National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

Internal Assessment Resource

Science Level 1

This resource supports assessment against:

Achievement Standard 90949

Investigate life processes and environmental factors that affect them

Resource title: Fish Heads and Broken Bones

4 credits

This resource:

- Clarifies the requirements of the standard
- Supports good assessment practice
- Should be subjected to the school's usual assessment quality assurance process
- Should be modified to make the context relevant to students in their school environment and ensure that submitted evidence is authentic

Date version published by Ministry of Education	December 2010 To support internal assessment from 2011
Authenticity of evidence	Teachers must manage authenticity for any assessment from a public source, because students may have access to the assessment schedule or student exemplar material. Using this assessment resource without modification may mean that students work is not authentic. The teacher may need to change figures, measurements or data sources or set a different context or topic to be investigated or a different text to read or perform.

Internal Assessment Resource

Achievement Standard Science 90949: Investigate life processes and environmental factors that affect them

Resource Reference: Science 1.10A

Resource Title: Fish Heads and Broken Bones

Credits: 4

Teacher guidelines

The following guidelines are supplied to enable teachers to carry out valid and consistent assessment using this internal assessment resource.

Teachers need to be very familiar with the outcome being assessed by Achievement Standard Science 90949. The Achievement Criteria and the Explanatory Notes contain information, definitions, and requirements that are crucial when interpreting the standard and assessing students against it.

Context/setting

This activity requires students to investigate two life processes:

- gas exchange in fish; and
- support and movement in mammals.

There are two tasks for each set of life processes, making four in total.

These tasks involve practical investigation, interpretation, biological drawings and the relating of biological ideas.

Conditions

Allocate 3 - 4 hours to complete the whole activity – up to 2 hours for each life process.

For each task, students carry out practical work to investigate the structural features of organs and tissues of the provided resources (fish heads and bones). (EN2)

They are then required to write about how the parts/features of tissues and organs carry out the relevant life process for each. Students then use another resource to write about each of the life processes and an environmental factor that affects them. (EN 3, 4 and 5)

Students could use their observations and findings from a fair test investigation carried out for AS 90925 ‘Carry out a practical investigation in a biological context, with direction’ to provide evidence for either task, as long as it is in the context of the life process being investigated for AS 90949.

The practical investigations can be carried out in pairs, but the written part is an individual task. The resource based activities are also to be carried out individually. It is expected that students would have covered the key ideas about gas exchange in fish

and support and movement in mammals as part of their teaching and learning programme.

Life processes may be selected from: support and movement, reproduction, sensitivity, growth, excretion, nutrition, gas exchange. At least two must be selected. (EN 6)

Environmental factors that affect life processes may be internal or external factors and may include: temperature, pH, light intensity, photoperiod, moisture levels, concentration of gases, hormone levels, and nutrient supply. (EN 7)

Biological ideas relating to a life process include the following (EN8):

- structural features of the organism such as its organ system or tissues as appropriate to the organism
- functioning of the components of any organ system or tissues
- identifying the biological processes carried out by the organ system or tissues
- environmental factors that affect the life process.

Resource requirements

Task 1

Fish heads (can be pre-dissected to show gill structure) and another resource showing the fine structure of gills e.g. a microscope slide of gills, an Internet resource.

Task 2

Any available mammal bones, sawn in half longitudinally, and another resource showing the fine structure of bones e.g. a microscope slide of a compact bone, an Internet resource.

Additional information

Conditions of Assessment related to this achievement standard can be found at www.tki.org.nz/e/community/ncea/conditions-assessment.php

This assessment is based on a learning and teaching programme that covers the following aspects of two life processes:

- structure (i.e. parts and features) and function of organs and tissues;
- effect of a range of environmental factors on the life processes; and
- implications of the environmental factors for the organism.

This Achievement Standard involves investigating life processes of plants and/or animals and investigating environmental factors that affect these processes:

1. The assessment materials can be modified to investigate any two life processes of other animals.
2. Teachers could also modify the materials to choose one task from this resource (i.e. one life process in an animal) and one from the resource 1.10B “Investigate Life Processes of Plants” (one life process in a plant) to make up the minimum of two life processes required to achieve the standard (EN6). This also raises the possibility of the partial assessment of one activity contributing evidence to the standard if both activities are assessed.

Internal Assessment Resource

Achievement Standard Science 90949: Investigate life processes and environmental factors that affect them

Resource Reference: Science 1.10A

Resource Title: Fish Heads and Broken Bones

Credits: 4

Achievement	Achievement with Merit	Achievement with Excellence
Investigate life processes and environmental factors that affect them.	Investigate, in depth, life processes and environmental factors that affect them.	Investigate, comprehensively, life processes and environmental factors that affect them.

Student Instructions

Introduction

This activity requires you to comprehensively investigate two life processes in an animal context and the environmental factors that affect them.

You will complete TWO tasks:

Task 1:

- Draw and label the gills of a fish and relate the key structures to their role gas exchange.
- Use findings to investigate the implications that a parasite will have on gas exchange in a fish.

Task 2:

- Draw and label bone structures and relate the key structures to their role in support and movement in mammals.
- Discuss how the muscles, bones and joints in a person work together to give support and movement.

You must use observations or findings and biological ideas to make significant links between the structure, function and environmental factors related to these life processes, including the implications for the animal of these factors.

Making significant links may involve justifying, relating, evaluating, comparing and contrasting, analysing.

Conditions

You will have one week of lessons to complete this task. The deadline for handing in the task is the end of Period 7 – Friday 19th October 2012.

You will be provided with the following equipment and samples:

Dissecting microscope

Fish Heads

Dissection kit and hand lenses

Photographs of gills and associated parasites.

Cross sections (Longitudinal) of long bones.

Photographs of long bone cross sections.

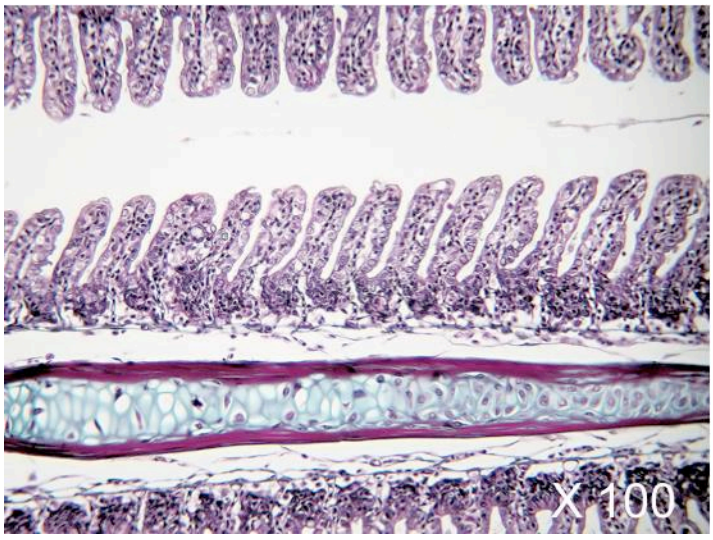
Microscope slide of compact bone cross section (transverse)

The practical investigations can be carried out in pairs but all other work, including the drawings, is individual.

At the end each task you must hand in your own completed set of drawings and notes as outlined in the tasks below.

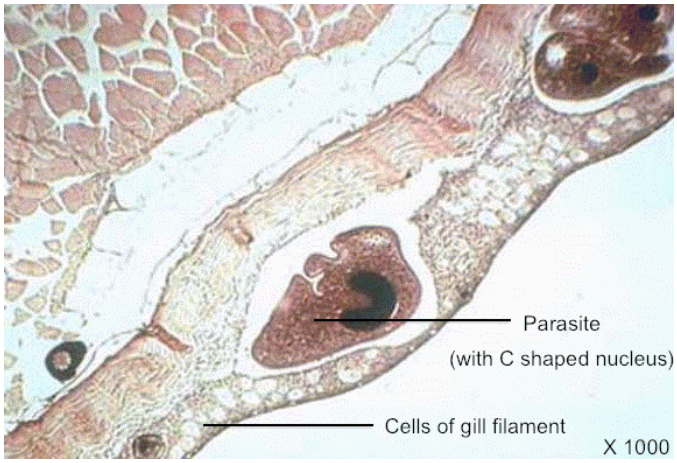
Task 1: Fish Heads

- Examine the dissected kahawai (or similar) fish head provided and take a photo OR make a biological drawing of the gills. On your photo or drawing, label the main structures of the gills that are visible and explain how they function to help the fish with the life process of gas exchange.
- The microscope image below shows gill detail that is not visible to the naked eye, but is found in the fish above. Make a biological drawing and label the main structures involved in gas exchange.



(Image source: Bresson Thomas, Wikicommons)

- Read the following information on the disease ‘white spot’ in fish.

White spot disease is the most common parasitic disease in the home fish tank. The adult parasite digs into the gills of the fish and causes damage by feeding on and destroying the cells lining the gill filaments. White spot is especially troublesome in water that warms quickly but can be treated by the slow addition of salt to the water.	
Image source: http://instruction.cvhs.okstate.edu/jcfox/htdocs/Disk1/Thumb/Img0020.gif	

Using this information, discuss how fish gills function to carry out gas exchange, including the importance of surface area and the implications that the ‘white spot’ causing parasite will have on gas exchange. You must use *biological ideas* to make significant links between the structure, function and an environmental factor in your discussion.

Task 2: Broken Bones

- Examine the bone provided and take a photo OR make a biological drawing of it. Label the main structures and explain how they function to help the animal with the life process of support and movement.
- Examine the microscope slide showing a TS section through a compact bone and make a biological drawing of it. Label the parts of the bone and explain how they function to help the animal with support and movement.
- The diagram shows the structure of the human skeleton. Environmental factors can cause stress and strain which may cause damage to the skeleton.

Discuss how the muscles, bones and joints in a person work together to give support and movement. Name an environmental factor which affects such skeletons and increases the risk of broken bones.

You must use *biological ideas* to make significant links between the structure, function and environmental factors (including the implications of broken bones) in your discussion.

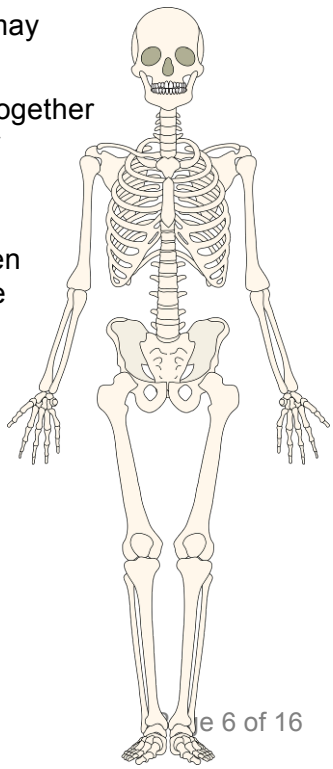
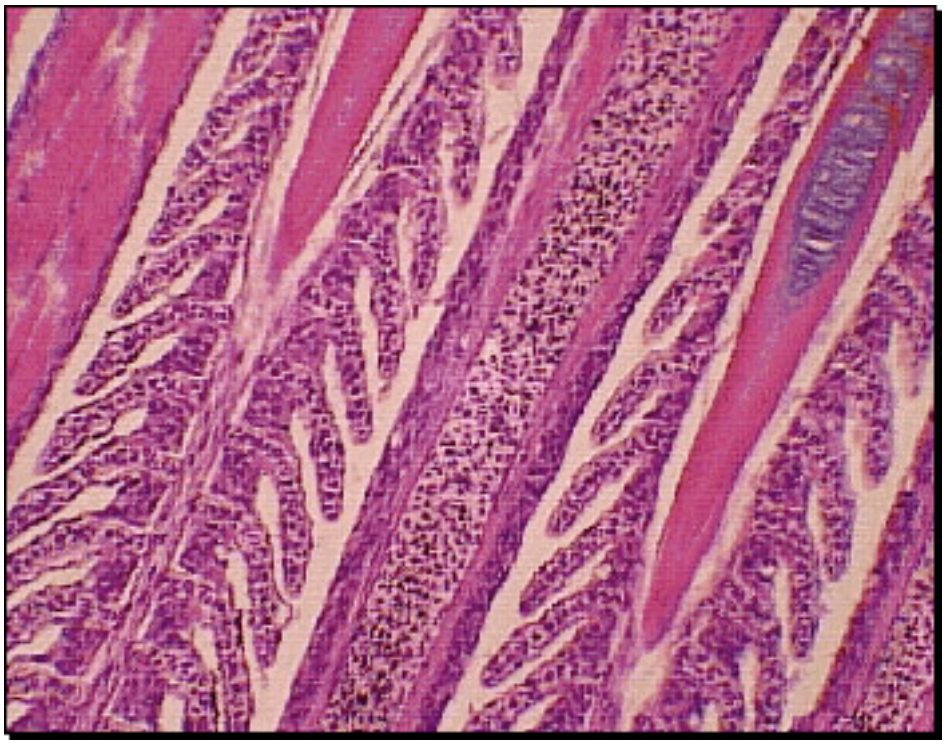
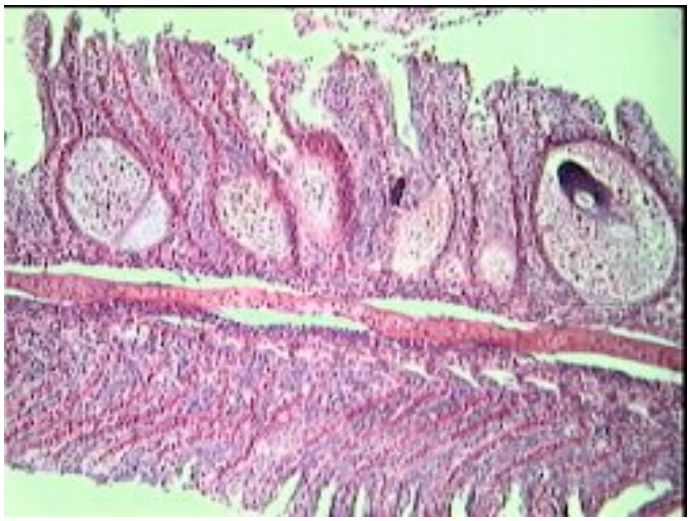


Image source: Wikicommons.

Appendix:

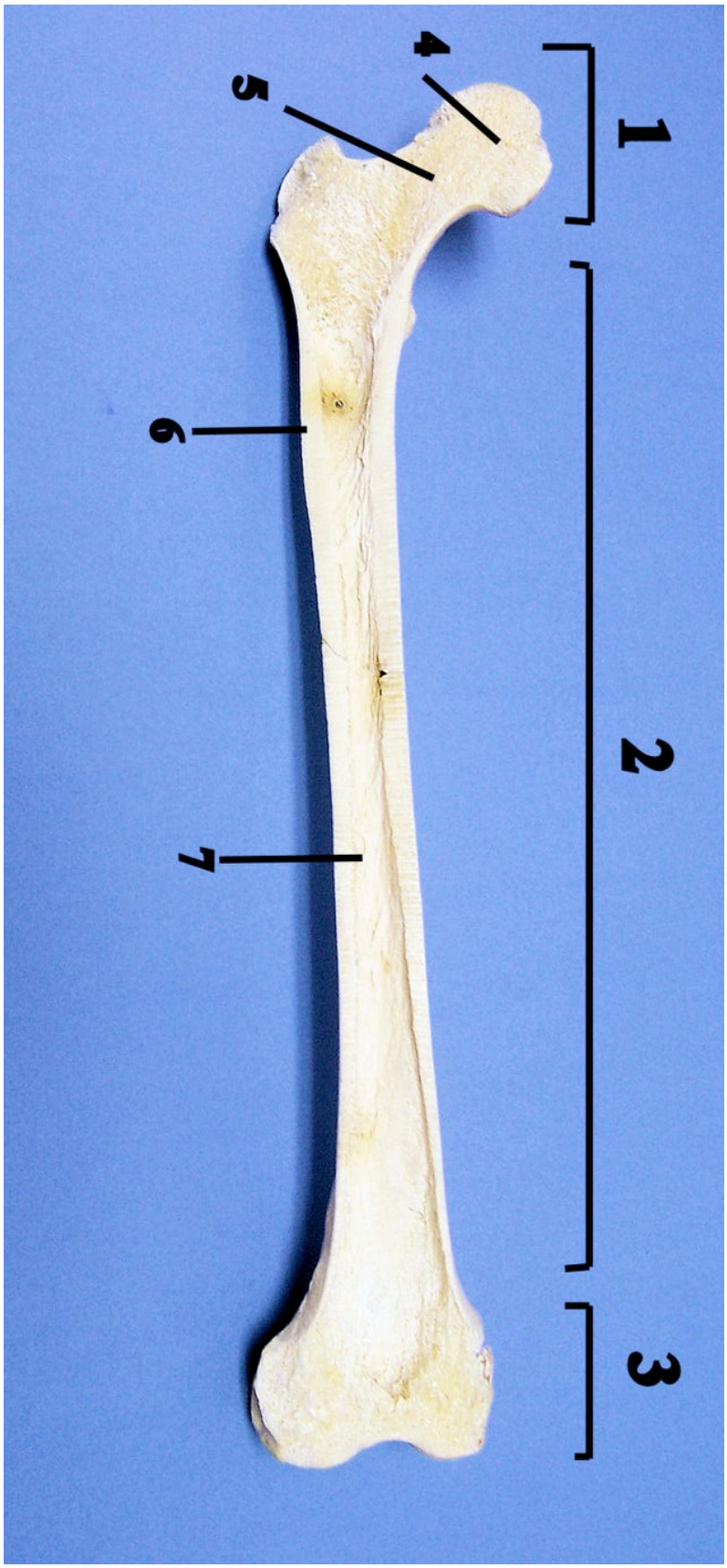


Cross section of a gill - http://www.kscience.co.uk/as/module1/gill_structure.htm



White spot Histology - http://www.fishdoc.co.uk

Longitudinal cross section of a Femur - http://www.usi.edu



Transverese section through compact bone – http://www.westernhistological.com.au