

Answer

Only selected answers are provided here

CHAPTER 1 Stimuli and Responses

Summative Practice 1

- (a) × (b) ✓ (c) × (d) ✓
- P: Brain
Q: Spinal cord
R: Peripheral nerve
- (a) Changes in the size of the pupil of the eye.
(b) Intensity of light which enters the eye.
(c) The lower the intensity of light directed towards the eye, the larger the size of the pupil of the eye.
(d) During a solar eclipse, the bright rays of the Sun will enter the eye and damage the cells of the retina.
- (a) Sound → Earlobe → Ear canal → Eardrum → Ossicles → Oval window → Cochlea → Auditory nerve → Brain
(b) Light → Cornea → Aqueous humour → Pupil → Eye lens → Vitreous humour → Retina → Optic nerve → Brain
- (a) X: Touch receptor
Y: Pain receptor
(b) Fingertip is more sensitive towards touch stimuli compared to the palm of the hand. Fingertip has a thinner layer of epidermis and more touch receptors compared to the palm of the hand.
(c) Agree. The tongue is a sensory organ that has receptors known as taste buds on the surface of the tongue which is protected by skin epidermis.
- (a) The sense of smell helps us to detect danger such as leakage of gas that might occur in the science laboratory. For example, we can detect the presence of dangerous gases such as chlorine and ammonia from their smell.
(b) Dogs have a very sensitive sense of smell because they have more sensory cells for smell than human and are more efficient to analyse smell than human.
- (a) – Positive phototropism
– Positive hydrotropism
(b) Positive phototropism ensures shoots and leaves of plants obtain sufficient sunlight to make food through photosynthesis.

Positive hydrotropism allows roots of plants to grow towards water so that they can absorb water to enable plants to carry out photosynthesis.

CHAPTER 2 Respiration

Summative Practice 2

- (a) Alveolus
(b) Bronchus
(c) Nasal cavity
- P: Trachea
Q: Bronchus
R: Alveolus
- (a) ✓ (b) ✓ (d) ✓
- (a) higher (b) lower
- (a) Haemoglobin transports oxygen from the red blood cell to body cells.
(b) Oxyhaemoglobin easily decomposes into haemoglobin and oxygen when it reaches body cells so that oxygen can diffuse into the cells.
- (a) Azura may be allergic to pollen. In Spring, more pollen is released from anthers. When Azura inhales air containing pollen, there is a higher risk of her getting an asthma attack.
(b) Any place that is hazy and dusty. Examples: industrial areas, construction sites and others. Haze and dust also cause asthma attacks in asthma patients.
- (a) – Thickness of the wall
– Moisture of the wall
– Surface area
– Network of capillaries
(b) (i) Asthma
Symptom: Shortness of breath
Cause: Excessive release of mucus on the surface of alveolus reduces the surface area and rate of gaseous exchange in the alveolus thereby causing shortness of breath.
(ii) Bronchitis
Symptom: Shortness of breath
Cause: Inflammation of the bronchus in bronchitis patients caused by tar and irritants in cigarette smoke reduces the rate of movement of air from the nose to the lungs through the bronchus. This causes

- bronchitis patients to be frequently breathless.
- (iii) Emphysema
 Symptom: Shortness of breath
 Cause: The alveolus in emphysema patients is damaged by dangerous substances in the air such as irritants in cigarette smoke. Hence, the surface area for gaseous exchange in the alveolus is reduced causing shortness of breath.

8. – Stop smoking.
 To avoid harmful substances found in cigarette smoke from entering the lungs and harming the respiratory system.
- Avoid places with polluted air.
 To avoid inhaling air that contains harmful substances such as cigarette tar, carbon monoxide, sulphur dioxide, nitrogen dioxide, haze, dust and pollen which are harmful to the respiratory system.
- Have proper exercise and lead a healthy lifestyle.
 To maintain a healthy respiratory system.

CHAPTER 3: Transportation

Summative Practice 3

- (a) PULSE (d) PHLOEM
 (b) TRANSPIRATION (e) HEART
 (c) CAPILLARY (f) ANTIGEN
- (a) ✓ (b) × (c) × (d) ×
- (a) Valve
 (b) Transport oxygenated blood
 (c) (i) Blood vessel Q has thick walls to withstand high blood pressure.
 (ii) Blood vessel R has walls which are one cell thick to increase the efficiency of exchange of substances between blood and body cells through diffusion.
- (a) Oxygen, carbon dioxide, water, digested food, waste products
 (b) Oxygen, carbon dioxide, water
 (c) During the day, plant cells carry out photosynthesis and produce oxygen. Hence, plant cells do not need oxygen supply.
- (a) (i) dub
 (ii) lub
 (iii) systolic
 (iv) diastolic
 (b) Systolic pressure reading is higher than diastolic pressure reading. Systolic pressure reading is reading of blood pressure which is higher when heart ventricle contracts to force blood out of the heart to be distributed to the whole body.

Diastolic pressure reading is reading of blood pressure which is lower when heart ventricle slackens to facilitate blood flowing from the whole body back to the heart.

- (a) (i) Eric, Roy
 (ii) Blood will coagulate. The victim may die.
 (b) (i) Individual 2.
 This is because she fulfils the age condition of 18 years and above but less than 60 years. She also fulfils the body mass condition of more than 45 kg.
 (ii) Pregnant women are not suitable to donate blood.

CHAPTER 4 Reactivity of Metals

Summative Practice 4

- (a) Elements: Iron, Silver, Potassium, Tin
 Compounds: Quartz, Bauxite, Galena, Hematite, Limestone
 (b) Bauxite, Aluminium and oxygen
- (a) Tin(IV) oxide
 (b) Carbon
 (c) Tin + oxygen → Tin(IV) oxide
- (b) ✓ (c) ✓
- (a) Oxygen
 (b) Potassium and sodium are very reactive metals. Paraffin prevents potassium and sodium from reacting with oxygen and water vapour in the air.
- (a) Oxygen
 (b) To provide oxygen for the reaction.
 (c) Heat the powdered metal until it glows before heating potassium manganate(VII) to provide oxygen for the reaction.
 (d) To construct a reactivity series of metals.

CHAPTER 5 Thermochemistry

Summative Practice 5

- (a) Exothermic reaction
 (b) Endothermic reaction
 (c) Exothermic reaction
 (d) Endothermic reaction
 (e) Exothermic reaction
 (f) Exothermic reaction
- (a) released (c) hot
 (b) increases (d) absorbed
- (a) THERMOCHEMISTRY
 (b) PHOTOSYNTHESIS
 (c) RESPIRATION
 (d) THERMOMETER
 (e) ENDOTHERMIC
 (f) EXOTHERMIC
- Heating of calcium carbonate is an endothermic reaction. Heat is absorbed by the chemical reaction that occurs during the decomposition of calcium carbonate.

5. The reaction between hydrochloric acid and sodium carbonate is an exothermic reaction whereas the reaction between hydrochloric acid and sodium hydrogen carbonate is an endothermic reaction.

CHAPTER 6 Electricity and Magnetism

Summative Practice 6

- (a) True (b) False (c) True
- (a) Non-renewable energy source
(b) Renewable energy source
(c) Renewable energy source
(d) Renewable energy source
- (a) Magnetic field lines are cut
(b) Induced current
(c) LED lights up. Induced current flows through the LED. The flow of current through the LED causes the LED to light up.
(d) Generator
- (a) Cathode Ray Oscilloscope
(b) Shape of graph, direction of current and voltage changes for direct current and alternating current.
(c) (i) Alternating current
(ii) Direct current
- (a) Step-down transformer
(b) Number of turns in the primary coil is more than the number of turns in the secondary coil.
(c) To reduce eddy current and increase the efficiency of the transformer
- (d) Using the formula, $\frac{V_p}{V_s} = \frac{N_p}{N_s}$

$$\frac{10 \text{ V}}{V_s} = \frac{100 \text{ turns}}{20 \text{ turns}}$$

$$\text{Secondary voltage, } V_s = 10 \text{ V} \times \frac{20 \text{ turns}}{100 \text{ turns}}$$

$$= 2 \text{ V}$$

CHAPTER 7 Energy and Power

Summative Practice 7

- (a) Energy possessed by an object is due to its position or condition.
(b) Energy possessed by a moving object.
- (a) N m (b) Work
(c) stationary (d) can
(e) acceleration
- (a) $W = Fs$
 $= 5 \text{ kg} \times 10 \text{ m s}^{-2} \times 2 \text{ m}$
 $= 100 \text{ J}$
(b) Energy used by motor = work done
 $= 100 \text{ J}$
- (a) Gravitational potential energy = mgh
where m is the object mass
 g is the gravitational acceleration
 h is the height

- (b) Elastic potential energy = $\frac{1}{2} Fx$,
where F is the compression or stretching force
 x is the displacement from equilibrium position
- (c) Kinetic energy = $\frac{1}{2} mv^2$,
where m is the mass
 v is the velocity

CHAPTER 8 Radioactivity

Summative Practice 8

- (a) \checkmark (b) \times (c) \checkmark
- Radioactive decay is a spontaneous process by which an unstable nucleus emits radioactive radiation until the nucleus becomes more stable.
- sodium-24 (Na-24)
- | | | | | |
|---------|---|-----------|------------|------------|
| 0 hours | → | 5.2 hours | → | 10.4 hours |
| 32 g | | 16 g | | 8 g |
| | | | | |
| | | → | 15.6 hours | → |
| | | → | 4 g | → |
| | | → | 20.8 hours | → |
| | | → | 2 g | → |

Therefore the remaining mass of Pa-234 after 20.8 hours is 2 g.

CHAPTER 9 Space Weather

Summative Practice 9

- A: Convection zone D: Radiation zone
B: Chromosphere E: Core
C: Photosphere F: Corona
- 11 years
- Sunspots
- Smartphone (mobile)
- Internet
- TV broadcast
- Global positioning system (GPS)

CHAPTER 10 Space Exploration

Summative Practice 10

- (a) \times (b) \checkmark (c) \times (d) \times
- (a) Ptolemy (b) Kepler
- Student's answers
- Because space probes are not built to return to Earth.
- (a) To gather information about Saturn to be sent back to Earth.
(b) Solar wind
(c) Solar energy



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Glossary

Alternating current An electric current with the direction of its flow constantly changing.

Artery A type of blood vessel which transports oxygenated blood from the heart to the whole body.

Aurora A stunning light display in the sky when charged gas particles interact with atoms and molecules in Earth's atmosphere.

Capillary A type of blood vessel which connects arteries with veins.

Carboxyhaemoglobin A stable compound formed when carbon monoxide combines chemically with haemoglobin.

Cathode Ray Oscilloscope (C.R.O.) An electronic device that can be used to show the differences in the shape of graph, direction of current and voltage change for direct current and alternating current.

Coronal mass ejection A huge cloud of plasma that erupts from the Sun and often occurs together with huge and strong solar flares.

Direct current An electric current that flows only in one direction.

Earth's magnetosphere A region in outer space surrounding Earth where the magnetic field in Earth's magnetosphere is a combination of Earth's magnetic field and the magnetic field in the region in space.

Electric current Rate of flow of electric charges through a conductor.

Electric meter A device used to measure the quantity of electrical energy used.

Energy The ability to do work.

Energy efficiency Percentage of energy input that is converted to useful form of energy output.

Exudation (guttation) Process of water loss from plants in liquid form through hydathodes found at the edges of leaves.

Fuse A short, fine wire, heats up easily and melts when the current flowing through it exceeds the value of the fuse.

Generator A device used to generate electrical energy in the form of an induced current.

Geocentric model Solar System Model with Earth at the centre and the Sun revolving around Earth.

Geotropism Directional response of plants towards the force of gravity.

Green building A building which applies the concept of energy conservation to save the cost of energy consumption and reduce the release of carbon dioxide.

Heliocentric model Solar System Model with the Sun at the centre and Earth and other planets revolving around the Sun.

Hydrotropism Directional response of plants towards water.

Involuntary action Action that occurs immediately without conscious control or prior thoughts.

Kinetic energy Energy possessed by a moving object with a given mass.

Long-sightedness A type of visual defect which causes near objects to appear blurry because the images are focused behind the retina.

Metal extraction Process of obtaining a metal from its ore.

Mineral Solid element or compound present naturally with definite crystalline structure and chemical composition.

Nastic response Response towards stimulus such as touch but does not depend on the direction of the stimulus.

Non-renewable energy sources Energy sources that cannot be replaced and will deplete.

Optical illusion An object that is seen differs from its actual state.

Oxyhaemoglobin Unstable compound formed when oxygen combines chemically with haemoglobin in the blood.

Passive smoker A person who does not smoke but inhales cigarette smoke from nearby smokers.

Phloem Component in vascular bundle which transports sucrose produced during photosynthesis to other parts of the plant.

Phototropism Directional response of plants towards light.

Power Rate of doing work.

Prominence Huge loop or arched column of glowing gases over the sunspot.

Pulse Produced by the contraction and relaxation of the muscular artery wall.

Reactivity series of metals Arrangement of metals according to their reactivity with oxygen.

Remote sensing Method of gathering and recording information from a distance.

Renewable energy sources Energy sources that can be replaced continually and will never deplete.

Short-sightedness A type of visual defect which causes distant objects to appear blurry because the images are focused in front of the retina.

Solar cycle The activity of sunspot that seems to appear and disappear according to a 11-year cycle.

Solar wind Particles in plasma such as electrons, protons and alpha particles that erupt from the Sun to outer space travelling together at high speeds.

Space probe Spacecraft that gathers information and sends the information back to the Earth.

Space weather Phenomena that occur on the surface of the Sun (such as prominences, solar flares, sunspots and coronal mass ejections) and in space (such as solar winds, solar radiation storms and geomagnetic storms).

Sunspots Dark regions seen on the surface of the Sun.

Thermochemistry A study associated with heat changes during chemical reactions.

Thigmotropism Directional response of plants towards touch.

Transformer Device that changes the voltage of an alternating current.

Transpiration Process of water loss in the form of water vapour from the surface of plants to the air through evaporation.

Tropism Directional response of plants towards stimuli such as light, water, gravity and touch from a certain direction.

Value of fuse Maximum value of current that can flow through the fuse without causing the fuse wire to melt.

Vein A type of blood vessel which transports deoxygenated blood from the whole body to the heart.

Voltage Electrical energy used to move a unit of electric charge through a conductor.

Voluntary action Conscious action and conducted under one's will.

Xylem Component in vascular bundle which transports water and dissolved mineral salts from the roots to the leaves.

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