



Sample assessment task

Year level	10
Learning area	Science
Subject	Earth and Space Sciences
Title of task	Global systems test

Task details

Description of task	Students are asked to discuss cycles of carbon, nitrogen and water and global climate change.
Type of assessment	Test
Suggested time	One lesson

Content description

Content from the Western Australian Curriculum	Science understanding Global systems, including the carbon cycle, rely on interactions involving the biosphere, lithosphere, hydrosphere and atmosphere Science inquiry skills Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations
Key concepts	Carbon cycle, water cycle, climate change

Task preparation

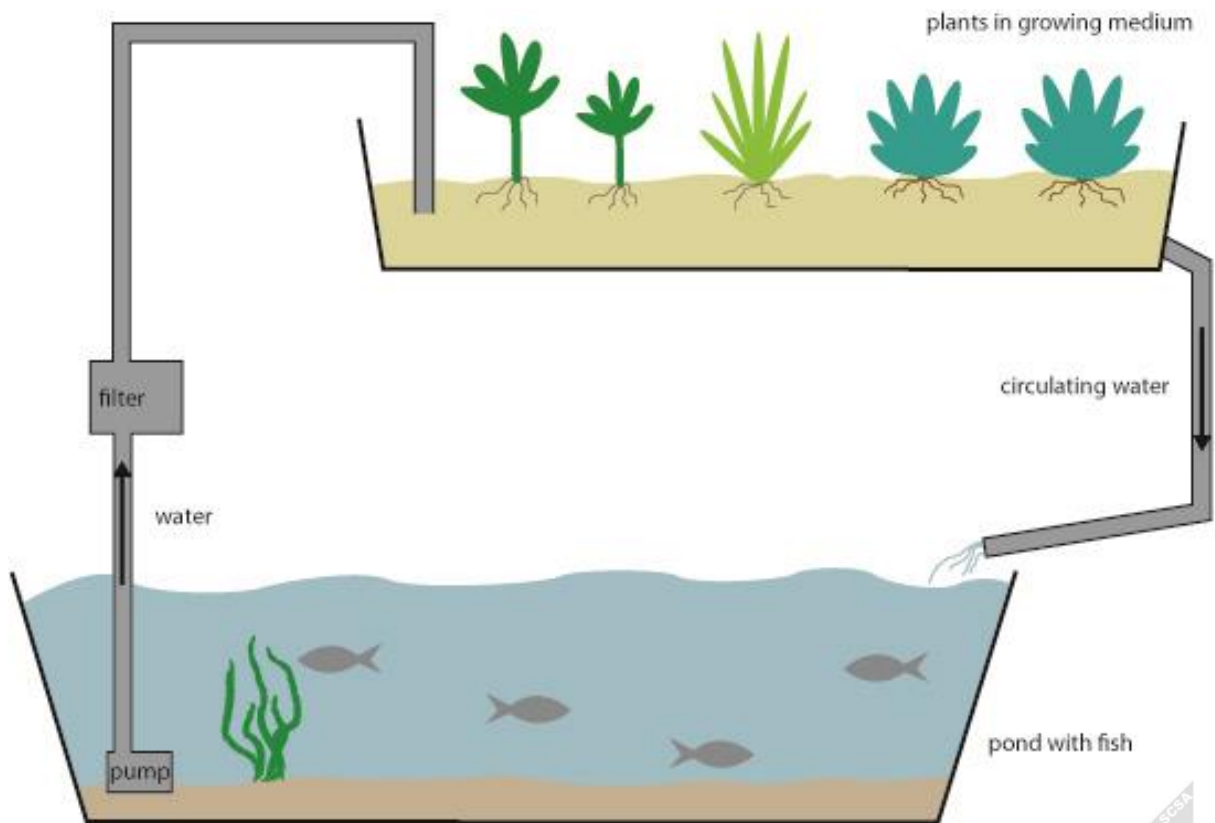
Prior learning	Students have studied the carbon and water cycles, and the causes of the enhanced greenhouse effect and its effect on climate.
Assessment differentiation	Teachers should differentiate their teaching and assessment to meet the specific learning needs of their students, based on their level of readiness to learn and their need to be challenged. Where appropriate, teachers may either scaffold or extend the scope of the assessment tasks.

Use your science understanding to fully answer the following questions.

Scientists are planning to send manned spacecraft to the planet Mars and set up human habitation there. All supplies required for this journey will need to be carried on board the spacecraft.

Therefore, all the inputs and outputs of the spacecraft need to be managed, since there is no opportunity to pick up extra supplies if they run out.

An aquaponics system for growing food is one way of supplying some of the requirements for the passengers and crew. The system consists of a pond with fish living in the water which is connected to a series of trays with plants in a growing medium (not soil). Water is pumped between the plants and the pond which has fish and algae in it.



1. Name three useful products that this aquaponics system could produce. (3 marks)

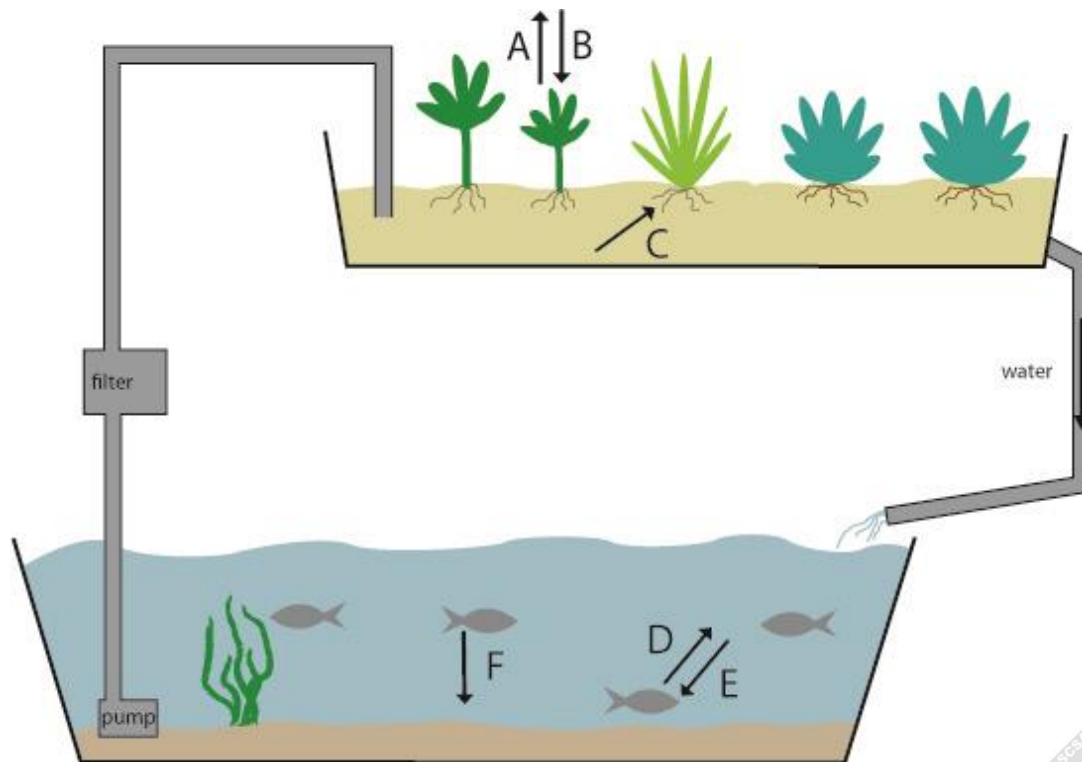
The aquaponics system needs to be finely balanced so that there are enough nutrients in the water to nourish the plants, but not so much that the pond water turns green.

2. (a) Explain why the water turns green if there are too many nutrients in it. (2 marks)

- (b) Also explain how this would affect the fish. (2 marks)

3. The water in this system will need to be topped up regularly, because over time water is lost from the system. Describe **two** ways that water is lost from the system. (4 marks)

4. The arrows labelled A – F on the diagram below represent inputs and outputs from the plants and fish in the aquaponics system.



Use the following terms to label the arrows A to F:

oxygen, carbon dioxide (CO₂), nitrogen-based nutrients (nitrates), nitrogenous waste
 Terms may be used more than once.

(6 marks)

A _____

D _____

B _____

E _____

C _____

F _____

5. Some of the vegetables being grown in the aquaponics system will be eaten during the journey. Explain how the composition of the air in the spacecraft will be affected if the number of plants in the system is halved. (4 marks)

6. How has the development of industry and the increased use of cars over the past 100 years affected the composition of the Earth's atmosphere? (2 marks)

7. Explain the term 'enhanced greenhouse effect'. (3 marks)

8. Explain **three** global changes to the environment that scientists think are caused by the enhanced greenhouse effect. (6 marks)

Sample marking key	
Description	Marks
Question 1	
Identifies three appropriate products	1-3
Subtotal	3
Answer could include, but is not limited to:	
• Fish, vegetables, oxygen	[3]
Description	Marks
Question 2	
Nutrients nourish the algae which turns the water green	1-2
Algae covers water surface resulting in decreased oxygen in water	1
Fish die due to lack of oxygen	1
Subtotal	4
Description	Marks
Question 3	
Names and describes water loss by evaporation	1-2
Names and describes water loss by transpiration	1-2
Subtotal	4
Description	Marks
Question 4	
A Oxygen B Carbon dioxide C Nitrates D Carbon dioxide E Oxygen F Nitrogenous waste	1-6
Subtotal	6
Description	Marks
Question 5	
Plants absorb CO ₂ and give out O ₂ during photosynthesis Fewer plants result in lower oxygen levels Higher CO ₂ levels	1-4
Subtotal	4
Description	Marks
Question 6	
Burning of fossil fuels has increased Carbon dioxide levels have increased	1-2
Subtotal	2
Description	Marks
Question 7	
Increased levels of carbon dioxide in the atmosphere caused by human activities Reflect sun's heat back to Earth Resulting in higher global temperatures	1-3
Subtotal	3

Description	Marks
Question 8	
Identifies and explains three global changes	1-6
Subtotal	6
<p>Answer could include, but is not limited to:</p> <ul style="list-style-type: none"> Higher temperatures due to reflected heat, melting polar ice due to higher temperatures, rising sea levels due to increased temperatures and melting ice, increased extreme weather events 	
Total	32