

Oxford *Revise & Assess* Integrated Science



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OXFORD
UNIVERSITY PRESS

Answers

I. Scientific investigation

I.1 Introduction to Integrated Science

Components of integrated science (Refer to page 2)

1. Biology, chemistry and physics

2. Biology – the study of living things.

Chemistry – a component of Integrated Science that deals with the substances that make matter, the investigation of their properties and reactions, and the use of such reactions to form new substances.

Physics – is a component of Integrated Science concerned with the study of nature, properties of matter and energy.

3. (a) Biology, chemistry, physics

(b) Kiswahili, history, mathematics, religious studies

Importance of Integrated Science in daily life (Refer to page 2)

1. Medicine, nursing, public health, dental surgery, pharmacy, engineering, agriculture

2. (a) A – Engineering, B – Scientific research, C – Pharmacy, D – Medicine and surgery

(b) Nursing, public health, dental surgery

3. – Observation – Classification – Analysis

– Communication – Prediction

4. (a) Health – the knowledge gained helps one to avoid lifestyle diseases, and solve problems, such as environmental pollution that are a threat to health.

(b) Agriculture – the knowledge acquired enables scientists to develop better crop varieties.

(c) Food industry – the knowledge and skills acquired help scientists detect unwanted and dangerous substances in food.

(d) Transport industry – it forms a background for careers such as mechanical and automotive engineering. Such engineers make and repair engines of motor vehicles, trains and aircrafts that are necessary in the transport industry.

(e) Textile industry – the knowledge gained is helpful in preparation of and mixing various dyes that are useful in textile industry.

5. (b)

6. **A** – Applied sciences **B** – Language and Literature **C** – Visual arts

I.2 laboratory safety

Common hazards in the laboratory and their symbols (Refer to page 6)

1. Open flames, open electric sockets, broken glass equipment, flammable chemicals, corrosive chemicals, chemicals emitting dangerous radiations.
2. **A** – electric shock **B** – flammable **C** – radioactive **D** – explosive
E – carcinogenic **F** – toxic
3. A – corrosive chemical
B – flammable chemical
4. (a) Anything that has the potential to cause harm or injure someone.
(b) Open flame or corrosive chemical

Causes of common accidents in the laboratory (Refer to page 7)

1. Sharp objects and broken glass, poisonous fumes, harmful chemicals, slippery floor.
2. Dispose of various types of waste such as chemicals, biological or sharp objects in their appropriate bins.
3. (a) Fall
(b) Rushing or running in the laboratory, litter such as banana peels on the floor
4. Scald – spilling of corrosive liquids or steam on the skin.
Suffocation – inhaling poisonous gases or fumes.
Poisoning – ingesting harmful chemicals.
Electrical shock – open electrical sockets
Cut – sharp objects and broken glasses

First aid measures for common laboratory accidents (Refer to page 8)

1. A procedure carried out to stabilise a victim of an accident before being taken to a medical expert.
2. - Take the victim to a wash station.
- Wash the eyes thoroughly with plenty of water and inform the teacher or the laboratory technician.
3. (a) minor cut
(b) - Take the victim to a wash station and wash the cut with clean water
(Use antiseptic if available to clean the area around the wound).
- Raise the part of the body that is bleeding and apply some pressure to the wound using a bandage or a clean piece of cloth.
(c) Wear gloves to prevent contact with the victim's blood.
4. (a) - Go to a wash station and cool the affected area with cold running water for about 10 minutes.
- Keep the affected area open until you seek medical attention.

- (b) - Identify the substance and the quantity that has been ingested if possible.
- Inform the teacher or laboratory technician immediately.

Importance of safety in the laboratory (Refer to page 9)

1.
 - To prevent accidents.
 - To reduce losses that arise from damage of laboratory apparatus and equipment.
2. (a) **A** – Ensuring that the mouth of the apparatus containing a substance that is being heated faces away from yourself and other laboratory users.
B – Smelling a gas by carefully wafting it towards the nose instead of smelling it directly from the gas jar.
 - (b) – Walking slowly and calmly in the laboratory instead of rushing.
 - Open laboratory windows to allow free air circulation.
 - Not eating or drinking in the laboratory.
 - Disposing of laboratory waste properly.
3. (a) To avoid accidents such as falls.
 (b) To allow free circulation of air.
 (c) To avoid splashing hot liquids on yourself or other laboratory users.
 (d) To prevent loose clothes and hair from catching fire.

1.3 Laboratory apparatus and instrument

Basic skills used in science (Refer to page 17)

1. (a) Observation – the use of our five senses (sight, hearing, smell, touch and taste) to study matter.
 (b) Prediction – giving a sensible suggestion about what will happen in future or the outcome of a process.
 (c) Communication – a skill used by scientists to exchange information and report findings.
 (d) Conclusion – the final judgement or decision after making observations and linking it with what is already known.
 (e) Classification – grouping or categorising items based on their similarities or differences.
2. Manipulation involves handling science apparatus, materials, substances and specimens correctly and skillfully during experiments while measurement involves measuring of quantities such as length, mass, area, among others.
3. Manipulative skill
4. (a) Observation (b) Conclusion (c) Measuring skill
 (d) Prediction (e) Classification
5. Observation, communication, conclusion, classification, prediction

Use and care for apparatus and instruments in the laboratory (Refer to page 18)

1. (a) **A** – Volumetric flask **B** – Pipette
(b) To clearly see the level of the liquid inside.
(c) Burette and syringe
2. (a) **A** – Tripod stand **B** – Wire gauze
(b) Tripod stand – to support the beaker during heating
Wire gauze – to support the beaker and ensure even distribution of heat.
(c) Portable burner and spirit lamp
(d) To obtain a non-luminous flame which is hotter and does not produce soot.
3. (a) Hand lens
(b) Used for magnification
- 4.

Number	Name	Use
A	Test tube rack	Hold test tubes and boiling tubes during experiments and when being stored.
B	Dropper	Deliver liquids dropwise into reacting vessels.
C	Gas jar	Collecting gas products during reactions.
D	Dropping funnel	Adding controlled amounts of liquid into a reacting vessel.
E	Crucible	Heating solid substances that require strong heating.
F	Pooter	Used to catch small specimens such as insects.
G	Evaporating dish	To hold liquids or solutions that are being heated to evaporate.
H	Thistle funnel	Delivering liquids into reacting vessels.
I	Thermometer	Measuring temperature.
J	Wire gauze	To support containers and ensure even distribution of heat during heating.

5. (a) Bunsen burner
(b) It is a source of heat.
(c) **A** – chimney **B** – airhole **C** – jet **D** – base

(d)

Part	Function
Chimney (A)	A mixture of air and gas is ignited at its mouth to produce a flame.
Airhole (B)	Opening through which air enters the burner
Jet (C)	Allows laboratory gas into the chimney.
Base (D)	Makes the burner stable on the bench.

6. (a) (i) A light microscope

(ii) For magnification

(iii) **A** – eyepiece lens **B** – body tube **C** – objective lens **D** – stage
E – condenser **F** – diaphragm **G** – mirror
H – fine adjustment knob **I** – coarse adjustment knob.

(iv)

Part	Use
A	Contributes to the total magnification of the image of the specimen under view.
B	Holds the eyepiece and revolving nosepiece in position.
C	Brings out the total magnification in combination with the eyepiece lens.
D	Where the specimen on the slide is placed.
E	Concentrates light on the stage.
F	Controls the light passing through the condenser to illuminate the stage.
G	Reflects light through the condenser to the stage.
H	Brings the image into sharp focus.
I	Brings the image into rough focus.

(b) (i) He held the base and the arm while carrying the microscope.

(ii) - Ensuring that the lenses do not touch the slide when viewing a specimen.
- Immediately cleaning the lens after using immersion oil.
- Cleaning the lenses carefully and using appropriate materials and reagents to avoid scratches.

(iii) Cover it with a dust cover and store in a cabinet. Store it in a cool dry place.

(iv) - Cleaning them after use.

- Handling them carefully to avoid breaking.

The SI units for basic and derived quantities in science (Refer to page 21)

1. It is the universal standard system of measurement used in science.
- 2.

Basic quantity	SI units
Length	Metre (m)
Mass	Kilogram (kg)
Temperature	Kelvin (K)
Time	Second (s)
Electric current	Ampere (A)
Amount of substance	Mole (mol)
Luminous intensity	Candela (cd)

3.
 - area – m^2 – volume – m^3
 - density – kg/m^3 – speed – m/s
4. (a) The degree of hotness or coldness of a substance, object or place.
 - (b) (i) $25^\circ\text{C} + 273 = 298\text{ K}$ (ii) $60^\circ\text{C} + 273 = 333\text{ K}$
 - (iii) $100^\circ\text{C} + 273 = 373\text{ K}$ (iv) $36.7^\circ\text{C} + 273 = 309.7\text{ K}$
5. (a) $273\text{ K} - 273 = 0^\circ\text{C}$ (b) $293\text{ K} - 273 = 20^\circ\text{C}$
- (c) $100\text{ K} - 273 = -173^\circ\text{C}$
6. (a) $\frac{12\text{ cm}}{100} = 0.12\text{ m}$ (b) $\frac{11\text{ cm}}{100} = 0.11\text{ m}$
7. (a) Tape measure
- (b) $\frac{300\text{ cm}}{100} = 3\text{ m}$
8. (a) Mass is the quantity of matter contained in a substance.
 - (b) – Electronic balance – Beam balance
 - Spring balance
- (c) (i) $\frac{200\text{ g}}{1000} = 0.2\text{ kg}$ (ii) $\frac{1500\text{ g}}{1000} = 1.5\text{ kg}$
- (iii) $1.5\text{ t} \times 1000 = 1\,500\text{ kg}$
- (d) (i) $21\text{ kg} \times 1000 = 21\,000\text{ g}$
- (ii) $3.2\text{ t} \times 1000 = 3200\text{ kg}$
- $3200\text{ kg} \times 1000 = 3\,200\,000\text{ g}$
9. (a) Second, millisecond or microsecond
- (b) $2\text{ hours} = 2 \times 60 \times 60 = 7200\text{ s}$
- $13\text{ mins} \times 60\text{ s} = 780\text{ s}$
- $7200 + 780 = 7980\text{ s}$
- (c) $24\text{ hrs} \times 60\text{ mins} \times 60\text{ s} = 86,400\text{ s}$
- (d) $6 + 3 = 9\text{ mins}$
- $9 \times 60 = 540\text{ s}$

10. (a) Electric current is a measure of quantity of charge passing at any point of an electric conductor per unit time.
 (b) Ammeter
 (c) Milliampere (mA) and microampere(μ A)
 (d) This is a measure of the amount of light a point source radiates in a given direction per unit of solid angle.
11. (a) 6.02×10^{23} particles (b) $\frac{(30.1 \times 10^{23})}{(6.02 \times 10^{23})} = 5$ moles
12. (a) Length (b) $100 \text{ m} \times 70 \text{ m} = 7\,000 \text{ m}^2$
 (c) Length = $\frac{1\,500}{100} = 15 \text{ m}$ (d) $\frac{50 \text{ cm}}{100} = 0.5 \text{ m}$
 Width = $\frac{900}{100} = 9 \text{ m}$ $\frac{20 \text{ cm}}{100} = 0.2 \text{ m}$
 Area = $15 \text{ m} \times 9 \text{ m} = 135 \text{ m}^2$ $\frac{30 \text{ cm}}{100} = 0.3 \text{ m}$
 $0.5 \text{ m} \times 0.2 \text{ m} \times 0.3 \text{ m} = 0.03 \text{ m}^3$
13. (a) Density is the mass of a substance per unit volume.
 (b) Mass and volume
 (c) $\frac{10 \text{ g}}{20 \text{ cm}^3} = 0.5 \text{ g/cm}^3$
 $1 \text{ g/cm}^3 = 0.001 \text{ kg}/0.000001 \text{ m}^3 = 1000 \text{ kg/m}^3$
 $0.5 \text{ g/cm}^3 = 0.5 \times 1000 \text{ kg/m}^3 = 500 \text{ kg/m}^3$
 (d) $\frac{12 \text{ g}}{40 \text{ cm}^3} = 0.3 \text{ g/cm}^3$
 $1 \text{ g/cm}^3 = 1000 \text{ kg/m}^3$
 $0.3 \text{ g/cm}^3 = 0.3 \times 1000 \text{ kg/m}^3 = 300 \text{ kg/m}^3$
 (e) Q should be the layer at the bottom and V the layer at the top.
 (f) $\frac{1 \text{ g}}{1 \text{ cm}^3} = 1 \text{ g/cm}^3$
 $1 \text{ g/cm}^3 \times 1000 = 1000 \text{ kg/m}^3$
14. (a) Length and time
 (b) $\frac{350 \text{ m}}{50 \text{ s}} = 7 \text{ m/s}$ or 7 ms^{-1}
 (c) Distance $160 \text{ km} \times 1000 = 160\,000 \text{ m}$
 Time = $2 \text{ hrs} \times 60 \text{ mins} \times 60 \text{ s} = 7\,200 \text{ s}$
 Speed $\frac{160\,000}{7\,200} = 22.22 \text{ m/s}$

Consumer protection when handling different apparatus, instruments and other materials (Refer to page 23)

1. Consumer protection is the practice of safeguarding the user of a product from any harm that can be caused by the product.
2. Quantity, expiry date, any dangers associated with the use of the commodity
3. -To know the quantity of the product.
-To know the storage temperature.
-To know the precautions to take when using the product.
-To know how to use and dispose of the container (packaging material)
-To know how to handle or transport the product.
-To know the expiry date of the product.
4. -Correctly label all chemicals to avoid confusion.
-Wear protective gloves when handling corrosive chemicals.
-Carry experiments that produce dangerous chemicals in a fume chamber.
5. (a) Gloves
(b) The chemical is corrosive
(c) Gas mask, safety glasses
6. The manufacturer has put the hazard symbols on the label to warn the consumer on the dangers associated with the use of the chemical.

2. Mixtures, elements and compounds

2.1 Mixtures

Separating homogenous mixtures (Refer to page 24)

1. (a) A mixture is the physical combination of two or more substances that retain their individual properties.
(b) A homogenous mixture is a mixture whose components are uniformly distributed.
(c) A heterogonous mixture is a mixture whose components are not uniformly distributed.
(d) A solute is a solid that dissolves in a solvent.
(e) A solvent is a liquid in which a solute dissolves.
(f) A solution is the homogenous mixture formed when a solute dissolves in a solvent.

2.

Mixture	Homogenous or heterogenous
Ethanol and water	Homogenous
Sand and water	Heterogenous
Beans and maize	Heterogenous
Diesel and water	Heterogenous
Milk and water	Homogenous
Salt and water	Homogenous

3. (a) Simple distillation – it is a homogenous solute-solvent mixture whose boiling points are different but not close.
(b) Fractional distillation – the components have boiling points that are different but close.
(c) Simple distillation – it is a homogenous solute solvent mixture whose boiling points are different but not close.
4. (a) Simple distillation.
(b) **A** – delivery tube, **B** – Test tube or Boiling tube, **C** – Distillate **D** – Ice cold water
(c) To prevent bumping when the salt solution is heated.
(d) To provide very low temperatures so that steam can condense.
5. (a) Fractional distillation
(b) **A** – Fractionating column **B** – Liebig condenser **C** – Distillate **D** – Round-bottomed flask, **E** – Broken porcelain or glass beads.
(c) Ethanol. It has a lower boiling point than water.
(d) To increase the surface area for condensation of vapour.
(e) Apparatus **B** will not be filled with water, which will reduce the efficiency of the Liebig condenser to carry out condensation. As a result, less of the distillate will be collected.
(f) Keep ethanol away from open flames because it is flammable.
6. (a) Sublimation is the process by which a solid changes directly to gas when heated.
(b) Iodine crystals, solid carbon (IV) oxide, naphthalene, ammonium chloride
(c) (i) Iodine sublimates when heated but sodium chloride does not.
(ii) Deposits of iodine
(iii) Deposition.
(iv) To provide very low temperatures so that the iodine vapour can be deposited.
(v) Mixture of sodium chloride and naphthalene. (*Accept any other.*)

7. (a) Chromatography is a method of separating coloured mixtures by taking advantage of their difference in solubility in a moving solvent and stickiness on a separating material while chromatogram is the separated colours of the mixture on the separating material.
- (b) Propanone.
- (c) – Most coloured components cannot dissolve in water.
– Methylated spirit is a coloured liquid and that would affect the results.
- (d) (i) B – it only contains the chromatogram of substance K.
(ii) A and C – they show chromatograms that do not correspond to K.
(iii) Avoid taking juice A and C since they contain banned food colours.
8. (a) -propanone, ethanol, methylated spirit
- (b) (i) To increase the surface area for the solvent to dissolve the oil.
(ii) For the solvent to evaporate leaving behind the oil.
(iii) A translucent mark was observed.
9. Propanone and water. Propanone dissolves iodine while water dissolves sugar.
10. (a) A saturated solution is a solution that cannot dissolve any more solute at a given temperature.
- (b) A crystal is a homogenous solid with a regular shape.
- (c) Crystallisation is the process of forming crystals by preparing a hot saturated solution and then allowing it to cool.
11. (a) About 30 cm³ of water was put in a beaker and copper (II) sulphate was added using a spatula. A stirring rod was used to stir up to quicken the rate of dissolving. More copper (II) sulphate was added while stirring. This was repeated until no more of the salt dissolved. The solution was heated to 50 °C and more copper (II) sulphate added as stirring continued until no more salt dissolved at this temperature and some undissolved salt remained at the bottom of the beaker. The solution was then decanted into an evaporating dish. This was a saturated solution of copper (II) sulphate.
- (b) (i) Dip a glass rod into the solution and hold it in the air. If some crystals form on the rod as it cools, then the solution is ready to form crystals.
(ii) Water is required for crystals to form. This water in crystals is called water of crystallisation.
- (c) - A mixture of sodium chloride and water (salt solution)
- A mixture of sugar and water (sugar solution)
- A mixture of zinc (II) nitrate and water (solution of zinc (II) nitrate)

Application of different methods of separating mixtures (Refer to page 30)

1.

Application in daily life	Method of separating mixtures
Testing of banned substances in urine of an athlete	Chromatography
Testing for unwanted additives in foods and drinks	Chromatography
Obtaining oil from sunflower seeds	Solvent extraction
Refining crude oil	Fractional distillation
Checking for contaminants in food and pharmaceutical products	Chromatography
Purifying water for drinking	Simple distillation

2. When heated, dry ice sublimates without leaving any wetness unlike ice from water which melts leaving wetness.
3. Fractional crystallisation.
4. (a) (i) Carbon (IV) oxide is removed by bubbling air through sodium hydroxide.
(ii) Water is removed by cooling the air to -25°C to condense it.
(b) (i) Dust particles are removed by filtration.
(ii) They are compressed to form liquid air which is then heated in a fractionating column. Nitrogen with the lower boiling point distills out first at -196°C while oxygen with a boiling point of -183°C distills out later.

2.2 Acids bases and indicators

Identifying acids and bases using a litmus paper (Refer to page 31)

1. It is a substance that gives a definite colour in acidic solutions and a different definite colour in basic solutions.
2. (a) blue (b) red
3. (a) red (b) blue

Substance	Effect on red litmus paper	Effect on blue litmus paper	Acidic	Basic
Sour milk	red	red	✓	
Bar soap solution	blue	blue		✓
Wood ash solution	blue	blue		✓
Lemon juice	red	red	✓	
Orange juice	red	red	✓	
Baking powder solution	blue	blue		✓
Grape juice	red	red	✓	
Anti-acid tablets	blue	blue		✓
Toothpaste solution	blue	blue		✓

Preparing an acid-base indicator from plant extracts (refer to page 33)

1. Ethanol and propanone
2. They change colour with time.
3. (a) (i) To increase the surface area for the solvent to dissolve the coloured pigment.
(ii) To dissolve the coloured pigment.
(b) Coloured pigments in flowers are insoluble in water.
(c) Dispose of them in appropriate bins.
- 4.

Substance	Colour after adding the extract	Acidic	basic
Sour milk	Colour depends on the type of flowers used		
Bar soap solution			
Wood ash solution			
Lemon juice			
Orange juice			
Baking powder solution			
Grape juice			
Anti-acid tablets			
Toothpaste solution			

Physical properties of acids and bases (refer to page 34)

1. (a) Turn red litmus blue, they have a bitter taste, they have a slippery feel, some are corrosive
(b) They have a sour taste, turn blue litmus paper red, some are corrosive
2. Being corrosive
3. (a) They are made up of a basic compound.
(b) They contain acids.
(c) They are made up of basic compounds.

Applications of acids, bases and indicators in real life (Refer to page 34)

1. (a) – Sulphuric acid is used to make fertilisers.
– Nitric acid is used to make dyes and paints.
(b) – Magnesium hydroxide is used to make anti-acid tablets.
– Sodium hydroxide is used to make detergents.
(c) – Used in agriculture to test the pH of soils.
– Used to determine the end point of neutralisation reactions.

2. (a) – Some acids and bases are used in the manufacture of fertilisers that are used to increase soil fertility.
 - Bases such as lime are used to decrease soil acidity.
- (b) – Some acids are used in the preservation of soft drinks.
 - Bases such as sodium hydroxide are used in the manufacture of soap.
- (c) – Hydrochloric acid in the stomach kills germs in food.
 - Bases such as magnesium hydroxide are used to manufacture anti-acid tablets.
3. (a) Manufacture of fertilisers. Also used in car batteries.
- (b) Manufacture of dyes and paints (c) Adding flavour to processed food
- (d) Manufacture anti-acid tablets (e) Manufacture of detergents
- (f) Reduce soil acidity
4. (i) Magnesium hydroxide (ii) sodium hydroxide/ potassium hydroxide
5. Calcium hydroxide.

3. Living things and their environment

3.1 Human reproductive system

Parts of the human male and female reproductive systems (Refer to page 38)

1. (a) A (b) B
2. A – penis B – urethra C – testis D – vagina
 E – ovary F – oviduct (fallopian tube) G – uterus H – cervix

Functions of parts of male and female reproductive system (Refer to page 38)

1. (a) Testis (b) Penis (c) urethra
2. Vagina – a passageway through which the baby comes out during childbirth.
 Cervix – produces a fluid that enables sperms to swim into the female's body for fertilisation to take place.
 Uterus – it is the site for implantation and development of foetus.
 Ovaries – they produce ova and female sex hormones.
 Oviduct – it is the site for fertilisation.

Physical changes that take place in boys and girls during adolescence (Refer to page 39)

1. (a) - Penis, scrotum and testes enlarge.
 - Chest and shoulders broaden.
 - Voice deepens.
 - Some experience wet dreams.

- Hair grows in pubic area, chest and under the armpits.
- Increased growth in weight and height.
- Pimples (acne) may appear on the face.
- (b) - Breasts start to enlarge.
 - Hips broaden.
 - Menstruation begins.
 - Hair grows in the pubic region and under armpits.
 - Increased growth in weight and height.
 - Pimples (acne) may appear on the face.
- 2. - Hair grows in pubic areas and under the armpits.
- Increased growth in weight and height.
- Pimples (acne) may appear on the face.

How to manage development challenges during adolescence

Challenges	How to manage
Feeling bad because of enlarged breasts, growth of beards and breaking voice.	Appreciate that it is a normal occurrence in adolescents.
Feeling bad due to menstruation or wet dreams.	Appreciate that it is normal for girls to experience menstruation and wet dreams for boys. Girls should have sanitary towels. Both girls and boys should observe hygiene.
Being aggressive and trying to indulge in risky behaviour.	Let the adolescents differentiate right from wrong. Let them know that it is okay to feel the way they are feeling but self-control should prevail.

Fun spot

Across

1. Scrotum
2. Uterus
3. Ovary
4. Penis
5. Urethra
6. Oviduct
7. Vagina

Down

2. Urethra
6. Ovum
8. Reproduction
9. Testis
10. Egg
11. Cervix

3.2 Human excretory system

Parts of the human skin and their functions (Refer to page 44)

1. Excretion is the process by which living things separate and eliminate waste products out of their bodies.
2. It helps in removing toxic waste which if allowed to accumulate may poison body cells.
3. Excess salts, water and urea
4. A – Dermis B – Epidermis C – Hair D – Sweat gland
5. (a) – It is the outermost layer that prevents bacteria and viruses from entering the body. It also prevents the loss of water from the body.
 - Its middle layer gives rise to a new cornified layer.
 - Its innermost layer produces new skin cells. It also contains a pigment called **melanin** that protects the body against ultraviolet radiation and gives the skin its colour.(b) It helps in temperature regulation.
(c) They produce sweat. When sweat evaporates, the body cools.
(d) An opening through which sweat leaves the body.
(e) Conducts sweat from the sweat gland to the skin surface.
6. When sweat evaporates, the body cools.

Parts of the urinary system and their functions (Refer to page 44)

1. P – kidney, Q – ureter , R – bladder , S – urethra
2. Water, urea, salt
- 3.

Function	Part of the urinary system
Excrete metabolic waste, regulate pH, performs osmoregulation hence maintaining ionic balance	Kidney
Transports urine from the kidney to the urinary bladder	Ureter
Temporarily stores urine	Bladder
Allows urine from the bladder to pass out of the body	Urethra
Has an artery that supplies blood with impurities to the kidney and a vein which takes blood from the kidney to the heart	Blood vessels

4. At low temperatures, one produces much dilute urine since less water is released through sweating. At high temperatures, little concentrated urine is produced as much water is released through sweat.

Causes of kidney disorders (Refer to page 45)

1. Any condition that leads to improper functioning of the kidney.
2. Matching the disorders with their causes.

Disorder	Causes
Nephritis	Bacterial and viral infections, allergic reaction to some medication, family history of the disease, low levels of potassium in the body.
Proteinuria	Damage of the filtering unit of the kidney due to inflammation, low blood pressure or dehydration.
Kidney stones	Inadequate intake of water, obesity, eating too much salt and excess animal protein.
Kidney failure	Blood clots in veins and arteries, cholesterol in the blood vessels, high levels of toxins in blood, allergic reactions to certain drugs.
Uraemia	Reduced intake of water, kidney infection, high animal protein intake

3. Intake of adequate amount of water helps to dissolve the nitrogenous waste and salts in urine preventing formation of kidney stones and other kidney disorders.
4. Avoiding a lot of sugary foods and exercising
5. Kidney stones and proteinuria
6. A diet rich in fruits and vegetables.
7. For early detection of any disorder so that it can be managed or treated before it advances.

Healthy lifestyle that promotes kidney and skin health (Refer to page 46)

1. (a) • Wash the skin with warm water and soap.
 - Take adequate amount of water.
 - Avoid stress that may be harmful to your skin.
 - Avoid smoking.(b) • Get enough sleep everyday.
 - Eat healthy food. Include enough fruits and vegetables in your diet.
 - Do regular physical exercises.
 - Do not smoke.
2. • Proper utilisation of time.
 - Being obedient to teachers and parents.
 - Sharing our challenges with trusted people for help.
3. Treatment or management of disorders at early stages can be cheaper and it is also possible to cure the disorders.

- Diets with enough fruits and vegetables provide enough vitamins that are essential for healthy skin. Vitamins and minerals in fruits and vegetables also help prevent some kidney infections.

4. Force and energy

4.1 Electrical energy

Sources of electricity in the environment (Refer to page 50)

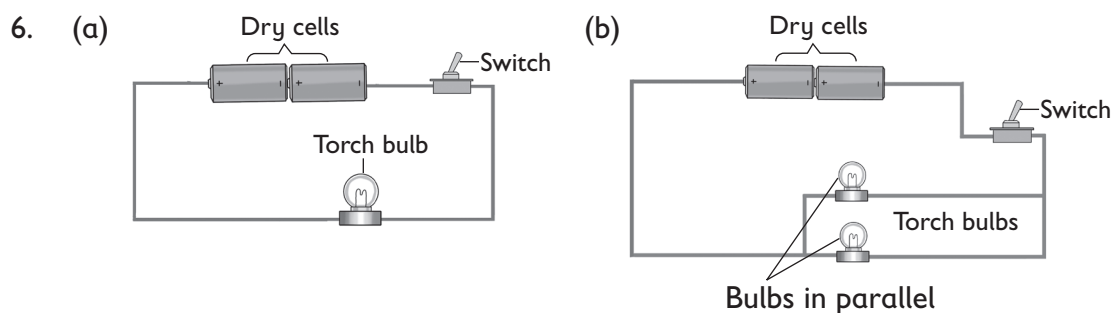
- It is energy that is produced by the movement of electrically charged particles.
- Sunlight, moving water, wind, tides, biomass, fossil fuels, natural gas, electric cells, underground steam
- Moving water, sunlight, biomass, underground steam (*Accept any other correct one.*)
- A – hydroelectric power
B – geothermal power

Simple electric circuits (Refer to page 50)

- A connection between a source of electricity and materials through which an electric current flows.
- A – dry cell B – switch C – bulb D – bulb holder
E – connecting wire
-

Component	Function
Dry cell	It is the source of electricity in the circuit.
Connecting wires	They connect the different parts of a circuit and current flows through them.
Switch	To open or close the circuit.
Bulb	It lights when the circuit is closed to show that current is flowing.

- (a) (i) B
(ii) A
(b) A – when cells are arranged in series, the total voltage is the sum of the voltages of the two cells while in parallel the total voltage is the same as that of one cell.
- (a) (i) B (ii) A
(b) B – when bulbs are in parallel, each receives the total voltage of the cells.
(c) – When one bulb is faulty, the other bulb is not affected.
– The bulbs are brighter
(d) When one bulb is faulty, the other bulb is affected.



7. (a) A conductor is a material that allows electric current to flow through it while a non-conductor of electricity is a material that does not allow electric current to flow through it.
- (b) (i) copper, iron, silver, aluminium (Accept any other correct response)
(ii) wood, plastic, paper, glass (Accept any other correct response)

8.

Material	Conductor	Non-conductor
Paper		✓
Wood		✓
Iron	✓	
Plastic		✓
Aluminium	✓	
Copper	✓	

Common electrical appliances used in day-to-day life (Refer to page 52)

1. (a) A – electric cooker B – blender C – electric lamp D – iron box
E – washing machine F- refrigerator

(b)

Electrical appliance	Use
Electrical cooker	Cooking
Blender	Mixing, blending and grinding foods and drinks
Iron box	Removes creases from clothes
Refrigerator	Keeps food and drinks cold so that they stay fresh for a longer period
Washing machine	Washing clothes
Electric lamp	Lighting

2. Radio, television, electric fan, torch, electric kettle, microwave (Accept any other correct one.)

Safety precautions when handling electrical appliances (Refer to page 53)

- Never use an appliance that has a damaged cable or plug.
- Never touch an electrical appliance with wet hands.

- Keep a safe distance from the moving parts of an electrical appliance.
- Never put your fingers or a metallic object into an electric circuit.
- Switch off an appliance before unplugging it from the source of electricity.
- Do not connect too many appliances to one socket. This can cause damage to the appliance and overload the circuit.
- Always ensure there are no electric cables on the pathways.

4.2 Magnetism

Properties of a magnet (Refer to page 55)

1. (a) attraction (b) repulsion (c) repulsion
2. A substance that is attracted to a magnet can either be a magnet or a magnetic material. A substance that repels a magnet can only be a magnet.
3. (a) Towards A (b) Away from A

Magnetic and non-magnetic materials (Refer to page 55)

1. A magnetic material is attracted by a magnet. A non-magnetic material is not attracted by a magnet.
2. Bring a magnet close to the materials one at a time. The magnet will either attract or repel the other magnet while the magnetic material will be attracted by the magnet
- 3.

Magnetic materials	Non-magnetic materials
Steel pins	Glass rod
Roofing iron sheets	Copper wire
Steel razor blade	Piece of paper
	Aluminium spoon
	Plastic cap

Use of magnets in day-to-day life (Refer to page 55)

1. (a) A magnet is used to pick out magnetic materials in a mixture leaving behind non-magnetic materials in the mixture.
(b) A small magnet fixed on the door attracts a magnetic material that is fixed at a suitable position on the refrigerator. This attraction keeps the door closed.
2. In magnetic compass to show direction, in speakers, screwdrivers and toys (**any three**).
3. Suspend the bar magnet horizontally using a thread. Allow the magnet to swing freely and then settle. When the bar magnet settles, its north pole points to the geographical north and its south pole points to the geographical south.

Fun spot

1. Copper
2. South pole of a magnet
3. Magnetic needle or compass needle.

Answers to sample Assessment papers

Assessment paper 1 (Refer to page 57)

1. Chemistry
2. (a) Measurement, recording, manipulation (**Accept any one**)
(b) Observation, communication, classification, prediction and conclusion.
3. (a) A – Toxic
(b) B – Corrosive
4. (a) Thermometer
(b) $36 + 273 = 309\text{K}$
5. (a) Simple distillation
(b) – The thermometer should not be dipped in the mixture.
– The water inlet and outlet in the liebig condenser have been interchanged.
6. (a) Propanone or ethanol
(b) It effectively dissolves the flower extract.
7. (a) A – Ovary, B – Fallopian tube, C – Uterus
(b) (i) C (ii) B
8. (a) The urinary system
(b) P – Ureter
(c) Q – to store urine temporarily.
9. (a) Solar energy panel
(b) Hydroelectric power generators, geothermal power generators, wind power generators.
10. (a) Repulsion
(b) Attraction

Assessment paper 2 (Refer to page 60)

1. Medicine and surgery, chemical engineering, scientific research (**Accept any other correct answer**)
2. (a) Anything that has the potential to cause harm or injure someone.
(b) Open flames, open electric sockets, broken glass equipment. (**Accept any other correct answer**)

3. (a) Bunsen burner (b) A source of heat (c) To make the burner stable on the bench.
4. 150 m²
5. (a) sublimation (b) iodine (c) deposition
- 6.

Colour of litmus paper	Colour in basic solution	Colour in acidic solution
Red	blue	Red
blue	blue	red

7. Breast development and menstruation
8. (a) Skin
(b) Excretion (Accept any other correct answer)
(c) **A** – epidermis **B** – sweat gland
9. (a) To open and close the circuit.
(b) The brightness of the bulb reduces.
10. (a) North pole and South pole
(b) (i) repulsion force (ii) attraction force
(c) – in making electric motors and generators.
– in separating magnetic materials when sorting garbage. (**Accept any other correct answer**)

Assessment paper 3 (Refer to page 62)

1. Through scientific research, drought and pest-resistance crops have been developed. (**Accept any other correct answer**)
2. – Wash the cut with clean running water.
– Apply pressure on the cut to stop bleeding.
– Apply an antiseptic if it is available.
3. (a) Light microscope
(b) It makes small things appear big. It magnifies specimens.
(c) Storing it in a dust-free safe box. (**Accept any other correct answer**)
4. (a) A – volumetric flask B – pipette
(b) To clearly see the level of the liquid in them.
5. (a) Homogeneous
(b) To prevent bumping of the solution.
(c) Table salt and water (**Accept any other suitable answer**).
(d) To obtain pure water from salty water (**Accept any other suitable answer**).
6. (a) The sting of the nettle plant was acidic. Wood ash is a base. The wood ash neutralised the acid in the sting thus relieving the pain.

- (b) (i) Used in making fertilisers, dyes, paints, drinks such as sodas, food flavours, substances for killing germs and car batteries.
 - (ii) Making anti-acid tablets, soaps and detergents, reagents for cleaning surfaces and lime used to reduce soil acidity.
7. (a) A – testis, B – urethra, C – penis
(b) It produces sperms and male sex hormones.
 8. (a) Eating healthy foods, regular physical exercise, not taking medicine without doctor's prescription, drinking enough water, avoiding stress, regular medical check-ups of kidneys.
(b) Washing it regularly and properly, not exposing it to intense sunlight, drinking enough water, avoiding stress, getting enough sleep, visiting a skin specialist in case of any unusual change on the skin, avoid smoking.
 9. (a) A – electric blender, B – fan C – washing machine D – electric kettle
(b) – Never use an appliance with a damaged cable.
– Keep hands, fingers, feet, toes and hair away from the moving parts of an appliance.
– Never touch an appliance with wet hands.
– Always hold the plastic base of the cable when unplugging it from the socket.
– Switch off the appliance when unplugging it from the source of electricity.
– Do not connect too many appliances to one socket.
– Remove cables from pathways.

Assessment paper 4 (Refer to page 65)

1. Biology
2. (a) Ensuring that the mouth of the test tube being heated is facing away from him to avoid accidents due to spurting.
(b) – Do not eat or taste anything in the laboratory.
– Do not smell gases directly, instead, waft them towards your nose with the palm of your hand.
– Ensure the gas taps are closed after use.
– Know the location of safety equipment such as the fire extinguishers and how to use them.
– Keep laboratory windows open to allow free circulation of air. (**Accept any other two**)
3. (a) Predictive skill
(b) Observation

4. (a) Length = $\frac{5}{100} = 0.05 \text{ m}$
 Width = $\frac{3}{100} = 0.03 \text{ m}$
 Height = $\frac{4}{100} = 0.04 \text{ m}$
 Volume = $0.05 \text{ m} \times 0.03 \text{ m} \times 0.04 \text{ m} = 0.00006 \text{ m}^3$
- (b) Mass = 120 g
 Volume = $5 \text{ cm} \times 3 \text{ cm} \times 4 \text{ cm} = 60 \text{ cm}^3$
 Density = $\frac{120 \text{ g}}{60 \text{ cm}^3}$
 $= 2 \text{ g/cm}^3$
 $= 2 \times 1000 \text{ kg/m}^3$
 $= 2000 \text{ kg/m}^3$
5. (a) propanone
 (b) Oil does not dissolve in water.
6. (a) toothpaste (b) lemon juice
 (c) use an acid-base indicator (**Accept any other correct answer**)
7. (a) Hand lens
 (b) A – eyepiece lens B – condenser C – diaphragm D – fine adjustment knob
 (c) A
8. I would let her know that the changes she is experiencing are normal and every adolescent is unique. (**Accept any other correct answer**)
9. (a) Kidney
 (b) – To regulate the pH of body fluids.
 – To remove metabolic wastes and excess water and salts from the body.
 – To regulate the amount of water and salts in the body fluids.
 (c) A – renal artery B – renal vein
10. (a) Wind power generators (**Accept any other correct response**)
 (b) – hydroelectric power generators
 – geothermal power generators
 – solar energy panels
 – electrical cells
 – natural gas
 (**Accept any other correct answer.**)
11. (a) A magnetic needle inside a magnetic compass rotates and settles in a north-south direction.

- (b) Cranes fitted with magnets are used to pick magnetic waste thus separating it from the non-magnetic garbage.

Assessment paper 5 (Refer to page 67)

1. The knowledge gained during the study of Integrated Science.
 - help solve the problems of environmental pollution.
 - helps to understand how to live a healthy life.
 - helps to avoid life style diseases. **(Accept any other correct answer)**
2. (a) Open flame or corrosive liquids.
(b) Go to the wash station immediately; cool the affected area with cold running water for about 10 minutes; keep the affected area open until you seek medical attention.
3. It helps us:
 - tell the quantity or amount of the product.
 - know the expiry date of the product.
 - identify the ingredients used to make the product.
 - tell the benefits of using the product.
 - know how to handle and transport the product
 - know how to use the product and how to dispose of the packaging material, and
 - understand the precautions to observe when using the product. **(Accept any other correct answer)**
4. (a) A – Crucible B – Hand lens
(b) A – used for heating solid substances that require strong heating.
B – used for magnifying objects.
5. (a) B
(b) To test for contaminants or unwanted substances in food, drugs or pharmaceutical products. **(Accept any other correct answer)**
6. (a) – Some are used to make fertilisers such as sulphuric acid.
– Nitric acid is used to make dyes and paints.
(Accept any other correct answer)
(b) – Magnesium hydroxide is used to make anti-acid tablets.
– Some are used to make soaps and detergents. Examples are sodium and potassium hydroxide.
– Lime is applied on the soil to reduce soil acidity. **(Accept any other correct answer)**

- 7. – Kidney stones – Uraemia
- 8. (a) (i) Dry cells – series
(ii) Bulbs – parallel
- (b) (i) When one bulb is faulty the other one is not affected.
(ii) The bulbs are brighter than when in series.
- 9. (a) Iron nail and copper wire (**Accept any other correct response**)
(b) A substance that does not allow an electric current to flow through.
- 10. – Never use an appliance with a damaged cable or plug.
– Never touch an electric appliance with wet hands.
(**Accept any other correct answer**)