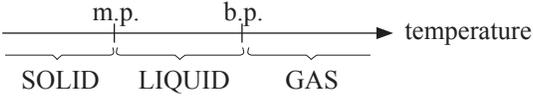


Teacher's Notes

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
Topic: Reproduction in Plants				
1.	This worksheet deals with the reproduction of plants and how pollination of plants is aided by animals like birds.	<ul style="list-style-type: none"> observing interpreting 	-	<ul style="list-style-type: none"> Teachers may want to initiate a detailed discussion on the four processes of reproduction in flowering plants — pollination, fertilisation, dispersal and germination.
2. 3.	These two worksheets focus on the subject of seed dispersal.	<ul style="list-style-type: none"> comparing inferring analysing communicating 	-	<ul style="list-style-type: none"> Teachers may initiate a discussion on the subsequent behaviour / motion of seeds scattered by different methods and where the seeds tend to land and grow.
4.	This worksheet examines sexual reproduction in plants.	<ul style="list-style-type: none"> communicating comparing inferring 	-	<ul style="list-style-type: none"> Teachers may elaborate, with the use of drawings, the male and female parts in plants.
5.	This worksheet examines the peanut / groundnut plant and its unique features.	<ul style="list-style-type: none"> analysing observing 	-	<ul style="list-style-type: none"> Teachers should point out that peanuts / groundnuts are seeds, not underground stems or underground storage roots although they are found underground. This adaptation of the peanut plant / groundnut plant protects the seeds from being eaten and increases its chance of reproduction.
6.	This worksheet examines the function of seed leaves and root hairs as well as the necessary conditions needed by plants for survival and growth.	<ul style="list-style-type: none"> inferring predicting 	<ul style="list-style-type: none"> Plant systems 	<ul style="list-style-type: none"> Teachers should point out that root hairs help to increase the surface area for water absorption, not act as 'straws' to suck up water into the root.
7.	This worksheet tests students on their ability to describe in detail the complete growth stages of a flowering plant. It also deals with the parts of a flower.	<ul style="list-style-type: none"> analysing drawing conclusions 	<ul style="list-style-type: none"> Plant life cycles 	<ul style="list-style-type: none"> This worksheet can be used as a general revision on germination and the parts of a flower.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
Topic: Reproduction in Humans				
8.	Students have to study a table about the acceptable weights of boys and girls and answer the questions that follow.	<ul style="list-style-type: none"> communicating analysing inferring 	-	<ul style="list-style-type: none"> Health Education can be brought into the picture with students referring to a real height-weight chart to determine if their weights are within the acceptable range. Students may even be taught how to calculate and interpret their B.M.I. (Body Mass Index).
9.	The first question asks students to study a table of the gestation periods of different animals and answer the questions that follow. The second question gets students to compare a human egg cell with a chicken egg.	<ul style="list-style-type: none"> communicating observing inferring 	-	<ul style="list-style-type: none"> Both the human egg and the chicken egg are fertilized inside the body before they can start to develop into an embryo.
10.	The first part of the worksheet is about puberty. The second question tasks students to draw the male and female sex cells and explain the process of fertilization.	<ul style="list-style-type: none"> communicating inferring 	-	<ul style="list-style-type: none"> Teachers may initiate a frank discussion about puberty and the changes which take place during this phase.
11.	This worksheet tasks students to study pictures of a sperm and an egg and answer related questions.	<ul style="list-style-type: none"> observing inferring 	-	<ul style="list-style-type: none"> Students may require a further explanation of part (e).
12.	This worksheet examines students' ability to interpret as well as construct a family tree given key details of the family members involved.	<ul style="list-style-type: none"> communicating observing analysing 	-	<ul style="list-style-type: none"> Teachers may ask students to collect photographs and construct their own family tree. Based on their knowledge of their family medical history and the photographs that they have, ask them to identify their own inherited traits and trace how far back each trait runs in the family. This can be an N.E.(National Education) activity.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
13.	This worksheet examines students' ability to interpret and extract information from a graph depicting the ideal weights of children based on their heights.	<ul style="list-style-type: none"> observing communicating inferring 	-	<ul style="list-style-type: none"> Teachers may obtain a real chart of ideal weights of children based on their heights and ask students to find out if they have an ideal weight. Students may also be taught how to calculate their B.M.I. (Body Mass Index) as an additional indication of their ideal weight. Teachers may also initiate a discussion of body weight / size, metabolic rate and how these may be affected by heredity.
Topic: Reproduction in Humans and Plants				
14.	This worksheet compares the reproductive systems of a plant and an animal.	<ul style="list-style-type: none"> communicating evaluating 	-	<ul style="list-style-type: none"> Teachers may draw parallels between the reproductive organs of a plant and an animal, e.g. pollen grains are the plant equivalent of sperms since both are male parts which are deposited into the female to bring about fertilization.
Topic: Water and Changes of State				
15.	The first part of the worksheet tasks students to study a heating curve and answer some related questions. The second part of the worksheet requires students to identify the state of a substance given its melting and boiling point.	<ul style="list-style-type: none"> observing analysing inferring 	<ul style="list-style-type: none"> Heat energy 	<ul style="list-style-type: none"> Teachers should emphasize to students that during the process of a change of state, the temperature always remains constant until all the substance has changed its state. Teachers may use the following diagram to explain to students how to identify the state of a substance given its melting and boiling point.  <p>Note: m.p. = melting point b.p. = boiling point</p>
16.	Students are tasked to study a temperature–time graph and answer the questions that follow.	<ul style="list-style-type: none"> analysing communicating inferring 	<ul style="list-style-type: none"> Heat energy (Lower block) 	<ul style="list-style-type: none"> Teachers may introduce the basic heating and cooling curves to students before studying the graph in this worksheet.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
17.	The first part of the worksheet deals with the similarities and differences between boiling and evaporation. The second part of the worksheet examines the relationship between the rate of melting and the exposed surface area.	<ul style="list-style-type: none"> observing inferring classifying communicating 	-	<ul style="list-style-type: none"> Teachers should emphasize to students that despite the same change of state involved, boiling and evaporation are not the same thing.
18.	The first part of the worksheet deals with different weather conditions. The second part of the worksheet is about the formation of dew on cold surfaces in the morning.	<ul style="list-style-type: none"> communicating inferring analysing 	-	<ul style="list-style-type: none"> Ensure that students are familiar with the term 'humidity' and explain how humidity levels affect the rate of evaporation.
19.	The first question in this worksheet is about evaporation and condensation. The second question deals with the relationship between the type of fabric and the rate of evaporation.	<ul style="list-style-type: none"> observing analysing inferring 	-	<ul style="list-style-type: none"> Teachers should point out to students that there is water present in most fruit as in the case of the experiment conducted in question 1.
Topic: The Water Cycle				
20.	The first part of the worksheet tests students on their familiarity with the water cycle. The second part of the worksheet deals with the results of water expanding when it becomes ice.	<ul style="list-style-type: none"> communicating inferring analysing 	-	<ul style="list-style-type: none"> A demonstration of part 2(b) may be conducted in class.
21.	This worksheet deals with the experiment to obtain pure water from seawater. Students also get to revise the changes of state of water.	<ul style="list-style-type: none"> observing analysing inferring 	-	<ul style="list-style-type: none"> Teachers may demonstrate the experiment in class.
22.	This worksheet looks at the condition of different water samples and how to purify water via the filtration method.	<ul style="list-style-type: none"> communicating observing analysing inferring 	-	<ul style="list-style-type: none"> National Education (NE) can be brought into the picture with a discussion on the water purification process that takes places in Singapore's water treatment plants and how water is a precious resource in Singapore.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
Topic: The Plant Transport System				
23.	This worksheet examines the function and location of the food-carrying tubes (phloem) of a plant.	<ul style="list-style-type: none"> observing evaluating inferring 	<ul style="list-style-type: none"> Transport in plants 	<ul style="list-style-type: none"> Teachers may revise with students 'Systems' (Upper Block) in plants, with emphasis on the water-carrying tubes (xylem) and food-carrying tubes (phloem).
Topic: Air and the Respiratory System				
24.	This worksheet examines the respiratory system and the gases involved during breathing.	<ul style="list-style-type: none"> observing communicating inferring 	<ul style="list-style-type: none"> The respiratory system 	<ul style="list-style-type: none"> Teachers may make use of this worksheet to talk about the composition of inhaled air as compared to exhaled air.
25.	The first part of the worksheet tasks students to answer questions based on a laboratory model of the respiratory system. The second part of the worksheet tests students on the process of respiration.	<ul style="list-style-type: none"> observing analysing inferring 	-	<ul style="list-style-type: none"> Teachers should point out to students the differences between breathing and respiration.
26.	This worksheet is about respiration in germinating seeds.	<ul style="list-style-type: none"> observing analysing inferring 	-	<ul style="list-style-type: none"> Teachers should point out to students that seeds are living things and as such, they undergo respiration.
27.	This worksheet deals with the gaseous exchange of plants during photosynthesis and respiration.	<ul style="list-style-type: none"> communicating comparing inferring 	<ul style="list-style-type: none"> Photosynthesis and respiration 	<ul style="list-style-type: none"> Teachers should point out to students that plants undergo respiration all the time just like animals; they take in oxygen and give out carbon dioxide. However, green plants also undergo photosynthesis in the presence of light, taking in carbon dioxide and giving out oxygen.
28.	This worksheet examines the oxygen and carbon dioxide levels in three different controlled environments.	<ul style="list-style-type: none"> communicating inferring 	-	<ul style="list-style-type: none"> Teachers may revise the Lower Block topic on fungi. Fungi are not plants. They do not photosynthesize but only undergo respiration.
29.	This worksheet examines the oxygen levels in the atmosphere throughout a 12-hour period.	<ul style="list-style-type: none"> inferring analysing evaluating 	-	<ul style="list-style-type: none"> Teachers may ask students to draw a graph of the amount of carbon dioxide in the atmosphere through the same period on Graph I in the worksheet. Draw students' attention to the inverse relationship of the two graphs.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
30.	Using a table and a flow chart, the first part of the worksheet examines the groups of living things which undergo photosynthesis and respiration, or respiration only. The second part of the worksheet examines the difference in composition of inspired and expired air.	<ul style="list-style-type: none"> analysing evaluating inferring 	<ul style="list-style-type: none"> Air 	<ul style="list-style-type: none"> Teachers may revise with students on theme 'Systems' in the Upper Block on the topic of air, with emphasis on the composition of air.
31.	This worksheet examines the effect of different coloured lights on the rate of photosynthesis.	<ul style="list-style-type: none"> observing analysing inferring 	-	<ul style="list-style-type: none"> Teachers may initiate a discussion about the concept of colours and the colour wheel. Note: White light is a mixture of all other colours.
32.	The first part of the worksheet examines how bigger animals are more susceptible to a sudden removal of oxygen from the atmosphere. The second part of the worksheet examines the adaptation of the cactus plant to living in a dry and hot habitat.	<ul style="list-style-type: none"> analysing inferring predicting 	<ul style="list-style-type: none"> Plant systems 	<ul style="list-style-type: none"> Teachers may introduce students to the concept of a terrarium and discuss why only plants and not animals, are able to survive in a terrarium.
33.	This worksheet examines respiration in yeast, a micro-organism.	<ul style="list-style-type: none"> inferring communicating 	<ul style="list-style-type: none"> Fungi and microorganisms 	<ul style="list-style-type: none"> Teachers should point out to students that yeast is a microorganism (a living thing). Like all living things, yeast undergoes respiration.
34.	This worksheet examines the energy transfers in the process of photosynthesis and respiration.	<ul style="list-style-type: none"> analysing inferring 	-	<ul style="list-style-type: none"> Teachers may draw students' attention to the presence of light that enables the plant to photosynthesize and the fish to take in the oxygen released so that it can stay alive.
35.	The experiment shown in this worksheet is similar to that in worksheet 31, but the focus here is on how the limiting factor in the set-up causes the rate of photosynthesis to change over a period of time.	<ul style="list-style-type: none"> analysing inferring evaluating 	-	<ul style="list-style-type: none"> Teachers may introduce the concept of 'limiting factor' which inhibits the continuation of a process despite the availability of other necessary conditions.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
36.	This worksheet compares the gaseous exchanges between photosynthesis, respiration and combustion (burning).	<ul style="list-style-type: none"> observing inferring communicating 	-	<ul style="list-style-type: none"> Teachers should point out to students that oxygen is required for burning. Illustrate this concept by placing an overturned beaker over a lighted candle. The flame will go out once all the oxygen inside the beaker has been used up.
37.	The first question looks at how air may affect the quality of food. The second question studies the oxygen levels in two environments and how this is affected by photosynthesis and respiration.	<ul style="list-style-type: none"> inferring analysing 	-	<ul style="list-style-type: none"> Teachers may take the graphs in the questions further and discuss other points such as how the carbon dioxide levels may change in each case.
Topic: The Circulatory System				
38.	The first part of the worksheet looks at the compatibility of blood types for transfusion. The second question deals with the circulatory system.	<ul style="list-style-type: none"> analysing communicating inferring 	-	<ul style="list-style-type: none"> Students may need some help in reading the table in question 1.
39.	The first part of the worksheet tasks students to answer questions based on a graph showing a person's pulse rate as he engages in an activity. The second question is about the function of the heart and the consequences of having a hole in the heart.	<ul style="list-style-type: none"> communicating analysing inferring 	-	<ul style="list-style-type: none"> Teachers may initiate a discussion of heart ailments, including a hole in the heart, blocked arteries etc. and their causes and effects. Health Education may come into the picture with a discussion on how a healthy diet can prevent certain types of heart disease.
40.	The first two questions are on the comparison between the parts of the human and plant transport system. The next two questions are about the human circulatory system.	<ul style="list-style-type: none"> communicating analysing observing 	-	<ul style="list-style-type: none"> Teachers may take the opportunity to revise the plant transport system with students.
Topic: The Respiratory and Circulatory Systems				
41.	The first question is a comparison of inhaled and exhaled air while the rest of the worksheet consists of miscellaneous questions regarding the respiratory and circulatory systems.	<ul style="list-style-type: none"> communicating analysing inferring 	-	<ul style="list-style-type: none"> Teachers should point out to students the inter-connectedness of the respiratory and circulatory systems for the smooth functioning of the body.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
42.	The first part of this worksheet is concerned about the respiratory system of a fish. The second part is a series of True / False questions regarding the respiratory and circulatory systems.	<ul style="list-style-type: none"> • inferring • analysing 	-	<ul style="list-style-type: none"> • Teachers should take the opportunity to compare the respiratory and circulatory systems of a fish and a human in class. Discuss with the class why double circulation is necessary in humans but not in a fish.
Topic: The Unit of Life — Cells				
43.	This worksheet examines the similarities and differences between a typical plant cell and an animal cell.	<ul style="list-style-type: none"> • comparing • classifying • communicating • observing 	-	<ul style="list-style-type: none"> • Teachers may tie in this worksheet with a laboratory lesson where students get to observe cells under a microscope.
44.	This worksheet examines the effect of plant cells in two different environments, one with a high water concentration and one with a low water concentration.	<ul style="list-style-type: none"> • comparing • observing • evaluating • communicating • formulating hypotheses 	-	<ul style="list-style-type: none"> • Teachers should explain that water moves from a region of higher water concentration to a region of lower water concentration through the semi-permeable membrane of the potato cell.
45.	This worksheet examines the root hair cell and the leaf cell, and their adaptations to perform specific functions for the plant.	<ul style="list-style-type: none"> • comparing • observing • communicating 	<ul style="list-style-type: none"> • Plant systems 	<ul style="list-style-type: none"> • Teachers should point out to students that some cells may be slightly different from the typical plant or animal cell they have learnt about. Such modified cells have adaptations to enable them to perform specific functions, e.g. red blood cells and root hair cells.
46.	This worksheet examines the process of binary fission and the effect of cell mutation.	<ul style="list-style-type: none"> • communicating • evaluating 	-	<ul style="list-style-type: none"> • Teachers may initiate a discussion on cell mutation and its effects (e.g. causing diseases).
47.	This worksheet analyses the process of binary fission in greater detail.	<ul style="list-style-type: none"> • communicating • observing • inferring 	-	<ul style="list-style-type: none"> • Teachers should point out to students the exponential increase in the number of cells starting from a single cell. Cells multiply very quickly by binary fission because the total number of cells doubles at each division. • To illustrate the magnitude of cells created by binary fission, ask students to calculate how much pocket money they would receive after a month if they received 1¢ the first day, 2¢ the next and so on, doubling the amount each day.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
48.	This worksheet examines the variation of a typical plant and animal cell.	<ul style="list-style-type: none"> observing comparing communicating inferring 	-	<ul style="list-style-type: none"> Teachers may initiate a discussion about the different cells found in our body.
49.	This worksheet examines cell division (binary fission).	<ul style="list-style-type: none"> observing comparing communicating 	-	<ul style="list-style-type: none"> Teachers may initiate a discussion about binary fission and single-celled organisms.
50.	This worksheet examines the effect of having a cell wall as well as respiration in cells.	<ul style="list-style-type: none"> inferring predicting communicating 	<ul style="list-style-type: none"> Respiration 	<ul style="list-style-type: none"> Teachers should emphasize to students that cells are living things and like all living things, respiration is vital to their survival.
Topic: Electrical Systems				
51.	Students have to design an experiment to distinguish between two objects based on their electrical conductivity.	<ul style="list-style-type: none"> communicating inferring creative problem-solving classifying 	-	<ul style="list-style-type: none"> Teachers should point out to students that a key difference between a metal and a non-metal is the former's ability to conduct electricity. Cases should be cited where non-metals may be able to conduct electricity too, e.g. carbon, water, orange juice. Teachers may demonstrate that an orange conducts electricity by setting up a circuit using metal plates, a cut orange and an ammeter.
52.	This worksheet analyses the components in a circuit and the effect of removing certain components. The second part of the worksheet deals with the application of a series or parallel arrangement of bulbs to suit a particular purpose.	<ul style="list-style-type: none"> observing analysing decision-making 	-	<ul style="list-style-type: none"> Teachers may initiate a discussion of the advantages/disadvantages of a series or parallel arrangement of bulbs as applied to different situations.
53.	This worksheet focuses on the interpretation of the connections on a circuit card.	<ul style="list-style-type: none"> observing analysing communicating 	-	<ul style="list-style-type: none"> Teachers should point out to students that in order for the bulb to light up, a direct or indirect connection must be established between the two paperclips in question. Teachers may tie in this worksheet with a laboratory lesson where students get to make and test their own circuit cards.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
54.	This worksheet illustrates the concept that water is a weak conductor of electricity.	<ul style="list-style-type: none"> observing communicating evaluating 	-	<ul style="list-style-type: none"> Teachers may demonstrate the experiment in the worksheet to students. At the same time, show that an acidic liquid (such as orange juice) or ionic solution (such as salt solution) is a better electrical conductor than water. Teachers may also correct a circuit using metal plates and a cut orange.
55.	The first part of this worksheet examines the effect of the arrangement of batteries and bulbs on the brightness of the bulbs. The second part examines which materials conduct electricity.	<ul style="list-style-type: none"> analysing communicating 	-	<ul style="list-style-type: none"> Teachers may allow students to connect a real circuit instead of just drawing out the correct arrangement. This will allow students to investigate for themselves the effect of the arrangement of batteries and bulbs on the brightness of the bulbs.
56.	The first part of this worksheet examines the difference between a series and a parallel arrangement. The second part of this worksheet tests students on their concept of a short circuit.	<ul style="list-style-type: none"> observing analysing communicating predicting 	-	<ul style="list-style-type: none"> Teachers should explain to students that electricity is 'lazy' and will choose the easiest path to travel (that is, one without 'obstacles' such as a bulb) within a circuit.
57.	This worksheet analyses two circuits and examines the effects if one bulb fuses or an additional wire connection is added.	<ul style="list-style-type: none"> observing analysing inferring 	-	<ul style="list-style-type: none"> Teachers should point out to students that a fused bulb leaves a gap in the circuit and inhibits the flow of electricity through that branch.
Topic: Using Electricity				
58.	This worksheet is about household electricity consumption and the calculation of the electricity bill.	<ul style="list-style-type: none"> observing analysing communicating 	-	<ul style="list-style-type: none"> Teachers may initiate a discussion on how a household's electricity bill is calculated in Singapore as well as bring up the topic of conservation of electricity.
59.	This worksheet examines the process of electroplating.	<ul style="list-style-type: none"> observing analysing inferring 	-	<ul style="list-style-type: none"> Teachers may conduct a demonstration of electroplating using a copper sheet and a coin if feasible.
60.	This worksheet challenges students to construct different circuits using the same set of available components to suit different criteria.	<ul style="list-style-type: none"> observing analysing communicating 	-	<ul style="list-style-type: none"> Teachers may make use of this worksheet to reinforce the features of a series versus parallel arrangement of batteries in a circuit.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
61.	The first part of the worksheet examines the concept and limitations of a two-way switch. The second part of the worksheet examines the differences in function of a series and a parallel circuit.	<ul style="list-style-type: none"> observing analysing communicating 	-	<ul style="list-style-type: none"> Teachers may introduce to students the concept of the two-way switch and its applications.
Topic: Forces				
62.	Students have to explain the procedure to determine if an object is a magnet, a non-magnet made of a magnetic material or a non-magnetic material. Students should also appreciate that the direction (polarity) of a conductor in a circuit does not affect the circuit. However, the direction is important if the component in the circuit is a battery.	<ul style="list-style-type: none"> comparing communicating analysing evaluating 	<ul style="list-style-type: none"> Magnets Electricity 	<ul style="list-style-type: none"> Teachers may allow students to experiment with magnets and magnetic objects on their own. For the second part, a demonstration of the electricity experiment in the question may be conducted.
63.	This question deals with the properties of magnets and the classification of objects which are made of magnetic materials and those which are not.	<ul style="list-style-type: none"> observing communicating classifying predicting inferring 	<ul style="list-style-type: none"> Magnets 	<ul style="list-style-type: none"> Teachers may make use of this worksheet to revise the topic on magnets (found in the Lower Block) with students.
64.	This worksheet enables students to appreciate the fact that a force exerted by a harder object on a softer object can cause the softer object to change its shape / become deformed (e.g. by making a hole in the styrofoam block). It also enables students to understand that the material an object is made of and its speed upon impact affects the amount of force produced.	<ul style="list-style-type: none"> communicating inferring predicting evaluating 	<ul style="list-style-type: none"> Energy changes 	<ul style="list-style-type: none"> Teachers may draw students' attention to how a greater force applied creates a deeper depression by dropping objects into a sandpit. Note that the depth of the depression (and hence the force applied) may be varied by changing the mass of the object, the height from which the object is thrown and the force with which it is thrown.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
65.	This worksheet introduces students to impact by forces and how the relative masses of two colliding bodies affect the subsequent behaviour of the objects after impact. The effect of friction on motion is also covered.	<ul style="list-style-type: none"> • comparing • communicating • predicting • generating possibilities • evaluating • formulating hypotheses 	-	<ul style="list-style-type: none"> • Teachers can initiate a discussion on road / vehicle safety, including the danger of not wearing seat belts. Relate the discussion to the effect of various forces present in a collision.
66.	This worksheet covers the effect of force exerted by air as applied to the suction cup and blowing up a balloon. The reason why an object is able to float in the air is also dealt with.	<ul style="list-style-type: none"> • communicating • inferring • analysing • predicting 	<ul style="list-style-type: none"> • Matter (air) 	<ul style="list-style-type: none"> • A demonstration of how a suction cup works may help students to understand the concept of air pressure (although this term need not be used).
67.	This worksheet requires students to interpret a bar graph and a line graph so as to answer some related questions about the elastic spring force and how it varies according to the mass hung from a spring.	<ul style="list-style-type: none"> • observing • communicating • analysing • evaluating 	-	<ul style="list-style-type: none"> • Students should be reminded about the difference between the <u>length</u> of a spring and the <u>extension</u> of a spring. • The elastic limit (beyond which the spring loses its elastic property) should be pointed out to students. They should understand that all springs will reach their elastic limit if the load is too heavy and the spring gets out of shape (deformed). However, the maximum mass a spring can take before reaching its elastic limit depends on the spring itself.
68.	Through studying the working principle of the spring balance and the kitchen scale, students will see the two different actions of a spring – compression and extension. In the second part, students have to design a spring balance and explain the procedure involved.	<ul style="list-style-type: none"> • communicating • using apparatus / equipment • creative problem-solving • comparing 	-	<ul style="list-style-type: none"> • Teachers should emphasize to students that a force can extend (pulling force) or compress (pushing force) a spring and that there are useful applications in either case.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
69.	This worksheet examines how the exposed surface area (not the mass) of an object affects the time it takes to fall through the air.	<ul style="list-style-type: none"> communicating observing inferring analysing 	-	<ul style="list-style-type: none"> Teachers may point out to students that air exerts an upward force on falling objects to slow them down (air resistance). In the absence of air, that is, in a vacuum, objects of any size and mass thrown from a fixed height will hit the ground at the same time.
70.	This worksheet examines the effect of the force of gravity on an object.	<ul style="list-style-type: none"> communicating inferring evaluating 	-	<ul style="list-style-type: none"> Teachers should point out to students the difference between an object's <u>mass</u> (the amount of matter in it) and its <u>weight</u> (the force of gravity acting on it).
71.	Students are tasked to identify some magnets and magnetic materials by reading a flow chart and a table.	<ul style="list-style-type: none"> communicating analysing 	-	<ul style="list-style-type: none"> Some students may need help in interpreting the table in question 1(c).
Topic: Our Environment — Living Together				
72.	The first part of the worksheet examines the choice of set-ups to ensure a fair test in an experiment. The second part of the worksheet examines the effect of overcrowding on the growth of trees in a forest.	<ul style="list-style-type: none"> analysing inferring evaluating observing 	-	<ul style="list-style-type: none"> Teachers should point out to students that to ensure that an experiment conducted is fair, only one variable can be changed. The rest of the variables must remain constant.
73.	Students have to interpret a line graph to discern how the change in the line patterns represent changes in the area of land covered by plants.	<ul style="list-style-type: none"> observing communicating inferring 	-	<ul style="list-style-type: none"> Teachers may initiate a discussion on how the introduction of animals affected the plant populations in this question as well as in other scenarios. While animals may decrease the plant population by feeding on them, animals can also have a positive impact on plant growth, e.g. ladybugs eat aphids which feed on leaves, or the droppings of animals act as fertilizers to enhance plant growth.
74.	This worksheet deals with an aquarium habitat and the factors affecting the plants and animals living in it.	<ul style="list-style-type: none"> observing inferring predicting communicating 	<ul style="list-style-type: none"> Photosynthesis and respiration 	<ul style="list-style-type: none"> Teachers may make use of the questions in this worksheet to embark on a discussion on the artificial aquarium habitat and its key features.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
75.	Students have to interpret graphs to track the changes in a plant and an animal population and answer related questions.	<ul style="list-style-type: none"> observing inferring predicting communicating 	-	<ul style="list-style-type: none"> Teachers may initiate a discussion of the factors which can possibly affect a plant or an animal population.
76.	This worksheet covers the principles of a terrarium.	<ul style="list-style-type: none"> observing inferring communicating evaluating 	-	<ul style="list-style-type: none"> Teachers may initiate a discussion of the terrarium as a unique self-sustaining habitat for plants only.
77.	This worksheet covers the concept of decomposition and the necessary conditions for decomposition to take place.	<ul style="list-style-type: none"> observing communicating inferring predicting using apparatus / equipment 	<ul style="list-style-type: none"> Respiration 	<ul style="list-style-type: none"> Teachers may initiate a discussion on the mechanism of decomposition as well as bring in the issue of food preservation to delay the onset of decomposition using various methods.
78.	This worksheet examines the necessary conditions for the survival of plants and animals.	<ul style="list-style-type: none"> observing communicating evaluating inferring using apparatus / equipment 	<ul style="list-style-type: none"> Photosynthesis and respiration 	<ul style="list-style-type: none"> Teachers may initiate a discussion on gaseous exchange between plants and animals and how photosynthesis helps to purify the air.
79.	This worksheet examines the necessary conditions for the survival of plants and animals in an aquarium, emphasizing on the interdependence between plants and animals.	<ul style="list-style-type: none"> observing communicating evaluating 	<ul style="list-style-type: none"> Photosynthesis and respiration 	<ul style="list-style-type: none"> Teachers should emphasize the interdependence between the fish and the water plants in the small aquarium community.
80.	This worksheet examines the relationship between the levels of oxygen and carbon dioxide in the atmosphere and how it changes due to the amount of vegetation in an area or the time of day.	<ul style="list-style-type: none"> observing communicating predicting evaluating 	<ul style="list-style-type: none"> Photosynthesis and respiration 	<ul style="list-style-type: none"> Teachers may initiate a discussion on how the levels of oxygen and carbon dioxide in the atmosphere may change due to various external factors such as the amount of vegetation, time of day or pollution.
81.	This worksheet examines the cultivation of plants by hydroponics / aeroponics.	<ul style="list-style-type: none"> observing evaluating analysing communicating 	<ul style="list-style-type: none"> Plant systems 	<ul style="list-style-type: none"> Teachers may introduce students to more details about hydroponics / aeroponics and its usefulness in space-constrained Singapore.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
82.	Students have to make use of the given information (in text form) to present the data in a suitable diagram.	<ul style="list-style-type: none"> classifying communicating comparing 	<ul style="list-style-type: none"> Classification of animals Man and the environment 	<ul style="list-style-type: none"> Teachers may initiate a discussion on the suitability of different diagrams in different situations to best present a set of given data / information. With reference to parts (d) and (e), the topic of conservation may be brought up for discussion.
Topic: Food Chains and Food Webs				
83.	This worksheet examines students' ability to interpret and extract information from a graph showing how the organisms in a community change over time.	<ul style="list-style-type: none"> observing comparing communicating inferring 	-	<ul style="list-style-type: none"> Teachers may introduce the concept of maintaining a balance in community to enable all its members to survive harmoniously. If this balance is upset, there will be consequences for the other members in the community as well. When two organisms share a predator-prey relationship, an increase in the population of one will cause a decrease in the population of the other and vice versa.
84.	This worksheet examines students' ability to interpret and extract information from a graph showing the birth and death rates of an animal population over a period of time.	<ul style="list-style-type: none"> observing comparing communicating evaluating 	<ul style="list-style-type: none"> The environment 	<ul style="list-style-type: none"> Teachers should point out to students that if the birth rate exceeds the death rate, the population will increase and vice versa.
85.	Students have to study a food web and classify the animals according to whether they are herbivores, carnivores or omnivores. They also have to draw a food pyramid from the information given in a food chain.	<ul style="list-style-type: none"> classifying communicating inferring predicting 	-	<ul style="list-style-type: none"> Teachers may draw students' attention to the energy / food pyramid and how it represents the amount of energy passed on through the food chain.
86.	This worksheet deals with the relationships between the organisms in a food web.	<ul style="list-style-type: none"> communicating inferring analysing 	-	<ul style="list-style-type: none"> Teachers may emphasize to students the difference between a primary and a secondary consumer. The role of decomposers in a food web can also be discussed.
87.	Students have to construct their own food web based on given information and make use of the food web to answer some questions.	<ul style="list-style-type: none"> communicating inferring predicting 	<ul style="list-style-type: none"> Man and the environment 	<ul style="list-style-type: none"> Teachers may guide students in constructing their own food webs by analysing each statement given.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
88.	Students have to combine separate food chains to form a food web and classify the organisms in a table.	<ul style="list-style-type: none"> communicating classifying analysing inferring 	-	<ul style="list-style-type: none"> Teachers may initiate a discussion on how several interrelated food chains can form a food web.
89.	By studying a tree habitat, students reinforce their concepts of 'population', 'community' and 'habitat'.	<ul style="list-style-type: none"> observing communicating analysing 	-	<ul style="list-style-type: none"> Teachers can initiate a discussion on the tree habitat as a single-plant community and the key features of such a habitat.
90.	This worksheet aims to help students to appreciate the necessary conditions required for the survival of organisms.	<ul style="list-style-type: none"> observing analysing communicating inferring 	<ul style="list-style-type: none"> The environment 	<ul style="list-style-type: none"> Teachers can initiate a discussion about the interrelationship between herbivores, carnivores and omnivores within a community as well as how fluctuations in the population of any one group can affect the whole community.
91.	This worksheet aims to make students realize how the introduction of a new member can affect the existing community.	<ul style="list-style-type: none"> observing communicating predicting evaluating 	<ul style="list-style-type: none"> The environment 	<ul style="list-style-type: none"> Teachers can initiate a discussion on how the introduction or removal of members in a community can upset the ecological balance and lead to consequences.
92.	This worksheet aims to highlight the presence of carnivorous plants in nature. It also recognizes the interdependence of organisms within a food web.	<ul style="list-style-type: none"> inferring analysing communicating 	<ul style="list-style-type: none"> Plants The environment 	<ul style="list-style-type: none"> Teachers may initiate a discussion on carnivorous plants and the reasons why such plants have to rely on insects as an additional food source.
Topic: Adaptations				
93.	Students have to classify animals using a given dichotomous key and draw a classification tree diagram.	<ul style="list-style-type: none"> classifying inferring communicating 	<ul style="list-style-type: none"> Classification of animals 	<ul style="list-style-type: none"> Students should be introduced to a dichotomous key and learn how to interpret it. Stress to students that a dichotomous key is simply a method of classifying organisms by dividing them into two separate groups at each stage. Teachers may link this lesson to adaptation of animals to live on land and in water.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
94.	This worksheet aims to help students appreciate the special adaptations needed by a plant to survive in a desert environment. It also helps students to appreciate that animals need specific structural adaptations to feed on certain foods (plants).	<ul style="list-style-type: none"> communicating inferring analysing predicting 	<ul style="list-style-type: none"> Food webs 	<ul style="list-style-type: none"> Teachers may discuss the desert habitat, especially desert plant life in detail. Teachers may point out to students that ‘sutcac’ is ‘cactus’ spelt backwards. Teachers may invent other imaginary planets with different environmental conditions and discuss with students the adaptations needed for plants / animals to survive under such conditions.
95.	This worksheet aims to help students appreciate the fact that some animals have adaptations to live in fixed climatic conditions while others have to adapt to changing conditions throughout the year. It also offers a detailed study of the adaptations of the polar bear (whose habitat is cold all year round) and the grizzly bear (whose habitat changes with the seasons).	<ul style="list-style-type: none"> observing comparing communicating 	-	<ul style="list-style-type: none"> Teachers may discuss in detail the adaptations of animals to long-term cold conditions versus that of animals living in places which experience seasonal climatic changes. Teachers can further discuss hibernation and migration as two different ways in which animals cope with environmental changes.
96.	Students are introduced to the different groups of aquatic plants (floating, partially submerged and submerged) and how they are adapted to survive in their habitats.	<ul style="list-style-type: none"> observing classifying predicting formulating hypotheses 	<ul style="list-style-type: none"> The environment Photosynthesis and respiration 	<ul style="list-style-type: none"> Teachers may initiate a thorough discussion of aquatic plants and introduce students to a variety of such plants. Teachers should point out the interdependence of aquatic plants and animals in maintaining ecological balance within an aquatic community. A trip to the school pond (if available) would give students a first-hand experience of aquatic life and allow them to observe the characteristics / adaptations of plant life there.
97.	This worksheet aims to help students appreciate the adaptations of certain animals and the reasons why nature has endowed them with such adaptations. It also helps students to appreciate the distinction between behavioural and structural adaptation and make them become aware of the adaptations for protection against prey.	<ul style="list-style-type: none"> classifying communicating predicting 	-	<ul style="list-style-type: none"> Teachers may bring to student’s attention that living organisms have adaptations for various reasons such as reproduction, escape from predators etc.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
98.	This worksheet covers the adaptations of the beaks and feet of birds to suit their habitats and feeding habits as well as the role birds can play in pollination.	<ul style="list-style-type: none"> observing comparing communicating inferring formulating hypotheses 	<ul style="list-style-type: none"> Reproduction in plants 	<ul style="list-style-type: none"> Teachers may initiate a discussion on all the structural / behavioural adaptations of different types of birds, including flightless birds and those living in extreme climatic conditions, e.g. the penguin.
99.	This worksheet covers the structural adaptations of the roots of some plants and their functions other than those usually associated with roots. Students will also learn that water is absorbed by the roots of the plant. This water then travels upwards in the stem to reach all parts of the plant.	<ul style="list-style-type: none"> observing communicating evaluating formulating hypotheses using apparatus / equipment 	<ul style="list-style-type: none"> Plant systems 	<ul style="list-style-type: none"> Teachers may initiate a discussion on the unique structural adaptation of some roots and the need for such adaptations. The experiment for question 2 may be carried out as a class demonstration.
100.	By studying the structural adaptations of a fish and applying them to the design of a race car, students can appreciate the function of each adaptation better and apply it in different scenarios. The second question on petrol consumption tests students on their skill of data analysis.	<ul style="list-style-type: none"> observing comparing communicating creative problem-solving decision-making 	<ul style="list-style-type: none"> Man and the environment 	<ul style="list-style-type: none"> Teachers may initiate a discussion on how man has borrowed design principles from nature and incorporated them into modern inventions. For question 2, teachers can mention to students the negative environmental effects of using fossil fuels and discuss the alternatives, e.g. hybrid cars which can run either on fuel or on electricity, CNG cars etc.
101.	This worksheet aims to get students to recognize the adaptations of an animal by studying the bone structure of its fossil.	<ul style="list-style-type: none"> observing communicating inferring analysing predicting 	<ul style="list-style-type: none"> The skeletal system The digestive system 	<ul style="list-style-type: none"> Teachers may link this subject to 'Man's Impact on the Environment' and initiate a discussion on the reasons why some animals have been driven to extinction as well as how a detailed study of their fossils helps us to understand more about such creatures.
Topic: Man's Impact on the Environment				
102.	This worksheet examines the role of trees in maintaining the balance in the water cycle and the gaseous exchange cycle. It also touches on the effects of deforestation.	<ul style="list-style-type: none"> analysing communicating evaluating 	<ul style="list-style-type: none"> Photosynthesis and respiration The water cycle 	<ul style="list-style-type: none"> Teachers may revise with students the topics on water cycle and transpiration.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
103.	This worksheet introduces students to the details of the water purification process.	<ul style="list-style-type: none"> analysing communicating inferring 	<ul style="list-style-type: none"> Water 	<ul style="list-style-type: none"> Teachers may initiate a discussion on water purification techniques, including desalination, reverse osmosis and the making of Newater. Explain why water purification is especially important for a nation like Singapore which is not self-sufficient in terms of her water supply.
104.	This worksheet examines water pollution in a river and how this affects the plant and animal life in it.	<ul style="list-style-type: none"> communicating analysing predicting 	<ul style="list-style-type: none"> Photosynthesis and respiration 	<ul style="list-style-type: none"> Teachers may initiate a discussion on the various forms of water pollution and its implications.
105.	This worksheet examines the various forms of pollution, their sources and impacts on the environment.	<ul style="list-style-type: none"> analysing decision-making communicating inferring 	-	<ul style="list-style-type: none"> Teachers may initiate a brief discussion on the location of the various infrastructure in the picture. A discussion on the suitability of each location for the particular type of infrastructure / land use so as to reduce pollution can be initiated as well. Teachers may point out to students the importance of town-planning to ensure that the allocation of land-use does not contribute to unhealthy pollution.
106.	This worksheet looks at the use of pesticides on vegetable farms, their effectiveness, necessity and dangers of overuse.	<ul style="list-style-type: none"> analysing drawing conclusions 	-	<ul style="list-style-type: none"> Teachers may initiate a discussion on organic farming and its greater acceptance in today's world.
107.	This worksheet examines the greenhouse effect and its long-term impact on the world.	<ul style="list-style-type: none"> inferring analysing 	<ul style="list-style-type: none"> Materials 	<ul style="list-style-type: none"> Teachers may initiate a discussion of common environmental concerns (e.g. global warming), their causes and methods of prevention.
108.	This worksheet examines the effect of oil spills on the environment.	<ul style="list-style-type: none"> communicating analysing classifying 	-	<ul style="list-style-type: none"> Teachers may initiate a discussion of oil spills and how this form of water and land pollution impact the environment.
109.	This worksheet examines the effects of soil erosion on an aquatic community.	<ul style="list-style-type: none"> communicating analysing inferring 	<ul style="list-style-type: none"> The environment Photosynthesis and respiration 	<ul style="list-style-type: none"> Teachers may initiate a discussion of soil erosion, its methods of prevention and how it affects the environment.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
Topic: Energy Sources, Forms and Uses				
110.	This worksheet examines the relationship between the mass of a weight on a string and its period.	<ul style="list-style-type: none"> • using apparatus and equipment 	-	<ul style="list-style-type: none"> • Teachers can set up a similar experiment and have the students tabulate the results.
111.	This worksheet deals in detail with the working principles of a hydroelectric power station and the energy changes that take place there.	<ul style="list-style-type: none"> • observing • communicating • inferring • generating possibilities • analysing 	-	<ul style="list-style-type: none"> • Teachers may initiate a detailed discussion of a hydroelectric power generator and its advantages / disadvantages.
112.	This worksheet aims to help students appreciate the fact that heat energy can be converted to other useful forms of energy which can be used to do useful work.	<ul style="list-style-type: none"> • observing • communicating • evaluating 	<ul style="list-style-type: none"> • Heat 	<ul style="list-style-type: none"> • Teachers should explain to students that the heat energy given out by the candle flame heats up the surrounding air. Hot air rises. It is the rising air which pushes the paper mobile.
113.	This worksheet takes a look at the interactive forces in a construction site and the energy changes that take place during its operation.	<ul style="list-style-type: none"> • observing • communicating • evaluating 	<ul style="list-style-type: none"> • Man and the environment 	<ul style="list-style-type: none"> • Teachers may point out to students that the pile driver is an example of a case where gravitational potential energy is converted to kinetic energy which is in turn used to do useful work. Are there other machines / systems which undergo similar energy changes? (E.g. a hydroelectric power station)
114.	This worksheet is about the energy changes which occur when water changes from one state to another.	<ul style="list-style-type: none"> • communicating • classifying • evaluating • analysing 	<ul style="list-style-type: none"> • Matter and its three states • Heat 	<ul style="list-style-type: none"> • Teachers should emphasize to students that the temperature of a substance remains constant during the process of changing state. This is because the energy taken in is being used to change the state rather than increase the temperature of the substance. Relate this to the graph obtained in part (b) of the question.
115.	This worksheet examines the relationship between the gravitational potential energy and the kinetic energy during a periodic motion (swing) and looping around a circular track (roller coaster).	<ul style="list-style-type: none"> • observing • communicating • analysing • evaluating 	-	<ul style="list-style-type: none"> • Teachers may initiate a discussion of common playground and amusement park equipment which work on scientific principles.

Worksheet No.	Specific Instructional Objective(s)	Process Skills	Related Topic(s) Covered	Suggested Lesson Lead-in / Follow-up + Remarks
116.	This worksheet examines the relationship between the gravitational potential energy and the kinetic energy during free fall motion as well as the force produced upon impact with the ground.	<ul style="list-style-type: none"> observing communicating analysing predicting 	<ul style="list-style-type: none"> Forces 	<ul style="list-style-type: none"> Teachers may initiate a discussion of how an object behaves during free fall. Students should be aware that the falling object speeds up as it falls, although the air may exert an opposite force to decrease the rate of speed-increase (air-resistance). The greater the speed of an object just before it falls, the greater the force it exerts on the ground.
117.	This worksheet examines the types of energy changes and the forces present when an object follows a parabolic path.	<ul style="list-style-type: none"> observing communicating analysing 	<ul style="list-style-type: none"> Forces 	<ul style="list-style-type: none"> Teachers may initiate a discussion about the motion of a ball, the energies and forces involved as well as why it eventually stops.
118.	The first part of this worksheet examines the different energy conversions that can take place in different circumstances. The second part involves comparing two very different energy sources.	<ul style="list-style-type: none"> observing communicating analysing comparing 	-	<ul style="list-style-type: none"> Teachers should emphasize the principle of conservation of energy to students. Even when there seems to be energy 'loss', the energy is actually just dissipated into the surroundings. It can never be destroyed or created.
119.	This worksheet examines the relationship between the length of a string and its period in a pendulum.	<ul style="list-style-type: none"> observing communicating analysing evaluating 	-	<ul style="list-style-type: none"> Teachers may allow students to conduct the pendulum experiment and record their results. From the experiment, students should note that the length of the string is the only variable that affects the period of oscillation because the longer the string, the greater the distance the weight has to travel in making one complete swing.
120.	This worksheet helps students to appreciate the concept that a free falling body accelerates (that is, increases its speed) during its fall. It can be used to help students appreciate the fact that the greater the height an object is released from, the greater the final speed of the object before it hits the ground. Hence, the object will exert a greater force on impact with the ground.	<ul style="list-style-type: none"> investigation formulating hypotheses communicating analysing 	<ul style="list-style-type: none"> Gravitational potential energy and kinetic energy 	<ul style="list-style-type: none"> Students may conduct a similar experiment using plasticine balls. Teachers should draw students' attention to the relationship between the speed of the falling object, the height through which the object falls and the force it exerts upon impact with the ground. (Consider an ideal case of a vacuum.) The fact that the air in the atmosphere slows down a falling object (air resistance) can be introduced.