

INTERMEDIATE SCIENCE
Grade 8



Scientific Literacy Assessment
June 2010

Student Name: _____

Homerom: _____

Data Analysis

Read the following situation and answer all questions in the space provided. (10 points)



It is difficult to turn on the television these days and not see infomercials promising weight-loss “magic” with some new diet program or piece of exercise equipment. Doctors will tell you that eating a well balanced diet and exercising regularly are the best way to maintain a healthy body. A national gym conducted a study to show how attending an aerobic class affects the heart rate of its members. The table below illustrates the data collected in their study.

Amount of Exercise (minutes)	# of Heartbeats / Minute
5	50
10	55
15	61
20	72
25	88
30	100
35	115

1. State a suitable hypothesis to be tested in this experiment. (1)

2. In this experiment, identify the independent (manipulated) and the dependent (responding) variables. (1)

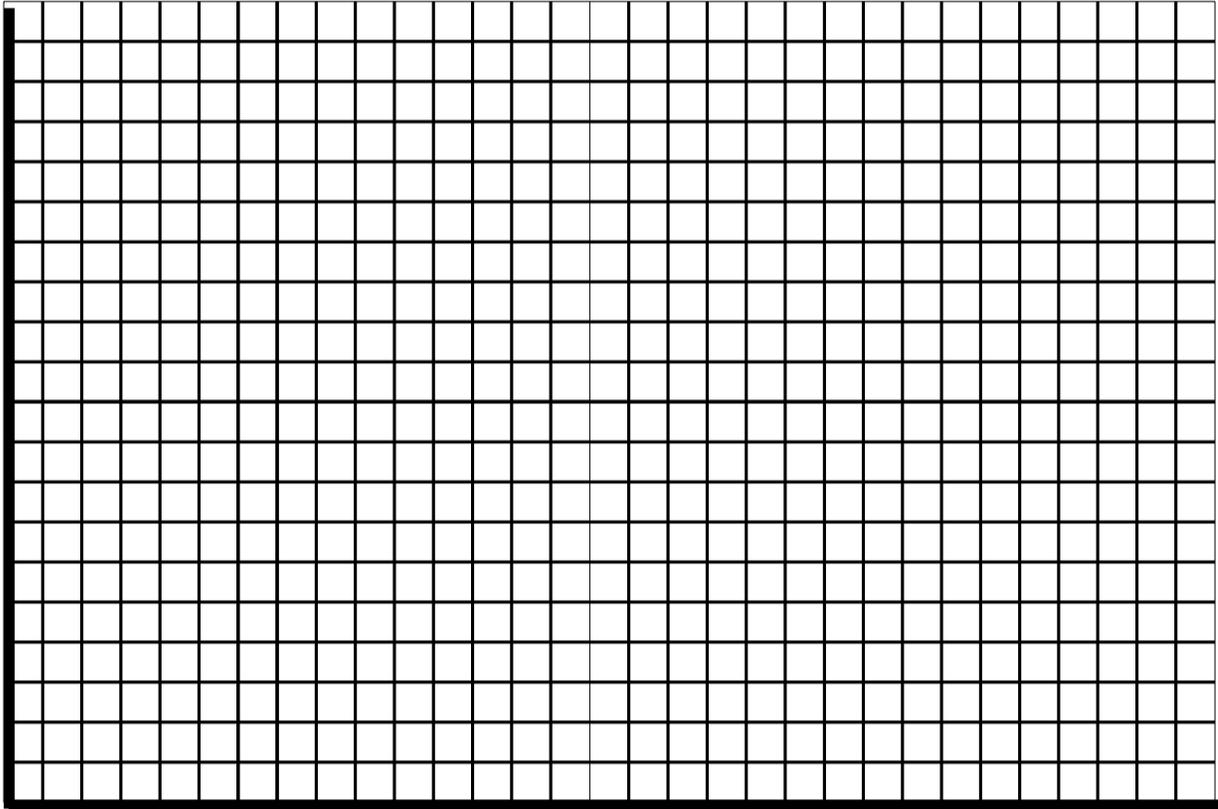
Independent (manipulated): _____

Dependent (responding): _____

3. State two (2) variables which have to be kept constant (controlled) in order for the results of the experiment to be valid. (1)

4. Plot a fully labeled line graph of the data on the grid below. (4)

Title: _____



5. Predict the heart rate after 40 minutes of exercise. (1)

6. After how many minutes would the heart rate be 110 beats/ minute? (1)

7. State a suitable conclusion for this experiment. (1)

Case Study I: A Grim Future for Some Killer Whales

Read the following information and answer the questions that follow. (10 points)

In 1989, an oil tanker called the *Exxon Valdez* struck an underwater reef in Prince William Sound, a large body of water in southern Alaska. The ship dumped over 40 million litres of crude oil into the freezing water — a disaster for animals that lived in or near the sea.



Twenty years later, the area still has not fully recovered. At the time of the spill, two groups of **orcas**, otherwise known as killer whales, were swimming in the area. One of these groups appears to be headed for extinction, and the other is recovering more slowly than scientists had predicted.

Group A wasn't large to begin with. When the spill happened, Group A had twenty-two orcas. Nine died during the spill. Since then, no baby whales have been born in the group. The older males — who can live to be 60 — have been dying off. Now, only seven whales remain.



Group A may look and live in the same areas as other orcas, but they are **genetically** different and communicate with a different set of sounds. Group A are called transient whales. They live in larger areas of the ocean than Group B orcas. Transient orcas eat mammals, such as harbour seals, sea lions, porpoises and other whales.

Group B are called resident whales. They are **endangered** whales that eat fish and squid. Group A and Group B orcas do not reproduce with each other. After the spill, thirteen whales in Group B died. Scientists predicted the population would return to its original size within 12 years. But they were wrong. The whales that died were either young or females. Scientists now think that Group B whales will not recover for another 10 years.

Remaining effects from the oil spill are not the only threats to killer whales. The whales are swimming in polluted waters, and scientists have found these pollutants in the whales' **blubber**. These poisonous substances may keep the whales from reproducing successfully. The pollution probably came from the air that blew across the Pacific from China and Southeast Asia, says Craig Matkin, a marine mammal biologist who studies the whales.

The oil spill also broke up the family structure of the whales. Groups of orcas live in communities where a female acts as the head of the family. The head female of Group B apparently died in the oil spill, and afterward many whales left to join a different group.

When Group B does eventually recover, it won't be the same. Group A may become **extinct**. Other scientists are finding that other animals affected by the oil spill — like otters, clams, herring and certain birds — have also failed to fully recover. In many cases, scientists are surprised about why so many effects of the *Exxon Valdez* disaster still continue twenty years after the spill.

(Adapted from Science News, April 2009)

Glossary

Blubber: A thick layer of fat underneath the skin.

Endangered: At risk of becoming extinct.

Extinct: No longer existing or living.

Genetics: The branch of biology that deals with the passing of biological traits from parents to their offspring through genes.

Marine: Found in the sea.

Orca: A black and white predatory whale. Also called killer whales.

1. What effect do poisonous substances found in blubber have on killer whales? (1) 1. ____
- A. Prevents them from reproducing successfully.
 - B. Prevents them from communicating.
 - C. Prevents them from moving greater distances.
 - D. Prevents them from digesting aquatic organisms.

2. How many transient whales have died since the oil spill occurred in Prince William Sound? (1) 2. ____
- A. 7
 - B. 9
 - C. 13
 - D. 15

3. Identify two differences between Group A and Group B orcas. (2)
- i. _____

- ii. _____

4. On April 20th of this year, an oil rig disaster off the southern coast of the United States has caused the waters in the Gulf of Mexico to become polluted with large amounts of crude oil. Based on the information scientists have gathered from the Exxon Valdez disaster, identify three (3) possible threats to **marine** life that may occur over the next ten years. (3)
- _____

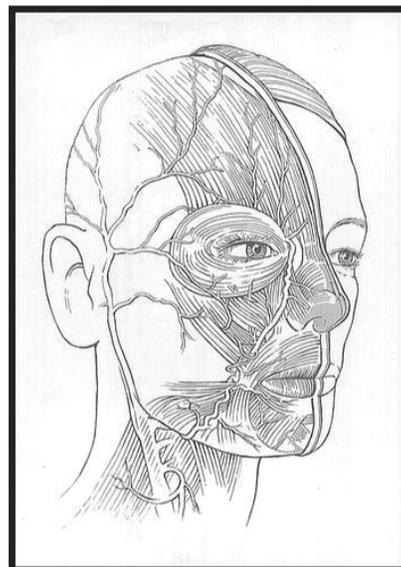
5. Who should be responsible for the clean-up after an oil spill disaster? Explain your answer. (3)

Case Study II: The Case for Autopsy

Read the following case study and answer the questions that follow. (10 points)

An autopsy can uncover startling facts and lead to important medical discoveries.

Once a grim and avoided topic, TV shows like *CSI* and *Law and Order* have brought autopsies into the mainstream. Recently, the death of Michael Jackson showed that an autopsy can often uncover startling new facts. Findings from autopsies can lead to criminal charges, **exoneration**, or important medical discoveries.



An autopsy is a medical procedure where a dead body is examined to determine the cause of death, and to look for signs of disease or injury.

Not every dead body is subjected to an autopsy. Autopsies are typically ordered if it is suspected that a person died as a result of murder or an accident. They are also performed when the cause of death is simply unknown, especially when someone dies suddenly and unexpectedly while in apparently good health. Autopsies may also be performed at the request of the family of the deceased.

Autopsies are performed by special medical doctors called pathologists. A **forensic** autopsy is a medical legal autopsy that is done as part of a police investigation. Here, doctors try to confirm whether a death was a result of “foul play” such as murder. If so, this evidence may help police catch and convict the person or persons responsible.

A clinical autopsy is usually done to determine cause of death for research or medical reasons. Here, doctors are looking to improve their understanding of disease so that they can improve future medical treatments. They may also be looking for evidence of a spreading infection that might pose a danger to the public.



During an autopsy, the pathologist starts by examining the outside of the body. This is particularly important in forensic autopsy. Visual clues like unusual bruises or skin under the fingernails can provide key evidence, such as whether the deceased put up a struggle and what kind of weapon was used.

Next, a pathologist will cut into the body to examine various organs and tissues. These can say a lot about why a person died. For example, damage to the brain or liver can provide evidence of drug abuse. Tests of blood and tissues can also be revealing. For example, a toxicology or “tox” screen looks for chemicals that have **toxic** effects on the body, such as drugs, alcohol or poison. DNA tests can be performed to help identify the presence of an infection or other kind of disease.

DID YOU KNOW?

One goal of an autopsy is to determine cause of death. There are five legally defined causes of death: 1) natural; 2) accident; 3) homicide; 4) suicide; and 5) undetermined.

(Adapted from Science News, October 2009)

Glossary

Exoneration: Being cleared of blame, being proven innocent.

Forensic: Applying scientific knowledge to legal proceedings.

Toxic: Poisonous

1. For what purpose does a forensic pathologist determine the cause of death? (1) 1. _____

- A. Clinical reasons
- B. Medical reasons
- C. Police investigation
- D. Research reasons

2. What does a toxicology screen look for? (1) 2. _____

- A. Chemicals
- B. Diseases
- C. DNA
- D. Infections

3. What information can be gathered by examining the outside of the body? (1)

4. Not every death is followed by an autopsy. List two (2) circumstances under which an autopsy required? (2)

5. Describe one (1) way a pathologist is like a detective and one (1) way their work is different. (2)

6. Not all religious groups approve of the use of autopsies to investigate causes of death. In your opinion, should religious beliefs be considered if an autopsy is important for understanding a disease? Support your opinion with at least two (2) reasons. (3)
