

Question 1**(19 marks)**

- (a) What was the independent variable in the investigation? (1 mark)

Description	Marks
Number of fish	1
Total	1
Note: do not accept just "fish"	

- (b) What was the dependent variable in the investigation? (1 mark)

Description	Marks
The weight of mangoes harvested	1
Total	1

- (c) Write a suitable hypothesis for the investigation. (2 marks)

Description	Marks
Hypothesis showing the relationship between independent and dependent variables	2
Statement made about fish stock and/or weight of mangoes harvested	1
Total	2
Answers may include, but are not limited to the following: <ul style="list-style-type: none"> an increase in the number of fish stocked in each canal will result in an increase in the weight of mangoes harvested 	

- (f) David's daughter, Sue, is studying Integrated Science at school. Sue tells her father that his investigation was not well designed. Outline **three** improvements that Sue could have suggested to her father to enhance the investigation design. (3 marks)

Description	Marks
One mark for each improvement. Maximum of three marks.	
Answers may include, but are not limited to the following: <ul style="list-style-type: none"> add a control group with zero fish the number of trees per row should have been kept constant (controlled variable) do more trials (lacks reliability) look at factors such as size of mangoes, quality of mangoes, (or other examples of measure of dependent variable) control the size of fish or other 'controlled variables' not accounted for. 	1–3
Total	3

- (g) Describe **two** ethical issues that David should have considered before starting his investigation. (4 marks)

Description	Marks
Two marks for each ethical issue. Maximum of four marks.	
Describes clearly an ethical issue	2
States an ethical issue	1
Total	4
Answers may include, but are not limited to the following: <ul style="list-style-type: none"> well-being of fish – habitat conditions in canals release of additional nutrients to river (fish food or waste, agricultural runoff) impact on water aquifers, etc through nutrients leaching other damage to river environment or surrounding environment. 	

Question 1**(18 marks)**

- (a) (i) Name the independent variable and the dependent variable in this investigation. (2 marks)

Description	Marks
Independent variable – diet the polar bears consumed (seal meat or seaweed preparation)	1
Dependent variable – The polar bears' body weight (in kg)	1
Total	2

- (ii) Write an hypothesis for this investigation. (2 marks)

Description	Marks
Hypothesis showing the relationship between independent and dependent variables	2
Statement made about polar bear diet and body weight (e.g. polar bear diet affects body weight)	1
Total	2

Answer could include:

- polar bears fed seal meat gain more body weight than those fed the seaweed preparation
- polar bears fed a seaweed preparation lose more body weight than those fed seal meat
- polar bears fed seal meat lose more body weight than those fed seaweed preparation.

Answer **must** include an item of diet and a reference to body weight gain or loss in comparison to the other item of diet.

Accept other relevant answers.

Question 1 (continued)

- (e) Name a factor in this investigation for which the researchers would have needed to seek approval. Explain the reason for the factor. (3 marks)

Description	Marks
Names a valid factor	1
Explains a reason for the factor	2
States some relevant information about the factor	1
Total	3
<p>Answer could include:</p> <ul style="list-style-type: none">• large numbers of bears: the size of the area in which they are enclosed maybe too confining• damage to the environment: environmental damage by polar bears on such a small area• change to polar bear diet: seaweed could cause harm to polar bears• potential harm to human beings: polar bears are wild animals, contact with humans in the past has often left people badly injured or dead• polar bears are endangered: the investigation may cause greater loss• nature of the enclosure: the enclosure may not be safe for bears and/or humans• initial condition of the bears: some of the female bears maybe pregnant and the welfare of the unborn bear cub could be at risk. <p>Accept other relevant answers.</p>	