INTERMEDIATE SCIENCE

Grade 8

Instructions:

All students are required to complete the Data Analysis question and **ONE** of the remaining Case Studies.

In some cases, there is a **Glossary** given with the Case Study to help with some of the terms.

Scientific Literacy Assessment

June 2013

Student Name:_____

Homeroom: _____

Data Analysis - All students are required to do this section.

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

Tsunami

Adapted from http://www.windows2universe.org/earth/tsunami1.html

Tsunamis are large waves caused by earthquakes, landslides, volcanoes or meteorites. They can cause severe damage to coastline areas due to the tremendous height of water waves that crash onto the shoreline. The tsunami that struck Japan March 11th, 2010 reported onshore waves as high 15m. That's the height of a five story building!

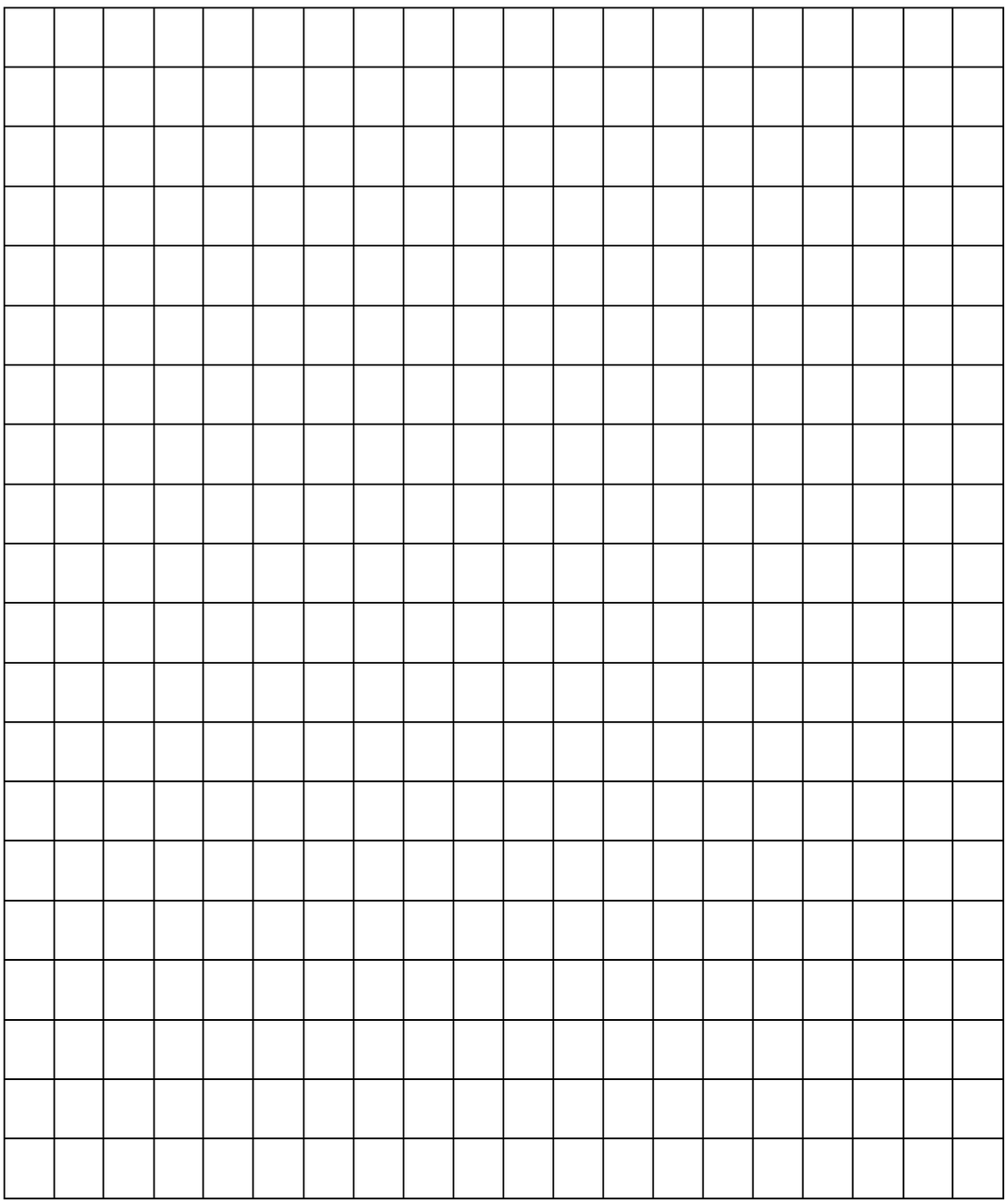
As a tsunami approaches the shore, the front end of the wave slows quickly compared to the back end which is still trying to move forward at a great speed. The result is, water at the front end of the wave gets pushed upward. Think of it like a long line of traffic speeding down a straight highway. All of a sudden, the front car hits the brakes and the cars behind keep ramming into the back of each other creating a pile up. This explains why tsunamis are so high and why they push forward with such force.

The data below illustrates the change in the wave's height as a tsunami approaches the shore.

Depth (m)	Wave height (m)
1000	0.5
900	0.6
800	0.6
700	0.7
600	0.9
500	1.1
400	1.4
300	1.9
200	2.5
100	5
0	10

1. Make a line graph of the data on the grid provided. **(4)**

Title : _____



2. What is the independent (manipulating) variable? **(1)**

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3. What is the dependent (responding) variable? **(1)**

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4. Estimate the height of the wave at a depth of 350m? **(1)**

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5. Estimate the depth where the wave is a height of 3m. **(1)**

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6. Imagine you are a fisherman on the water when you hear a tsunami warning. Would it be safer to move to deep water or to shallow water? Explain your choice. (2)

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Students are required to do ONE of the Case Studies.

Read the following information and answer the questions in the space provided.

(10 points)

Either: **Case Study I:** Crime-solving camera

Adapted from Science News for Kids

By Stephen Ornes / August 31, 2012

Criminals can't hide their crimes with paint anymore, thanks to a lighting trick and an ordinary camera.

In July 2012, scientists reported that a standard digital camera can photograph blood even when it's hidden behind many layers of paint. All it takes are some small adjustments to the camera to turn it into a crime-fighting tool.

In an investigation, blood found at the scene of a crime is powerful evidence. It may contain DNA, which can be used to identify victims and criminals. DNA is the genetic material found inside almost every living cell. Like your fingerprints, your DNA is unique to you.

Law enforcement can use an adjusted digital camera to take a photo of an area if they are suspicious about a possible cover-up. That might come in handy for past crimes where the existing evidence is inconclusive. Most importantly, investigators can use this technique before gathering more evidence in ways that damage the property, such as scraping paint off of a wall.

Light travels as waves. The wavelengths of infrared light are slightly longer than those of red visible light. Those longer wavelengths give infrared light the ability to pass through paint, something visible light can't do. To turn a standard digital camera into a crime-fighting tool, investigators need the right filters. A filter attaches to a camera's lens and limits the type of light let in. To see behind paint, a camera needs to be outfitted with filters that admit only infrared light.

Glen Porter, a forensic photographer, and his colleagues installed filters so the camera could detect infrared light. They put small drops of horse blood mixed with water on a board painted white. After allowing the blood to dry, the scientists painted over it. They tested several different colors of paint and three different types of white paint.

Beneath two layers of black paint, the blood was invisible to human eyes, but not to the camera. Porter and his colleagues reported that the blood showed through six layers of black paint when photographed with the camera viewing the infrared light. Six layers of red couldn't hide the stains from the camera. Purple, orange, blue, yellow and green paint also failed to fool the camera. But two layers of white acrylic paint did manage to conceal the drops of blood from the camera.

This new photographic technique borrows on one that art experts have been using since the 1930s. They photograph paintings in infrared light to hunt for drawings that might be hidden beneath the surface. Drawings made with charcoal show up particularly well because the carbon in charcoal is good at absorbing infrared light.

Power Words

Acrylic: A common type of fast-drying paint.

Forensics: The application of scientific methods and techniques to the investigation of crime.

Lens: The light-gathering part of a camera

Questions

1. Which unique genetic material, contained in blood samples, can be used to identify victims and criminals? (1)

    a. DNA

    b. Fingerprints

    c. Color

    d. Wavelength

2. Installing the right filters in an ordinary digital camera can turn it into a crime-fighting tool. What does the filter do? (1)

    a. It absorbs blood into the camera's lens.

    b. It allows the camera to take photos very quickly.

    c. It analyzes the DNA found at a crime scene.

    d. It limits the type of light let into the camera's lens.

3. Name two(2) reasons why is it important for investigators to take pictures of a crime scene before using other methods of gathering evidence? (2)

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    _____

4. What characteristic of infrared light makes it more useful than visible light in capturing images of a crime scene? (1)

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5. Criminals may think that painting over a crime scene hides blood evidence. What findings in Porter's study **do not** support this idea? (2)

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6. Why do you think it is important to have several methods of collecting evidence to investigate a crime? Use one of the findings from Porter's study to support your answer. (2)

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7. Where did scientists get the idea for this new technique for photographing crime scenes? (1)

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Or: **Case Study II:** Quit while it Counts

Adapted from: http://www.ctvnews.ca/health/smokers-who-quit-by-40-can-live-almost-as-long-as-non-smokers-study-1.1126619

http://www.nejm.org/doi/full/10.1056/NEJMsa1211128#t=article

While it's estimated that smoking cuts at least 10 years off a person's lifespan, new analysis from researchers at Toronto's St. Michael's Hospital finds that people who quit smoking before the age of 40 regain many potentially lost years.

"The most important message is that quitting works," says lead researcher Dr. Prabhat Jha. "Quitting smoking at an early age avoids about 90% of the risk of continuing to smoke, and the risk is big. Smokers are looking at a decade of life lost, a decade of good life lost."

Jha's team examined health records of 216,917 adults from the U.S. National Health Interview Survey between 1997- 2004. They also looked at data from the National Death Index, narrowing in on 16,000 people who had died but who had reported smoking earlier in life. They found that people who quit smoking between 35 and 44 years of age gained about nine years life back. Those who quit between ages 45-54 gained six years and 55-64 gained four years of life.

Jha stresses his team's findings shouldn't be interpreted as saying it is safe to smoke until 40 and then stop. Former smokers still have a greater risk of dying sooner than non-smokers.

Many smokers have the belief that if they've been smoking for a decade or more already, it's too late to quit. Jha says that's simply not true. He explains some of the effects of a smoker's past history linger while others don't. For example, ex-smokers still have a higher risk of developing lung cancer than those who never smoked, though of course their risk is not as high as for those who continue to smoke.

Your ability to recover from smoking related diseases varies. For example: smoking could cause a sudden narrowing of your **coronary arteries** which could lead to a heart attack. If a person stopped smoking, this problem can be erased with time.

This study is also among the first to examine the death rates of the generation of women who started smoking when they were young and kept smoking through their adult lives. The research suggests that women will also lose about 10 years of life by continuing to smoke. Basically, if women smoke like men, they will experience the same health risks as men.

Glossary

Coronary arteries – These are blood vessels that supply the heart with oxygen and nutrients.

1. How many years does life-long smoking generally cut off of a person's life span? (1)
    a. 5
    b. 10
    c. 20
    d. 25

2. Name 2 organs that are impacted by smoking according to the article. (1)
    a. liver , large intestine
    b. pancreas, stomach
    c. skin, tongue
    d. heart, lungs

3. Give two health risks associated with smoking. (2)

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4. After reading the article, a student is given the opportunity to talk to a 35 year old smoker who is hesitant to quit smoking. Why might the student say, "The sooner you quit the better"? (2)

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5. What did the study uncover about women who do smoke as much as men? (1)

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6. This study was conducted for 7 years. Give one reason why the researches needed to collect data for such a long period of time? (1)

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7. Explain two ways your school or community has attempted to reduce tobacco usage. (2)

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