3 GIFTED MINDS
EDUCATION

FREE 33-PAGE PREVIEW

Secondary 2 Science Series

G2 & G3 | MOE Lower Secondary Science Syllabus



A genuine look inside the complete series

Actual notes, diagrams, worksheets, tests and answer explanations

THIS SAMPLE INCLUDES

- 16 Topical Notes pages across all 8 chapters
- 8 Worksheet pages, one from every chapter
- 2 Chapter Test previews
- 4 detailed Answer Key pages
- A full overview of the 24-booklet hardcopy series

© 3 GIFTED MINDS EDUCATION PTE LTD 2026

The complete Secondary 2 series

8 chapters. 3 separate saddle-stitched booklets per chapter. 24 booklets in total.

09	Application of Forces and Transfer of Energy	96 pages
10	Transfer of Heat Energy and its Effects	96 pages
11	Chemical Changes	96 pages
12	Interactions within Ecosystems	88 pages
13	Electrical Systems	96 pages
14	Human Digestive System	96 pages
15	Transport Systems in Living Things	96 pages
16	Human Sexual Reproductive System	88 pages

EVERY CHAPTER: TOPICAL NOTES | WORKSHEET & TEST | ANSWER KEY

Topical Notes

Build a strong foundation of the chapter's key concepts.

Worksheet & Test

Attempt each worksheet and the chapter test under timed conditions.

Answer Key

Full worked explanations, because the reasoning matters more than the final answer.

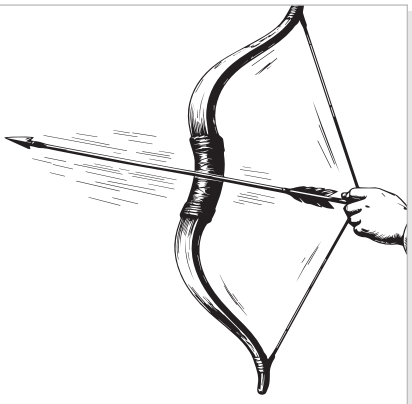
Optional G2 content and enrichment material are clearly identified within the materials.

CHAPTER

9

Application of Forces and Transfer of Energy

TOPICAL NOTES



9.1 FORCES IN NATURE

DEFINITION | **Force:** a push or a pull. Its SI unit is the newton (N).

Forces in nature can be powerful enough to cause natural disasters, and over long periods they also shape the landforms around us.

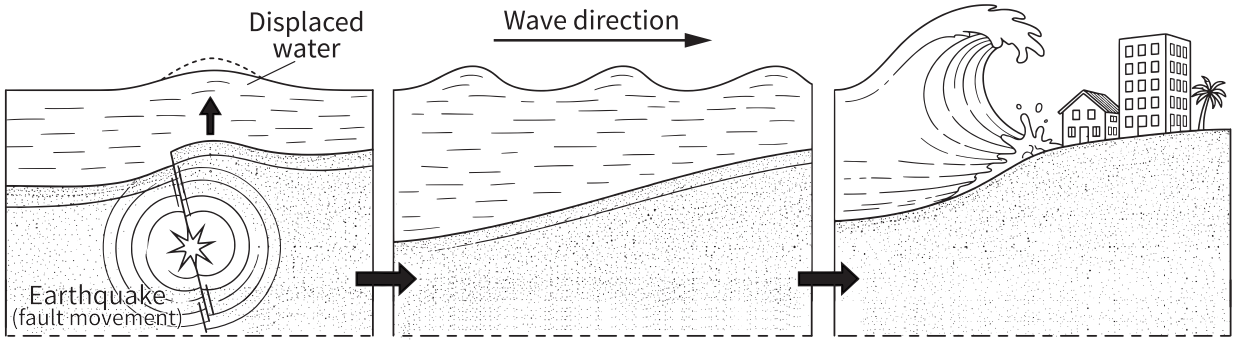
- **Earthquakes:** Earth's surface is made of huge moving plates. When plates slide against each other, the force releases a large amount of energy, felt as tremors.
- **Volcanic eruptions:** magma is pushed out with great force, releasing stored energy as heat, light and kinetic energy.
- **Tsunamis:** underwater earthquakes or eruptions displace ocean water. The potential energy of the water converts to kinetic energy as the waves race to shore and strike with great force (Figure 9.1).
- **Tropical cyclones:** form over warm oceans; strong winds exert great forces on objects in their path.
- Forces also build landforms over millions of years, such as the Twelve Apostles in Australia, where waves and wind eroded limestone cliffs into caves, then arches, then standing pillars.

Tsunami sequence

❶ Underwater earthquake displaces water, giving it potential energy.

❷ The wave grows in size and races across the ocean.

❸ As the wave reaches shallow water near the shore, it increases in height and strikes buildings.



Potential energy	Energy change	Kinetic energy
Stored in the displaced water due to the movement of the ocean floor.	→ (as the tsunami moves from deep ocean to shore)	Energy of the moving wave as it travels and strikes the shore and buildings.

Figure 9.1: Forces in nature transfer energy from one form to another.

© 3 GIFTED MINDS EDUCATION PTE LTD

Enrichment

Forces and climate change

Warmer oceans caused by climate change lead to more intense storms. Mangrove trees act as a natural barrier: their dense, above-ground roots bind and build up soil, reducing coastal erosion during violent storms and floods.

9.2 TYPES OF FORCES

Forces are grouped by whether the objects must touch for the force to act.

Type of force	When it acts	Examples
Contact force	Objects are in physical contact (touching).	Friction, elastic force
Non-contact force	Objects are not touching (acts at a distance).	Gravitational force, magnetic force

Contact forces

DEFINITION | **Friction:** the force that opposes motion between two surfaces in contact.

- It lets us grip and hold things, such as a rock climber's chalked hands and shoes gripping the rock.

DEFINITION | **Elastic force:** the force acting on a stretched or compressed elastic object to return it to its original shape.

- A stretched climbing rope pulls back, reducing the impact when a climber falls.

Non-contact forces

DEFINITION | **Gravitational force:** a force that attracts two objects towards each other.

- It gives objects their weight and keeps the Moon orbiting Earth.

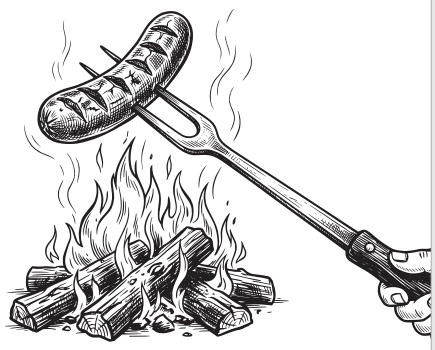
© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

10

Transfer of Heat Energy and its Effects

TOPICAL NOTES



10.1 TEMPERATURE AND THE TRANSFER OF HEAT

Temperature

DEFINITION | **Temperature:** the measure of how hot an object is. Its SI unit is the kelvin (K).

- Measured in degrees Celsius (°C) or degrees Fahrenheit (°F) in daily life.
- How hot something feels by touch is unreliable and differs from person to person, so temperature is measured accurately with a thermometer.

Enrichment

- Temperature is linked to the average kinetic energy of the particles in a substance. The higher the temperature, the faster the particles move.

Transfer of heat

- **Heat** is a form of energy. The Sun is the main source of heat energy on Earth.

KEY IDEA | **Heat energy always flows from a region of higher temperature to a region of lower temperature.**

- When two objects are in contact, heat flows from the hotter object to the colder object. The hotter object cools and the colder object warms up.
- Transfer continues until both objects reach the same temperature (Figure 10.1).
- The greater the temperature difference between two objects, the faster the rate of heat transfer.

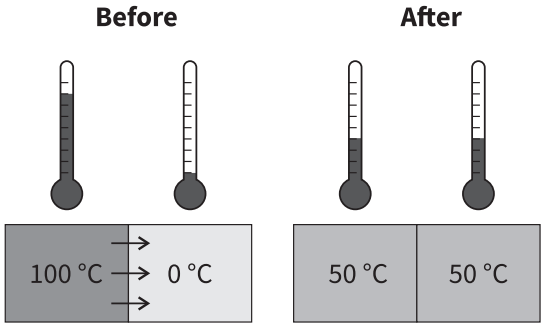


Figure 10.1: Heat flows from the hotter object to the colder object until their temperatures are equal.

© 3 GIFTED MINDS EDUCATION PTE LTD

10.2 EFFECTS OF HEAT: EXPANSION AND CONTRACTION

Expansion and contraction

DEFINITION | **Expansion:** the increase in volume of a substance when it is heated.

DEFINITION | **Contraction:** the decrease in volume of a substance when it is cooled.

- Heating gives particles more energy, so they move further apart and the substance expands (volume increases).
- Cooling removes energy, so particles move closer and the substance contracts (volume decreases).
- During expansion and contraction, the mass stays the same because the number of particles does not change.

Effect on density

- When a substance expands, volume increases but mass is unchanged, so its **density decreases**.
- When a substance contracts, volume decreases but mass is unchanged, so its **density increases**.

density = mass ÷ volume

Amount of expansion in solids, liquids and gases

- Different materials expand and contract by different amounts for the same temperature change.
- Order of increasing amount of expansion: solids expand the least, then liquids, then gases expand the most.

State	Particle behaviour	Amount of expansion
Solid	Particles vibrate about fixed positions and cannot move around.	Smallest (hard to notice)
Liquid	Particles are close but can move past one another.	Larger than solids
Gas	Particles move freely at high speed in all directions.	Greatest

© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

11 Chemical Changes

TOPICAL NOTES



11.1 IDENTIFYING A CHEMICAL CHANGE

Physical and chemical changes

DEFINITION | **Physical change:** a change in which no new substances are formed.

DEFINITION | **Chemical change:** a change in which new substances (in the form of elements and/or compounds) are formed.

The two types of change differ in what they produce and whether they can be reversed:

Physical changes	Chemical changes
No new substances are formed.	One or more new substances are formed.
Usually reversible. The constituents can be recovered using separation techniques.	Usually not easily reversed. The reactants cannot be recovered easily.

- When a chemical change occurs, a **chemical reaction** has taken place. The substances that react are the **reactants**; the new substances formed are the **products**.
- Energy is sometimes taken in or given out during a chemical reaction (for example, heat is released when carbon burns).
- Many chemical changes involve substances combining to form one or more new substances, or one substance breaking down into two or more new substances.

Enrichment

How to spot a chemical change

In practice you recognise one by its tell-tale signs. One or more of these usually appear:

- A **colour change** that is not simply mixing (for example, iron turning to brown rust).
- A **gas given off** (bubbling or fizzing), for example acid on a carbonate.
- A **temperature change**: the mixture gets hot or cold as energy is taken in or given out.
- A **precipitate**: a solid forming when two solutions are mixed.
- **Light** or a new **smell** being produced.

A single sign is a clue, not proof. The only sure test is whether a genuinely new substance has formed.

© 3 GIFTED MINDS EDUCATION PTE LTD

Representing chemical reactions

- A **word equation** shows the reactants and products of a reaction, and sometimes the condition needed for it to occur.
- Reactants go on the left; products go on the right. Any condition (such as heat or light) is written above the arrow (Figure 11.1).

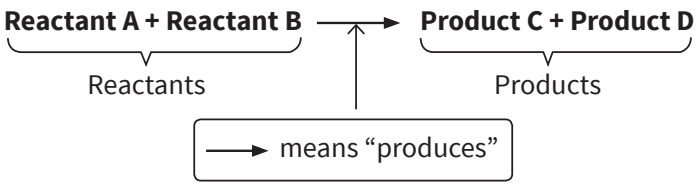


Figure 11.1: Reactants are converted into products during a chemical reaction.

methane + oxygen $\xrightarrow{\text{heat}}$ **carbon dioxide + water**

calcium carbonate $\xrightarrow{\text{heat}}$ **calcium oxide + carbon dioxide**

Rearrangement of atoms and conservation of mass

- During a reaction, the atoms of the reactants rearrange and combine to form the products. The atoms of the products always come from the reactants.
- Atoms are **neither created nor destroyed** in a chemical reaction (Figure 11.2).

KEY IDEA | **The total number of atoms is the same before and after the reaction, so the mass of the reactants equals the mass of the products. Mass is conserved.**

- This is the law of conservation of mass, established by the French scientist Antoine Lavoisier (1743 to 1794), who carefully weighed reactants and products and found their total mass unchanged.

© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

12

Interactions within Ecosystems

TOPICAL NOTES



12.1 HOW DO OUR ACTIONS IMPACT THE ENVIRONMENT?

Earth has only limited resources, such as fossil fuels and fresh water. Because all living things are connected to one another and to their environment, our everyday actions can affect the environment and the survival of other organisms.

Actions that harm the environment

Action	Why it harms the environment
Wasting food	Growing crops and rearing livestock use up water, energy and soil minerals. Wasting food wastes these limited resources.
Using more electricity	In Singapore, electricity is generated mainly by burning natural gas, a limited resource. Burning more fuel gives off more carbon dioxide, which contributes to climate change.
Using more water	Only about 3% of Earth's water is fresh water, and less than 1% is available for use. As water use rises, this limited resource is depleted more quickly.
Creating excessive waste	More waste must be disposed of, polluting the air, water and land. Waste dumped in the oceans can poison or kill marine organisms.

Actions that conserve the environment

DEFINITION | **Conserving the environment:** using only the amount of Earth's resources that we need, so that resources last for future needs and fewer greenhouse gases are released.

Action	How it helps
Reducing the use of fossil fuels	Taking public transport, walking and using energy-efficient appliances reduce the fuel burnt to power vehicles and appliances.
Reducing consumption	Using less paper, reusing items and recycling reduce the need for raw materials such as wood, which in turn reduces deforestation.
Environmentally friendly practices	Initiatives such as bringing your own bag reduce greenhouse gas emissions and the effects of climate change.
Reforestation	Replanting trees protects soil and stores carbon, removing carbon dioxide from the air during photosynthesis.

© 3 GIFTED MINDS EDUCATION PTE LTD

KEY IDEA | **No effort is too small. As our actions add up, conserving resources helps slow climate change and effects such as rising sea levels.**

12.2 HOW DOES AN ENVIRONMENT INFLUENCE THE SURVIVAL OF ORGANISMS?

Physical factors

DEFINITION | **A habitat:** the place where an organism lives.

DEFINITION | **Physical factors:** the non-living conditions of a habitat, such as air, water, temperature, light, minerals and acidity or alkalinity (pH).

Optional for G2

Physical factors such as pH, temperature and light intensity can be measured using instruments such as data loggers and probes.

A suitable combination of physical factors allows plants to grow and provide animals with food and shelter, so the animals can survive and reproduce. Different environments therefore support different living things, as the two deserts below show.

Hot desert	Cold desert
Extreme temperatures and very little water. Few plants and animals can survive these harsh conditions.	Extreme cold near the poles, with most water frozen as ice. Only shallow-rooted plants that mature quickly survive the long, dark winters, and few animals live here.

DEFINITION | **Adaptive traits:** features that help an organism to survive and reproduce in its environment. Only organisms suited to their environment survive long enough to reproduce.

Adaptations in organisms

DEFINITION | **A structural adaptation:** a physical characteristic of an organism that helps it survive in its habitat.

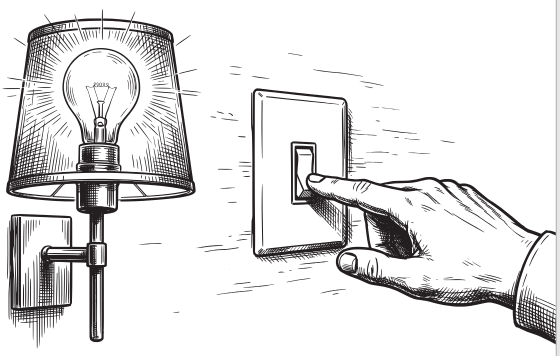
DEFINITION | **A behavioural adaptation:** an action or behaviour of an organism that helps it survive in its habitat.

© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

13 Electrical Systems

TOPICAL NOTES



13.1 WHAT DOES AN ELECTRICAL SYSTEM COMPRISE?

Many appliances, such as a mobile phone or an ECG machine, cannot work on their own. They must be connected to other components to form an electrical system. The components are joined by wires to make a circuit through which electricity can flow.

Electric circuit

- A basic electric circuit contains four parts: an electrical energy source (such as a cell or battery), a conducting wire, a switch and an electrical component (such as a bulb) (Figure 13.1).

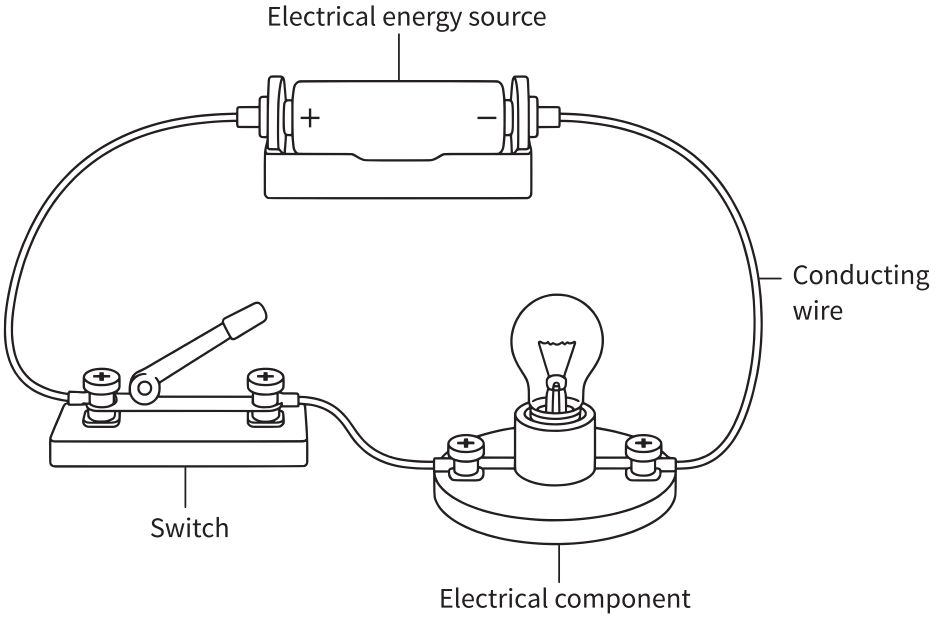


Figure 13.1: A circuit consisting of a cell, a switch, a bulb and connecting wires.

© 3 GIFTED MINDS EDUCATION PTE LTD

- A circuit diagram simplifies the drawing of a circuit by representing each part with a standard symbol (Figure 13.2).

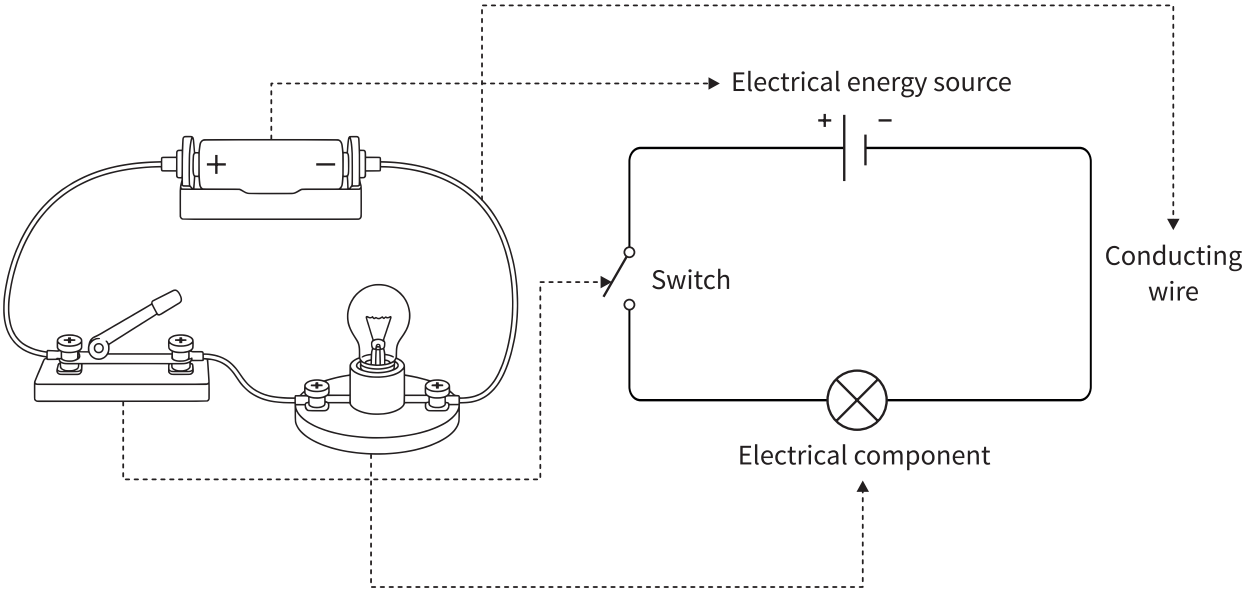
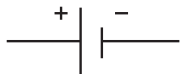
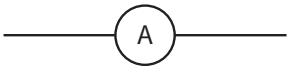
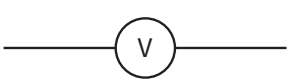


Figure 13.2: Representing a real electrical circuit using a circuit diagram.

Components and their circuit symbols

Engineers represent a circuit with a diagram that uses a standard symbol for each component.

Component	Circuit symbol
Cell	
Battery (two or more cells)	
Bulb	
Switch (open)	
Switch (closed)	
Ammeter	
Voltmeter	

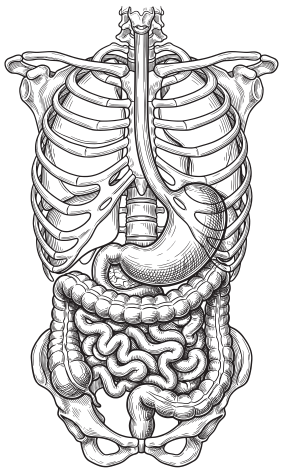
© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

14

Human Digestive System

TOPICAL NOTES



14.1 WHY IS A DIGESTIVE SYSTEM NEEDED IN HUMANS?

We eat because food provides the nutrients the body needs to carry out cellular activities. One of these activities is respiration, which releases the energy used for processes such as growth and tissue repair.

DEFINITION | **Nutrition:** the process by which living organisms obtain the nutrients they need.

Classes of food

The three common types of nutrients found in food are carbohydrates, proteins and fats. The body also needs vitamins, water, fibre and mineral salts to function normally.

Nutrient	Common food sources	Main function in the body
Carbohydrates	Rice, potatoes, bread, noodles, biscuits, pasta	Main source of the body's energy.
Proteins	Beans, peas, tofu, eggs, milk, fish, meat, nuts	Growth of new cells and repair of damaged tissues; needed to make enzymes and hormones.
Fats	Cooking oil, butter, peanuts, avocado, tuna, full-cream milk	A store of energy (fats hold about twice as much energy per gram as carbohydrates); a layer under the skin insulates the body and helps keep it warm.
Vitamins, water, fibre and mineral salts	Fruit and vegetables such as apple, watermelon, broccoli, cucumber	Allow the body to function normally; fibre also keeps the digestive system working smoothly.

Enrichment

- Elements present: carbohydrates and fats contain carbon, hydrogen and oxygen; proteins contain carbon, hydrogen, oxygen, nitrogen, usually sulfur, and sometimes phosphorus.

Why food must be digested

Digestion is the breaking down of food into small, soluble molecules that the body can absorb; food has to be digested so that its nutrients can be used by the body cells. A grape placed in the mouth gives no energy directly; it must first be digested before its nutrients can be used.

© 3 GIFTED MINDS EDUCATION PTE LTD

- Simple organisms such as the amoeba absorb nutrients from their surroundings by diffusion.
- Large organisms such as humans need a digestive system to break food down into small, soluble molecules. Only then can the digested food be used by body cells to release energy through cellular respiration.

14.2 HOW DO THE PARTS OF THE DIGESTIVE SYSTEM WORK TOGETHER?

The human digestive system is a muscular tube about nine metres long that starts at the mouth and ends at the anus (Figure 14.3). As food moves along it, the food is broken down by a combination of physical and chemical processes.

TAKE NOTE | *The digestive tube is also called the gut or the alimentary canal.*

Physical and chemical digestion

DEFINITION | **Physical digestion:** the breaking down of food into smaller pieces by mechanical means such as crushing, grinding and mixing. No enzyme is involved.

DEFINITION | **Chemical digestion:** the breaking down of large, insoluble food molecules into small, soluble molecules through the action of enzymes.

- Physical digestion increases the surface area of the food, so that enzymes can act on it more quickly.
- Examples of physical digestion: chewing in the mouth and the churning action of the stomach.

Enrichment

- Food is pushed along the alimentary canal by waves of muscular contraction called **peristalsis**.

Enzymes and digestion

DEFINITION | **Enzyme:** a biological molecule produced by the digestive system that speeds up the breakdown of large food molecules into small molecules.

- Without enzymes, most of these chemical reactions would take far too long to complete.
- Enzymes are specific: each type acts on only one type of food substance (Figure 14.1).

There are three common classes of digestive enzyme:

Enzyme class	Acts on	End products
Carbohydrases	Carbohydrates	Simple sugars (e.g. glucose)
Proteases	Proteins	Amino acids
Lipases	Fats (lipids)	Fatty acids and glycerol

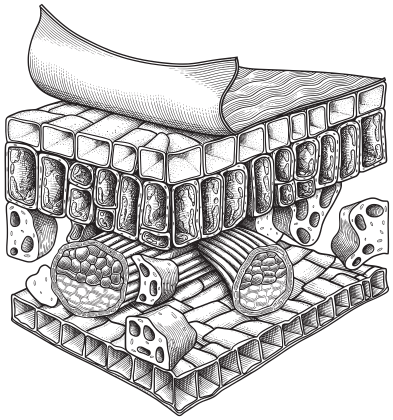
© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

15

Transport Systems in Living Things

TOPICAL NOTES



15.1 WHAT ARE THE FUNCTIONS OF A TRANSPORT SYSTEM AND ITS PARTS?

DEFINITION | **Transport system:** the system that moves substances such as oxygen, digested food, water and waste around a living organism.

Both humans and plants need a transport system to stay alive. Each part has its own function, and the parts work together to move substances around the organism.

Optional for G2

- Why multicellular organisms need one: in a unicellular or very small organism, substances can reach or leave every cell quickly by diffusion alone. In a large, **multicellular** organism, a transport system is needed to move substances fast enough, or cells would starve or be poisoned by their own waste.

The human transport system

The human transport system is also called the **circulatory system**. It works like a pump pushing a liquid through a network of pipes (Figure 15.1), and is made up of three main parts:

Part	Role
Heart	The pump.
Blood	The liquid that is moved.
Blood vessels	The network of pipes.

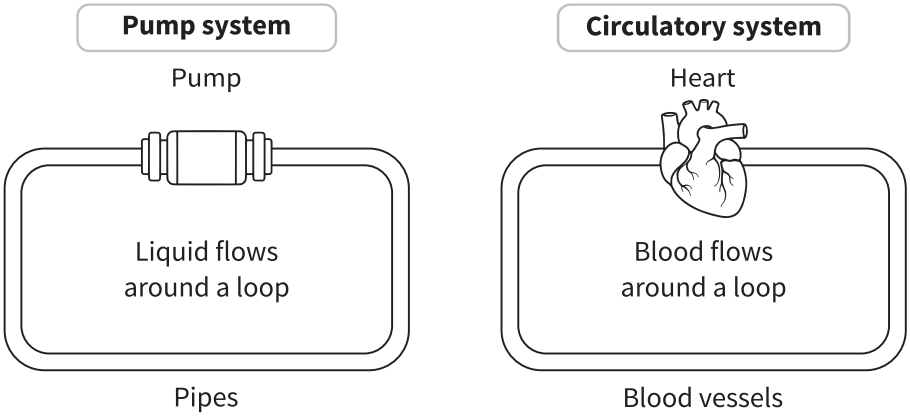


Figure 15.1: The human circulatory system works like a system for pumping a liquid through pipes.

© 3 GIFTED MINDS EDUCATION PTE LTD

Heart

- Located near the centre of the chest, slightly to the left, and about the size of a fist.
- Beats about 60 to 100 times a minute and has very strong muscles; it pumps continuously so that blood is circulated from head to toe.

Blood

An adult body holds about five litres of blood, made up of different parts:

Component	Function
Red blood cells	Transport oxygen to all parts of the body; they are very numerous and give blood its red colour.
Plasma	The liquid part of blood; it transports water and dissolved substances such as digested food, mineral salts and waste. It makes up more than half the volume of blood.
White blood cells	Help protect the body against infection (part of the immune system).
Platelets	Help form a blood clot, which stops severe bleeding and keeps microorganisms out of a wound.

Enrichment

- A red blood cell has **no nucleus** (so it can hold more haemoglobin, the substance that carries oxygen) and a **biconcave shape** (a large surface area for fast oxygen exchange, and flexibility to squeeze through narrow capillaries).

Blood vessels

There are three main types of blood vessel:

Type	Function
Artery	Carries blood away from the heart.
Vein	Carries blood towards the heart.
Capillary	The site where substances (digested food, gases and waste) are exchanged between the blood and the body cells.

- Most arteries carry blood rich in oxygen and digested food from the heart to the rest of the body. They branch into capillaries, which are the smallest and most numerous vessels.
- Capillaries have very thin walls and lie close to the body cells, so substances can be exchanged easily. Oxygen and digested food diffuse out to the cells; carbon dioxide and waste diffuse in to be carried away.

© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

16 Human Sexual Reproductive System

TOPICAL NOTES



16.1 FUNCTION OF THE HUMAN SEXUAL REPRODUCTIVE SYSTEM

Sexual reproduction

DEFINITION | **Sexual reproduction:** the process in which the young are formed when the nuclei of two sex cells, an egg cell and a sperm cell, fuse (join) together.

DEFINITION | **Fertilisation:** the fusion of the male and female sex cells (an egg cell and a sperm cell). During fertilisation, the nucleus of the sperm cell fuses with the nucleus of the egg cell (Figure 16.1).

- The sex cells are the egg cell (female) and the sperm cell (male).
- A fertilised egg develops into an embryo, then into a new individual (the offspring).
- The offspring contains **genetic material (DNA)** from both parents.

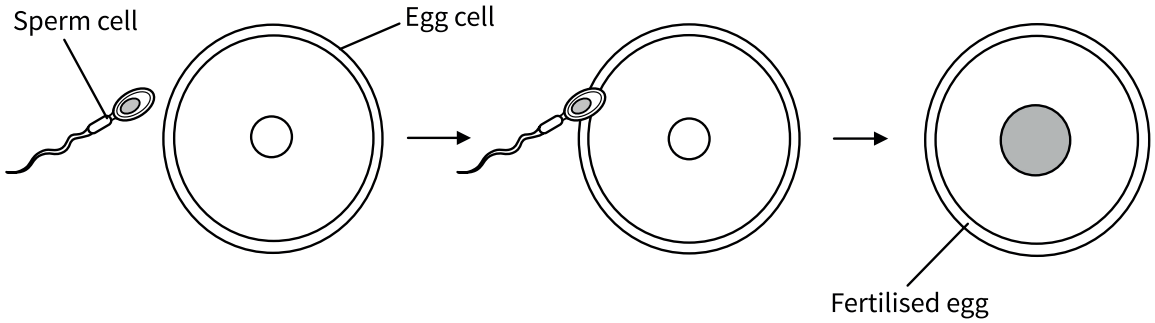


Figure 16.1: Fertilisation of an egg cell by a sperm cell.

Heredity

DEFINITION | **Heredity:** the passing down of genetic material from one generation to the next during sexual reproduction.

- Genetic material in the sex cells acts like a set of instructions for the cells to form a specific organism.
- An organism produces its own kind unless its genetic material is changed in some way.
- This is why offspring resemble their parents.

© 3 GIFTED MINDS EDUCATION PTE LTD

Optional for G2

Family resemblances and variations

- Children inherit traits (characteristics) from both parents, so they resemble them.
- Children do not look identical to either parent because they inherit a unique combination of genetic material.
- The offspring receives genetic material from the mother (via the egg) and the father (via the sperm).
- Inheriting a trait is a random process, so an offspring can inherit any possible combination of traits.
- Different combinations explain the similarities and differences between individuals, their parents and their siblings.
- Some disorders are carried in the genetic material and can be passed from parent to offspring, e.g. **sickle cell anaemia** (a blood disorder) and **cystic fibrosis** (a disease of the lungs and other organs).

Enrichment

Asexual reproduction and DNA editing

- Not all organisms reproduce sexually. In asexual reproduction only one parent is needed and no sex cells fuse (e.g. the whiptail lizard, which is all-female).
- **CRISPR** is a technology used to edit or change genetic material. It has helped produce pest- and drought-resistant crops and new cancer treatments.
- DNA editing can raise ethical concerns (e.g. when used on human embryos), so its use must be debated carefully.

16.2 HOW THE PARTS OF EACH SYSTEM WORK TOGETHER

Puberty

DEFINITION | **Puberty:** the period during which the body undergoes physical changes and matures sexually.

DEFINITION | **Hormones:** chemicals produced by different parts of the body that control and coordinate activities by triggering other organs to function.

- Puberty usually begins around ages 11 to 14, but can start earlier or later.
- It begins when certain hormones are produced. Hormones occur in tiny amounts in the blood but have large effects on organ systems such as the reproductive system.
- The sex hormones are produced by the testes (in males) and the ovaries (in females).
- These hormones act on other body systems and cause the physical changes shown in the table below.

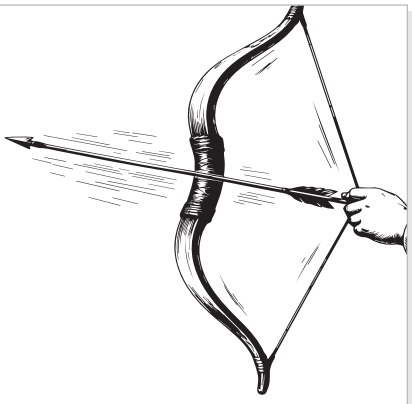
© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

9

Application of Forces and Transfer of Energy

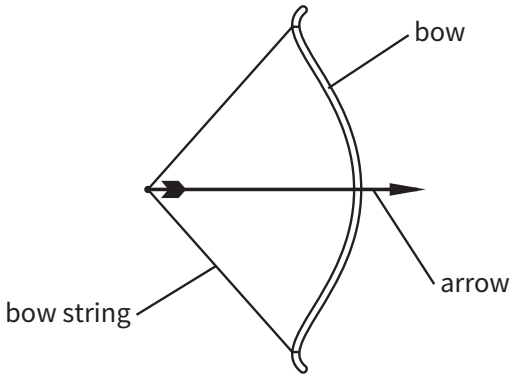
WORKSHEET 1



SECTION A MULTIPLE CHOICE QUESTIONS

There are twenty questions in this section. Answer ALL questions. For each question, there are four possible answers, A, B, C and D. Choose the one you consider correct and record your choice in the brackets provided.

1 An archer places an arrow in a bow. The archer pulls the string back and then releases it to let the arrow fly. Which energy change takes place during this process?



(A) chemical potential energy → elastic potential energy → kinetic energy

(B) chemical potential energy → gravitational potential energy → elastic potential energy

(C) gravitational potential energy → chemical potential energy → kinetic energy

(D) kinetic energy → chemical potential energy → kinetic energy ( )

© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER
10

Transfer of Heat Energy and its Effects

WORKSHEET 1



SECTION A MULTIPLE CHOICE QUESTIONS

There are twenty questions in this section. Answer ALL questions. For each question, there are four possible answers, A, B, C and D. Choose the one you consider correct and record your choice in the brackets provided.

1 Which statement is **not** true when an iron rod contracts?

(A) Its density decreases.

(B) Its mass remains the same.

(C) The size of iron particles remains the same.

(D) The number of iron particles remains the same. ( )

2 Which factor will remain the same when a copper rod is heated?

(A) density

(B) length

(C) mass

(D) volume ( )

© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

11

Chemical Changes

WORKSHEET 1



SECTION A MULTIPLE CHOICE QUESTIONS

There are twenty questions in this section. Answer ALL questions. For each question, there are four possible answers, A, B, C and D. Choose the one you consider correct and record your choice in the brackets provided.

1 Which of the following reactants go through neutralisation when they are mixed?

(A) nitric acid and sodium chloride

(B) hydrochloric acid and nitric acid

(C) nitric acid and sodium hydroxide

(D) sodium hydroxide and ammonia ( )

2 Optional for G2

The word equation represents the reaction between substance J and hydrochloric acid.

substance J + hydrochloric acid ⟶ magnesium chloride + hydrogen

What is substance J?

(A) magnesium

(B) magnesium carbonate

(C) magnesium hydroxide

(D) magnesium oxide ( )

© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

12

Interactions within Ecosystems

WORKSHEET 1



SECTION A MULTIPLE CHOICE QUESTIONS

There are twenty questions in this section. Answer ALL questions. For each question, there are four possible answers, A, B, C and D. Choose the one you consider correct and record your choice in the brackets provided.

1 Which is the correct organisation of ecological systems from the lowest to the highest level of organisation?

(A) ecosystem, community, population, species

(B) population, species, ecosystem, community

(C) species, community, population, ecosystem

(D) species, population, community, ecosystem ( )

2 What is an ecosystem?

(A) a physical environment that organisms live in

(B) a group of organisms of the same species that live in an area

(C) many groups of organisms of different species that live in an area

(D) many communities of organisms in an area interacting with each other and their environment ( )

3 Which of the following is an example of structural adaptation?

(A) Owl hunting prey at night.

(B) Bears hibernating in winter.

(C) Hamsters breeding only in the spring.

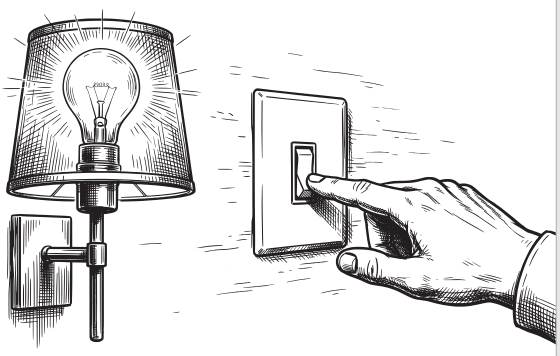
(D) Eagles catching prey using sharp claws. ( )

© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

13 Electrical Systems

WORKSHEET 1



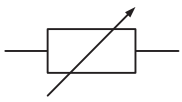
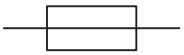
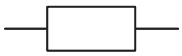
SECTION A MULTIPLE CHOICE QUESTIONS

There are twenty questions in this section. Answer ALL questions. For each question, there are four possible answers, A, B, C and D. Choose the one you consider correct and record your choice in the brackets provided.

1 Which electrical appliance makes use of the magnetic effect of an electric current?

(A) oven
(B) kettle
(C) light bulb
(D) telephone ( )

2 A student wants to include a component in a circuit to vary the current flowing through the circuit.
What is the component that the student should include?

(A) 
(B) 
(C) 
(D) 

( )

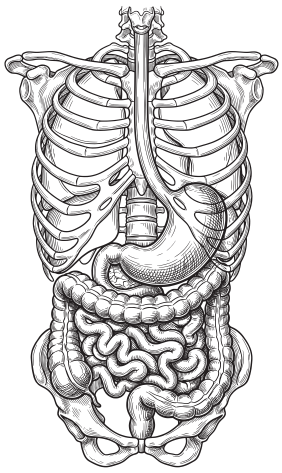
© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

14

Human Digestive System

WORKSHEET 1



SECTION A MULTIPLE CHOICE QUESTIONS

There are twenty questions in this section. Answer ALL questions. For each question, there are four possible answers, A, B, C and D. Choose the one you consider correct and record your choice in the brackets provided.

1 Which nutrient is the main source of energy?

(A) fats
(B) carbohydrates
(C) vitamins
(D) proteins ( )

2 In which part(s) of the digestive system does digestion not take place?

1 stomach
2 small intestine
3 large intestine
4 rectum

(A) 4 only
(B) 3 and 4
(C) 1, 3 and 4
(D) 2, 3 and 4 ( )

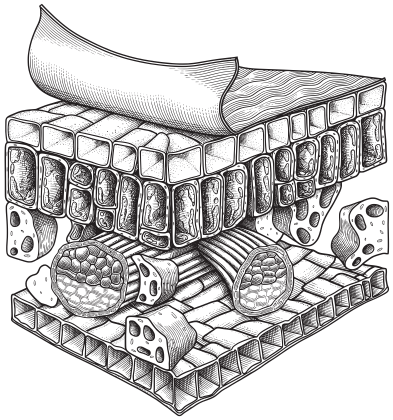
© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

15

Transport Systems in Living Things

WORKSHEET 1



SECTION A MULTIPLE CHOICE QUESTIONS

There are twenty questions in this section. Answer ALL questions. For each question, there are four possible answers, A, B, C and D. Choose the one you consider correct and record your choice in the brackets provided.

1 Which statement about nicotine is incorrect?

(A) Nicotine is found in cigarettes.

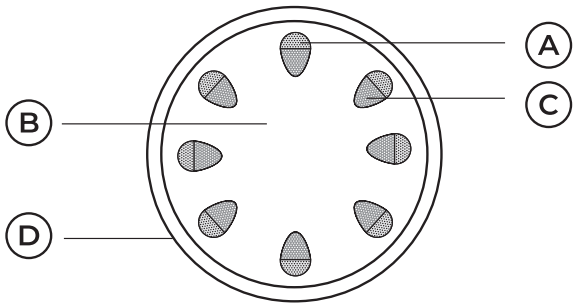
(B) Nicotine decreases heart rate.

(C) Nicotine increases blood pressure.

(D) Nicotine increases the chances of getting a stroke. ( )

2 Optional for G2

Which part of the plant stem transports water?



( )

© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

16

Human Sexual Reproductive System

WORKSHEET 1



SECTION A MULTIPLE CHOICE QUESTIONS

There are twenty questions in this section. Answer ALL questions. For each question, there are four possible answers, A, B, C and D. Choose the one you consider correct and record your choice in the brackets provided.

1 Which change(s) are most likely observed in only males or females when puberty occurs?

1 growth of pubic hair

2 height increase

3 voice deepens

4 widening of hips

(A) 3 only

(B) 2 and 3 only

(C) 3 and 4 only

(D) 2, 3 and 4 ( )

2 Which statement is false about sexually transmitted infections (STIs)?

(A) All STIs are bacterial infections.

(B) Birth control pills do not reduce the risk of STI transmission.

(C) STIs can be transmitted during sexual intercourse.

(D) STIs can be transmitted from mother to an infant through breastfeeding. ( )

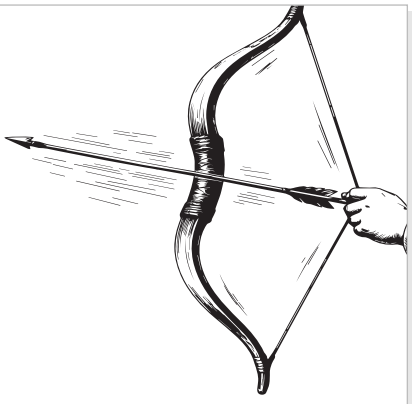
© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

9

Application of Forces and Transfer of Energy

TEST



TEST SUMMARY

Section A	Section B	Total
_____ / 20	_____ / 35	_____ / 55

SECTION A MULTIPLE CHOICE QUESTIONS

There are twenty questions in this section. Answer ALL questions. For each question, there are four possible answers, A, B, C and D. Choose the one you consider correct and record your choice in the brackets provided.

1 What is the SI unit of weight?

(A) joule
(B) kilogram
(C) newton metre
(D) newton ( )

2 Optional for G2

A small table weighing 40 N stands on four legs, each having an area of 0.0010 m^2.

What is the pressure of the table on the floor?

(A) 400 Pa
(B) 1000 Pa
(C) 10 000 Pa
(D) 40 000 Pa ( )

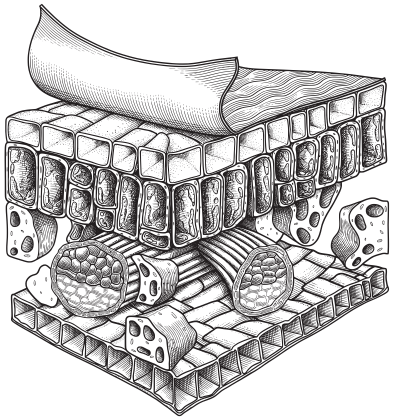
© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

15

Transport Systems in Living Things

TEST



TEST SUMMARY

Section A	Section B	Total
_____ / 20	_____ / 37	_____ / 57

SECTION A MULTIPLE CHOICE QUESTIONS

There are twenty questions in this section. Answer ALL questions. For each question, there are four possible answers, A, B, C and D. Choose the one you consider correct and record your choice in the brackets provided.

1 Which of the following is false about capillaries?

(A) Capillaries are the least numerous blood vessels found in the body.

(B) Capillaries are the smallest blood vessels found in the body.

(C) Capillaries carry oxygen and digested food in the blood to the cells in the body.

(D) Capillaries transport carbon dioxide and waste substances away from the cells. ( )

2 Which option indicates the correct route taken by the blood from the heart?

(A) heart → artery → capillaries → veins

(B) heart → artery → veins → capillaries

(C) heart → capillaries → artery → veins

(D) heart → capillaries → veins → artery ( )

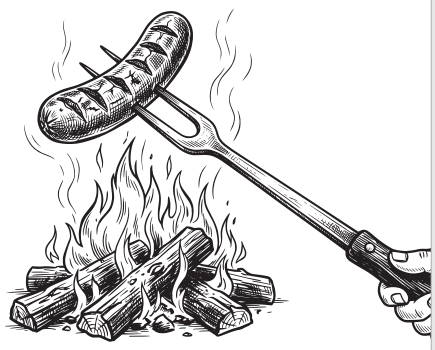
© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

10

Transfer of Heat Energy and its Effects

WORKSHEET 1



SECTION A MULTIPLE CHOICE QUESTIONS

1	2	3	4	5	6	7	8	9	10
A	C	A	C	C	D	A	D	C	C

11	12	13	14	15	16	17	18	19	20
D	D	C	A	C	C	D	B	B	B

SECTION A – Detailed Explanations

1 A **The correct answer is A because when an iron rod contracts, its volume decreases while its mass remains the same, so its density increases, not decreases.**

- **B** is incorrect because the mass of the rod remains unchanged.
- **C** is incorrect because the size of the iron particles does not change during contraction.
- **D** is incorrect because the number of iron particles also remains the same.

2 C **The correct answer is C because mass stays the same: heating doesn't add or remove matter, only increases particle motion and spacing.**

- **A** is incorrect because density changes as volume changes during thermal expansion.
- **B** is incorrect because length increases due to thermal expansion of the metal.
- **D** is incorrect because volume increases when the rod expands on heating.

3 A **The correct answer is A because copper has much higher thermal conductivity than plastic, rubber or wood.**

- **B** is incorrect because plastic has low thermal conductivity.
- **C** is incorrect because rubber is a poor thermal conductor.
- **D** is incorrect because wood is an insulator with low thermal conductivity.

4 C **The correct answer is C because cardboard and styrofoam are poor thermal conductors, so they reduce heat loss by conduction.**

- **A** is incorrect because the lid insulates the top only; heat still conducts through the cup wall.
- **B** is incorrect because cardboard is thin and mainly for grip; styrofoam provides most insulation.
- **D** is incorrect because the plastic lid adds little conduction reduction; it mainly prevents heat loss by convection or evaporation.

5 C **The correct answer is C because a vacuum removes matter so conduction and convection cannot occur, but radiation still travels.**

- **A** is incorrect because a vacuum also prevents convection; there is no air for bulk fluid movement.
- **B** is incorrect because a vacuum prevents conduction across the gap between the inner and outer walls.
- **D** is incorrect because thermal radiation can travel through vacuum, so radiation is not prevented.

© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

12

Interactions within Ecosystems

WORKSHEET 1



SECTION A MULTIPLE CHOICE QUESTIONS

1	2	3	4	5	6	7	8	9	10
D	D	D	D	D	A	D	B	B	A

11	12	13	14	15	16	17	18	19	20
A	B	A	A	B	C	B	C	C	D

SECTION A – Detailed Explanations

1 D **The correct answer is D because the ecological hierarchy from smallest to largest is species → population → community → ecosystem; a population is a group of one species in an area, a community is several species together in an area, and an ecosystem is the community plus its physical environment.**

- **A** is incorrect because it lists ecosystem first, but ecosystem is the largest level, not the smallest.
- **B** is incorrect because it puts population before species and swaps the order of community and ecosystem.
- **C** is incorrect because it places community before population, but a community (many species together) is larger than a population (one species).

2 D **The correct answer is D because an ecosystem is made up of a community and its interactions with the physical environment.**

- **A** is incorrect because it includes only the physical environment, missing the organisms and their interactions.
- **B** is incorrect because it describes a single species group (a population), not a community and its environment.
- **C** is incorrect because it describes a community but omits interactions with the physical environment.

3 D **The correct answer is D because eagles' sharp claws (talons) are physical features of the body, which is a structural adaptation for catching prey.**

- **A** is incorrect because hunting at night is a behavioural adaptation, not a structural one.
- **B** is incorrect because hibernation is a behavioural adaptation, not a structural one.
- **C** is incorrect because breeding only in spring is a behavioural/seasonal adaptation, not a structural one.

4 D **The correct answer is D because a flamingo's pink colour comes from the carotenoid pigments in its diet (algae and brine shrimp); this is a dietary (biotic) feature, not an adaptation to the physical environment.**

- **A** is incorrect because long legs let the bird wade into deeper water to reach food, an adaptation to its watery habitat.
- **B** is incorrect because webbed feet help it move across soft mud and water without sinking, an adaptation to the physical environment.
- **C** is incorrect because tolerating hot, salty water is an adaptation to the physical conditions of its habitat. Only D is unrelated to the physical environment.

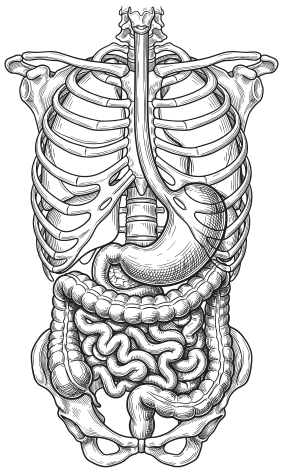
© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

14

Human Digestive System

WORKSHEET 1



SECTION A MULTIPLE CHOICE QUESTIONS

1	2	3	4	5	6	7	8	9	10
B	B	C	A	C	A	B	C	A	B

11	12	13	14	15	16	17	18	19	20
A	B	C	B	C	D	D	B	B	A

SECTION A – Detailed Explanations

1 B **The correct answer is B because carbohydrates are the body's main source of energy; they are broken down into glucose, which is used in cellular respiration to release energy.**

- **A** is incorrect because fats are a concentrated energy store and provide more energy per gram than carbohydrates, but they are not the body's main everyday energy source.
- **C** is incorrect because vitamins do not provide energy; they support various body processes in tiny amounts.
- **D** is incorrect because proteins are used mainly for growth and repair; the body only uses them as an energy source when carbohydrates and fats are unavailable.

2 B **The correct answer is B because digestion takes place in the stomach and small intestine, but no digestion takes place in the large intestine (3) or rectum (4): they are only involved in absorption of water and storage of faeces.**

- **A** is incorrect because, although the rectum is correct, it omits the large intestine, where digestion also does not occur.
- **C** is incorrect because it includes the stomach, where chemical digestion of proteins does take place.
- **D** is incorrect because it includes the small intestine, where most chemical digestion takes place.

3 C **The correct answer is C because the stomach produces gastric juice, which contains hydrochloric acid that is strongly acidic and corrosive, and which kills harmful bacteria in food.**

- **A** is incorrect because the gullet (oesophagus) only transports food to the stomach; it does not secrete acidic digestive fluid.
- **B** is incorrect because the large intestine absorbs water; it does not secrete strongly acidic fluid.
- **D** is incorrect because the small intestine receives alkaline juices from the pancreas, so its contents are not strongly acidic.

4 A **The correct answer is A because a bone fracture is an injury to the skeletal system, not a health issue of the digestive system.**

- **B** is incorrect because constipation is a digestive system problem, in which faeces become hard and difficult to pass.
- **C** is incorrect because food poisoning is a digestive system illness caused by eating contaminated food, leading to vomiting and diarrhoea.
- **D** is incorrect because gastric pain affects the stomach and is a common digestive issue caused by problems such as gastritis or ulcers.

© 3 GIFTED MINDS EDUCATION PTE LTD

CHAPTER

16

Human Sexual Reproductive System

WORKSHEET 1



SECTION A MULTIPLE CHOICE QUESTIONS

1	2	3	4	5	6	7	8	9	10
C	A	D	D	D	A	D	C	C	B

11	12	13	14	15	16	17	18	19	20
A	C	B	D	B	A	D	B	B	A

SECTION A – Detailed Explanations

1 C **The correct answer is C because voice deepening (3) occurs only in males and widening of the hips (4) occurs only in females, so both are sex-specific.**

- **A** is incorrect because it omits 4, which is also sex-specific.
- **B** is incorrect because height increase (2) occurs in both sexes.
- **D** is incorrect because it includes 2, which occurs in both sexes.

2 A **The correct answer is A because STIs also include viral infections such as HIV, not only bacterial ones.**

- **B** is incorrect because birth control pills protect against pregnancy, not STIs.
- **C** is incorrect because sexual contact can transfer infected fluids or skin-to-skin pathogens.
- **D** is incorrect because some STIs (e.g. HIV) can be passed in breast milk from mother to infant.

3 D **The correct answer is D because sperm and egg meet and fuse in the oviduct shortly after ovulation.**

- **A** is incorrect because menstruation is shedding of the uterine lining when fertilisation does not occur.
- **B** is incorrect because ovulation is when the egg is released and fertility is highest.
- **C** is incorrect because fertilisation is fusion of sperm and egg, not the egg digesting the sperm.

4 D **The correct answer is D because tubal ligation surgically blocks or seals the oviducts, permanently preventing eggs from meeting sperm.**

- **A** is incorrect because an intra-uterine device is a removable device inserted into the uterus; it can be taken out, so it is not permanent.
- **B** is incorrect because the rhythm method is based on timing of the menstrual cycle; fertility resumes once the method is stopped, so it is not permanent.
- **C** is incorrect because spermicides and contraceptives give temporary chemical or barrier protection, not permanent.

© 3 GIFTED MINDS EDUCATION PTE LTD

You have only seen a fraction.

The complete series contains over 750 pages of learning, practice, assessment and answer material across 24 hardcopy booklets.

8	24	750+
CHAPTERS	BOOKLETS	PAGES

LEARN | PRACTISE | TEST | REVIEW

Complete hardcopy set

- 8 Topical Notes booklets
- 8 Worksheet & Test booklets
- 8 Answer Key booklets
- G2 and G3 coverage with optional G2 content clearly marked
- Physical saddle-stitched booklets delivered to your home

GET THE FULL SERIES

www.3giftedminds.com

WhatsApp 9388 5073 | Canberra and Woodlands | Online lessons available

3 GIFTED MINDS EDUCATION