# Answers

## CHAPTER 1
## The Scientific Endeavour

### What's in a Word?

1.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | E | R | S | E | V | E | R | A | N | C | E | R | S | A | C |
| A | S | F | T | B | N | M | R | U | N | U | E | T | D | L | O |
| D | C | M | I | L | K | Y | L | I | O | R | T | U | N | J | B |
| E | R | E | S | P | O | N | S | I | B | I | L | I | T | Y | B |
| A | E | D | D | I | B | L | O | U | A | O | C | N | V | O | L |
| R | A | Q | U | A | J | E | T | H | U | S | R | T | A | P | E |
| Y | T | O | N | D | E | X | G | U | T | I | F | E | T | N | R |
| G | I | W | E | T | C | N | I | G | R | T | I | G | Y | M | Q |
| J | V | A | E | N | T | B | U | T | U | Y | R | R | H | X | W |
| U | I | N | L | Y | I | A | N | A | S | F | S | I | B | S | E |
| K | T | T | C | D | V | I | K | B | T | O | T | T | O | A | H |
| N | Y | C | O | L | I | L | O | L | E | U | L | Y | R | T | B |
| T | S | E | B | P | T | G | B | E | R | R | Z | V | N | E | O |
| Z | C | B | U | N | Y | I | Y | N | J | K | L | E | A | M | N |

2. (a) investigate; observations; explain
   (b) qualitative
   (c) quantitative
   (d) accurate

### Level 1

#### Multiple-choice Questions

1. D The symbol represents an oxidising substance. This means that the substance releases oxygen easily and can cause fire and/or explosions.
2. C All breakages, accidents and spillages should be reported to your teacher so they can take the appropriate action.
3. D The symbol represents a substance that is harmful and is an irritant. Contact with the substance can lead to irritation or allergic reactions of the skin or eyes.
4. D The SI unit for time is the second.
5. B Curiosity, objectivity, perseverance, integrity and open-mindedness are attitudes necessary in scientific inquiry.
6. D A strike back occurs when there is too much oxygen entering a Bunsen burner through the air-hole. This can be prevented by closing the air-hole before lighting a Bunsen burner.
7. A The length of the pencil is 12.0 cm.
8. C We can reduce parallax error by making sure that the line of sight is perpendicular to the marking on the ruler.

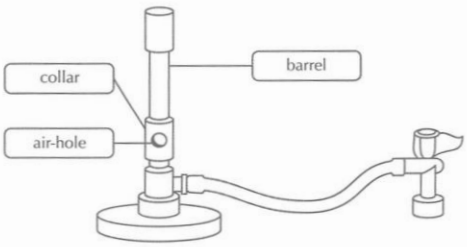
### Level 2

#### Multiple-choice Questions

1. D David was using the data obtained from his investigation to develop possible explanations.
2. D Smoking is prohibited at a petrol station as the sparks from cigarettes may ignite the petrol which is flammable.
3. C Plastics are non-biodegradable and cause pollution. Medical knowledge is used to produce biological weapons. Options I and III are useful effects of science.
4. C Quantitative data is data that is represented by numerical quantities. Option III: Time taken is an example of quantitative data. Option IV: A percentage rise in sales is an example of quantitative data. Options I and II are qualitative data.
5. B Mercury in a thermometer has a convex meniscus. The top of the meniscus gives a reading of 37.6 °C.

#### Structured Questions

1. (a) Lisa cannot make a fair comparison of the prices as the quantities of detergent are measured differently.
   (b) Lisa can compare the strength of detergents, the smell of the detergents or the form the detergent comes in (powder or liquid). (Accept any two answers.)
2. (a) Noelle took off her safety goggles, pointed the test tube at herself and rushed to buy food without washing her hands.
   (b) Noelle should keep her safety goggles on at all times when in the laboratory, point the test tube away from herself and others, and wash her hands before leaving the laboratory.
3. (a) (i)




   (ii) The air-hole allows air to enter the Bunsen burner. The collar regulates the air going into the air-hole. The barrel raises the flame to a suitable height for burning.
   (b) Close the air-hole before lighting a Bunsen burner to prevent a strike back. Do not leave a Bunsen flame unattended. (*Accept other possible answers.*)
   (c) A non-luminous flame is more suitable for heating as it has a higher temperature and is steadier.

## Level 3

### Structured Questions

1. (a) The angle through which the ruler bends / The distance through which the end of the ruler moves (*Any one.*)
   (b) The material of the ruler
   (c) The thickness of the ruler / The length of the ruler (*Accept other possible answers.*)
   (d) The experiment will not be a fair one, so the results will not be reliable.
2. (a) Eric did not warm the acid gently as instructed. When the acid boiled, it could have bubbled violently and spilled out of the test tube.
   (b) The Bunsen burner might burn nearby objects or people. (*Accept other possible answers.*)

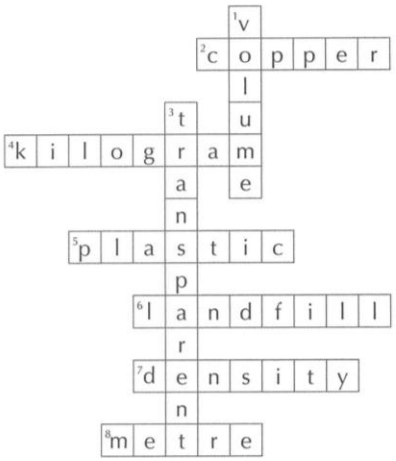
### Free-response Questions

1. (a) The longer a liquid takes to evaporate, the slower the rate of evaporation.
   (b) Different amounts of liquid were used. The beakers were placed in different environments.
   (c) Albedo should use the same amount of liquid **X** and liquid **Y**. He should also place the liquids in the same environment (i.e. beside the window).
2. (a) Better communication, entertainment, online shopping (*Accept other possible answers.*)
   (b) Radiation from phone, addiction, security risk (*Accept other possible answers.*)

# CHAPTER 2
# Exploring Diversity of Matter by Its Physical Properties

## What's the Word?

1.




2. (a) colour; texture
   (b) boiling
   (c) melting
   (d) flexible

## Level 1

### Multiple-choice Questions

1. A Metal is a good conductor of electricity and heat, and can be moulded into shapes.
2. C Pots and pans need to be good conductors of heat to cook food efficiently.
3. C Thermal conductivity of a material refers to the measure of how easily heat flows through it.
4. B The volume of the liquid is read from the lowest point of the meniscus.
5. D The high electrical conductivity of metal **X** allows an electric current to flow through it, completing the circuit and causing the bulb to light up.
6. B A kitchen knife goes through wear and tear every time it is used to cut something. The hardness of steel allows the knife to withstand wear and tear and stay sharp for longer.
7. A Solder needs to have a low melting point so that the components it is joining together do not melt when it is heated.
8. D A styrofoam cup is most likely to float on water as it is waterproof and has a lower density than water.

## Level 2

### Multiple-choice Questions

1. A Each tick in the table indicates that metal **P** is harder than metal **Q** as it can scratch metal **Q**. Steel has three ticks, iron has two ticks, copper has one tick and zinc has zero ticks. Hence, steel is the hardest, followed by iron, copper and zinc.
2. C For a substance to be a solid at 25 °C, its melting point must be higher than 25 °C. For a substance to be a gas at 75 °C, its boiling point must be lower than 75 °C.
3. B Gold that is not pure contains other materials which have different densities.
4. A The densities of the substances are in this order: substance **Q** (lowest density) < substance **P** < substance **S** < substance **R** (highest density)
   Substance **S** sinks in substance **Q**.
   Therefore, it is denser than substance **Q**.
5. C Lorries that transport flammable substances might catch fire, and thus need tyres that are poor conductors of heat and can withstand high temperatures.

### Structured Questions

1. Bennett can classify the food items by the type of food, label them, and place them in different sections of the fridge. (*Accept other possible answers.*)
2. The density of the block does not change if it is cut in half.
   Density of block

$$= \frac{\text{mass}}{\text{volume}}$$

$$= \frac{500\ \text{g}}{(7\ \text{cm} \times 15\ \text{cm} \times 8\ \text{cm})}$$

$$= \frac{500\ \text{g}}{840\ \text{cm}^3}$$

$$= 0.60\ \text{g/cm}^3$$

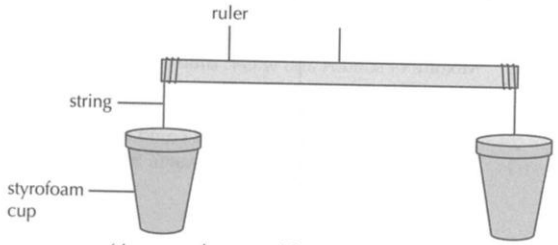
As the density of the block is less than that of water, it will float.

3. As an egg becomes older, its composition changes such that there is more air than liquid content in the egg. Older eggs become less dense than water and thus float.

## Level 3

### Structured Questions

1. (a) Material A is most suitable for making a jacket. Since its temperature decreased the slowest, it is a poor conductor of heat.
   (b) Material C is most suitable for making a wok. Since its temperature decreased the fastest, it is a good conductor of heat.
2. (a) Julie can fill the teaspoon or tablespoon with the ingredient and sweep off any excess ingredient. *(Accept other possible answers.)*
   (b) She can build her own balance as shown with a ruler, strings and two styrofoam cups. She can place the stick of butter (110 g) in one cup and add the sugar in another until both cups are at the same level (aligned horizontally). At this point, the amount of sugar in the cup will be 110 g. She can then take out the stick of butter and divide the sugar equally between the two cups so that the balance becomes horizontal once again. The amount of sugar in each cup will then be 55 g.




*(Accept other possible answers.)*

### Free-response Questions

1. (a) John can measure the thickness of 20 pieces of paper. Dividing the measurement by 20 will then give the thickness of a piece of paper. *(Accept other possible answers.)*
   (b) The measurement will be less accurate. Digital calipers measure up to 0.01 cm while metre rulers only measure up to 0.1 cm.
2. (a) Density of gold nugget
   $= \frac{\text{mass}}{\text{volume}}$
   $= \frac{50\text{ g}}{3.2\text{ cm}^3}$
   $= 15.63\text{ g/m}^3$
   (b) Density of 24K gold = $19.3\text{ g/cm}^3$
   Density of 18K gold
   $= \frac{18}{24} \times 19.3$
   $= 14.5\text{ g/cm}^3$
   Density of 14K gold
   $= \frac{14}{24} \times 19.3$
   $= 11.3\text{ g/cm}^3$
   The gold nugget is most likely to be 18K gold as its density is the closest to that of 18K gold.

# CHAPTER 3
# Exploring Diversity of Matter by Its Chemical Composition

## What's the Word?

1. (a) Elements are the basic building blocks of — two or more elements that are chemically combined together.
   (b) A mixture is made up of — metals or non-metals.
   (c) A compound consists of — living and non-living matter.
   (d) Elements can be classified as — insoluble substances in a solvent.
   (e) A suspension is a mixture that contains — two or more elements and/or compounds that are not chemically combined.

## Level 1

### Multiple-choice Questions

1. B An element has a fixed melting point, can be found in the periodic table and cannot be broken down into simpler substances by both chemical and physical means.
2. B Elements are arranged into metals and non-metals in the periodic table.
3. A Water and sodium chloride are compounds as they consist of two elements chemically combined together.
4. C A solution is a mixture in which one substance dissolves completely in another substance. A suspension is a mixture that contains insoluble substances in a solvent.
5. B A solution with a high percentage of dissolved solute is known as a concentrated solution.
6. C The factors that affect the rate of dissolving are: rate of stirring, size of solute particles and temperature of solvent.
7. A Metals: potassium, sodium, magnesium
   Non-metals: carbon, fluorine, chlorine, hydrogen, oxygen
8. B The type of solvent and the type of solute used affect the solubility of a solute.

## Level 2

### Multiple-choice Questions

1. C An element contains only one kind of atom, while a compound contains two or more kinds of atoms.
2. A A substance that dissolves in another substance is called a solute.
3. A Hydroxyapatite contains four elements: calcium (Ca), phosphorus (P), oxygen (O) and hydrogen (H).
4. B Seawater is a solution with salt, the solute, dissolved in water, the solvent.
5. C Light can pass through salt water fully as the particles of salt have dissolved and cannot be seen. Light cannot pass through orange juice fully as the orange pulp has not dissolved and can be seen.

### Structured Questions

1. (a) Carbon and oxygen
   (b) Carbon dioxide does not have the same properties as its constituent elements, carbon and oxygen. The constituent elements of carbon dioxide are always chemically combined in a fixed proportion by mass. Carbon dioxide cannot be separated into its constituent elements easily. (*Any two.*)
2. (a) Statements 1, 2, 3 and 5
   (b) Statement 1: Elements **cannot** be broken down into simpler substances.
   Statement 2: Compounds consist of **two** or more elements chemically combined together.
   Statement 3: Compounds **do not** have the same properties as their consituent elements.
   Statement 5: A mixture **has** the same characteristics as its constituents.
3. (a) Solid **F**
   (b) Solvent **P**
   (c) Increase the temperature of solvent **R**.

## Level 3

### Structured Questions

1. (a) The resulting mixture is a solution. Particles from the tea bags dissolve in the water to form tea.
   (b) The resulting mixture is a suspension. The pearls are not soluble in the tea.
2. (a) Na, *Cl*
   (b) Sodium
   (c) The smaller the particle size of sodium chloride, the faster sodium chloride dissolves in water.
   (d) The higher the temperature of the water, the faster sodium chloride dissolves in water.

### Free-response Questions

1. (a) Nitrogen and hydrogen
   (b)

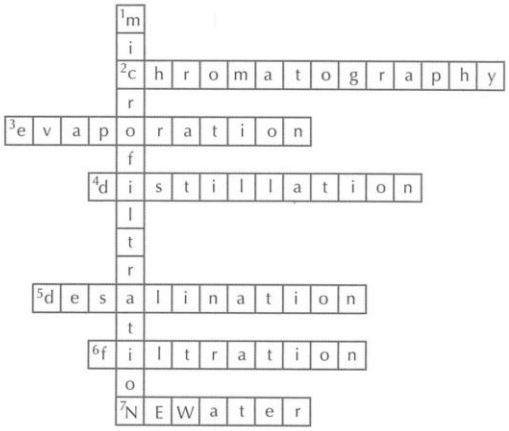
| Compound | Mixture |
|---|---|
| Contains two or more elements | Can contain two or more elements, or two or more compounds, or one or more elements and compounds |
| Does not have the same properties as its constituent elements | Has the same properties as its constituents |
| Constituent elements chemically combined in fixed proportion by mass | Constituents do not have a fixed proportion |
| Cannot be separated into its constituent elements easily | Its constituents can be separated from the mixture easily |

   (c) Someone who has exercised vigorously will have lost water and salts in the body through sweating. Since isotonic drinks contain similar concentrations of salt and sugar as in the human body, they will replenish the fluids lost by the body during exercise.
2. (a) Solubility refers to how well a solute dissolves in a fixed volume of a particular solvent.
   (b) Mixture of solid **A** and water: Blue particles of solid **A** could be seen.
   Mixture of solid **B** and water: A colourless solution was formed. / Particles of solid **B** could not be seen.
   (c) Increase the temperature of the water. Stir the mixture of solid **B** and water.

# CHAPTER 4
# Exploring Diversity of Matter Using Separation Techniques

## What's the Word?

1.



## Level 1

### Multiple-choice Questions

1. D Magnetic attraction is used to separate a magnetic material from a non-magnetic material. Steel is magnetic, while chlorine is non-magnetic.
2. B In filtration, the filter paper is placed onto the filter funnel, which is placed above a container.
3. C During distillation, the mixture is boiled and the substance with the lowest boiling point changes into a vapour, which then condenses to form the distillate.
4. D Paper chromatography is used to separate the different substances in ink.
5. B Distillation is used to separate substances that boil at different temperatures.
6. B The Four National Taps are NEWater, imported water, desalinated water and water from local catchment.
7. D Microfiltration is the process of removing microscopic particles from water.
8. C In reverse osmosis, the partially permeable membranes allow water particles to pass through. Bacteria, salt particles and chemical contaminants are not allowed to pass through.

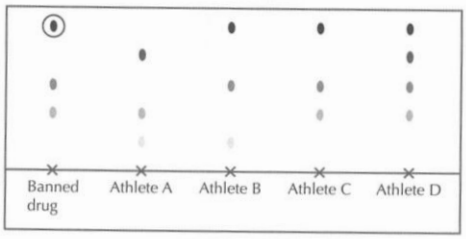
## Level 2

### Multiple-choice Questions

1. A Excess water is added to the mixture and stirred to dissolve substances **P** and **R**. Filtration is then performed to remove substance **Q**, which is insoluble. Distillation is then performed to separate substances **P** and **R**, which have different boiling points.
2. B A salt solution consists of salt dissolved in water which can be separated by evaporation.
3. C Filtration is used to separate the iron filings and sand from the water. Magnetic attraction is used to separate the iron filings from the sand.
4. B Microfiltration and ultraviolet disinfection are two processes used in the production of NEWater.
5. B The salt solution is able to pass through the filter paper and is called the filtrate. The iron filings are unable to pass through the filter paper and are collected as residue.

### Structured Questions

1. (a)



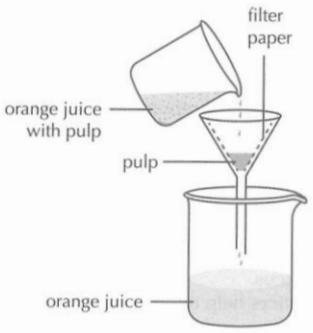

(b) Athletes **C** and **D** took the banned drug. The substances found in their urine samples matched those found in the banned drug.

2. (a) Seawater is forced through partially permeable membranes at high pressure. The membranes have small pores which allow water particles but not salt particles and other microorganisms to pass through.

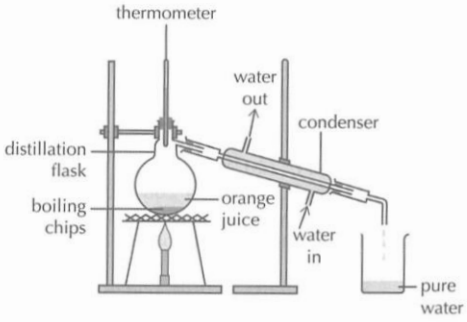
(b) Distillation requires a large amount of seawater to be heated up, which takes up a lot of energy and is not sustainable.

(c) Turn off the water while soaping. Use water-efficient showerheads. Use half-flush for the toilet whenever possible. (*Accept other possible answers.*)

3. (a)




(b)




## Level 3

### Structured Questions

1. (a) Ink **D**
   (b) Inks **B** and **D**
   (c) This is so that the line will not dissolve in the solvent.
   (d) Some dyes travel further as they are more soluble in the solvent.
2. (a) Microfiltration, reverse osmosis and ultraviolet disinfection
   (b) Microscopic particles, bacteria and viruses
   (c) Ultraviolet disinfection
   (d) NEWater is supplied to industries and added to reservoirs during dry weather. It can also be used for drinking.

### Free-response Questions

1. (a) Chromatography
   (b) Evaporation
   (c) Distillation
   (d) Filtration
   (e) Magnetic attraction
2. (a) Firstly, add excess water to the mixture of substance **P** and substance **Q**. Next, filter the mixture to obtain substance **Q** as the residue and substance **P** as the filtrate. Wash substance **Q** with distilled water to obtain a pure sample. Lastly, use distillation to obtain substance **P** as the distillate.
   (b) Substance **P** has a different boiling point from water.

## Specimen Paper 1

### Section A

#### Multiple-choice Questions

1. C Science is a human endeavor spanning many centuries and civilisations and is manifested in all aspects of our lives. Scientific knowledge is based on evidence and scientific data can be either qualitative or quantitative.
2. D The hazard symbol represents carcinogenicity.
3. C A hyothesis is a proposed explanation for an observation.
4. B Positioning the eyes so that the line of sight is perpendicular to the marking on the ruler helps to reduce parallax error.
5. A The volume of the liquid is read from the bottom of the meniscus.
6. D Safe practices help minimise the risk of accidents and harm to ourselves and others.
7. B The strength of a material is its ability to withstand heavy loads.
8. A Steel's strength makes it suitable as a material for the blade of a shovel as a shovel is subjected to heavy loads constantly.
9. D Option **A**: 12 $l$ = 12 000 $cm^3$
   Option **B**: 1200 m$l$ = 1200 $cm^3$
   Option **C**: 120 000 $cm^3$
   Option **D**: 1.2 $m^3$ = 1 200 000 $cm^3$
10. A We can live in a sustainable manner by reducing unnecessary use of resources and recycling products.
11. A Bringing reusable bags, bottles or containers reduces the need for disposable plastic alternatives and thus reduces plastic waste.
12. A Sodium sulfate contains three elements: sodium (Na), sulfur (S) and oxygen (O).
13. B Steam is a pure compound as it consists of only two elements: hydrogen and oxygen.
14. B Oil is the substance that dissolves, so it is the solute. The substance that oil dissolves in is benzene, which makes benzene the solvent.
15. C There are two compounds in substance **P**.
16. D Rate of stirring, size of solute particles and temperature of solvent affect the rate of dissolving.
17. B During reverse osmosis, undesirable contaminants are removed from the water.
18. A The most soluble substance will travel the furthest from the start line.
19. A Substance **X** is unable to pass through the filter paper because its particles are larger than the pores in the filter paper.
20. C Iron is magnetic while diamond is non-magnetic.

### Section B

#### Structured Questions

1. (a) **(i)** wire gauze [1]
   **(ii)** Bunsen burner [1]
   (b) He should use a non-luminous flame [1]. It has a higher temperature than a luminous flame and burns more steadily [1].
   (c) The air-hole should be partially open [1]. A luminous flame will be formed if the air-hole is closed [1].
   (d) Closing the air-hole before lighting the Bunsen burner prevents a strike back from occurring [1].
2. (a) Beaker **A** [1]
   (b) When salt was added to the solution in beaker **B**, the density of the solution increased [1]. When the density of the solution became higher than that of the ball [1], the ball floated [1].
3. (a) **Y** [1]
   (b) **U** [1]
   (c) **W**, **X**, **Z** [1]
   (d) **V**, **Z** [1]
   (e) **U** [1]
4. (a) The amount of dissolved salts will decrease [1].
   (b) The seawater is pumped through partially permeable membranes at high pressure [1]. Each membrane has small pores which allow water particles but not salt particles to pass through [1]. The pores also do not allow microorganisms such as bacteria and chemical contaminants to pass through [1]. As only water particles are allowed to pass through the pores, pure water is obtained [1].
5. (a) Water from local catchment [1], imported water [1], NEWater [1] and desalinated water [1]
   (b) Desalination [1]
   (c)

| Sample | Separation Technique | Substance Required |
|---|---|---|
| Seawater | Evaporation [1] | Salt |
| Seawater | Distillation [1] | Water |
| Mixture of chalk and water | Filtration [1] | Chalk |
| Mixture of iron filings and sand | Magnetic attraction [1] | Iron filings |

## Section C

### Free-response Questions

1. (a) Variable to be changed in the experiment: Type of oil used [1]
Variable to be observed: Sound level when riding on bicycle [1]
Constant variable(s): Volume of oil used [1]
Peter can use different oils to lubricate his bicycle and observe the amount of sound produced when he rides his bicycle [1]. The softer the sound produced, the better the oil is for lubricating [1].
(b) (i) The elements found in vitamin E are: carbon (C), hydrogen (H) and oxygen (O) [1].
(ii) Vitamin E is a compound [1] as it contains three elements chemically combined together [1].
2. (a) A solution is a mixture in which one substance dissolves completely in another substance [1] while a suspension is a mixture that contains insoluble substances in a solvent [1].
(b) Rate of dissolving refers to how quickly a solute dissolves in a solvent [1] while solubility refers to how well a solute dissolves in a fixed volume of a particular solvent [1].
(c) The substance that dissolves is called the solute [1] while the substance in which the solute dissolves is called the solvent [1].
3. (a) Paints **W** and **Z** [1]
(b) Paints **V** and **Y** [1]
(c) 6 pigments [1]
(d) Identify colours in dyes [1], identify coloured substances in food products [1], detect water pollutants [1] (*Accept other possible answers.*)

# Specimen Paper 2

## Section A

### Multiple-choice Questions

1. B To prevent a strike back, the collar should first be turned to close the air-hole fully. Next, turn on the gas tap. Place the lighter at the top of the barrel and light it. Lastly, adjust the air-hole to obtain the desired type of flame.
2. D The hazard symbol represents acute toxicity.
3. A The SI units for length, mass and time are m, kg and s respectively.
4. C The substance in which the solute dissolves in is the solvent. Since cooking oil is being dissolved in the detergents, detergent **X** and detergent **Y** are the solvents in this experiment.
5. A The type of detergent is the variable being tested, so it is the variable that needs to be changed.
6. D To find out the rate at which cooking oil dissolves, the time taken for the oil to dissolve has to be measured.
7. A Parallax error when measuring the volumes of the oils and detergents will lead to inaccurate results. Since time is being measured, slow reactions will lead to inaccurate results.
8. B Jane was proposing a hypothesis when she made a prediction. She was collecting data when she took measurements and recorded the results. She was conducting an experiment when she put her idea into practice. She was developing an explanation when she made a conclusion based on the data collected.
9. D Ceramic has poorer thermal conductivity, so pots made of ceramic will retain heat longer.
10. B Since plastic is a poor conductor of heat, it will not heat up easily and hurt the user.
11. D Titanium is a hard material so it can scratch the other metals which are softer than itself.
12. A $780\ kg/m^3 = 780\ 000\ g/m^3$
$= 780\ 000/1\ 000\ 000\ g/cm^3$
$= 0.78\ g/cm^3$
13. D A mixture is made up of two or more elements and/or compounds that are not chemically combined.
14. D The higher the temperature of the solvent, the faster the solute can dissolve in it.
15. A Compounds do not have the same properties as their constituent elements.
16. C We should wash the car with a pail instead of a hose to reduce water usage.
17. A Distillation involves boiling, which requires heating. Filtration can separate substances using a sieve, without a need for heating.
18. C Since substances **A** and **B** are obtained as residue and substance **C** is obtained as filtrate on filtering, substances **A** and **B** are insoluble in water and substance **C** is soluble in water. Substance **A** is magnetic (iron filings) since a magnet could remove it from the residue. This means that substance **B** is non-magnetic (sand). Substance **C** is soluble in water and can be obtained through evaporation (salt).
19. A Distillation is a process that separates substances with different boiling points. Water boils at a much lower temperature compared to salt, and can be separated using distillation.
20. D The dyes that are more soluble in the solvent travel further from the starting point.

## Section B

### Structured Questions

1. (a) Plastics are used to make many different products [1]. Paper products have changed the way we print, write and communicate [1]. Medical advancements have allowed us to treat many previously untreatable diseases [1]. Technological advancements have made life more convenient in many ways [1]. (*Accept other possible answers.*)
(b) Plastics are non-biodegradable and cause environmental pollution [1]. Excessive logging leads to deforestation [1]. Urbanisation has affected the lives of animals [1]. Weapons are used to harm and kill people [1]. (*Accept other possible answers.*)
2. (a) The incorrect reading is 1.96 cm [1]. The reading is the furthest from the other three readings [1].
(b) Average reading $= (2.12 + 2.11 + 2.10) \div 3$
$= 6.33 \div 3$
$= 2.11$ cm [2]
(c) Obtaining multiple readings to find the average reduces error [1] and makes the results more accurate [1].

3.

| Object | Material | Reason |
|---|---|---|
|  Wok | Metal/iron/ steel [1] | Good conductor of heat which allows food to be cooked efficiently [1] |
|  Container | Plastic [1] | Lightweight [1] |
|  Spectacle lenses | Glass/plastic [1] | Transparent [1] |

(*Accept other possible answers.*)

4. **(a)** Material **P** [1]. Heating is required in distillation so a high melting point is required. A transparent flask allows us to observe the contents of the flask during the experiment [1].
   **(b)** Material **P**: glass [1]
   Material **Q**: plastic [1]
   Material **R**: metal [1]
5. **(a)** Orange juice is a suspension [1] as it has a layer of pulp which is insoluble [1].
   **(b)** In a solution, the particles of the solute cannot be seen but in a suspension, insoluble substances can be seen [1]. In a solution, the solute does not settle to form solid deposits but in a suspension, insoluble substances can settle to form solid deposits [1]. Light can pass through fully in a solution but not in a suspension [1].

## Section C

### Free-response Questions

1. **(a)** The liquid can float as it is less dense than the seawater [1].
   **(b)** Density is the amount of matter an object has in proportion to its volume [1]. The SI unit of density is $kg/m^3$ [1].
   **(c)** Mass and volume [1]
   **(d)** Cindy can pour the liquid into a measuring cylinder to determine its volume [1]. By placing the beaker of liquid on the electronic balance and subtracting the mass of the beaker, she can find the mass of the liquid [1]. The density of the liquid can be found by dividing its mass by its volume [1].
   **(e)** Oil [1] and alcohol [1] (*Accept other possible answers.*)
   **(f)** Whether an object floats or sinks does not depend on its weight but its density [1]. The wooden block is able to float because it is made of wood, which is less dense than water [1]. The metal bottle cap sinks because it is made of metal, which is denser than water [1].

2. **(a)** It is transparent [1] and hard [1].
   **(b)** Plastic weighs less than glass [1] and is less fragile than glass [1].
   **(c)** Glass is able to scratch plastic as it is harder than plastic [1].
   **(d)** A plastic ruler is more flexible than a glass ruler [1].
   **(e)** We can bring our own shopping bags when we go shopping [1]. We can drink directly from cups or bottles instead of using a disposable straw [1]. (*Accept other possible answers.*)