

NAME:	SCIENCE TEACHER:	10C
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SCIENCE

Year 10 Examination 2007

10C – 40 marks

Make sure that you have answered all the questions in paper 10B before you start this paper

Time allowed for both examinations: 2 hours

Answer all questions in the spaces provided on the paper.

You may use a calculator.

Show all your working in calculations; marks are awarded for it.

Give units for all answers (eg kg or m) unless they are already provided.

For Teacher Use

<i>Question</i>	1	2	3	4	5	6	7	8	9	10	11	<i>Total</i>
<i>Marks gained</i>												
<i>Marks available</i>	1	2	2	8	5	3	4	3	2	7	3	40

Question One: Wilma, the Weightlifter

When Wilma bends her arm at the elbow, the bones and muscles in her arm are acting as a system.

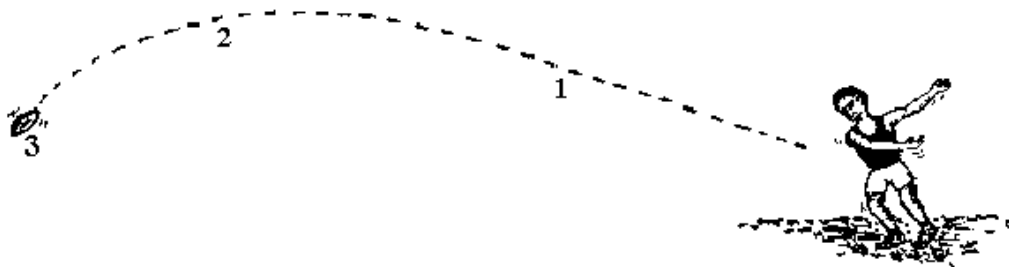
What simple machine does this system represent?

- (A) Inclined plane
- (B) Pulley
- (C) Wedge
- (D) Lever

(circle the correct letter)



Question Two: Darryl, the discus thrower



- a) At which point is the discus travelling **fastest**? Circle the correct letter below.
(A) 1 (B) 2 (C) 3 (D) None of the above, its speed is constant.
- b) What force is acting on the discus to slow it down? _____
- c) What **other** force is acting on the discus? _____

Question Three: Harry, the human cannonball

Harry works for the circus.
He is a human cannonball.
When the cannon goes off, Harry flies high in the air.

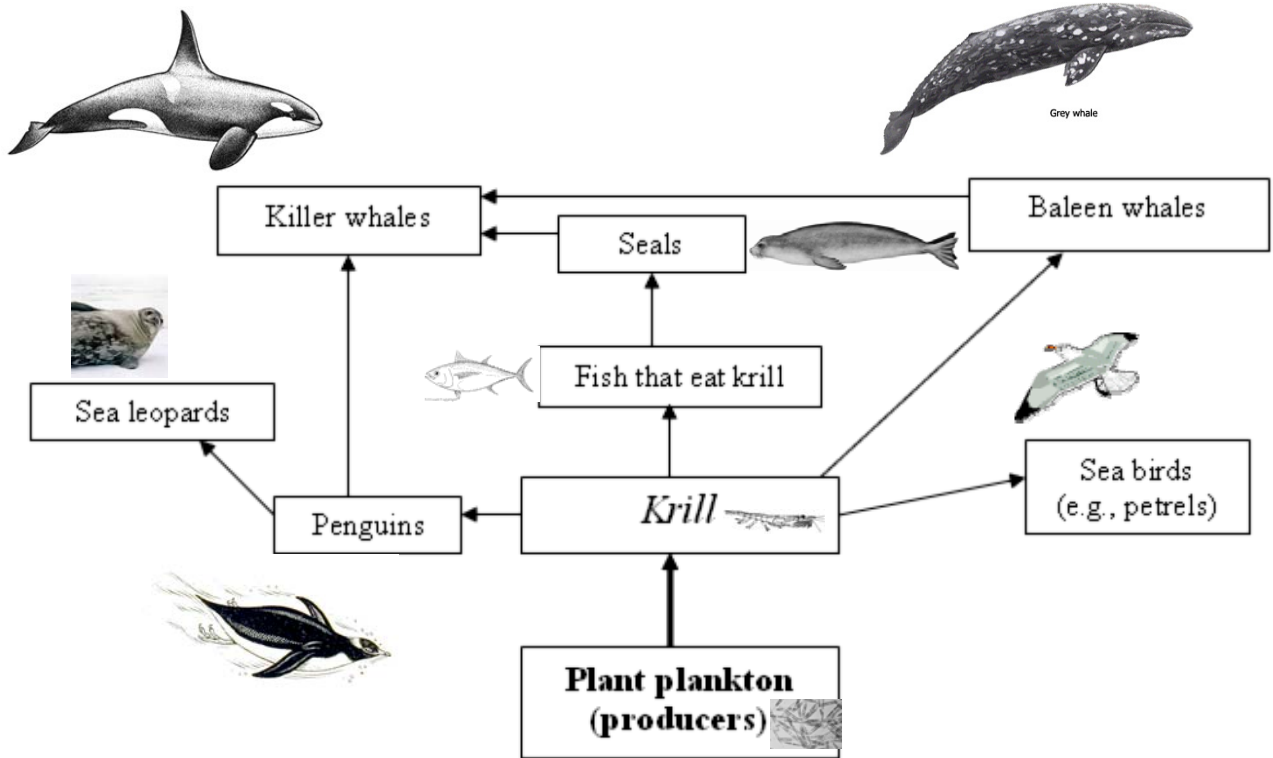


Explain the energy transformations that occur when the cannon is fired.
Include as many energy transformations as possible for the cannon and Harry.

Question Four: Feeding relationships in the Southern Ocean

There are lots of living things in the cold waters of the Southern Ocean around Antarctica. Key feeding relationships there are shown in the food web below.

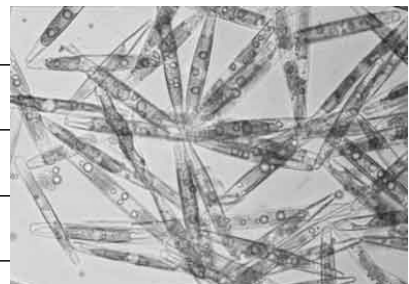
A Southern Ocean food web



Interpret the food web to answer the following questions:

a) What part do producers play in a food web?

b) Plant plankton are tiny, but there are millions of them. They shelter and breed under the edges of the floating ice sheets. Their numbers are highest during the long daylight hours of late summer. Why would this be a good time for them to breed?

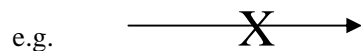


c) Numbers of plant plankton in the Southern Ocean are falling because the ice sheets are melting as global warming increases sea temperatures. Explain what would be likely to happen to krill numbers in this situation.

d) What do the *arrows* on the food web represent?

e) Krill are small shrimp-like animals that can live up to 5 years – if they can avoid their many predators. Scientists say that the numbers of krill in the Southern Ocean have dropped by as much as 80% since the 1970's.

i) **On the food web**, mark a cross on all the arrows where you think falling krill numbers will have a negative effect on other animals.



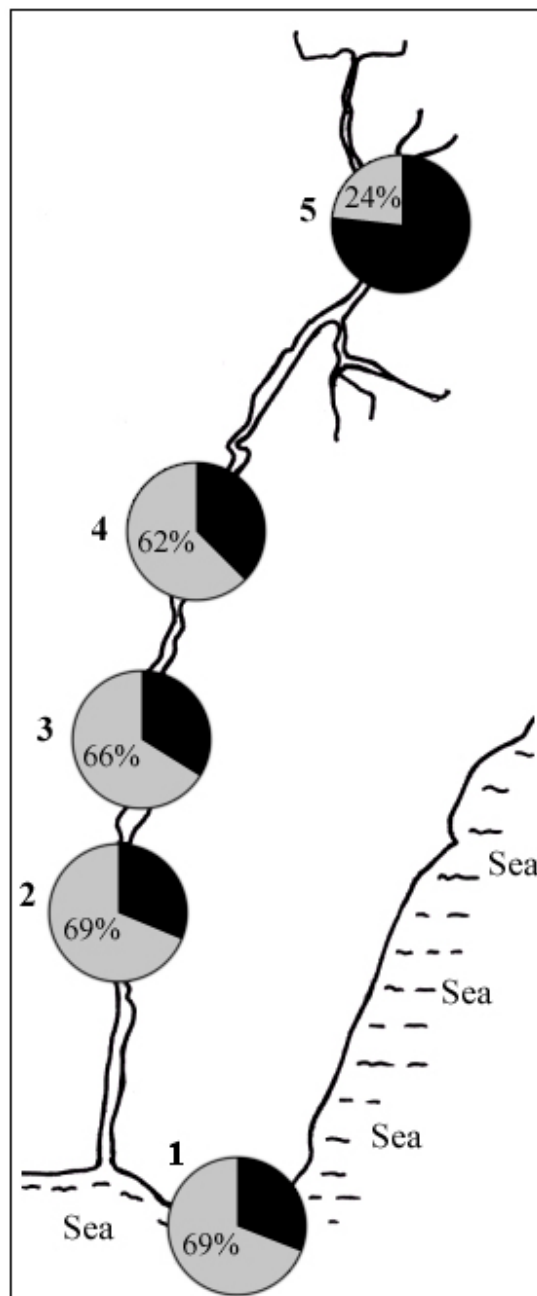
ii) Explain why you crossed out these arrows on the food web.

Question Five: Possum coat colour and the weather.

Scientists have found that the percentage of grey-coated and black-coated possums in an area can be related to the annual rainfall of the area.

The percentage of black-coated possums increases by 1% with every 20 mm rise in annual rainfall.

The diagram below shows the percentage (%) numbers of black- and grey-coated possums in five different areas.



Use the information on the previous page to help answer these questions.

a) Which area (1, 2, 3, 4, or 5) has the greatest rainfall?

b) If the annual rainfall in area 1 is 1400 mm, calculate what would it be in Area 4?

_____ mm

(space for working out)

c) Differences in a population, like the coat colour differences in possums, are known as

- (A) variation.
- (B) individual choice.
- (C) genetic manipulation.
- (D) cloning.

Answer is: _____ (Choose the correct answer)

d) In another area, scientists want to know the percentage of grey-coated and black-coated possums. Outline a method the scientists could use to find out the percentage of each coat colour for this area.

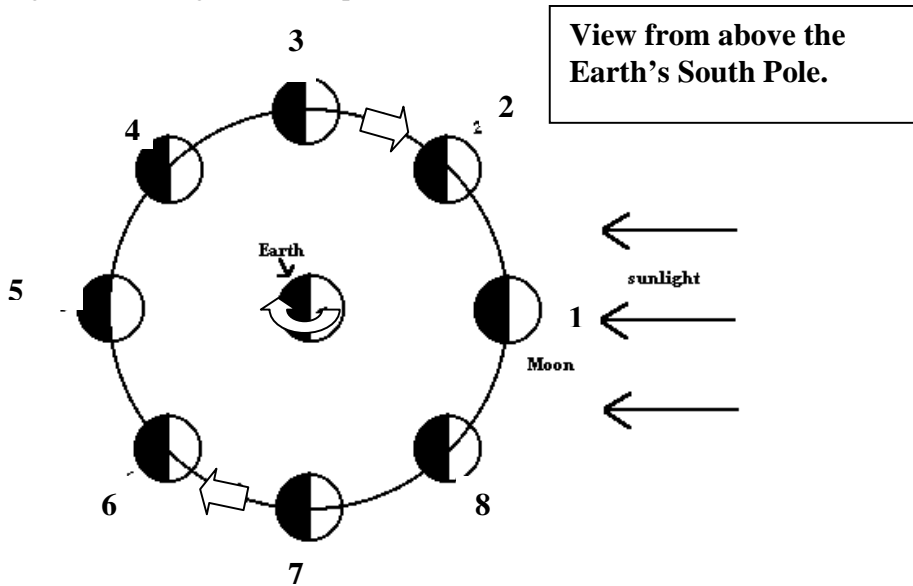
e) Which of the adaptations below would be expected to be shown by black-coated possums?

- (A) Black-coated possums need more water and their fur is more water-proof.
- (B) Black-coated possums need less water and their fur is more water-proof.
- (C) Black-coated possums need less water and their fur is less water-proof.
- (D) Black-coated possums need more water and their fur is less water-proof.

Answer is: _____ (Choose the correct letter)




Question Six: Phases of the Moon

The diagram shows eight different positions of the Moon as it orbits the Earth.



Use the diagram above to answer the following questions:

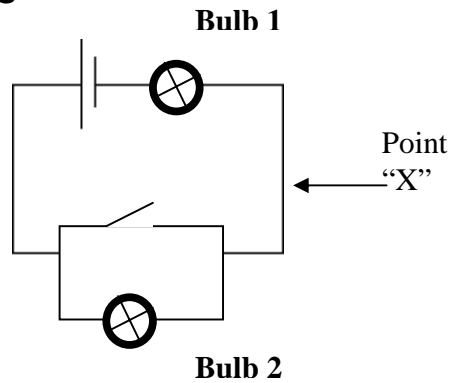
- (a) Which position on the Earth would you have to be in to see a full moon?
(choose from numbers 1 to 8) **Answer: Position _____**
- (b) Which position on Earth would you have to be in to see the following phases:
Write the correct number (choose from 1 to 8) in the box underneath the phase.

The moon's appearance:			
Position on diagram			

- (c) Explain, using the diagram above, why when we are standing on the Earth, we see different phases of the moon.

Question Seven: Electrical Circuits

In the following circuit, bulbs 1 and 2 are identical.



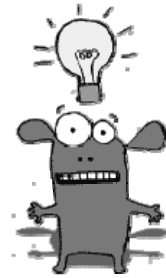
Answer the following questions about the circuit:

- (a) Describe the arrangement of the bulbs in the circuit

The switch in the circuit is open.

- (b) What will you observe about the brightness of each bulb when the switch is open? Choose the correct letter or line from the table.

	Bulb 1	Bulb 2
A	bright	not going
B	not going	bright
C	bright	bright
D	bright	dim



Answer:

The switch in the circuit is now closed.

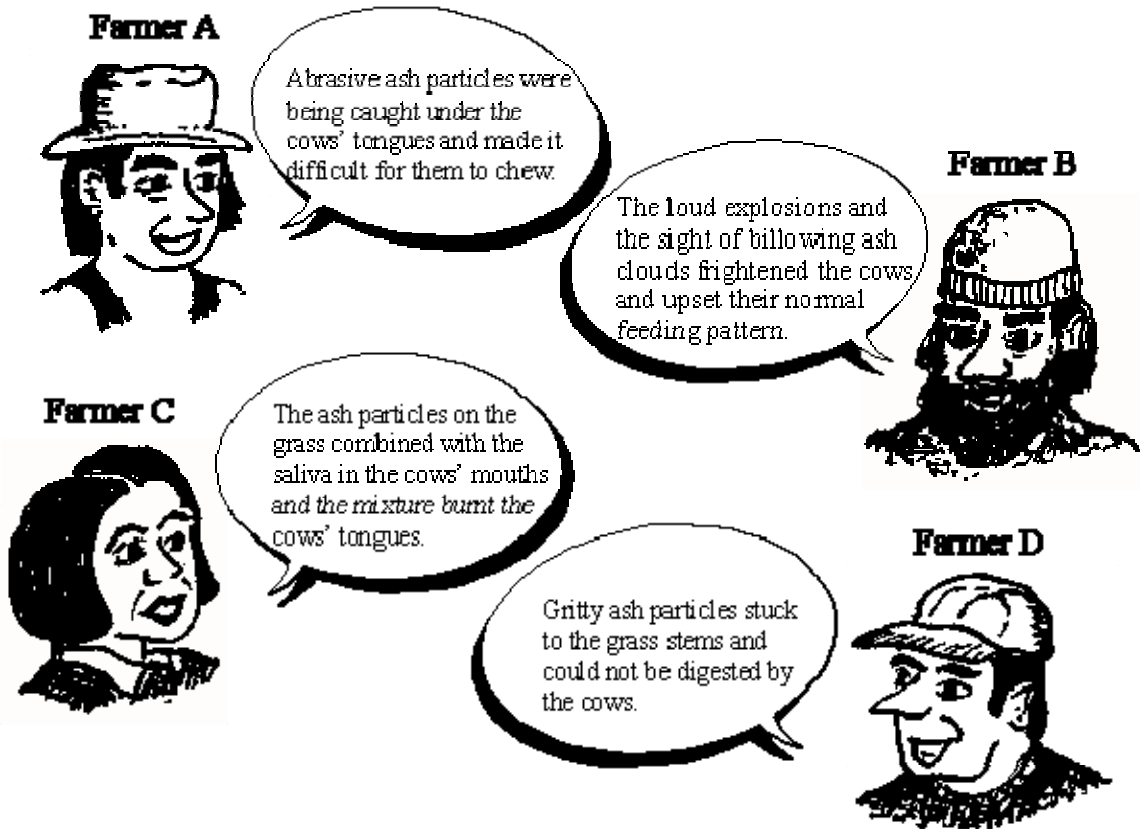
- (c) What will happen to the brightness of bulbs 1 and 2 when the switch is closed?

- (d) What will happen to the brightness of bulb 1 if another identical bulb is added to the circuit at point "X"? The switch is still closed.

Question Eight: Mt Ruapehu

Ash deposits from the 1996 eruption of Mt Ruapehu covered many of the farms around the volcano. Farmers noticed that their cows stopped eating and had red, swollen areas around their mouths and tongues.

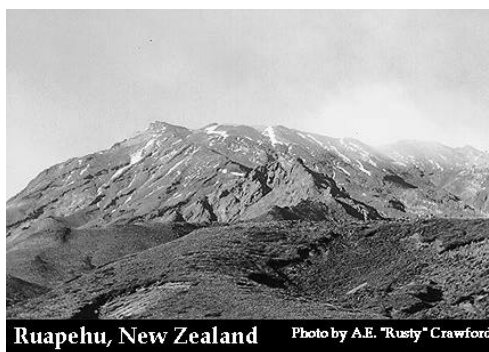
The farmers decided that the ash on their pastures was the major cause of this, but each suggested a different reason.



a) Which farmer has stated the **most** probable cause? _____

b) Explain why the ash caused this to happen.

- c) Lahars have been common throughout Ruapehu's volcanic history.



- (i) What is a lahar?

- (ii) Explain the problems and dangers associated with a lahar.

Question Nine: Acids, Bases and the pH Scale.

This table shows the pH of four solutions.

Solution	pH
W	3
X	5
Y	7
Z	12

- a) Circle whether each of the following statements are **true** or **false**.

i) Solution Z is more basic than Solution W. **True / False**

ii) Solution X is more acidic than Solution W. **True / False**

iii) Solution X is neutral. **True / False**

- b) All acids contain what type of ions in solution? _____

Question Ten: Making Salts

Acids and Bases can be used to make salts.
There can be more than one way to make a particular salt.

The table below shows:

- the acid and the chemical required to make a salt,
- the name of the salt formed, and
- the other products formed.



Complete the table. The first line has been done for you.

	Acid	+ Chemical	→	Salt	+ Other Product(s)
	<i>hydrochloric</i>	<i>copper oxide</i>		<i>copper chloride</i>	<i>water</i>
a)	sulfuric acid	sodium hydroxide		i) _____ _____	water
b)	i) _____ _____	zinc carbonate		zinc chloride	water + carbon dioxide
c)	nitric acid	(i) _____ _____		copper nitrate	water + carbon dioxide
d)	hydrochloric acid	zinc		i) _____ _____	ii) _____ _____
e)	i) _____ _____	ii) _____ _____		sodium sulfate	water

Question Eleven: Insecticides and Flies



Read the following information and answer the question which follows.

A farmer was working with dairy cattle at an agricultural experiment station. The population of flies in the barn where the cattle lived was so large that the animals' health was affected. So the farmer sprayed the barn and the cattle with a solution of insecticide A. The insecticide killed nearly all the flies. Some time later, however, the number of flies was again large. The farmer again sprayed with the insecticide. The result was similar to that of the first spraying. Most, but not all, of the flies were killed. Again, within a short time the population of flies increased, and they were again sprayed with the insecticide. This sequence of events was repeated five times: then it became apparent that insecticide A was becoming less and less effective in killing the flies.

The farmer noted that one large batch of the insecticide solution had been made and used in all the sprayings. Therefore he suggested the possibility that the insecticide solution decomposed with age.

NOTE: "Decomposed" means to chemically break apart. The chemical starts to lose its ability to kill insects.

Source: *Teaching About Evolution and the Nature of Science*, National Academy Press, Washington, DC, 1998, p. 75.

The farmer's suggestion is that the insecticide decomposed with age.

Briefly explain how this suggestion could be tested.

