direction of force and multiplies it. Distance move by load is smaller.</p>	<p>Changes direction of force and diminishes it. Distance move by load is larger.</p>	<p>Changes direction of force and multiplies it. Distance move by load is smaller.</p>

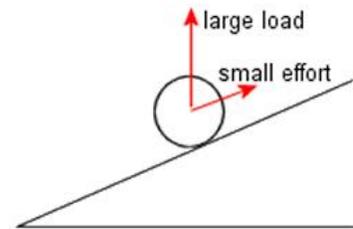
(ii) Wedge – knife or chisel change the direction of force to sideways (outwards) to split the material. Force is multiplied.



(iii) Wheel and axle – car wheel changes direction of force and reduces it, multiplies distance. Grinder (hand mill) changes direction of force and multiplies it, reduces distance.



(iv) Inclined plane – ramp changes direction of force and multiplies force, reduces distance.

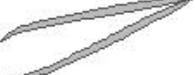
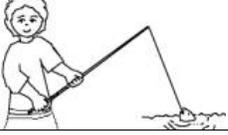


(b)

<p><b>Force Multiplier</b></p> <p><b>First Class Lever</b></p>	<p><b>Distance Multiplier</b></p> <p><b>First Class Lever</b></p>	<p><b>Second Class Lever</b></p>	<p><b>Third Class Lever</b></p>
<p>A first class lever can be a force multiplier like a crowbar use to move a heavy stone – a small force through a longer distance is use to develop a large force moving through a shorter distance (diagram above). The first class lever to the right is a distance multiplier and can make work easier by lifting a light load through a large distance when the effort moves through a smaller distance.</p>	<p>A second class lever is always a force multiplier, as for example, generating a large force to remove a nail with a claw hammer or lifting a large load with a wheel barrow.</p>	<p>A third class lever is always a distance multiplier, as for example, using a tweezers to hold a small object. Effort is the force applied; Load is the force that is required to do the</p>	

		job and the fulcrum is the part of the lever which does not move.
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(c)

Device		Lever class	
Scissors		first	Fulcrum in middle
Pliers		first	Fulcrum in middle
Wheelbarrow		second	Load in middle
Tongs		third	Effort in middle
Crowbar 1		first	Fulcrum in middle
Crowbar 2		second	Load in middle
Fishing rod		third	Effort in middle