

# ANSWERS

## CHAPTER 1

### 1.1

- The diversity of organisms whether it is a microorganisms, animals or plants
- (a) Plants and animals supply various types of food resources for humans  
(b) Nutrient cycle, pollination and interaction between organisms create a natural balance  
(c) Developing an area rich in biodiversity as a recreation area  
(d) The usage of herbacious plants in medicine and cosmetic manufacture  
(e) The logs, bamboo and rattan is an examples of the forest resources that being used to make music instrument, furniture and for building construction  
(f) Development of knowledge and the creation of latest technology through scientific investigation towards microorganisms, animals and plants
- (a) Plants absorb carbon dioxide and release oxygen during photosynthesis  
(b) 1 As sources of food, clothing and construction materials  
2 As a centre of tourist attraction

### 1.2

- (a) invertebrates, vertebrates  
(b) backbones, mammals, birds, fish, amphibians, reptiles  
(c) do not have backbones
- (a) P: Reptiles  
Q: Mammals  
(b) P: Turtles  
Q: Cat  
(c) 1 Cold-blooded  
2 Reproduces by laying eggs
- Monocotyledon: Maize plant, Banana plant  
Dicotyledon: Hibiscus plant, Rubber tree
- (a) By producing cone  
(b) By producing spores  
(c) By producing spores
- (a) Plants that live in groups in a limited habitat in a particular location  
(b) (i) Pitcher plant  
(ii) Rafflesia

### ACTIVITY

Student's answer

### KBAT Corner

Biodiversity provides food sources such as honey from bees and medicine such as high blood pressure capsules which are extracted from the 'Misai kucing'. Therefore, a continuous research on various plants and animals should be conducted to help increase the standard of living in humans. Knowledge on the classification of plants and animals ease humans in obtaining sources of raw materials to be used in the construction, furniture, clothes, food and medical industries. However, researches should be done adequately without interfering the survival of the species of the organisms involved.

### PISA/ TIMSS Corner

- Dry scale
- Can breathe in water and on land

### MEMORY BOOST

- Vertebrate
  - Mammals
  - Amfibians
  - Fish
  - Birds
  - Reptiles
- Invertebrate
- Monocotyledon
- Dicotyledon
- Non-flowering plants
  - Conifer
  - Moss

### PT3 PRACTICE

- (a) (i) Q, R  
(ii) P, S  
(b) Lays a lot of eggs  
(c) To maintain the balance of biodiversity
- (a) P: Monocotyledon  
Q: Dicotyledon  
(b) P: Fibrous root  
Q: Tap root  
(c) P: Coconut tree//Paddy plant  
Q: Balsam plant//Papaya trees

## CHAPTER 2

### 2.1

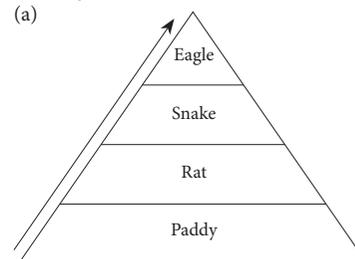
- (a) Green plants that carry out photosynthesis to produce food for other living organisms  
(b) Animals that eat plants or other animals as food

- Microorganisms that decompose dead plants and animals to return the organic substances into the soil

- (a) (i) Vegetables  
(ii) Snail  
(iii) Grasshopper  
(iv) Bird  
(v) Frog  
(vi) Eagle  
(vii) Snake  
(b) (i) Vegetables  
(ii) Snail//Grasshopper  
(iii) Bird//Frog  
(iv) Snake/Eagle

- (a) Paddy  
(b) Rat  
(c) Snake  
(d) Eagle

- (a)



- (i) Decreases  
(ii) Increases
- No, only small part of energy is transferred to another level as big part of energy is lost in the process of life such as metabolism, respiration and excretion
- Other organisms will die or move to other habitat
- (i) Increases because no other organism to eat the paddy plants  
(ii) Decreases because the snakes have less food and will move away from the habitat  
(iii) Decreases because that eagles have less food and will move away from the habitat

### 2.2

- (a) transpiration  
(b) respiration, water vapour  
(c) Soil erosion, evaporation
- (a) (i) Respiration  
(ii) Photosynthesis  
(iii) Respiration  
(iv) Combustion  
(v) Decaying process by microorganism

- (b) Photosynthesis
  - (c) Plants and animals undergoes the respiration process that used the oxygen and releasing the carbon dioxide
  - (d) Dead plant and animals are decomposed by the bacteria and the fungi in the soil by using the oxygen and releasing the carbon dioxide
  - (e) It will greatly reduced
- 3 (a) Creating a systematic agriculture practice
- (b) Using the public transport
  - (c) Storing the rainfalls for daily used
  - (d) Tree replanting
  - (e) Law enforcement

### 2.3

- 1 (a) Organisms having similar features and able to mate and produce offspring
- (b) A group of similar organisms living together in an area
  - (c) A group of different populations living together in an area
  - (d) An area where an organism obtains shelter, food and a place to breed
  - (e) The interaction between the living organisms and non-living components
- 2 (a) Prey-predator
- (i) One organism eats another organism as food
  - (b) Competition
  - (ii) Two organisms of similar species or of different species compete for the same resource
  - (c) Mutualism
  - (iii) Two organisms of different species living together and both benefiting from the relationship
  - (d) Commensalism
  - (iv) Two organisms of different species living together where only one organism gains from the relationship and the other is neither harmed nor benefits from the relationship
  - (e) Parasitism
  - (v) Two organisms of different species living together where one organism gains from the relationship and causes harm or death to the other
- 3 (a) It is the use of one living organism to control the population of another organism which is regarded as a pest
- (b) Prey-predator and parasitism
  - (c) 1 The method is safe as it does not harm to other living organisms
  - 2 It does not cause air pollution or water pollution

### ACTIVITY

Student's answer

- 4 (a) Existence of predator
- (b) Forecast changes
  - (c) Sources of food
- 5 (a) Lack of water resources
- (b) Migration
  - (c) Change in population size

### 2.4

- 1 (a) Soil erosion
- (b) Air, water and soil pollution
  - (c) Water pollution
  - (d) Flash flood

### KBAT Corner

When 10 organisms R died, population of P increases because the number of organisms R that eat them decreases. Populations of Q and S decrease because their food sources are reduced

### PISA/ TIMSS Corner

B

### MEMORY BOOST

- 1 Producer
- 2 Consumer
- 3 Decomposer
- 4 Water cycle
- 5 Carbon cycle and oxygen cycle
- 6 Prey-predator
- 7 Symbiosis
- 8 Both
- 9 gains benefit, not harmed
- 10 Parasitism
- 11 gains benefit, harmed

### PT3 PRACTICE

- (a) X: Sulphur dioxide  
Y: Nitrogen oxide
- (b) The gases dissolve in the water vapour in the clouds and then it falls as acid rain
- (c) The water becomes acidic and the aquatic organisms are killed
- (d) Install filters on chimneys and the exhaust pipes of vehicles

## CHAPTER 3

### 3.1

- 1 (a) Carbohydrate;  
Supplies the body with energy
- (b) Building new cells and repairs damaged tissues
  - (c) Supply energy
  - (d) Vitamin A; Milk, Butter and carrot
  - (e) Prevents beri-beri
  - (f) Prevents scurvy
  - (g) Butter, eggs and fish; Prevents rickets

- (h) Vitamin K; Helps in blood clotting
  - (i) Helps in the formation of blood plasma
  - (j) Production of haemoglobin
  - (k) Iodine; Seafoods, seaweed and fruits
  - (l) Helps in building bones and teeth
  - (m) Prevents constipation
  - (n) Fruit juice; Transports digested food
- 2 P: Scurvy  
Q: Rickets  
R: Kwasiyorkor

### 3.2

- 1 (a) Age
- (b) Gender
  - (c) Body size
  - (d) Types of occupation
  - (e) Health condition
  - (f) Climate
- 2 (a) food classes; quantity
- (b) protein
  - (c) carbohydrate
  - (d) colder
  - (e) more
- 3 Total energy for
- (a) Fat =  $52 \text{ g} \times 38 \text{ kJ/g}$   
= 1976 kJ
  - (b) Carbohydrate  
=  $12 \text{ g} \times 17 \text{ kJ/g}$   
= 204 kJ
  - (c) Protein =  $4 \text{ g} \times 17 \text{ kJ/g}$   
= 68 kJ
- Total energy  
= 1976 kJ + 204 kJ + 68 kJ  
= 2245 kJ

### 3.3

- 1 (a) Digestion is a process in which large food molecules are broke down into smaller molecules so that assimilation can happen.
- (b) P: Small intestine; Absorption of digested food
  - Q: Stomach; Stores food, digests protein
  - R: Large intestine; Reabsorption of water
  - S: Mouth; Digests starch
- (c) S → Q → P → R
- 2 (a) Mouth
- (b) Oesophagus
  - (c) Stomach
  - (d) Rectum
  - (e) Anus
- 3 (a) amylase; starch; maltose
- (b) protease; polypeptide
  - (c) (i) amylase; maltose
  - (ii) protease; peptide
  - (iii) lipase
  - (d) (i) maltase; glucose
  - (ii) peptide; amino acid
  - (iii) lipase; fatty acid; gliserol/ glycerol

- (e) (i) Glucose
- (ii) Amino acid
- (iii) Fatty acid and glycerol

### 3.4

- 1 (a) 1 Have a folded surface  
2 The wall is one cell thick
- (b) blood
- (c) heart
- (d) heart
- 2 (a) large intestine
- (b) fibre
- (c) rectum
- (d) Diarrhoea; water; death

### ACTIVITY

Student's answer

### KBAT Corner

Because high intake of sugar and salt can cause obesity and various health problems such as high blood pressure, diabetes and heart disease

### PISA/ TIMSS Corner

B

### MEMORY BOOST

- (a) Age
- (b) Types of occupation
- (c) Health condition
- (d) Body size
- (e) Climate
- (f) Gender
- (g) Physical activity
- (h) (i) Carbohydrate
- (ii) Protein
- (iii) Fat
- (iv) Vitamin
- (v) Mineral
- (vi) Water
- (vii) Fibre
- (i) Oesophagus
- (j) Small intestine
- (k) Large intestine
- (l) Anus
- (m) Starch
- (n) maltose
- (o) Protein
- (p) Polypeptide
- (q) Glucose
- (r) Amino acid
- (s) Fatty acid
- (t) Glycerol

### PT3 PRACTICE

- 1 (a)  $Y \rightarrow W \rightarrow Z \rightarrow X$
- (b) Z
- (c) Starch; Maltose
- 2 (a) (i) Millon's reagent
- (ii) Iodin solution
- (b) (i) Colourless
- (ii) Yellow
- (c) (i) Red

- (ii) Blue-black
- (d) Meat
- (e) (i) Rice
- (ii) Soy bean/ groundnut

### CHAPTER 4

- 1 (a) infectious; transmitted
- (b) genetic factors; lifestyles
- 2 (a) Hand, foot and mouth disease (HFMD); Infected by Coxsackie virus through contact with tainted objects or an infected person
- (b) Lung cancer; Smoking
- (c) Zika fever; Bitten by Zika-infected Aedes mosquitoes
- (d) Diabetes; Due to genetic factor, or excessive sugar in diet
- 3 (a) X
- (b) X
- (c) ✓
- 4 (a) Virus
- (b) Bacteria
- (c) Protozoa
- (d) Fungi
- (e) Worm
- 5 (a) (i) exhaled
- (ii) water droplets; pathogen
- (iii) enter
- (b) Infection through air-borne droplets
- (c) He will infected with the same disease as the host
- (d) The pathogens have entered the breathing cavity of the healthy individual
- (e) The host should wear a face mask
- 6 (a) (i) Sharing
- (ii) itchiness
- (iii) red
- (iv) same
- (v) tight; damp
- (vi) Athlete's foot
- (vii) smelling foot
- (viii) blisters
- (b) P = Pathogens enter the body thru the eyes
- Q = Pathogens on the surface of the pen enter the mouth
- R = Most pathogens on the hands are killed
- S = Pathogens enter the body thru the nose
- 7 (i) Anopheles mosquito
- (ii) Housefly
- (iii) Rat
- (iv) Dogs; cat; bat (mammals)
- (v) Camels
- 8 (a) towns; cities
- (b) Aedes mosquito
- (c) viral
- (d) mosquito's bite
- (e) chills
- (f) rural
- (g) Anopheles mosquito
- (h) Protozoan

- 10 (a) (i) X, Rabies is transmitted thru the bite of an infected mammal
- (ii) ✓, Contaminated water (with infected rat urine) enters the body through the eyes, mouth or small cuts on the body
- (iii) ✓, Contaminated water (with infected faeces) enters the body through the mouth
- (b) Dysentery
- (c) Floodwater contains a mixture of drain water and sewage
- (d) No, because the water in the swimming pool has been added chlorine to disinfect germs.

### 4.2

- 1 (a) Immunisation; immunity; infection
- (b) Antigen; foreign
- (c) vaccine; weakened; immune; antibody
- (d) Antibody; protein; white; antigen
- 2 (a) Artificial active immunity
- (b) Natural passive immunity
- (c) Natural active immunity
- (d) Immunity is long-lasting
- (e) Immunity is temporary and short-lived
- (f) Immunity is long-lasting after infection

### ACTIVITY

Student's answer

### KBAT Corner

Yes, tuberculosis is an infectious disease that transmits through the air

### PISA/ TIMSS Corner

If a victim suffers serious burns on his body, it means that his skin which is the first line of defence mechanism cannot stop foreign substances including pathogens from entering straight into his blood stream. This will cause serious infections and maybe life-threatening.

### MEMORY BOOST

- 1 Water
- 2 Air
- 3 Vector
- 4 Contact
- 5 Colera
- 6 SARS
- 7 Dengue
- 8 Ringworm
- 9 Diabetes
- 10 Cancer
- 11 Asthma
- 12 Improve the level of health
- 13 Vector control; Protecting the host
- 14 Skin; Mucous membranes
- 15 White blood cell
- 16 antibody
- 17 Natural
- 18 recovery

- 19 mother's milk  
20 vaccine  
21 antiserum

### PT3 PRACTICE

- 1 (a) (i) P: Athlete's foot (*Tinea pedis*)  
(ii) Q: Ringworm (*Tinea corporis*)  
(b) Fungi  
(c) Through contact with infected skin  
(d) (i) Practice personal hygiene care  
(ii) Do not share other people's personal stuff
- 2 (a) Both viruses cause infectious diseases  
(b) Influenza virus is spread through the air whereas HIV virus is spread through sex contact, sharing injecting needle, as well as blood transfusion and organ transplant from host  
(c) (i) No because HIV virus cannot survive and reproduce in insects  
(ii) No because HIV virus is not found at the skin surface  
(d) (i) Improves the immunity of the body by practicing good dietary habit that is to eat more vegetables and fruits containing a lots of vitamin C  
(ii) Increase people's awareness about AIDS and the transmission method of the HIV virus, especially through education in schools
- 3 (a) Spreads through coughing and sneezes of the patient  
(b) Need to get a diphtheria vaccine injection  
(c) She needs to bring her son for vaccine shots as scheduled in the Malaysian vaccination program  
(d) Her son's immunity towards the polio virus infection will decrease and becomes weakened  
(e) The concentration of antibodies to fight the polio virus in her son's blood does not reach the immunity level. Therefore, if the polio virus succeeds in invading her son's body, the amount of antibodies will not be enough to defeat the attack of the polio virus. As a result, her son will be infected with polio

## CHAPTER 5

### 5.1

- 1 (a) 0°C  
(b) 0°C  
(c) 100 °C  
(d) 1 g per cm<sup>3</sup>  
(e) poor  
(f) poor  
(g) Odourless  
(h) Tasteless  
(i) Colourless
- 2 (a) Electrolysis  
(b) hydrogen; oxygen; electrolysis; 2:1

- 3 (a) Evaporation  
(b) Water molecules on the surface area having high kinetic energy, moving fast and release to the air  
(c) (i) Air humidity  
(ii) Surrounding temperature  
(iii) Surface area of exposed water  
(iv) Air movement

### 5.2

- 1 (a) The solid particles that dissolve in a liquid  
(b) A mixture that is formed when a substance is added to a liquid and form a homogenous liquid  
(c) A mixture of one or more solute that spread evenly  
(d) A liquid in which solid particles dissolve
- 2 (i) Little  
(ii) Able to dissolve a little more solute  
(iii) Unable to dissolve solute anymore
- 3 (a) The maximum quantity of solute that can dissolve in 100 g solvent at certain temperature  
(b) (i) Turpentine; Petrol; Kerosene  
(ii) Alcohol  
(iii) Acetone  
(iv) Benzene  
(v) Alcohol  
(vi) Chloroform

### 5.3

- 1 (a) Removes suspended particles; Cannot remove dissolved substance  
(b) Kills microorganisms; Cannot remove suspended particles  
(c) Kills microorganisms, removes smell and colour; Cannot kill all microorganisms. Cannot remove suspended particles  
(d) Removes all impurities; Water does not contain mineral salts which are needed for the body
- 2 A (f)  
B (d)  
C (h)  
D (g)  
E (a)  
F (b)  
G (e)  
H (c)
- 3 1 Rain  
2 River  
3 Sea  
4 Spring well  
5 Glacier
- 4 1 Sewage  
2 Heavy metals
- 5 Water purification is important to remove pollutants in water to ensure the water is suitable for drinking and does not harm the skin
- 6 (a) Causes flood when accumulated in rivers  
(b) Spread of diseases

- (c) Changes pH and kill sea creatures  
(d) Causes cancer  
(e) Killing aquatic lives  
(f) Poison living things by accumulating toxic substances in the food chain  
(g) Rivers become shallow and causing flood  
(h) Destroys habitat along the shore
- 7 (a) importance  
(b) sanitation system  
(c) biodegradable  
(d) law

### ACTIVITY

Student's answer

### KBAT Corner

The boiling point, freezing point and density of pure water are 100 °C, 0 °C and 1 gcm<sup>-3</sup> at the temperature of 4 °C respectively. Therefore,

- Determine the freezing point of liquid X and show that it is 0 °C
- Determine the boiling point of liquid X and show that it is 100 °C
- Determine the density of liquid X and show that it is 1 gcm<sup>-3</sup> at the temperature of 4 °C

### PISA/ TIMSS Corner

B

### MEMORY BOOST

- taste
  - 0 °C
  - boiling point
  - Freezing point
  - 1 g per cm<sup>3</sup>
  - weak
    - electrolysis
    - 2:1
    - Drying hair
    - Production of salt
    - Drying clothes
    - Production of milk powder
    - Food preservation
- Dilute solution: Solution that contains little amount of solute  
Concentrated solution: Solution that contains a lot of solute  
Saturated solution: Solution that contains maximum amount of solute and can dissolve in a solvent at certain temperature

### PT3 PRACTICE

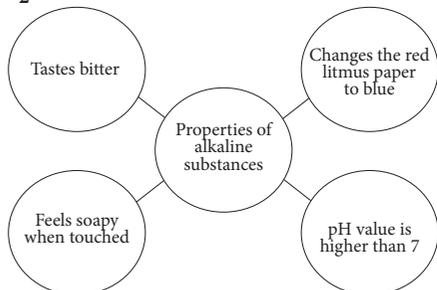
- (a) The water particles at the water surface absorbs heat from the surrounding. They move faster and escape from water surface thus becomes gas particles
- (b) (i) Q (ii) P
- (c) The larger the surface area, the faster the rate of evaporation
- (d) When the air at the surface of the cup is blown, the air molecules move faster. The rate of evaporation increases and the hot tea cools down faster

## CHAPTER 6

### 6.1

- 1 (a) sour  
(b) less  
(c) nitrogen  
(d) blue; red

2



- 3 (i) (a) Blue  $\longrightarrow$  Red  
(b) Blue  $\longrightarrow$  Blue

- (ii) (a) Acidic  
(b) Alkali

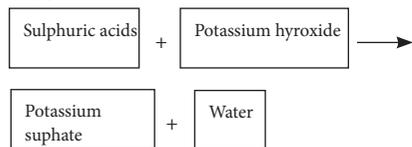
- 4 (a) P: No changes  
Q: Red  $\rightarrow$  Blue

(b) No changes occur on the colour of litmus paper in beaker P because alkali cannot show its characteristic without the presence of water.

### 6.2

1 Reaction happens between acid and alkali and produce salt and water.

2 (a)



(b) Titration

### KBAT Corner

Nitric acid and sodium hydroxide will mix together to form water and salt which is neutral. The nitrogen ions combine with the hydroxide ions to form water, so the litmus paper does not change colour.

### PISA/ TIMSS Corner

D

### MEMORY BOOST

- Acid
- Vinegar
- Lime juice
- pH value more than 7
- Bitter taste
- Turns red litmus paper into blue
- Agriculture
- Industrial
- Medicinal

- Tooth paste
- acid; alkali; salt
- Sodium chloride
- Nitric acid; Sodium hydroxide

### PT3 PRACTICE

- 1 (a) X: Neutral  
Y: Acid  
Z: Alkali  
(b) X: Drinking water  
Y: Lime juice  
(c) The liquid detergent will turn red litmus paper into blue while there is no change on blue litmus paper.  
(d) (i) Fenolftalein  
(ii) Universal indicator
- 2 (a) Neutralisation  
(b) Neutralisation is a process between acid and alkali to produce salt and water.  
(c) (i) Sodium chloride + water  
(ii) Potassium sulphate + water  
(d) 1. Tooth paste which is alkaline is used to neutralise acidic substance in food.  
2. Milk of magnesia which is alkaline is used to neutralise excess acid in the stomach.

## CHAPTER 7

### 7.1

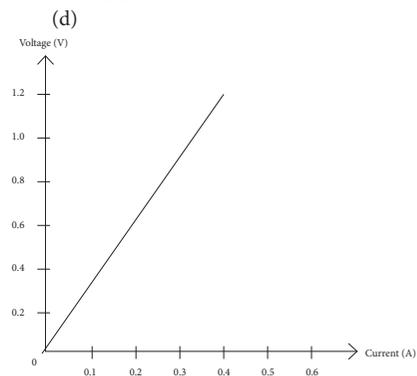
- 1 The ability of doing works
- 2 (a) Chemical energy  
(b) Kinetic energy  
(c) Electric energy  
(d) Light energy
- 3 (i) Sun  
(ii) Geotherma  
(iii) Water  
(iv) Biomass  
(v) Fossil fuel  
(vi) Wave  
(vii) Radioactive substance  
(viii) Wind
- 4 (a) electrostatic forces  
(b) electroscope  
(c) conduction rate  
(d) ammeter; ampere(A)  
(e) voltage; voltmeter  
(f) volt(v)  
(g) resistance  
(h) Ohm( $\Omega$ )

### 7.2

- 1 1 (d)  
2 (e)  
3 (g)  
4 (f)  
5 (i)  
6 (h)  
7 (a)  
8 (c)  
9 (b)

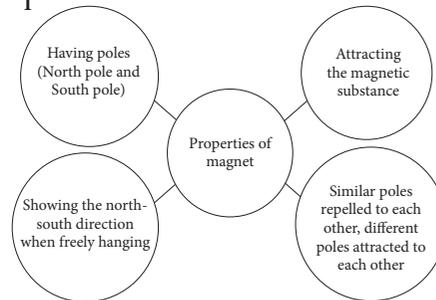
2 Series circuit; Parallel circuit

- 3 (i) Each component in the circuit received equal quantity of current  
(ii) Each component in the circuit received different quantity of current  
(iii) All components are controlled by the same switch  
(iv) All electric appliances can be switched on and off separately  
(v) Addition of voltage will supply the larger current  
(vi) Addition of electric appliances didn't affect the function of other electric appliances
- 4 (a) To control the flow of current in the circuit  
(b) The voltage will increase  
(c) Current is shown by the reading of ammeter



### 7.3

1



### KBAT Corner

During the formation of clouds, collision between the clouds and also between the clouds and air occur. It produces a lot of charge. The charge produced may lead to the producing of positive charge on the object on Earth. The strong attraction between both charges caused the positive and negative parts of the clouds will separate. This causes releasing of the energy in heat and light form that produce lightning.

### PISA/ TIMSS Corner

C

### MEMORY BOOST

- Types of energy
- Electrostatic
- Sound energy
- Kinetic energy
- Elastic energy
- Nuclear energy
- Sun
- Geothermal
- Fossil fuel
- pull; push
- ampere (A)
- Volt (V)
- Ohm ( $\Omega$ )
- Pointed to north-south when hanging freely

### PT3 PRACTICE

- Electroscope
- X: Metal plate  
Y: Gold leaf
- The pull and push forces between electric charge which consists of positive charge and negative charge.
- Lightning phenomenon

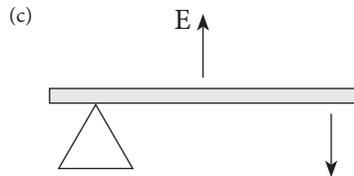
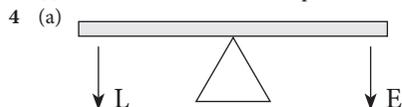
## CHAPTER 8

### 8.1

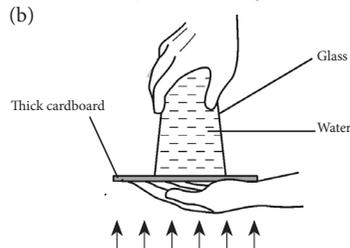
- pull; push
  - magnitude; direction
  - newton; N
  - original; extension
  - spring balance
- Both
  - Pull
  - Both
  - Push
- Normal force
  - Gravitational force
  - Floating force

### 8.2

- Move a stationary object
  - Stop a moving object
  - Change the speed of moving object
  - Change the direction of a moving object
  - Change the shape and size of an object
- fixed
- three
  - first-class; second-class; bigger
  - third-class; smaller; bigger
  - fulcrum
  - turning
  - clockwise; anti-clockwise; point



- 5 (a) The cardboard does not drop and water does not spill out of the glass.



- tiny
  - distance
  - random
  - particles; colliding
  - pressure
  - kinetic; increases
- low
  - higher
  - spray
  - increases; low
  - higher
  - water; thumbs
  - lower; flow
  - surface; lower

### KBAT Corner

- The gravitational force pulls the durian down
  - The frictional force opposes the movement and reduces the speed of the ball.

### PISA/ TIMSS Corner

- Dry scale
  - Can breathe in water and on land
- D

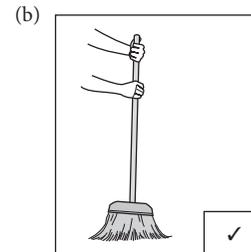
### MEMORY BOOST

- pull; push
- S.I unit
- Gravitational force
- Normal force
- Weight
- Elastical force
- Floating force
- Frictional force

- magnitude
- Changes shape
- Changes position
- Stop the moving object
- Changes the direction of movement
- Increases or decreases speed
- Hammer, pliers
- Bottle opener, wheelbarrow
- Broom, forceps

### PT3 PRACTICE

- Third-class lever



- The distance of effort from the fulcrum is smaller than the distance of load from the fulcrum.
- A greater effort is needed to overcome a smaller load.

## CHAPTER 9

### 9.1

- One of the type of energy
- Degree of the heating and cooling of an object
- S.I unit is Joule (J)
- S.I unit is degree celcius ( $^{\circ}\text{C}$ ) or kelvin (K)
- The quantity of heat depends on the types of material, the quantity of substance and temperature
- The temperature is depends on the movement of the particles in the materials

### 9.2

- The heat that flow from one hot object to another object
- Conduction
    - Convection
    - Radiation
  - Conduction
      - Process of heat flow from hot area to cold area through solid medium.
      - Occurs when the particles vibrate and collide between each other when receiving the heat energy and transfer the heat through the medium
    - Convection
      - Heat is transfer through the movement of the liquid
      - The cooler and denser liquid part will be going down

- The movement of the liquids up and down continuously are known as
  - (iii) Radiation
    - Heat transfer process without medium
    - Heat can merambat through the empty space or vacuum
- 3 (a) Sea breeze  
 (b) Sea breeze occurs during daytime. It occurs from convection process. The surface of the land rises quickly than the sea. The warm air expands and becomes less dense. The cold air from the sea moves to the lands replacing the warm air

4 Heat conductor; Heat insulator; Heat conductor

### 9.3

- (a) X  
 (b) During hot day, the telephone cable expands and sags. Early in the morning or at night, the temperature is low, the cables contracts and tightens. The cables should hung loosely to allow expansion and contraction. If the cable is hung tightly it might snap.

### 9.4

- 1 (a) Types of surface  
 (b) Surface colour  
 2 Black and dull surface is a good heat absorption and releasing as compare to the white and shiny surface. Hence, the temperature in conical flask B is higher than the temperature in conical flask A.

### KBAT Corner

The usage of cork as thermos lid can reduce heat transmission through conduction and convection. Double glass wall and the silver coated wall prevents the heat to be transmit through radiation. The vacuum prevents the heat to be transmit through conduction. The air space that exist between the glass wall and the thermos wall can reduced the transmission of heat through conduction.

### PISA/ TIMSS Corner

A

### MEMORY BOOST

- 1 energy; joule (J)
- 2 Expendables
- 3 Contraction
- 4 Conduction
- 5 Convection
- 6 Radiation
- 7 solid
- 8 heat
- 9 less
- 10 denser
- 11 Sea breeze
- 12 temperature
- 13 Sun radiation on the Earth

### PT3 PRACTICE

- 1 (a) Q  
 (b) Stall Q is painted with darker colour. Dark surface is a good heat absorber  
 (c) Wood : X  
 Metal pot : ✓  
 Iron nail : ✓  
 Microwave hand glove : X
- 2 (a) (ii) ✓  
 (b) During night time, land becomes quickly cooler than the sea. The air over the sea is warmer and less dense. The cooler and denser air from the land moves to the sea and produce land breeze.

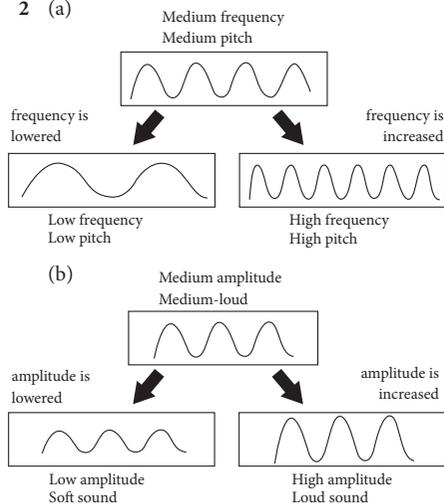
### CHAPTER 10

#### 10.1

- 1 (a) energy; vibration  
 (b) propagate  
 (c) hard; smooth; reflect
- 2 (i) ✓  
 (ii) X  
 (iii) ✓
- 3 Clothes; Carpet; Pillow; Bolster; Mattress; Blankets; Curtain
- 4 (a) Gas; Slowest; far apart; the slowest; liquid and solid  
 (b) liquid; faster; closer; faster  
 (c) Solid; Fastest; close together; very fast

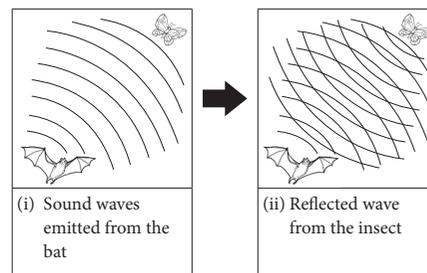
#### 10.2

- 1 (a) height of a sound wave; equilibrium line  
 (b) amplitude; louder  
 (c) number of complete waves; one second  
 (d) higher; pitch; higher
- 2 (a)



### 10.3

1 (a)



- (b) (i) ✓  
 (ii) ✓  
 (iii) X  
 (iv) ✓  
 (c) Dolphins; whales

### KBAT Corner

At the beginning, no sound is heard because the vacuum space does not have any particles. When carbon dioxide is pumped in initially, the number of gas particles is not many. The distance between the gas particles is still very far apart. So the sound of bell is soft. When the number of particles increases, the distance between gas particles becomes closer. So, the sound of bell becomes clearer

### PISA/ TIMSS Corner

The victims need to produce periodic knocking sound on the pipes or wall of the rubbles(solid objects). This is because the sound can travel very far through solid medium. Shouting for help is not suitable because the shouts cannot be propagated far through the air because the sound is quickly absorbed by the objects in the collapsed structure

### MEMORY BOOST

- (1) Solid
- (2) Liquid
- (3) gas
- (4) different
- (5) bat; whales
- (6) Echo
- (7) Doppler effect
- (8) hard and smooth
- (9) absorbed
- (10) soft and rough
- (11) Ultrasound
- (12) Infrasound
- (13) Stethoscope
- (14) Loudspeaker
- (15) Hearing aid
- (16) The pitch depends on the frequency of the sound. the higher the frequency, the higher the pitch

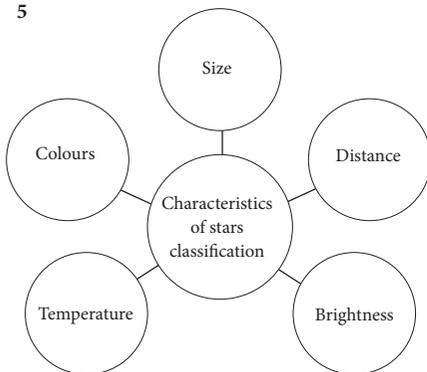
### PT3 PRACTICE

- 1 (a) P: Loud and low pitch  
 Q: Soft and high pitch  
 R: Medium-loud and medium pitch

- (b) (i) Q; Cricket  
(ii) R; Monkey  
(iii) P; Buffalo
- 2 (a) Doppler effect  
(b)  $\longrightarrow$   
(c) The pitch of the sound becomes lower because the frequency of the sound decreases  
(d) The pitch of the sound becomes higher because the frequency of the sound increases  
(e)  $\longleftarrow$
- 3 (a) Infrasound  
(b) Ultrasound  
(c) 20,000 Hz  
(d) (i) Ultrasound reflection can be used to see the condition of the fetus in the mother's womb  
(ii) Sonar is used to measure the depth of the seabed

### CHAPTER 11

- 1 A system of millions of stars together with the gas and dust
- 2 (i) Spiral  
(ii) Elliptical  
(iii) Small magellanic  
(iv) Large magellanic
- 3 (a) Milky way; spiral  
(b) billion; Sun
- 4 (a) (i) Strong gravity force causes the gas cloud to shrink and condense and forming a core  
(ii) The temperature and pressure in the core becomes higher and causes the nuclear reaction to happens  
(b) (a) ✓  
(b) ✗  
(c) ✓  
(d) ✗
- 5



### KBAT Corner

The temperature of the stars is depending on the distance from Earth. Increasing the distance of the stars from the Earth leading to the increasing of the temperature. High temperature causes the colour of the radiation becomes bluish. This is because the energy release are produced from the violet and ultraviolet

### PISA/ TIMSS Corner

C

### MEMORY BOOST

- 1 Galaxy
- 2 Stars
- 3 Stars lifecycle
- 4 Spiral
- 5 Elliptical
- 6 Irregular
- 7 Colours
- 8 Temperature
- 9 Size
- 10 Distance
- 11 Brightness

### PT3 PRACTICE

- 1 (a) Spiral galaxy  
(b) Milky way
- 2 (a) Galaxy; gas  
(b) big cloud; hydrogen  
(c) supernova  
(d) black hole

### CHAPTER 12

#### 12.1

- 1 (a) The average distance between Earth and Sun,  $1.5 \times 10^8$  km  
(b) The distance that light can travel in one year,  $9.5 \times 10^{12}$  km
- 2 (a) (i) Jarak dalam A.U.  

$$= \frac{\text{Jarak dalam km}}{1.5 \times 10^8 \text{ km}}$$

$$= \frac{1.08 \times 10^7 \text{ km}}{1.5 \times 10^8 \text{ km}}$$

$$= 0.72 \text{ A.U.}$$
(ii) Jarak dalam ly  

$$= \frac{\text{Jarak dalam km}}{9.5 \times 10^{12} \text{ km}}$$

$$= \frac{1.08 \times 10^7 \text{ km}}{9.5 \times 10^{12} \text{ km}}$$

$$= 1.13 \times 10^{-5}$$
(b) (i) Jarak dalam A.U.  

$$= \frac{\text{Jarak dalam km}}{1.5 \times 10^8 \text{ km}}$$

$$= \frac{2.87 \times 10^9 \text{ km}}{1.5 \times 10^8 \text{ km}}$$

$$= 19.13 \text{ A.U.}$$

$$\begin{aligned} \text{(ii) Jarak dalam ly} &= \frac{\text{Jarak dalam km}}{9.5 \times 10^{12} \text{ km}} \\ &= \frac{2.87 \times 10^9 \text{ km}}{9.5 \times 10^{12} \text{ km}} \\ &= 3.02 \times 10^{-3} \end{aligned}$$

- 3 1 (g)  
2 (f)  
3 (b)  
4 (e)  
5 (a)  
6 (h)  
7 (c)  
8 (d)
- 4 (a) X: Mercury  
Y: Uranus  
(b) (i) Jupiter  
(ii) Saturn  
(c) Mercury. The Sun radiation will strike the surface causing the temperature of the surface area raised and extremely hot while the dark side are very cold  
(d) Neptune  
(e) The farthest the planets from the Sun, the longest time needed to orbit the Sun

### KBAT Corner

The food sources will reduce due to the increasing of the temperature. The plants wilt and the possibility of photosynthesis process will be lower. Animals reproduction will also decrease because the temperature is too high. The extremely high temperature may affect human health because human body might be losing a lot of water. It may affect the human immunisation system due to the excess UV radiation. Besides that, human skin that expose to the radiation may cause skin cancer

### PISA/ TIMSS Corner

A

### MEMORY BOOST

- 1 Light Years(ly)
- 2 Earth; Sun
- 3 light
- 4 Mercury
- 5 Earth
- 6 Jupiter
- 7 Saturn
- 8 Neptune
- 9 water
- 10 oxygen
- 11 temperature
- 12 atmosphere
- 13 Sun
- 14 gravitational
- 15 temperature; Sun; temperature; Sun
- 16 farther; Sun; longest

### PT3 PRACTICE

- 1 (a) (i) Earth  
 (ii) 1 Contains high oxygen content for respiration process  
 2 Having suitable range of temperature, not too hot or too cold  
 (b) (a) west; east  
 (b) Neptune

### CHAPTER 13

#### 13.1

- 1 (a) (i) Made up of gases, ice and a little of dust and rock  
 (ii) Orbits the Sun on its own orbit with shaped like ellips  
 (b) Meteoroid  
 (iv) Lumps of rock and metal in outer space  
 (c) (v) Large rock and metal that moves around the Sun by its own orbit  
 2 (i) Meteoroid floating and moving in the space area  
 (ii) Meteor showers occur when a lot of meteor entering the Earth at one time  
 (iii) Meteor that can reach the Earth are called as meteorite that hits the Earth surface will form crater  
 3 (a) belt  
 (b) Amor; outside; crossing; Earth  
 (c) asteroid; Earth  
 (d) large; destruction  
 4 (a) ✓  
 (b) ✗  
 (c) ✓  
 (d) ✓  
 (e) ✗

#### KBAT Corner

Meteoroid strikes the atmosphere at high velocity. This is due to the gravity force of the Earth. Friction causes this meteoroid to incinerate in a streak of light known as meteor. If the meteoroid does not burn up completely, the left strikes Earth's surface and produce the crater. However, the atmospheric layer is protecting the Earth from meteoroid strikes

#### PISA/ TIMSS Corner

B

#### MEMORY BOOST

- 1 Meteoroid  
 2 10  
 3 42  
 4 Sun  
 5 -73 °C  
 7 Meteoroid; Meteor; Meteorite  
 8 Comet  
 9 head; tail  
 10 gas; water

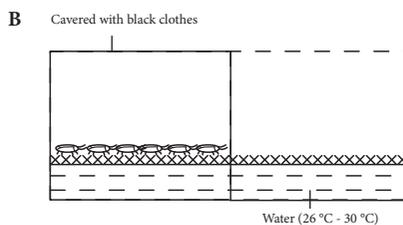
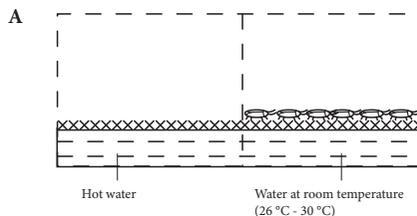
### PT3 PRACTICE

- 1 (a) (i) rock; metal  
 (ii) Mars; Jupiter  
 (b) Comet: Moves with speed of 10 kms-1 until 70 kms-1 to orbit around the Sun  
 Meteoroid: Moves with speed of 42 kms-1 to orbit around the Sun  
 (c) Due to the Solar wind from the Sun

### PRACTICAL

#### Guided Experiment 1.1

Observation:



#### Inquiry Experiment 3.2

Observation:

Food test	Test tube A		Test tube B	
	Beginning	After 30 minutes	Beginning	After 30 minutes
Iodine test	Dark blue	Dark blue	Dark blue	No change
Benedict test	No change	Brick-red precipitate is formed	No change	No change

Discussion

- (a) To make sure that there is no starch and glucose residue in the saliva collected.  
 (b) Test tube A  
 (c) It is the most suitable temperature for the enzyme in the saliva to react.  
 (d) starch  
 (e) iodine test; dark blue  
 (f) starch; glucose

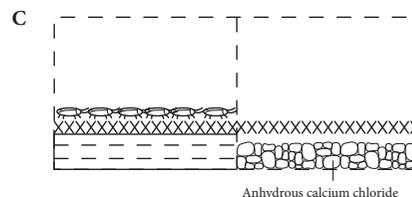
Conclusion

Starch; glucose

#### Inquiry Experiment 3.3

Observation:

- (a) Small intestine



Anhydrous calcium chloride

Discussion

- A (a) The area with water at room temperature (26°C-30°C)  
 (b) To ensure the species survivality  
 B (a) To prevent the entrance of light  
 (b) It will dead  
 C (a) To absorb water vapour  
 (b) To the area that contains water (high humidity)

Conclusion

low; dark; high

#### Inquiry Experiment 3.1

Observation:

- (a) dark blue  
 (b) brick-red precipitate  
 (c) white precipitate; red  
 (d) milky solution

Conclusion

- (a) starch  
 (b) Benedict's test  
 (c) protein  
 (d) Alcohol-emulsion test

(b) Blood

- (c) So that the enzyme works at optimum rate  
 (d) (i) Amylase  
 (ii) To digest starch into glucose

Conclusion

Only digested food can be absorbed in the small intestine

#### Inquiry Experiment 5.1

Observation:

- (a) (i) 3 cm  
 (ii) 6 cm

(b)

Test tube	Test for gas	Observation	Inference
P	Glowing wooden splinter	The splinter reignites	Oxygen is present in the test tube
Q	Burning wooden splinter	A 'pop' sound is heard	Hydrogen gas is present in the test tube

Conclusion

- (a) hydrogen; oxygen
- (b) H<sub>2</sub>O

### Inquiry Experiment 5.2

I Variables:

- (a) Manipulated:  
Humidity of air
- (b) Responding:  
Rate of evaporation
- (c) Constant:  
Surrounding temperature, exposed surface area, movement of air

II Variables:

- (a) Manipulated:  
Surrounding temperature
- (b) Responding:  
Rate of evaporation
- (c) Constant:  
Humidity of air, exposed surface area, movement of air

III Variables:

- (a) Manipulated:  
Exposed surface area
- (b) Responding:  
Rate of evaporation
- (c) Constant:  
Humidity of air, surrounding temperature, movement of air

IV Variables:

- (a) Manipulated:  
Movement of air
- (b) Responding:  
Rate of evaporation
- (c) Constant:  
Humidity of air, surrounding temperature, exposed surface area

### Inquiry Experiment 5.2

Observation:

Step	Mixture of sugar and water	Mixture of flour and water
I	No sedimentation	Sedimentation of flour is seen
II	Light can shine through	Light cannot shine through
III	No residue is left on the filter paper	Residue is left on the filter paper

Discussion

Activity I

- (a) To absorb the moisture in the air
- (b) To increase the water vapour in the air
- (c) Bell jar P
- (d) Humidity of air depends on the amount of water vapour in the air. High amount of water vapour will prevent more water particles from escaping to the air.

Activity II

- (a) The filter paper which is placed under the hot sun
- (b) Higher surrounding temperature gives more energy to the water particles so that they can move faster and overcome the attraction force between the particles to escape into the air.

Activity III

- (a) Petri dish
- (b) Evaporation only occurs at the surface of water. Larger exposed surface area allows more water particles to escape into the air.

Activity IV

- (a) Water in the petri dish under the fan
- (b) Movement of air removes water vapour at the surface of water. This provides more space for more water particles to escape to the air.

Conclusion

Low; high; big; cepat

Discussion

- (a) sugar and water; flour and water
- (b) filtration
- (c) sugar and water

Conclusion

Solution is clear, homogenous and cannot be separated through filtration. Suspension is cloudy, non-homogenous and can be separated through filtration.

### Guided Experiment 5.3

Activity I

Variables:

- (a) Manipulated:  
Temperature of solvent
- (b) Responding:  
Time taken for the solute to dissolve
- (c) Constant:  
Quantity and size of solute

Activity II

Variables:

- (a) Manipulated:  
Rate of stirring
- (b) Responding:  
Time taken for the solute to dissolve
- (c) Constant:  
Quantity and size of solute

Conclusion

Faster; increased; faster

### Inquiry Experiment 5.4

Results:

Activity	Observation
I	Before filtration: The water has suspended particles and microorganisms. After filtration: The water has no suspended particles but still contains microorganisms.
II	The water looks clear. The microorganisms in the water are dead.
III	The water still has suspended particles. The microorganisms in the water are dead.

Conclusion:

Filtration; distillation; boiling

### Inquiry Experiment 6.1

Observation:

Student's answer

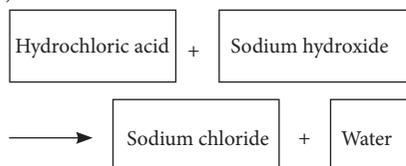
Conclusion:

- (a) Orange juice; vinegar; tamarind
- (b) Detergent; coffee; toothpaste

### Inquiry Experiment 6.2

Observation:  
Student's answer

Discussion:  
(a) Neutralisation  
(b) 7  
(c)



(d) (i) Potassium sulphate; Water  
(ii) Calcium nitrate; Water

Conclusion  
Acid; alkali; salt; water

### Inquiry Experiment 8.1

Results:  
**A** dropped to the ground  
**B** are attracted to the plastic ruler  
**C** does not slide down  
**D** are attracted to the bar magnet

Discussion:  
Pulled; pushed; forces; types

Conclusion:  
Gravitational force; electrostatic force; frictional force; magnetic force

### Inquiry Experiment 8.2

Hypothesis:  
The rougher the surface, the greater the magnitude of frictional force.

Variables:  
(a) Manipulated:  
Roughness of surface  
(b) Responding:  
Magnitude of frictional force  
(c) Constant:  
Mass of object

Observation:

Type of surface	Reading of the spring balance (N)
Table	5.0
Sand paper	9.8
Mahjong paper	1.3
Floor	7.1

Discussion:  
(a) Sand paper  
(b) Mahjong paper  
(c) Maximum magnitude of friction produced by the surface  
(d) Sand paper  
(e) Mahjong paper

Conclusion  
The rougher the surface, the greater the magnitude of frictional force

### Inquiry Experiment 8.3

Observation:  
Activity I  
Position

Activity II  
Faster

Activity III  
Direction

Activity IV  
Shape

Conclusion:  
Position; speed; direction; shape

### Guided Experiment 8.4

Hypothesis:  
The higher the position of centre of gravity, the lower the stability of an object

Observation:  
P

Discussion:  
(a) Higher  
(b) less

### Inquiry Experiment 8.5

Observation:  
(a) 40  
(b)

Mass of weights (g)	Distance from the middle (cm)
50	40
100	20
150	13
200	10

Analysis  
(a) force  $\times$  perpendicular distance  
(b) (i) Moment  
 $= 0.5 \text{ N} \times 0.4 \text{ m}$   
 $= 0.2 \text{ Nm}$   
(ii) Moment  
 $= 2 \text{ N} \times 0.1 \text{ m}$   
 $= 0.2 \text{ Nm}$

(c) Yes  
(d) Force (N)  $\times$  Force distance (m)  
 $= \text{Load (N)} \times \text{Load distance (m)}$   
(e)  $W \times 0.4 \text{ m} = 2 \text{ N} \times 0.1 \text{ m}$   
 $W = \frac{2 \times 0.1}{0.4}$   
 $W = 0.5 \text{ N}$

Conclusion:  
(a) Moment (Nm) = Force (N)  $\times$  Distance (m)  
(b) Principle of moment:  
Force (N)  $\times$  Force distance (m) = Load (N)  $\times$  Load distance (m)

### Inquiry Experiment 8.6

Observation:  
Activity I  
Decreases; increases

Activity II  
(a) increases; increases  
(b) decreases

Conclusion:  
(a) The smaller the volume of a container, the higher the air pressure in it.  
(b) The higher the temperature of air, the higher the air pressure.