

Teaching flow (to cater for learner diversity)

Chapter 2 Water

2.1 Water exists in three states (pp. 94–104)

Background knowledge learnt in primary school:

- Three states of water, and their properties
- Changes between states of water
- Melting point and boiling point of water

MUST – for **ALL** students
SHOULD – for students of **AVERAGE** capability
COULD – for students of **HIGH** capability

	MUST	SHOULD	COULD	No. of periods
2.1A How does water change between states? (pp. 94–97)	Warm up 2.1			0.5
	↓ Recognize that water exists on Earth in three physical states.			0.5
	↓ <ul style="list-style-type: none"> • Be aware that a substance can change from one state to another. • Describe some processes of the change of states of water. 			1
	↓ Checkpoint 2.1A			0.5
2.1B Is energy absorbed or released when water changes states? (p. 98)		Be aware that energy is released or absorbed when the physical state of water changes.		0.5
2.1C How does the temperature change when water changes states? (pp. 99–104)		↓ Expt 2.1 Perform practical work to heat pieces of ice to steam.		0.75
		↓	Skill Training 2.1 <ul style="list-style-type: none"> • Using a graph, show how the variable on the x-axis affects the variable on the y-axis. • Using a graph, show how the temperature of water changes with time in Expt 2.1. 	0.5
	↓ <ul style="list-style-type: none"> • Recognize that melting and boiling of water take place at a fixed temperature. • Recognize that temperature of water remains unchanged during a change in state. 	←	←	0.5
	↓ Checkpoint 2.1B			0.5

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2.2 The water cycle (pp. 105–116)

(Factors affecting the rate of evaporation are NOT introduced in the Primary curriculum. Ss may have vague ideas from personal experience, but these ideas have to be tested scientifically.)

Background knowledge learnt in primary school:

- Basic concepts of the water cycle
- Rainwater is a major source of fresh water.
- Most plants take up water.

	MUST	SHOULD	COULD	No. of periods
2.2A How does the water cycle work? (pp. 105–109)	Warm up 2.2			0.5
	Understand that evaporation and condensation are important processes in the water cycle.			1.5
		Realize that the water cycle supplies water to water bodies on the Earth's surface.		0.25
	Expt 2.2 Perform practical work to simulate the formation of rain.			0.5
		Realize that the 'water cycle' model simulates the purification effect of the water cycle.		0.25
2.2B What factors affect the rate of evaporation? (pp. 110–116)		Explore 2.2 Determine which variables to be kept unchanged when investigating the factors affecting the rate of evaporation. E		0.25
	Sci Inv 2.2A Perform fair tests to investigate how temperature affects the rate of evaporation. E			0.5
	Sci Inv 2.2B Perform fair tests to investigate how humidity affects the rate of evaporation. E			0.5
	Sci Inv 2.2C Perform fair tests to investigate how air flow affects the rate of evaporation. E			0.5
	Sci Inv 2.2D Perform fair tests to investigate how exposed area affects the rate of evaporation. E			0.5
	Describe the factors affecting the rate of evaporation. E			0.25
	Checkpoint 2.2			0.5

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2.3 Dissolving and solubility (pp. 117–130)

(From personal experience, Ss may have a vague idea that different substances have different solubility in water, but this idea has to be tested scientifically.)

	MUST	SHOULD	COULD	No. of periods
2.3A What is dissolving? (pp. 117–120)	Warm up 2.3			0.5
	<ul style="list-style-type: none"> Recognize that a solution is formed when a solute is dissolved in a solvent. Give some examples of soluble and insoluble substances in water. 			0.5
	Expt 2.3 Classify household substances as soluble or insoluble substances in water.			0.5
	Checkpoint 2.3A			0.5
2.3B What makes a substance dissolve faster? (pp. 121–125)	Realize that a solute may dissolve in water at different rates, depending on certain factors.			0.5
		Explore 2.3 Determine which variables to keep unchanged when investigating the factors affecting the rate of dissolving.		0.25
	Sci Inv 2.3A Perform fair tests to investigate how stirring affects the rate of dissolving.			0.5
	Sci Inv 2.3B Perform fair tests to investigate how the volume of water affects the rate of dissolving.			0.5
	Sci Inv 2.3C Perform fair tests to investigate how the size of solute pieces affects the rate of dissolving.			0.5
	Describe the factors affecting the rate of dissolving in water.			0.25
2.3C What is solubility? (pp. 126–130)		Recognize the meaning of solubility. E		0.5
			Sci Inv 2.3D Perform fair tests to find the solubility of a substance at different temperatures. E	0.5
		Recognize that the solubility of a substance in water changes with temperature. E		0.25
	Checkpoint 2.3B			0.25

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2.4 Water purification (pp. 131–151)

Background knowledge learnt in primary school:

- Biological importance of water to the human body
- Importance of water for human activities
- Basic idea of filtering


	MUST	SHOULD	COULD	No. of periods
2.4A Why do we need clean water? (pp. 131–133)	Warm up 2.4			0.5
	↓ Realize living things' biological need for pure water.			0.75
	↓ Realize the need for water for human activities.			0.25
2.4B What impurities does natural water contain? (pp. 134–135)		Expt 2.4A Observe a sample of unpurified water under a microscope.		0.5
	↓ State some impurities in natural water.	←		0.5
2.4C How can we purify water? (pp. 136–148)	Expt 2.4B Recognize the effects of sedimentation.			0.5
	↓ Understand the processes involved in sedimentation, and its effects.			0.5
	Expt 2.4C Recognize the effects of filtration.			0.5
	↓ Understand the processes involved in filtration, and its effects.			0.5
	Expt 2.4D Recognize the presence of impurities in the filtrate.			1
	↓		STEM 2.4 Design and make a filtration column to purify muddy water.	after class
	Expt 2.4E Recognize the effects of distillation.		←	1
	↓ Understand the processes involved in distillation, and its effects.			0.5
	↓ Review and compare the effects of sedimentation, filtration and distillation.			0.5
	↓			
2.4D Water cycle as a purification system (pp. 149–151)		Understand the role of the water cycle as a purification process.		0.25
		↓	Skill Training 2.4 Learn to make comparisons of two phenomena in an organized way.	0.5
		↓ Make a comparison between the natural water cycle and distillation in laboratory.	←	0.5
	↓ Checkpoint 2.4	←		0.5

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2.5 Further treatment of drinking water (pp. 152–159)

Background knowledge learnt in primary school:

- Two major sources of Hong Kong' water: reservoirs and the *Dongjiang*
- The need for water treatment

	MUST	SHOULD	COULD	No. of periods
2.5A Killing micro-organisms: Why and how? (pp. 153–155)	Warm up 2.5			0.5
	State some harmful effects on our health caused by the micro-organisms in water, and the need to kill them			0.25
		Name some common types of micro-organisms in water.		0.25
	State some methods to kill micro-organisms in water, including the uses of chlorine, ozone and ultraviolet light.			1
2.5B Water treatment in Hong Kong (pp. 156–157)		Recognize the sedimentation and filtration processes in a water treatment. 		0.5
		Be aware of the importance of sterilizing tap water before drinking, despite water treatment.		0.25
2.5C Fluoridation (pp. 158–159)	Be aware of the importance of the addition of fluoride to drinking water in preventing tooth decay.			0.5
			Explore 2.5 Search for information and form an argument for / against fluoridation.	after class
	Checkpoint 2.5			0.5

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2.6 Water conservation and pollution (pp. 160–169)

Background knowledge learnt in primary school:

- Some ways of water conservation

	MUST	SHOULD	COULD	No. of periods
2.6A Why should we conserve water? (pp. 160–161)	Warm up 2.6			0.5
	Recognize the importance of water conservation.			0.25
			Skill Training 2.6 Acquire the basic skills of seeing trends in a graph and making qualitative observations.	0.5
2.6B How can we conserve water? (p. 162)	Recognize some ways to conserve water.			0.25
2.6C Causes and effects of water pollution (pp. 163–165)	State some causes of water pollution.			0.5
		Recognize some effects of water pollution.		0.75
			Explore 2.6 Be aware of possible pollution in Hong Kong's drinking water.	0.25
2.6D How can we reduce water pollution? (p. 166)	<ul style="list-style-type: none"> State some methods to control water pollution. Be aware of our responsibility to minimize water pollution. 			0.5
2.6E Treating waste water: Why and how? (pp. 167–169)		Recognize the importance of treating waste water before discharging it into the sea. E		0.25
			Recognize some government measures of sewage treatment in Hong Kong. E	0.25
	Checkpoint 2.6			0.5

Teaching flow (to cater for learner diversity)

Chapter 4 Cells, Human Reproduction and Heredity

MUST – for **ALL** students
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4.1 Cells – the basic units of our body (pp. 2–25)

(Cells were NOT introduced in the primary curriculum. Ss may have heard about them, but may not have clear ideas.)

	MUST	SHOULD	COULD	No. of periods
4.1A What are the basic units of our body? (p. 4)	Warm up 4.1			0.5
	Recognize cells as the basic units of our body.			0.5
4.1B How to use a light microscope? (pp. 5–12)	Recognize the parts of a light microscope and their functions.			0.75
		Calculate the magnification of a light microscope.		0.25
	Expt 4.1A • Master the skills in using a light microscope. • Realize the nature of images observed when using a light microscope.			1.5
	Checkpoint 4.1A			0.5
4.1C Are there differences between animal cells and plant cells? (pp. 13–21)	Recognize the structure of a typical animal cell.			0.5
		Skill Training 4.1 Master the skills in biological drawing.		0.5
		Expt 4.1B Prepare a slide of animal cells.		1.5
	Expt 4.1B Observe and draw an animal cell under a light microscope.			0.5
	Recognize the structure of a typical plant cell.			0.5
		Expt 4.1C Prepare a slide of plant cells.		1.5
	Expt 4.1C Observe and draw a plant cell under a light microscope.			0.5
		STEM 4.1 Acquire STEM skills through making a microscope using a mobile phone.		after class
		Explore 4.1 Understand more about plant cells, and enhance interest in study, through 'magic' performance.		after class
	Checkpoint 4.1B			0.5
4.1D How do new cells and different kinds of cells appear? (pp. 22–23)	Recognize that cells can divide, grow and differentiate.			0.5
4.1E The five levels of organization in our body (pp. 24–25)		State the levels of organization in most living things. E		0.5
	Checkpoint 4.1C			0.5

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4.2 DNA – the book of our life (pp. 26–34)

(DNA and chromosomes were NOT introduced in the primary curriculum. Ss may have heard about them, but may not have clear ideas.)


	MUST	SHOULD	COULD	No. of periods
4.2A What is DNA? (pp. 26–30)	Warm up 4.1 ↓			0.5
	<ul style="list-style-type: none"> Recognize that DNA contains information that determines our body structure and functions. Recognize that DNA is present inside the nucleus, and can coil to form chromosomes. 			1
		<ul style="list-style-type: none"> State that there are 23 pairs of chromosomes in a human cell. Recognize that male and female sex cells have different sex chromosomes. 		0.5
			Explore 4.2A Have an experience in extracting DNA from fruits.	1
4.2B How does DNA carry information? (pp. 31–34)			<ul style="list-style-type: none"> State the four kinds of bases on DNA and their pairing on the double helix structure of DNA. E Recognize that the instructions encoded in DNA depend on the base sequences. E 	1
			Explore 4.2B Simulate how the base sequences of DNA carry information. E	0.5
	Checkpoint 4.2			0.5

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4.3 Human reproduction (pp. 35–54)

Background knowledge learnt in primary school:

- Basic structures of male and female reproductive systems
- Puberty — sexual maturation; secondary sexual characteristics; wet dreams and menstrual cycle
- How to face puberty — physical and psychological changes, variations between individuals, reactions towards sex

	MUST	SHOULD	COULD	No. of periods
4.3A Where did all of us come from? (pp. 35–39)	Warm up 4.3			0.5
	<ul style="list-style-type: none"> • State that reproduction is essential to the continuity of human survival. • Identify sperms and eggs as the male and female sex cells in humans. 			0.25
		State that each sperm and egg carries 23 chromosomes.		0.25
	Recognize different structures of the male and female reproductive systems and their functions.			1
	Checkpoint 4.3A			0.5
4.3B How is the journey from fertilization to birth? (pp. 40–48)	Realize the process of fertilization.			0.25
		Realize the restoration of 46 chromosomes after fertilization.		0.25
			Explore 4.3A Realize what determines our sex.	0.5
	Realize the process of implantation and signs of pregnancy.			0.5
	Realize the processes of embryo and foetus development.			0.5
	Realize the process of birth and the importance of parental care.			0.5
	Checkpoint 4.3B			0.5
4.3C What happens after entering puberty? (pp. 48–51)	Recognize the signs of maturation during puberty and secondary sexual characteristics.			1.5
		Explore 4.3B Understand problems faced during puberty and how to handle them.		after class
	Checkpoint 4.3C			0.5
4.3D Family planning and birth control (pp. 52–54)	Be aware of the need of family planning, and the basic principles of birth control.			0.5
			Recognize various methods of birth control and that some can help prevent STD transmission. 	0.5
	Checkpoint 4.3D			0.5

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4.4 Heredity and variation (pp. 55–67)

Background knowledge learnt in primary school:

(Heredity was NOT introduced in the primary curriculum. Ss may have heard about heredity but may not have clear ideas.)

	MUST	SHOULD	COULD	No. of periods
4.4A Why do we look like our parents? (p. 56)	Warm up 4.4			0.5
	↓ State that heredity is the passing of characteristics through transmission of genetic information.			0.25
			Explore 4.4A Understand more about heredity through observing a family tree.	0.25
4.4B Why are we different? (pp. 57–65)	↓ • Give examples of continuous and discontinuous variations, and how they are related to heredity and the environment. • Realize the use of bar charts and histograms to show variation distributions.			1
			Skill Training 4.4 Master the skills in grouping data and drawing a histogram.	1
			↓ Expt 4.4 Master the skills in constructing bar charts and histograms to shown variation distributions, and interpreting them.	1
			↓ Explore 4.4B Recognize more about how DNA encodes instructions by studying mutations.	0.5
4.4C What are twins? (pp. 65–67)	↓ Distinguish between the occurrence of identical and non-identical twins.			1
	↓ Checkpoint 4.4			0.5

Teaching flow (to cater for learner diversity)

Chapter 5 Energy

5.1 Energy and energy conversion (pp. 82–103)

MUST – for **ALL** students
SHOULD – for students of **AVERAGE** capability
COULD – for students of **HIGH** capability

	MUST	SHOULD	COULD	No. of periods
5.1A Forms of energy (pp. 82–87)	Warm up 5.1			0.25
	↓ Recognize that energy exists in different forms.			0.75
	↓	Explore 5.1 • Realize energy transfer from daily life phenomena. • Give examples of energy transfer in daily life.		0.5
	↓ Checkpoint 5.1A	←		0.5
5.1B Can energy change form? (pp. 88–97)	↓ Recognize that different forms of energy can be converted from one form to another.			0.5
	↓ Skill Training 5.1 Represent energy conversion process with a diagram.			0.5
	↓ Expt 5.1A Understand some energy conversion processes through experiments.			1.5
	↓	SI 5.1 Do a scientific investigation to determine the relation between the thickness of a rubber band and its PE stored.		2
	↓		STEM 5.1 Apply the concept of energy interconversion to make a roll-back can.	after class
	↓ Checkpoint 5.1B	← ←	←	0.5
5.1C Some common examples of energy conversion (pp. 98–103)	↓ Recognize some common energy conversion processes.			0.5
	↓	Expt 5.1B Realize the energy conversion process in motors and dynamos.		0.5
	↓ Checkpoint 5.1C	←		0.5

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5.2 Conservation of energy (pp. 104–113)

	MUST	SHOULD	COULD	No. of periods
5.2A How much energy? (pp. 104–105)	Warm up 5.2 ↓			0.5
	State that joule (J) and kilocalorie (kcal) are units of energy. ↓	↓	Convert the unit of energy from joule to kcal	0.25
				0.25
5.2B Can energy be created or destroyed? (pp. 106–108)	Recognize that energy is conserved ↓	←		0.5
	Skill Training 5.2A Distinguish between useful output energy and wasted energy. ↓	↓		0.5
5.2C Are all forms of energy useful? (pp. 108–110)		Use graphical representation to illustrate that energy is conserved in an energy conversion process. ↓		0.5
5.2D How much energy output is useful? (pp. 110–113)		Recognize what efficiency is during an energy conversion process. E		0.5
			Apply the equation $\text{Efficiency} = \frac{\text{Useful energy output}}{\text{total energy input}} \times 100\%$ to find the efficiency of an energy conversion. E	0.5
			Skill Training 5.2B Understand how to calculate the efficiency of an electrical appliance. E	0.5
	Checkpoint 5.2	←	←	0.5

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5.3 Heat transfer (pp. 114–134)

	MUST	SHOULD	COULD	No. of periods
5.3A What is heat transfer? (pp. 114–115)	Warm up 5.3			0.5
	↓ Realize that heat flows from a hot object to a cold object.			0.5
5.3B How is heat transferred? (pp. 116–134)	↓ Realize conduction as a way of heat transfer in matter.			0.5
		↓ <ul style="list-style-type: none"> Give examples of heat conduction in daily life. Distinguish between common good conductors and insulators of heat. 		0.5
		↓ Explore 5.3 Identify conductors and insulators in our daily life.		0.5
		↓ Expt 5.3A Realize how slow it is for heat to be conducted in water and air.		1
	↓ Checkpoint 5.3A	←		0.5
	↓ Realize convection as a way of heat transfer in fluids.			0.5
	↓ Expt 5.3B Observe convection currents in air and water.			1
		↓ <ul style="list-style-type: none"> Give examples of convection of heat in daily life. Draw convection currents to show how heat is transferred by convection. 		0.5
	↓ Checkpoint 5.3B	←		0.5
	↓ Realize radiation as a way of heat transfer in matter or in a vacuum.			0.5
		↓ Tell how the colour of an object affects its rate of absorption and emission of thermal radiation.		1
		↓ Expt 5.3C & 5.3D Verify how the colour of an object affects its rate of absorption and emission of thermal radiation.		1
		↓ Give daily life examples of controlling of heat flow.		0.5
		↓ Skill Training 5.3 Analyse how various designs can control heat flow.		0.5
		↓ STEM 5.3 Apply the concepts of heat transfer to slow down heat flow.		after class
	↓ Checkpoint 5.3C	←	←	0.5

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5.4 Energy sources **E** (pp. 135–144)

	MUST	SHOULD	COULD	No. of periods
5.4A What is our main energy source now? (pp. 135–137)		Warm up 5.4 ↓ <ul style="list-style-type: none"> Recognize that fossil fuels are non-renewable. Be aware of the concerns about using fossil fuels. ↓ Skill Training 5.4A Understand how to handle data from graphs.		0.5 0.5 1
		Recognize the need for developing alternative energy sources. ↓ Be aware of the concerns arising from the use of different energy sources. ↓ Explore 5.4B Understand different concerns for various alternative energy sources.	↓ Explore 5.4A Understand more about biofuels. ↓ 	0.5 0.5 0.5 1
		Recognize the need for saving energy in daily life. ↓ Checkpoint 5.4	↓ Skill Training 5.4B Design a poster to promote saving energy. ↓ 	0.5 after class 0.5

Teaching flow (to cater for learner diversity)

Chapter 8 Making use of electricity

8.1 Batteries and bulbs (pp. 88–108)

(In primary level, Ss have got a rough idea of the flow of electricity, conductors and insulators.)

MUST – for **ALL** students
SHOULD – for students of **AVERAGE** capability
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	MUST	SHOULD	COULD	No. of periods
8.1A Transferring energy (pp. 90–91)	Warm up 8.1 ↓			0.25
	<ul style="list-style-type: none"> Think of a circuit as a set-up that transfers energy. Visualize a circuit as a hula hoop system. ↓			0.25
	Explore 8.1A Light up a bulb with a hand crank dynamo and a battery in turn.			0.5
8.1B Charge flows! (p. 92)	Recognize that charges flow through a bulb when the bulb lights up.			0.5
8.1C Conductors and insulators (pp. 93–94)	Identify electrical conductors and insulators.			0.5
		Expt 8.1A Test whether some given liquids are electrical conductors or insulators.		1
8.1D Completing the circuit (pp. 95–99)	Understand that a closed circuit and a battery are required for lighting up a bulb.			0.25
	↓			
	Expt 8.1B Realize the necessary conditions for a bulb to glow.			0.5
	↓			
		Expt 8.1B Light up a bulb with ONE wire and a battery.		0.5
		↓		
		Understand switch as a device to complete or break a circuit.		0.5
		↓		
	Checkpoint 8.1A			0.25
8.1E Circuit diagrams (pp. 100–102)	Understand circuit diagrams and circuit symbols.			0.5
	↓			
	Represent a real circuit by drawing a circuit diagram.			0.5
		Explore 8.1B <ul style="list-style-type: none"> Explore ways of connection that light up three bulbs. Practise drawing corresponding circuit diagrams. 		1

(Cont'd)

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	MUST	SHOULD	COULD	No. of periods
8.1F What if one of the bulbs is unscrewed? <i>(pp. 103–108)</i>	Trace and identify the bulbs that are connected on the same conducting loop.			0.25
	Skill Training 8.1 Master the skills in building circuits according to circuit diagrams.			0.25
		Expt 8.1C Trace the loop that goes round a series circuit.		0.5
		Expt 8.1D Trace the parallel loops that go round a parallel circuit.		0.5
			Explore 8.1C Determine whether a component is on a closed loop that goes through the battery.	0.25
	Checkpoint 8.1B			0.25

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8.2 Voltage and current (pp. 109–126)

(The concepts of voltage and current were NOT introduced in primary level.)

	MUST	SHOULD	COULD	No. of periods
8.2A Current (pp. 109–110)	Warm up 8.2			0.25
	<ul style="list-style-type: none"> Recognize electric current as a flow of charge. State that ampere (A) is a unit of the size of current. 			0.5
8.2B Water circuit analogy (pp. 111–112)	Visualize a circuit as a water pipe system.			0.25
8.2C Voltage of a battery (pp. 113–115)	<ul style="list-style-type: none"> Recognize that battery with a higher voltage provides more energy to each charge. State that volt (V) is a unit of the size of voltage. 			0.25
		Understand that voltage is the cause of the charge flow.		0.25
	Checkpoint 8.2A			0.5
8.2D Measuring voltage and current (pp. 116–121)	Expt 8.2A Use a voltmeter to measure the voltages of different sources.			0.5
			Expt 8.2A Measure the voltage produced by a hand crank dynamo.	0.25
		Skill Training 8.2 Know the steps needed to insert an ammeter into a circuit.		0.25
	Expt 8.2B Use an ammeter to measure current.			0.5
		Expt 8.2B Compare currents entering and leaving the battery.		0.5
8.2E Current in a series circuit (pp. 122–123)	Expt 8.2C Recognize that current is the same at all points in a series circuit.			0.75
	Understand why current is the same at all points in a series circuit.			0.25
8.2F What determines the size of current? (pp. 124–126)	Recognize that the size of current is determined by the voltage of the battery and the components connected in the circuit.			0.5
		Expt 8.2D <ul style="list-style-type: none"> Investigate how the voltage of the battery affects the size of current. Investigate how the number of bulbs in series affects the size of current. 		1
	Checkpoint 8.2B			0.5

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8.3 Resistance (pp. 127–142)

(In primary level, Ss have learnt that some materials conduct electricity better than others.)

	MUST	SHOULD	COULD	No. of periods
8.3A Comparing different conducting materials (pp. 127–128)	Warm up 8.3	Recognize the difference in conducting ability between good conductors and poor conductors.		0.25
		Expt 8.3A Compare the conducting ability of copper and nichrome.		0.25
				0.5
8.3B Resistance (pp. 129–133)	<ul style="list-style-type: none"> Understand that a larger resistance will result in a smaller current to flow in a circuit. State that ohm (Ω) is a unit of resistance. 			0.5
			Recognize that resistance can be measured with a multimeter or an ohmmeter.	0.25
		Recognize the use of resistors in a circuit.		0.25
		Expt 8.3B Investigate how the resistance affects the current in a circuit.		0.5
		Expt 8.3B Investigate the effect of adding resistors in series on the current.		0.5
		Recognize that adding resistors in series increases the overall resistance, and thus reduces the current in the circuit.		0.5
8.3C Factors affecting the resistance of a wire Ⓔ (pp. 134–137)			Understand the effect of the material, thickness and length of the wire on its resistance.	0.5
			Expt 8.3C <ul style="list-style-type: none"> Measure the resistance of a wire with a multimeter. Investigate how the thickness of a wire affects its resistance. 	0.5
			Expt 8.3D <ul style="list-style-type: none"> Investigate how the length of a wire affects its resistance. Plot a graph to present the experiment results. 	1
8.3D Rheostat Ⓔ (pp. 138–142)			<ul style="list-style-type: none"> Understand how a rheostat works. Give examples of common applications of rheostats. 	0.5
			Expt 8.3E Understand the working principle of a rheostat used as a variable resistor.	1
	Checkpoint 8.3			0.5

MUST – for **ALL** students
SHOULD – for students of **AVERAGE** capability
COULD – for students of **HIGH** capability

8.4 Parallel paths (pp. 143–155)

(In primary level, Ss only come across single-loop circuits. Ss may have heard about the danger of short circuits.)

	MUST	SHOULD	COULD	No. of periods
8.4A Branches in a circuit (pp. 143–146)		Warm up 8.4		0.25
		↓ Recognize that the voltage across parallel branches is the same.		0.5
		↓ Recognize that a larger current flows in the branch with a smaller resistance.		0.5
		↓ Expt 8.4A Study how the current in a branch depends on the resistance of that branch.		1
8.4B Total current in main path (pp. 147–151)		↓ Recognize that the current in the main loop is the sum of the currents in the branches.		0.5
		↓ Expt 8.4B Study the effects of adding more bulbs in parallel on the overall resistance and the total current.		1
		↓	• Recognize that a brighter bulb demands energy more quickly from the battery. • Realize that both current and voltage affect the brightness of a bulb.	0.5
		↓ Checkpoint 8.4A	←	0.5
8.4C What if one of the branches has almost no resistance? (pp. 152–155)		↓	Understand the condition for shorting a bulb.	0.5
		↓	Expt 8.4C Investigate the behaviour of the circuit when one of its bulbs is shorted.	1
		↓	Explore 8.4 Trace the conducting loops and predict which bulb(s) will be shorted when switches are closed.	0.5
		↓	Checkpoint 8.4B	0.5

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8.5 Household electricity (pp. 156–180)

(In primary level, Ss have learnt the heating and magnetic effects of current and some safety precautions in using electricity.)

	MUST	SHOULD	COULD	No. of periods
8.5A Home appliances (pp. 156–158)		Warm up 8.5 ↓ <ul style="list-style-type: none"> Recognize that electrical appliances are energy converters. Be aware that many appliances make use of the heating effect and magnetic effect of current. 		0.5
			STEM 8.5 Acquire STEM skills through designing and building a hairdryer circuit with specified functions.	0.5
				0.5
8.5B Powering home appliances (pp. 158–164)	State the mains voltage in Hong Kong.			0.25
	Identify the colour coding of wires and understand the wiring of a three-pin plug.			0.25
			Explore 8.5A <ul style="list-style-type: none"> Strip a cable and identify the three wires inside. Connect the wires to the pins of a plug and study the holes of an adaptor. 	1.5
		Be aware that current normally flows in the live and neutral wires but not the earth wire.		0.5
		Explain why parallel circuits are preferred to series circuits in household circuits.		0.5
	Checkpoint 8.5A			0.5
8.5C Safety issues in using appliances (pp. 165–173)	Understand the danger of overloading and short circuits.			0.5
	Recognize fuses and circuit breakers as safety devices for protecting circuits.			0.5
		Expt 8.5A Understand how a fuse protects a circuit.		1
	Recognize the importance of the use of earth wire.			0.5
		Explore 8.5B State safety precautions in using electricity.		0.5
	Checkpoint 8.5B			0.5

(Cont'd)

MUST – for **ALL** students
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	MUST	SHOULD	COULD	No. of periods
8.5D Cost of operating an appliance ⑤ <i>(pp. 173–180)</i>			<ul style="list-style-type: none"> Understand power as the electrical energy transferred to an appliance per second. State that watt (W) is a unit of power. Recognize that the amount of energy consumed = power × time of use. 	0.25
			Expt 8.5B Measure the power of a light bulb with a joulemeter.	1
			<ul style="list-style-type: none"> State that kilowatt-hour (kW h) is a larger unit of energy. Understand the inter-conversion between kilowatt-hours and joules. 	0.25
			State that kilowatt-hour (kW h) is a unit for calculating the cost of electricity.	0.25
			Explore 8.5C Calculate the cost of electricity from the amount of electrical energy consumed.	0.5
			Recognize the efficiency of an electrical appliance as the ratio of useful power output to power input.	0.25
			Explore 8.5D Study the information provided by an energy label.	0.5
			Checkpoint 8.5C	0.5

Teaching flow (to cater for learner diversity)

Chapter 9 Common acids and alkalis

9.1 Two common types of chemicals—acids and alkalis (pp. 4–13)

MUST – for **ALL** students
SHOULD – for students of **AVERAGE** capability
COULD – for students of **HIGH** capability

	MUST	SHOULD	COULD	No. of periods
9.1A Why do some plant extracts change colours? <i>(pp. 4–7)</i>	Warm up 9.1 	Recognize that some plant extracts show different colours in daily items that contain acids or alkalis. 		0.5
		Explore 9.1 Stimulate Ss' learning interest through testing some everyday substances with different plant extracts. 		0.25
	Recognize that acids and alkalis are two common types of chemicals found in many daily items. 			1
				0.25
9.1B Where can acids and alkalis be found? <i>(pp. 8–9)</i>		Realize the presence of acids and alkalis in foods and daily items. 		0.5
9.1C Some properties of acids and alkalis <i>(p. 10)</i>	Realize some properties of acids and alkalis. 			0.5
9.1D How to handle acids and alkalis safely? <i>(pp. 11–13)</i>	Realize the safety precautions and emergency treatments when handling acids and alkalis. 			1
	Checkpoint 9.1			0.5

MUST – for **ALL** students
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9.2 Testing acids and alkalis (pp. 14–39)

	MUST	SHOULD	COULD	No. of periods
9.2A Which are acids and which are alkalis? (pp. 14–20)	Warm up 9.2			0.5
	Realize the use of acid–alkali indicators to distinguish between acids and alkalis.			0.5
	Experiment 9.2A Test acids and alkalis using litmus paper.			0.5
		Experiment 9.2A Use litmus paper to identify acidic, alkaline and neutral solutions.		0.5
		Use litmus paper to show that acids and alkalis are chemical opposites.		0.25
	Checkpoint 9.2A			0.5
9.2B How acidic and how alkaline? (pp. 21–39)	<ul style="list-style-type: none"> Understand the use of the pH scale for comparing the degrees of acidity and alkalinity. Be able to use universal indicator solution and pH paper to find out the pH values of acids and alkalis. 			1
	Experiment 9.2B Find out the pH values of acids and alkalis using universal indicator solution			1
			Explore 9.2 Understand how universal indicator works.	0.5
			STEM 9.2 Acquire STEM skills through making your own 'universal indicator'.	after class
	Checkpoint 9.2B			0.5
		Understand the limitations of universal indicator.		0.25
		Recognize that pH meters can be used to find the pH value of a substance accurately.		0.5
	Experiment 9.2C Use pH paper and pH meters to find out the pH values of some household substances.			1.5
		Experiment 9.2C Compare the advantages and disadvantages of using pH paper and pH meters in finding the pH values of substances.		0.5
			Realize the pH values of some common substances.	0.25
			Realize the importance of keeping a suitable pH value in different cases.	0.5
	Checkpoint 9.2C			0.5

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9.3 Mixing an acid with an alkali (pp. 41–56)

	MUST	SHOULD	COULD	No. of periods
9.3A What happens when we mix an acid and an alkali together? (pp. 41–52)	Warm up 9.3			0.5
	Recognize that the properties of acids and alkalis 'cancel out' each other when they are mixed together.			0.5
	Experiment 9.3A Observe the changes in pH value in the process of neutralization.			1
		Skill Training 9.3 Master the skills in plotting a pH curve and be able to read information from the curve.		1
	Experiment 9.3B Realize that a salt is produced in neutralization.			1
		Write word equations to describe the neutralization reactions between common acids and alkalis.		0.5
			Recognize how the chemical name of a salt is formed.	0.25
			Explore 9.3A Recognize the pattern in word equations of neutralization reactions.	0.5
9.3B Making use of neutralization (pp. 53–56)	Recognize that mass is conserved in neutralization reactions.			0.5
	Experiment 9.3C Show that mass is conserved in neutralization reactions.			0.5
	Realize the everyday applications of neutralization.			0.5
			Explore 9.3B Realize more everyday applications of neutralization.	after class
	Checkpoint 9.3		Realize the everyday uses of acids and alkalis.	0.5

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9.4 Corrosive nature of acids (pp. 57–72)

	MUST	SHOULD	COULD	No. of periods
9.4A Actions of acids on metals (pp. 57–62)	Warm up 9.4			0.5
	↓ Recognize the corrosive effects of acids on metals			0.5
	↓ Experiment 9.4A • Recognize how to test for hydrogen. • Observe the reactions between a dilute acid and metals.			1.5
		↓ Explore 9.4A Realize how to choose suitable cooking pots for cooking acidic foods.		0.5
		↓ Write word equations to describe the reactions between metals and dilute acids.		0.5
9.4B Actions of acids on building materials (pp. 63–67)		↓ Recognize the corrosive effects of acids on building materials.		0.5
		↓ Experiment 9.4B Observe the reactions between a dilute acid and building materials.		1.5
		↓ Write word equations to describe the reactions between calcium carbonate and dilute acids.		0.5
			↓ Explore 9.4B Realize how an increase in carbon dioxide content in the atmosphere affects sea life.	0.5
		↓ Checkpoint 9.4A		0.5
9.4C Acid rain (pp. 68–72)	↓ Understand the causes of acid rain and its effect on the environment.			1
	↓	↓ Experiment 9.4C Realize the effect of acid rain on the growth of plants.		0.5
	↓ Realize some preventive measures against acid rain.	↓		0.5
	↓ Checkpoint 9.4B			0.5

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9.5 Potential hazards in using acids and alkalis (pp. 73–81)

	MUST	SHOULD	COULD	No. of periods
9.5A Irritant and corrosive properties of acids and alkalis (pp. 73–77)	Warm up 9.5			0.5
	Realize that many acids and alkalis are irritant or corrosive.			0.25
		Recognize that the corrosive and irritant properties of an acid or alkali depend on its concentration and strength.		1
	Experiment 9.5 Observe the corrosive power of concentrated strong acids and alkalis.			1
9.5B Safety precautions in using concentrated strong acids and alkalis (p. 78)	Understand the safety precautions in using concentrated strong acids and alkalis.			0.5
9.5C Hazards related to mixing common cleaners (pp. 79–81)	Realize the hazards related to mixing common cleaners and the safety tips when using cleaners.			1
	Checkpoint 9.5			0.5