Government of **Western Australia**
School Curriculum and Standards Authority

SAMPLE ASSESSMENT TASKS

INTEGRATED SCIENCE
GENERAL YEAR 11

Sample assessment task

Integrated Science – General Year 11

Task 1 – Unit 1

Assessment type: Extended response

Conditions
Time for the task:

- Three lessons to research the topic and complete notes (Part 1) and present a PowerPoint presentation

Task weighting
8% of the school mark for this pair of units

Marine ecosystems in Western Australia

Australia has a combined mainland and surrounding island coastline of approximately 36,000km in length. As an island nation, our coastline plays an important role in our environment. The Australian coastline is spread through tropical and sub-tropical climate zones and contains many estuaries, bays, inlets, rocky shores, mangroves, beaches, reefs and other fascinating ecosystems.

Part 1: Research notes **(70 marks)**

Use library and internet resources to research and make notes on the following **five (5)** marine ecosystems from around Western Australia:

- Swan-Canning or Peel-Harvey estuaries
- Ningaloo (coral) reef
- Shark Bay seagrass beds
- inter-tidal zones
  - mangroves
  - rocky shore.

For each of the marine ecosystems above, your notes should include the following:

- location (1 mark)
- description of the ecosystem (5 marks)
- types of flora and fauna that inhabit the ecosystem (3 marks)
- abiotic factors present (3 marks)
- importance of the ecosystem to humans (2 marks)

*Note: all research should be based on Australian information

Part 2: Presentation

With the information you have collected through your research, produce a PowerPoint presentation on one of the marine ecosystems you have researched.

Marking key for sample assessment task 1 — Unit 1

Description	Marks
Swan-Canning OR Peel-Harvey estuaries • Location ▪ Swan-Canning estuary, Perth, Western Australia ▪ Peel-Harvey estuary, Mandurah, Western Australia • Description ▪ partially enclosed body of water formed by the mixing of freshwater with saline marine water from the ocean **Swan-Canning estuary** ▪ Swan-Canning estuary protected partially from ocean waves by a barrier island (Rottnest) and rocky reef ▪ freshwater drains from the Avon, Canning and Helena rivers ▪ flows through the Perth CBD ▪ meanders from the Darling Range to Fremantle ▪ consists of many differing habitats, including shallow waters, sandy beaches, rocky cliffs and mud flats **Peel-Harvey estuary** ▪ protected from ocean waves by strip of land ▪ consists of Peel inlet and Harvey estuary ▪ covers an area of 136km^2 and a volume of 111 megalitres ▪ Dawesville cut connects Peel-Harvey estuary to ocean ▪ subject to tides ▪ consists of many differing habitats, including shallow waters, sandy beaches and mud flats • Types of flora and fauna that inhabit the ecosystem Fauna ▪ water birds such as black swan, pelican, duck, seagull, tern, ibis, heron, egret, black and pied cormorant, striped grunter, blowfish, flathead, herring, hardy head, black bream, mulloway, crab, prawn, mussel, bloodworm, marine worm, jellyfish, dolphin, bull shark Flora ▪ green algae, sea grass, brown algae, macro algae, macrophytes and filamentous algae • Abiotic factors present ▪ nutrients, toxins, heavy metals, light, temperature, turbidity, pH, water depth, dissolved oxygen, salinity • Importance of the ecosystem to humans ▪ provides a variety of habitat for many aquatic plants and animals ▪ provides nurseries for species which are important for commercial fisheries ▪ provides areas for recreational activities, including fishing, boating, sailing, kayaking	1 1–5 1–3 1–3 1–2
Ningaloo (coral) reef • Location ▪ North-west of Western Australia, north of Perth • Description ▪ fringing coral reef, 260km long ▪ largest fringing coral reef and largest coral reef close to a land mass ▪ one of two coral reef systems formed on the western coast of a continent ▪ back of reef forms a protected lagoon ▪ reef is formed 5–100m off shore ▪ coral reef is made up of calcium carbonate which is secreted by coral polyps ▪ the hard exoskeleton of the colony of coral polyps forms the reef ▪ many different species of coral polyps produce a colourful and varied structure that makes the reef ▪ provides protection and habitat for other marine organisms	1 1–5

Description	Marks
• Types of flora and fauna that inhabit the ecosystem Fauna ▪ migratory marine species such as whale sharks, dolphins, dugongs, manta rays, humpback whales, loggerhead, hawksbill and green turtles ▪ other marine vertebrates, including approximately 500 different species of fish, including several species of emperor, snapper, trevally, groper, cod, trout, mackerel, tuna and shark ▪ invertebrates, including several species of crab, crayfish, jellyfish, prawn, sea star, sea urchin, mollusc (snail, abalone, mussel, clam), coral polyp, sea anemone and others Flora ▪ many varieties of seagrasses, seaweed, algae (green, red, brown), diatoms and phytoplankton	1–3
• Abiotic factors present: ▪ nutrients, light, temperature, turbidity, pH, water depth, dissolved oxygen, salinity, light penetration, habitat	1–3
• Importance of the ecosystem to humans ▪ the Ningaloo reef supports a large variety of species providing a biodiversity hotspot which is important for all living things ▪ important feeding and nursery area for migratory species such as whale sharks, humpback whales, manta rays and dugongs, all of which are of great interest to people ▪ reef is a source of recreation/tourism ▪ nursery area for key species that are important for commercial fisheries	1–2
Shark Bay seagrass beds • Location ▪ located in Shark Bay marine park 740km north of Perth	1
• Description: ▪ large areas where seagrasses grow in an underwater meadow ▪ sea grasses are flowering plants and have the same basic structure as land-based flowering plants – produce flowers, have leaves and roots ▪ grow in sandy or mud bottom, shallow seas ▪ area of low-wave action ▪ grow in lines parallel to water currents	1–5
• Types of flora and fauna that inhabit the ecosystem: Fauna ▪ dugongs, sharks, rays, bottlenose dolphins, and a variety of fish, including emperors, wrasse, snapper whiting and other appropriate vertebrate species ▪ invertebrates include stromatolites, bivalves (clams, oysters and mussels), jellyfish, sea stars and other appropriate invertebrates Flora ▪ twelve types of sea grasses, the most common being wire weed, ribbon weed and paddle weed	1–3
• Abiotic factors present: ▪ nutrients, light, temperature, turbidity, pH, water depth, dissolved oxygen, salinity, light penetration, habitat	1–3
• Importance of the ecosystem to humans: ▪ satisfies 4/10 criteria for World Heritage listing ▪ significant natural values like stromatolites, dugongs and largest seagrass meadows ▪ tourism value ▪ provides nursery area for some key species for commercial fisheries	1–2
Inter-tidal zone – Mangroves • Location ▪ located in coastal regions in all mainland states of Australia; mainly in the north of Western Australia/Kimberley	1

Description	Marks
• Description ▪ found in tropical and sub-tropical tidal areas ▪ areas where there is a lot of fine sediment/silt deposited ▪ protected from wave-action ▪ various types of salt tolerant trees and shrubs that can grow in inter-tidal conditions ▪ provides habitat for a diverse range of aquatic and terrestrial animals • plants and animals are exposed to a broad range of salinity, temperature, moisture and other key environmental conditions	1–5
• Types of flora and fauna that inhabit the ecosystem Fauna ▪ saltwater crocodiles, shellfish (mussels, snails), polychaetes (mud worms, burrowing worms), fish (mud skipper, mangrove jack, threadfin salmon, barramundi), mud crabs, mud lobster, prawns, insects, sea snakes, pythons, snakes, birds, monitor lizards Flora ▪ common mangrove (yellow, Milky, Grey, Red, Orange, River), salt marsh, salt-tolerant herbs and shrubs	1–3
• Abiotic factors present ▪ in-coming tides bring salt, flooding, oxygen in sediment, nutrients, sediments, high turbidity ▪ outgoing tides remove organic carbon/organic matter, sulphur compounds	1–3
• Importance of the ecosystem to humans ▪ provides breeding ground for key fisheries species – barramundi, banana prawn, mud crab, mussel ▪ protect shorelines from erosion ▪ carbon sink and sequestration ▪ habitat for migratory birds and fish	1–2
Inter-tidal zone – Rocky shore • Location ▪ found where sea meets rocky coastland along the coasts of all states in Australia, where limestone or granite make up shoreline	1
• Description ▪ consists of some form of rock (limestone, granite, basalt) ▪ weathered by wave action to produce rock pools, crevices, platforms, boulder fields ▪ provides a fairly permanent coastal feature ▪ subject to being under water at high tide ▪ can be separated into o high-tide zone: submerged only during high tide, dries out when not high tide, highly saline o middle-tide zone: submerged for approximately equal amounts of time between tide changes o low-tide zone: mostly submerged by water	1–5
• Types of flora and fauna that inhabit the ecosystem ▪ high-tide zone: anemones, barnacles, chitons, crabs, green algae, isopods, limpets, snails, whelks and mussels. In rock pools in high-tide zone – small fish, octopus and larger seaweed ▪ middle-tide zone: anemones, barnacles, chitons, crabs, green algae, sea lettuce, sea palms, sea stars, snails, sponges, mussels and whelks. Rock pools in middle-tide zone provide habitat for small fish, shrimp, krill, sea urchins and zooplankton ▪ low-tide zone: more marine vegetation like seaweeds, brown seaweed, surf grass, sea lettuce, green algae, sponges, abalone, anemones, mussels, crabs, sea cucumbers, prawns, shrimp, hydroids, tube worms and whelks and a wide variety of fish like tailor, bream and herring	1–3
• Abiotic factors present ▪ high salinity, high turbidity, lack of water (high-tide zone), wave action, high temperatures (high-tide zone), sunlight	1–3

Description	Marks
• Importance of the ecosystem to humans ▪ provides habitat for desirable species such as abalone, mussels and sea urchin ▪ provides nursery areas for many marine animal species ▪ provides food source for commercially important species such as bream, snapper, yellowtail, samson fish, Australian salmon ▪ at low tide, provides food source for many marine birds	1–2
Total	**/70**

Sample assessment task

Integrated Science – General Year 11

Task 5 – Unit 1

Assessment type: test

Conditions
Time for the task: 45 minutes

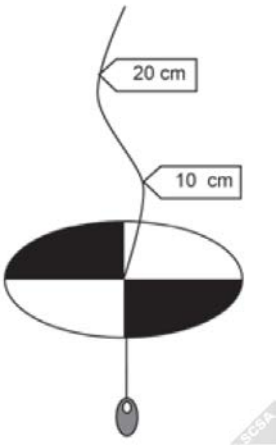
Task weighting
5% of the school mark for this pair of units

Properties of water and marine biology test

Part A: Multiple-choice **(15 marks)**

This section has 15 questions. Answer all questions on the multiple-choice answer sheet.

Use the following diagram for the first two questions



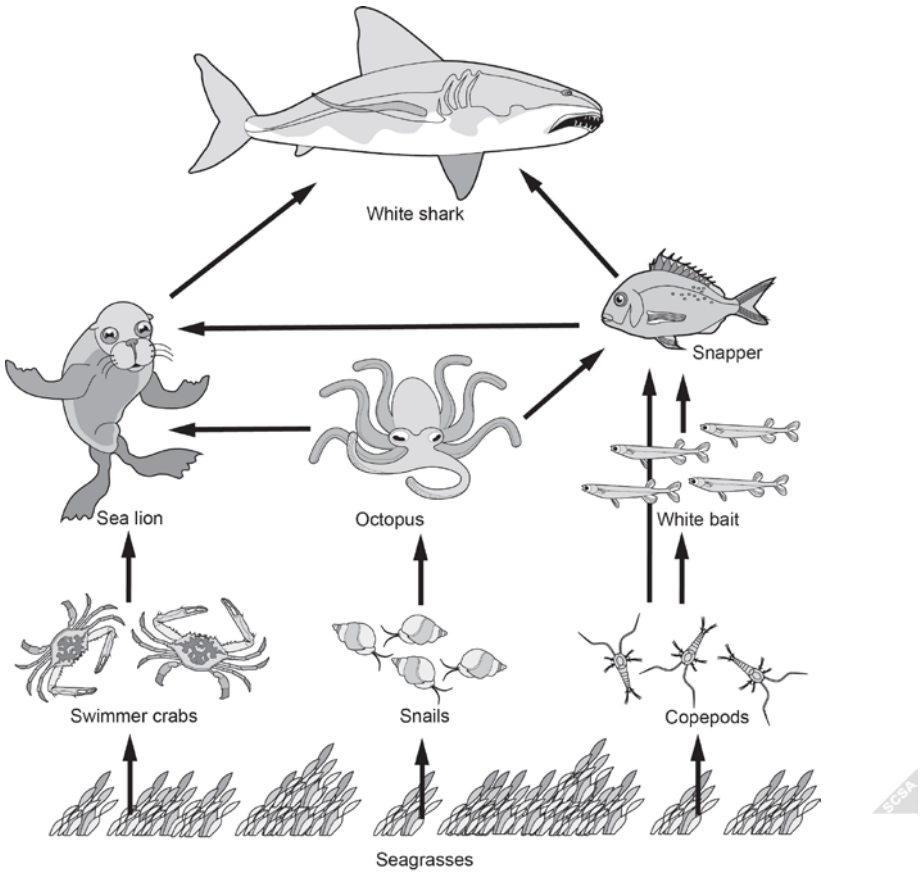
1. What is the name of this apparatus?

   a) secchi disc
   b) conductivity meter
   c) dissolved oxygen meter
   d) water depth measurer

2. What does this apparatus measure when conducting water quality tests?

   a) temperature
   b) turbidity
   c) salinity
   d) water depth

The next three questions refer to the diagram below



3. Which organisms are the producers?

   a) White shark
   b) snails
   c) copepods
   d) seagrasses

4. A pollutant that destroys chlorophyll is introduced into this system. Which organism will be affected directly and, in the immediate short term, due to population reduction of the first organism?

   a) Seagrasses, then snails, copepods and swimmer crabs
   b) Snails, then swimmer crabs, octopus and seagrasses
   c) Copepods, then seagrasses, white bait and snapper
   d) Snapper, then octopus, white bait, sea lions, copepods and White shark

5. Sea lions feed exclusively on marine animals and are therefore classified as

   a) herbivores.
   b) frugivores.
   c) carnivores.
   d) omnivores.

6. Which one of the following is **not** a feature that increases gas exchange in fish?

   a) plates in the gills supporting two rows of filaments to increase the surface area
   b) blood capillaries surrounding each filament
   c) drawing water into the mouth and forcing it between the gills by closing the mouth
   d) swimming slowly so the oxygen has time to diffuse into the blood

7. Which one of the following statements best describes the movement of matter and energy in an ecosystem?

   a) Producers convert matter to energy, which then passes through the levels before being recycled.
   b) Energy enters an ecosystem as light and is lost as heat, while matter is recycled.
   c) Producers convert light energy to heat energy, which is then used to support the consumers.
   d) Consumers absorb heat energy from the environment and convert it to matter, which is then recycled.

8. Plants are found at the beginning of food chains because they

   a) cannot move around to obtain food.
   b) are the most common food source available.
   c) do not have any structures for biting and chewing.
   d) are able to convert light energy into food.

9. Mangrove ecosystems help sustain fisheries and biodiversity because

   a) they produce all the available nutrients in the ocean through decomposition.
   b) there is a wide range of plant species available for organisms to feed on.
   c) they provide a wide range of food sources and shelter for juvenile fish and invertebrates.
   d) they are usually in remote places and fish do well in them because they are inaccessible to humans.

10. Fish living in salt water maintain water balance through osmoregulation by drinking

    a) small amounts of water and producing large amounts of dilute urine.
    b) small amounts of water and producing small amounts of concentrated urine.
    c) lots of water, actively excreting salts from gills and producing small amounts of concentrated urine.
    d) lots of water, actively excreting salts from gills and producing large amounts of dilute urine.

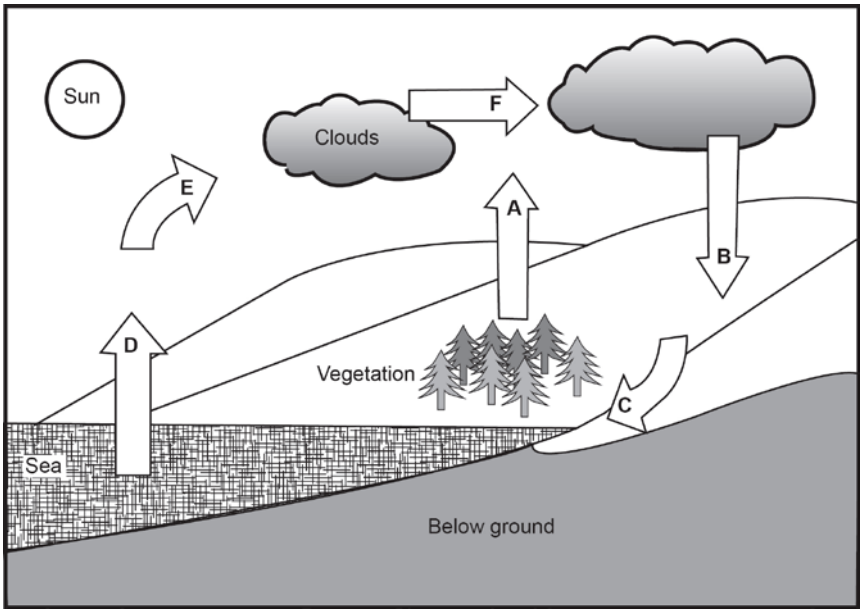
11. Most fish have a structure within their bodies that helps them to maintain buoyancy, so that they don't have to be constantly swimming to stay at a certain depth. This structure is known as

    a) gills.
    b) swim bladder.
    c) dorsal fin.
    d) operculum.

12. Seagrass communities are one of the most productive biological ecosystems because they are

    a) sources of food and shelter to a large variety of juvenile marine creatures.
    b) inaccessible to predators when the tide comes in.
    c) inaccessible to humans and fisheries as nets are difficult to use.
    d) less prone to human damage due to their remote locations.

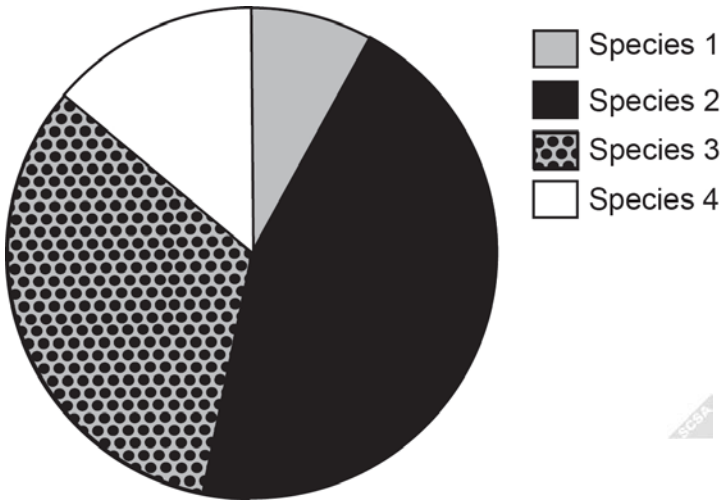
13. The following diagram shows a simplified water cycle.



    The process illustrated by the Label 'A' is called

    a) condensation.
    b) evaporation.
    c) precipitation.
    d) transpiration.

Questions 14 and 15 relate to the following information about sea stars. Biologists collected sea stars that congregated around a particular part of a reef. Four species of sea stars were found in the collection. The following pie chart shows the percentage of individuals of each species in the collection.



14. Based on the pie chart, the second most abundant species in the collection was species

    a) 1.
    b) 2.
    c) 3.
    d) 4.

15. If 500 sea stars were collected, which of the following statements is correct?

    a) At least 400 sea stars are from Species 1 and 2 combined.
    b) About 125 sea stars are from Species 1 and 2 combined.
    c) About 300 sea stars are from Species 3 and 4 combined.
    d) More than 250 sea stars are from Species 2.

Part B: Short answer **(39 marks)**

This section has **four (4)** questions. Answer all questions in the spaces provided.

16. Seagrass meadows support diverse communities of organisms. The organisms in the seagrass meadows acquire nutrients in a variety of ways. Indicate whether each of the following organisms is an autotroph, a herbivore, a carnivore or a detritivore. (4 marks)

    i) Marine worms that feed on dead pieces of seagrass

    _____

    ii) Photosynthetic algae that live attached to the seagrass

    _____

    iii) Fish that feed only on the other fish in the area

    _____

    iv) Dugongs (sea cows) that eat only the seagrass

    _____

17. A team of biologists spent six months on an isolated island off the North-west coast of Australia. Their task was to prepare a biological survey of the estuary on the island. One of the biologists investigated the feeding relationships in the estuary. A brief summary of his findings is presented in the paragraph below.

    'Small herring and striped grunter have been observed eating seagrass in beds in the shallow waters of an estuary in Western Australia. They compete for the seagrass with a number of invertebrates that include prawns, bloodworms and estuary slaters. These invertebrates also eat macro algae. School whiting have been observed eating prawns and bloodworms while hardy heads have been recorded eating slaters and blood worms in the estuary, while black bream have been seen eating both invertebrates and striped grunter. Pelicans pick off whiting and hardy heads from the shallows of the estuary while large mulloway are known to eat any small fish in the estuary.'

    a) Use the information in the paragraph above to construct a food web showing all the feeding relationships. (5 marks)

b) What do the arrows in the food web represent? (1 mark)

_____

c) Identify **two (2)** primary consumers in the food web. (2 marks)

_____

_____

d) Toxic chemicals caused aquatic conditions to change so that the prawns and blood worms in the food web decreased in number and eventually died out. Describe changes that would occur over time to the population of organisms in the food web. (10 marks)

_____

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Scientists use many measurements from biotic and abiotic factors to build up a picture of the health of an estuarine environment. These include measuring pH, salinity, turbidity, dissolved nutrients, and oxygen levels. They also use biological indicators by determining the number of macro-invertebrate species that are collected and identified.

e) Suggest **one (1)** advantage and **one (1)** disadvantage of using physical measurements (such as measuring pH and oxygen levels) compared with biological measurements (such as macro-invertebrate sampling). (2 marks)

Advantage:

_____

Disadvantage:

_____

f) Describe the method a scientist would use to collect data on pH and salinity of the water in an estuary. (6 marks)

_____

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_____

g) Describe a method of how a scientist can gather information on the abundance of a particular species of seagrass present in an estuary. (3 marks)

_____

_____

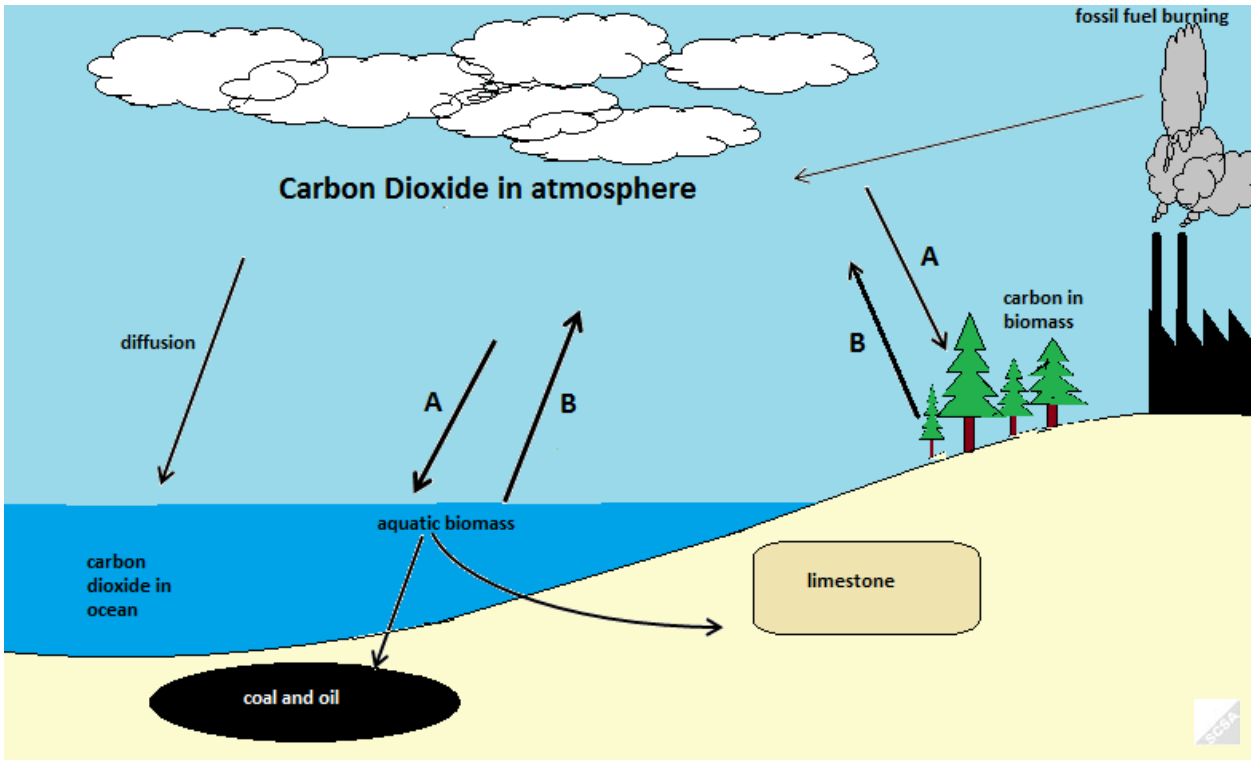
_____

_____

18. Complete the table of fish adaptations below by filling in the blanks (4 marks)

Body Part	Adaptation	Advantage	Example
Eyes		Can lie flat on the bottom and still see	Flounder
Body shape		High-speed swimmer	Tuna
Fins	Spines on fins		Stonefish
Camouflage	Counter shading – dark on top light underneath		Salmon, shark, tailor

19. Below is a diagram of a simplified carbon cycle.



Using words chosen from the following list (not all words will be required), name the processes A and B. (2 marks)

evaporation, distillation, respiration, transpiration, precipitation, condensation, photosynthesis, infiltration

A _____

B _____

Marking key for sample assessment task 5 — Unit 1

Part A: Multiple-choice

1.	A
2.	B
3.	D
4.	A
5.	C
6.	D
7.	B
8.	D
9.	C
10.	C
11.	B
12.	A
13.	C
14.	B
15.	D

Part B: Short answer **39 marks**

16. Seagrass meadows support diverse communities of organisms. The organisms in the seagrass meadows acquire nutrients in a variety of ways. Indicate whether each of the following organisms is an autotroph, a herbivore, a carnivore or a detritivore.

i) Marine worms that feed on dead pieces of seagrass

Description	Marks
detritivore	1

ii) Photosynthetic algae that live attached to the seagrass

Description	Marks
producer	1

iii) Fish that feed only on the other fish in the area

Description	Marks
carnivore	1

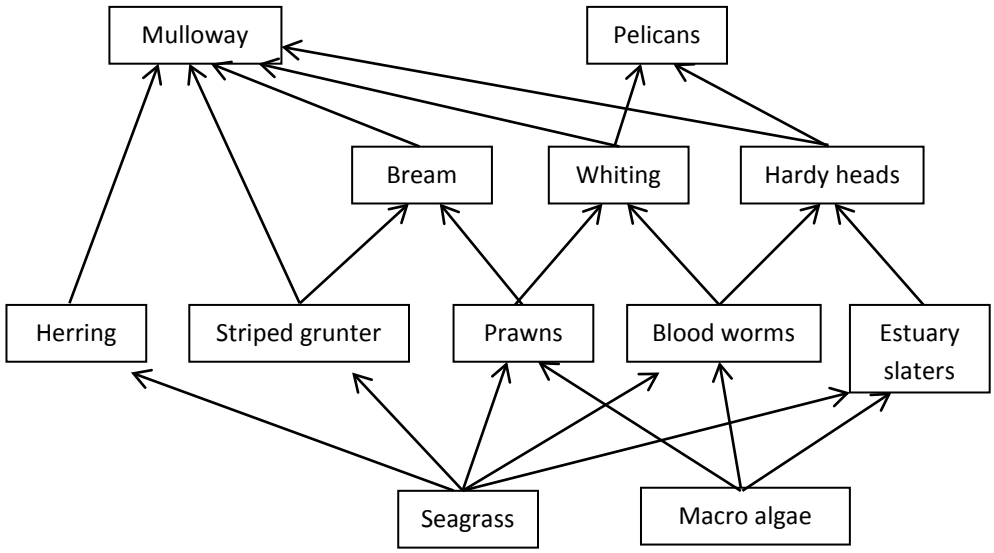
iv) Dugongs (sea cows) that eat only the seagrass

Description	Marks
herbivore	1

17. A team of biologists spent six months on an isolated island off the north-west coast of Australia. Their task was to prepare a biological survey of the estuary on the island. One of the biologists investigated the feeding relationships in the estuary. A brief summary of his findings is presented in the paragraph below.

'Small herring and striped grunter have been observed eating seagrass in beds in the shallow waters of an estuary in Western Australia. They compete for the seagrass with a number of invertebrates that include prawns, bloodworms and estuary slaters. These invertebrates also eat macro algae. School whiting have been observed eating prawns and bloodworms and hardy heads have been recorded eating slaters and blood worms in the estuary, while black bream have been seen eating both invertebrates and striped grunter. Pelicans pick off whiting and hardy heads from the shallows of the estuary while large mulloway are known to eat any small fish in the estuary.'

a) Use the information in the paragraph above to construct a food web showing all the feeding relationships.

Description	Marks
	1
• starts food web with producers • arrows show flow of energy • correct feeding relationships • organised to show trophic levels	1 1 1 1
Total	**/5**

b) What do the arrows in the food web represent?

Description	Marks
transfer/flow of energy	1
Total	**/1**

c) Identify **two (2)** producers in the food web.

Description	Marks
macro-algae and seagrass	1
seagrass	1
Total	**/2**

d) Toxic chemicals caused aquatic conditions to change so that the prawns and blood worms in the food web decreased in number and eventually died out. Describe changes that would occur over time to the population of organisms in the food web.

Description	Marks
• loss of bloodworms and prawns	
• less competition for macro-algae leads to increase in abundance	1–2
• loss of food source for whiting leading to decrease in numbers of whiting	1–2
• increased competition for striped grunter between mulloway and black bream lead to decrease in number of striped grunter	1–2
• loss of competition for food estuary slaters leads to increased numbers • increased slaters leads to increased numbers of hardy heads • increased predation on hardy heads due to loss of half of food source for pelicans • increased competition between pelicans and mulloway for hardy heads	1–4
Total	**/10**

Scientists use many measurements from biotic and abiotic factors to build up a picture of the health of an estuarine environment. These include measuring pH, salinity, turbidity, dissolved nutrients, and oxygen levels. They also use biological indicators by determining the number of macro-invertebrate species that are collected and identified.

e) Suggest **one (1)** advantage and **one (1)** disadvantage of using physical measurements (such as measuring pH and oxygen levels) compared with biological measurements (such as macro-invertebrate sampling).

Description	Marks
Advantage: • quick and easy to obtain measurement data • reliable, repeatable method	1
Disadvantage: • does not give information on long-term effects on environment • does not show impact on environment	1
Total	**/2**

f) Describe the method a scientist would use to collect data on pH and salinity of the water in an estuary.

Description	Marks
pH: • rinse collection vial with estuary water • collect sample of estuary water, mid-water • add drops of universal indicator and check colour change against chart	1–3
Salinity: • rinse collection vial with estuary water • collect sample mid-water • use conductivity probe to determine salinity	1–3
Total	**/6**

g) Describe a method of how a scientist can gather information on the abundance of a particular species of seagrass present in an estuary.

Description	Marks
• Measure out an area to sample and decide on size of quadrat to use • Randomly place quadrats and count number of species in quadrat • Calculate approximate number of species present in area	1–3
Total	**/3**

18. Complete the table of fish adaptations below by filling in the blanks

Description				Marks
Body Part	Adaptation	Advantage	Example	
Eyes	**Eyes on same side**	Can lie flat on the bottom and still see	Flounder	1
Body shape	**Torpedo/streamline**	High speed swimmer	Tuna	1
Fins	Spines on fins	**Protection from predators**	Stonefish	1
Camouflage	Counter shading – dark on top light underneath	**Predators/prey have difficulty seeing it from above or below**	Salmon, shark, tailor	1
			Total	**/4**

19. Using words chosen from the following list (not all words will be required), label the processes A and B.

Description	Marks
A: photosynthesis	1
B: respiration	1
Total	**/2**

Sample assessment task

Integrated Science – General Year 11

Task 10 – Unit 2

Assessment type: Science Inquiry

Conditions
Time allocated for completion of the task:

- Part A: research and planning completed and submitted (three lessons) **(32 marks)**
- Part B: constructing rocket and conducting investigation (two lessons) **(10 marks)**
- Part C: reporting and writing up of investigation; results completed and submitted **(20 marks)**

Task weighting
9% of the school mark for this pair of units

Investigating rocket design **(62 marks)**

Your task is to plan and conduct an investigation into the design factors that affect the flight of a rocket and present your findings in a scientific report.

Part A:

1. **Research** **(15 marks)**
   - use the internet to research the following rocket design features— nose cone, fins, fuel type, engine nozzle and rocket stability

2. **Plan investigation and design bottle rocket** **(17 marks)**
   - choose one of the design features of a rocket you researched to investigate its effect on the flight of a rocket
   - develop a hypothesis and select independent, dependent and controlled variables for your investigation
   - design the rocket you will be using for your investigation; you can use either a water rocket, solid-fuel rocket or any other design you can find
   - describe in detail the method you will follow when conducting your investigation
   - propose the way that you will record your data
   - state how you will process the data to arrive at some conclusions

Part B:

3. **Conduct the investigation** **(10 marks)**
   - set up equipment required for your investigation
   - carry out your investigation, recording results in an appropriate way

Part C:

4. **Process, evaluate and communicate findings** **(20 marks)**

Complete the write up of your investigation as a scientific report, including the following:

- Results – show processing of raw data, identify any outliers, and plot by hand any graphs to show results
- Analysis and Evaluation – describe any trends and patterns in your data, state how your data relates to your hypothesis, use your knowledge and understanding to explain your results, comment on the reliability and accuracy of the data collected, comment on the reliability of your collection strategy, list at least two (2) limitations in the data collection strategy that may have affected the accuracy of your data, list at least two (2) improvements you could make to the data collection strategy.
- Conclusion – summarise your findings and comment on the validity of the investigation.

Investigating Rocket Design

Research: **(15 marks)**

Use library and internet resources to research the following rocket features:

nose cone

_____

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fins

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rocket stability

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Planning the investigation: **(17 marks)**

Choose one of the features of rocket design you have researched to investigate its effect on the flight of a rocket.

Hypothesis

_____

Independent variable _____

Dependent variable _____

What are some of the variables that will need to be controlled during the investigation?

_____

_____

Material

What material/equipment will you need to use during the investigation?

_____

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Procedure

What procedure will you be using during the investigation?

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Results and observations:
Draw the table you will use to record your data.

How will you make sure your data is accurate?

_____

_____

Conducting: **(10 marks)**
You will now have to negotiate a time to conduct your investigation with your teacher.

Processing and analysing results:

Graph the results of the data you collected.

Discussion of results: **(20 marks)**

Analyse your data. Describe any patterns, trends or relationships shown by the data and represented by the graph. Is your hypothesis supported by the data?

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Using science concepts, explain any patterns, trends or relationships you can identify in your data.

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What were the main sources of experimental error?

_____

_____

_____

_____

How could you improve the design of the investigation to reduce error and increase validity and reliability of the results?

_____

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_____

Conclusion:

What is your conclusion to the investigation?

_____

_____

_____

Marking key for sample assessment task 10 – Unit 2

Description	Marks
Part A:	
Background research	
Nose cone • leading part of rocket • aerodynamically designed to reduce air resistance • assists rocket to move at high speeds through the air • usually designed as an area to carry the payload	1–3
Fins • a thin, wing-like attachment to side of rocket • designed to produce lift or thrust • stabilises motion of rocket in flight	1–3
Fuel type • solid fuel – consists of a steel casing, filled with a mixture of solid fuel and oxidiser and burns from the centre outward; once ignited cannot stop • liquid fuel – fuel and oxidiser are stored in separate tanks and are fed through pipes to mix during combustion. Advantage over solid fuel can be throttled, stopped and restarted. Examples of liquid fuels are petroleum, liquefied gases – hydrogen and oxygen • hybrid fuel – a mixture of liquid and solid fuels. The fuel is generally solid and the oxidiser is generally liquid in hybrid fuels. Advantage is that they have high performance like solid fuels but can be moderated, stopped and restarted	1–3
Engine nozzle • used to expand and accelerate exhaust gases • exhaust gas flow moves rockets at take off • makes exhaust gases exit at hypersonic speeds	1–3
Stability • stability is achieved if centre of gravity is above centre of pressure on a rocket • stability of a rocket is affected by drag on nose cone, wind, unbalanced drag on fins, unequal streamlining • fins assist in stabilising a rocket by providing lift on one side of the rocket when it starts to rotate	1–3
Total	**/15**
Plan the investigation	
Hypothesis – states relationship between independent and dependent variable	1–2
Variables • independent • dependent • controlled – lists at least three to be kept the same	 1 1 3
Procedures used to collect data • equipment • step by step method ▪ outlines method to change independent variable ▪ outlines method to measure dependent variable ▪ outlines method to control variables ▪ safety requirements ▪ preliminary trials included ▪ repeated trials included • appropriate diagrams of experimental setup	 1 1 1 1 1 1 1 1
• appropriate table to record data, including headings and trials	1–2
Total	**/17**
Total – Part A	**/32**

Description	Marks
Part B: Conducting	
• safety procedures practised during launch	1–2
• rocket stable during flight	1–2
• parachute deploys	1–2
• rocket descent stable and safe	1–2
• appropriate data recorded in well-organised table	1–2
Total – Part B	**/10**

Description	Marks
Part C: Processing and analysing results	
Results	
• consistency of data	1–2
• average calculated	1
• correct graph	1
• correct axes	1
• labelled axes	1
• units	1
• points plotted accurately	1
Discussion of results	
• identifies patterns or trends in the data	1
• states whether hypothesis supported by results and gives brief explanation	1
Explanation of results using science concepts	
• identifies appropriate science concept/s	1
• describes the science concept/s	1
• explains how the science concept/s is/are applied in everyday life	1
• identifies main sources of experimental error	1
Evaluation	
• describes any difficulties encountered	1
• comments on consistency of results	1
• accounts for anomalous readings	1
• suggests improvements in experimental design or method of data collection for accuracy	1
Conclusion	
• states the relationship between the independent and dependent variable	1
• states whether the hypothesis is supported	1
Total – Part C	**/20**
Assessment total	**/62**