Sydney Technical High School

Student Number

Student Name_____ Class_____

Science
2008 Trial School Certificate

General Instructions

- Reading time: 10 minutes
- Working time: 2 hours
- Write using blue or black pen
- You may use a pencil to draw or complete diagrams
- Attempt ALL questions
- Calculators may be used
- Detach Stimulus Booklet provided at the end of this paper and use it where required throughout the test.

Total marks – 100

Section 1
Pages 2 - 26

60 marks
Allow about 1 hour and 10 minutes for this section.

This section has TWO parts
Part A – Questions 1-50 50 marks
Part B – Questions 51-60 10 marks

Section 2
Pages 27-36

40 marks
Allow about 50 minutes for this section

This section has SIX questions

Question 61 7 marks
Question 62 6 marks
Question 63 7 marks
Question 64 4 marks
Question 65 11 marks
Question 66 5 marks

Section 1

60 marks
Allow about 1 hour and 10 minutes for this section.

Part A

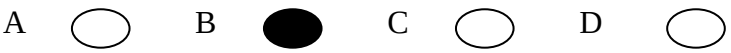
Questions 1 – 50 50 marks

Use the Section 1 Part A Answer Sheet for Questions 1 – 50.

Instructions for answering multiple-choice questions

Select the alternative A, B, C or D that best answers the question. Fill in the response oval completely.

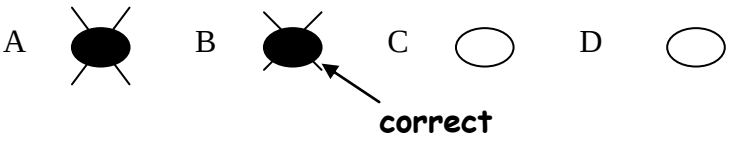
Sample: 2 + 4 = (A) 2 (B) 6 (C) 8 (D) 9



If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.



If you change your mind and have crossed out what you consider to be the correct answer, then indicate the correct answer by writing the word **correct** and drawing an arrow as follows.



Questions 1 – 5 refer to the diagram of the Periodic Table, showing the positions of the first 20 elements, below.

(The letters used are not the chemical symbols of the elements represented)

1 ***A***											2
3	4 ***B***				5	6 ***C***	7	8	9 ***D***	10 ***E***	
11 ***F***	12				13	14	15	16	17 ***G***	18	
19 ***H***	20										

1. Of the following choices, which letter represents the element with the lightest atom?

(A) ***B***

(B) ***E***

(C) ***G***

(D) ***H***

2. Which one of the following letters represents an element which is a metal?

(A) ***C***

(B) ***D***

(C) ***E***

(D) ***F***

3. Which one of the following letters represents the element with similar properties to element D?

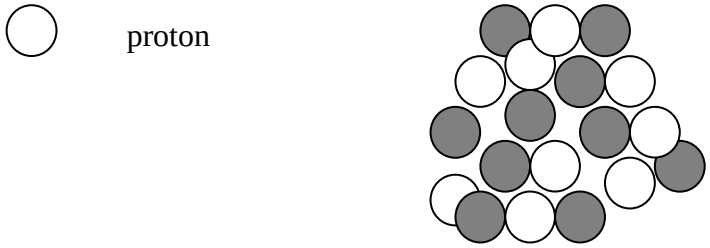
(A) ***C***

(B) ***E***

(C) ***F***

(D) ***G***

4. The drawing below represents the arrangement of subatomic particles in the nucleus of an atom.



Which letter represents this element?

(A) ***A***

(B) ***D***

(C) ***G***

(D) ***H***

5. How many electrons would a neutral atom of this element have?

(A) 0

(B) 9

(C) 10

(D) 19

6. The current Periodic Table is an example of a scientific model. It is based on accumulated evidence and replaces several earlier versions which were found to be less useful.

It arranges elements in a way which shows the relationships between their subatomic structure and their chemical properties. A measure of the usefulness of the Periodic Table as a model is the fact that scientists were able to use it to predict the properties of several elements before they were even discovered.

Which one of the following can be thought of as a scientific model?

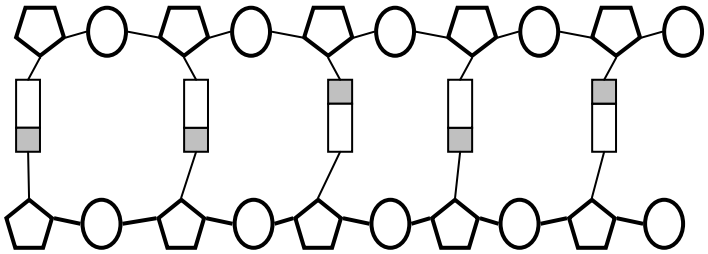
(A) The electron microscope.

(B) The human reproductive system.

(C) The mechanism of genetic inheritance.

(D) The system of symbols used to represent components in an electric circuit.

Questions 7 and 8 refer to the diagram of a section of DNA shown below.



7. Which pair of scientists is chiefly credited with discovering the molecular structure of DNA?

(A) Darwin and Wallace

(B) Newton and Kepler

(C) Thomson and Rutherford

(D) Watson and Crick

8. DNA is a conservative molecule. It only changes very rarely. These changes are called mutations.

Which one of the following statements would be true if mutations didn't occur?

(A) There would be no more disease.

(B) There would be no more reproduction.

(C) There would be no more evolution.

(D) There would be no more birth defects.

9. Genetic engineering involves the manipulation and altering of the DNA molecule. It is a technology that is seen as having huge potential for the future.

Which combination of Science subjects would give the best background for a career in this area?

(A) Biology and Chemistry.

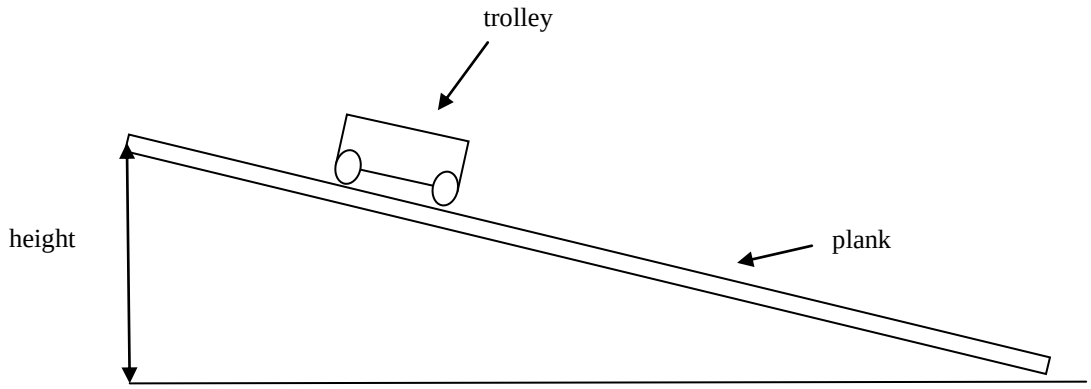
(B) Physics and Chemistry.

(C) Biology and Geology.

(D) Geology and Chemistry.

Questions 10 and 11 refer to the information below.

Jacqui wishes to investigate the relationship between the mass of a trolley and the time it takes to roll down an inclined plank.



Her hypothesis was as follows:

The greater the mass of a trolley, the less time it will take to roll down an inclined plank.

The table below summarises the 6 tests which she carried out.

Test no.	Height of end of plank (mm)	Mass of trolley (Kg)	Length of plank (m)
1	100	1	5
2	200	1	10
3	200	2	5
4	300	2	10
5	300	3	5
6	300	3	10

10. Jacqui didn't need to perform all of these tests.

Which combination of tests should she perform to test her hypothesis?

(A) 1 + 2

(B) 1 + 3 + 5

(C) 2 + 4

(D) 4 + 6

11. What piece of equipment should Jacqui use to measure the dependent variable in this experiment?

(A) stopwatch

(B) metre rule

(C) 15 cm ruler

(D) spring balance

12. The Big Bang Theory proposes that the universe began about 12 – 15 billion years ago from a single point which expanded dramatically.

Which one of the following is regarded as the best evidence for this?

(A) The Earth is still expanding.

(B) Other stars of the same size as our sun have progressed to the red giant stage.

(C) We have observed other 'Big Bangs' in supernova explosions.

(D) The red shift effect suggests that other galaxies are moving away from us.

13. Examine the word equation below.

sulfuric acid + sodium hydroxide → sodium sulfate + water.

The reaction shown is an example of:

(A) Decomposition

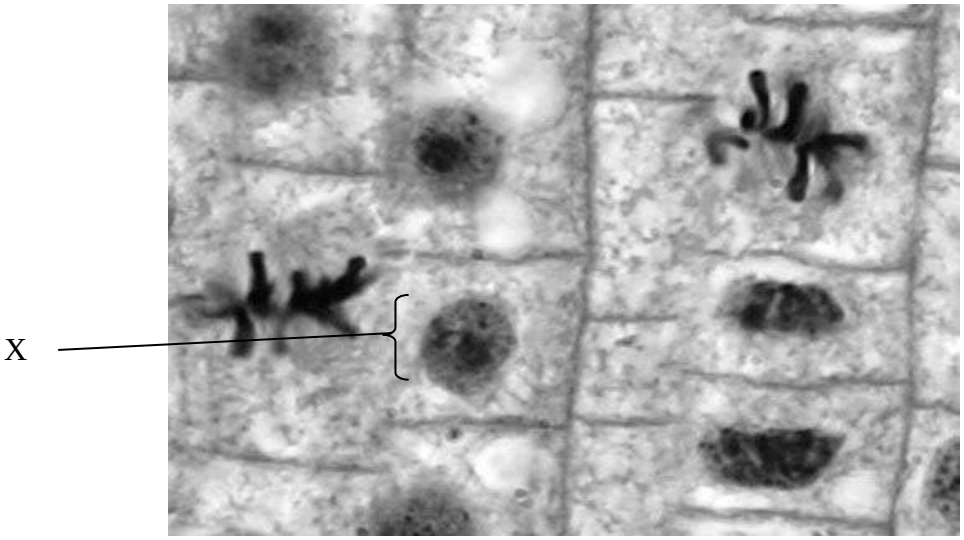
(B) Neutralisation

(C) Acid + metal

(D) Corrosion

Questions 14 and 15 refer to the photomicrograph below.

The photomicrograph below shows onion root cells undergoing mitosis, the division of the nuclear material which occurs during cell division.



The photomicrograph shows an area 0.30 mm x 0.20 mm.

14. Estimate the diameter of the nucleus labelled X.

(A) 4 mm.

(B) 2 mm.

(C) 0.04 mm.

(D) 0.02 mm

15. Which one of the following is true about the type of cell division shown above?

(A) It produces cells with identical DNA to the parent cell.

(B) It produces cells with changed (mutated) DNA.

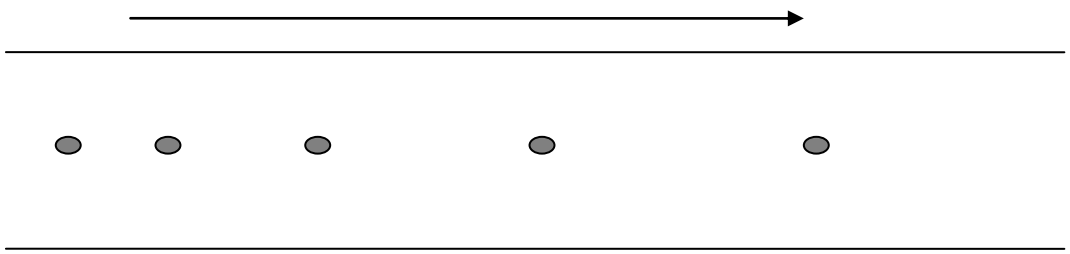
(C) It produces cells for reproduction with just half the DNA of the parent cell.

(D) It produces cells without DNA.

Questions 16 and 17 refer to the picture below.

A car travels along a road in the direction shown by the arrow.

As it travels it releases a drop of oil every second. The diagram below shows the pattern of oil drops on the road after it has passed.



Scale. 1 cm = 1 m.

16. The motion of the car can best be described as:

(A) stationary
(B) travelling at constant speed
(C) accelerating
(D) decelerating

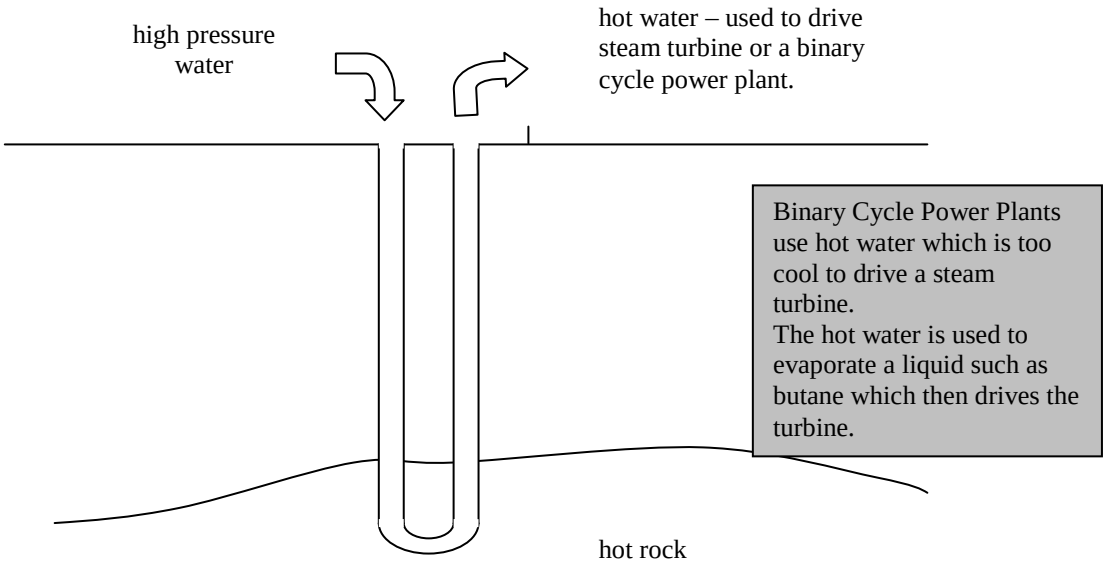
17. The average speed of the car between the first and last oil drop is:

(A) 10 m/s
(B) 5 m/s
(C) 2.5 m/s
(D) 2 m/s

Questions 18 – 20 refer to the drawing and information below.

In South Australia, a company is constructing a Hot Dry Rock Geothermal power station. It seeks to exploit deposits of very hot rocks a few kilometres beneath the Earth's surface.

High pressure water is pumped down to the hot rock where it heats up and is returned to the surface as hot water. If hot enough, this water is used to drive a steam turbine, if not, it is used in a binary cycle power plant. (see the text box below)



18. Which one of the following would environmentalists see as the main advantage of this method of power generation?

(A) It is much cheaper than any of the other methods.

(B) It releases no carbon dioxide.

(C) It has no environmental impact.

(D) By cooling the hot rock it will counteract global warming.

19. Which one of the following conditions must be met for this to be regarded as a sustainable energy resource?

(A) The technology involved must be cheap and reliable.

(B) The power station site must be revegetated and returned to its natural state at the end of its useful life.

(C) The power station must be 'carbon neutral' in terms of its greenhouse contributions.

(D) The rate at which heat energy is taken from the rock must not be greater than the rate at which it is replenished.

20. Which property of butane does the Binary Cycle Power Plant rely on?

(A) It is found in hot rocks.

(B) It has a lower boiling point than water.

(C) It expands more on heating than water.

(D) It can absorb more heat energy than water.

21. A medical researcher wishes to research the effects of smoking on human health.

She has assembled a group of 100 middle aged males who are all heavy smokers.

She will monitor the health of this group over the next twenty years.

Which one of the following groups below should she also monitor for her research to be valid?

(A) 100 middle aged female heavy smokers

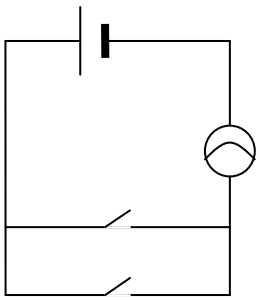
(B) 50 male and 50 female middle aged light smokers.

(C) 100 young male heavy smokers.

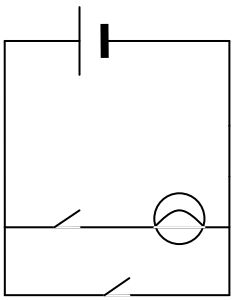
(D) 100 middle aged male non-smokers.

22. Which one of the electric circuits below would allow the light to be switched on by either switch?

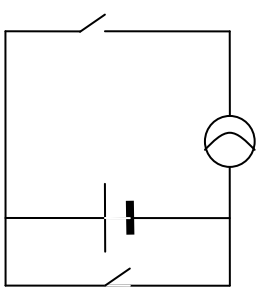
(A)



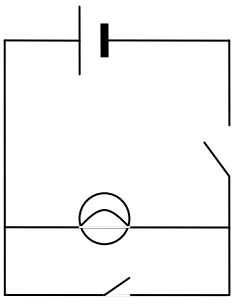
(B)



(C)



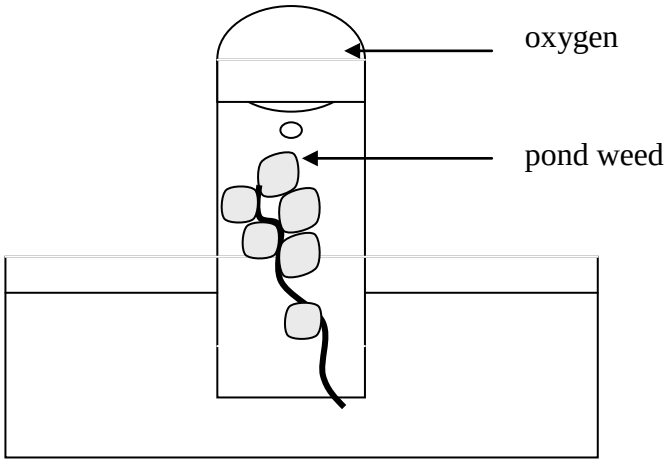
(D)



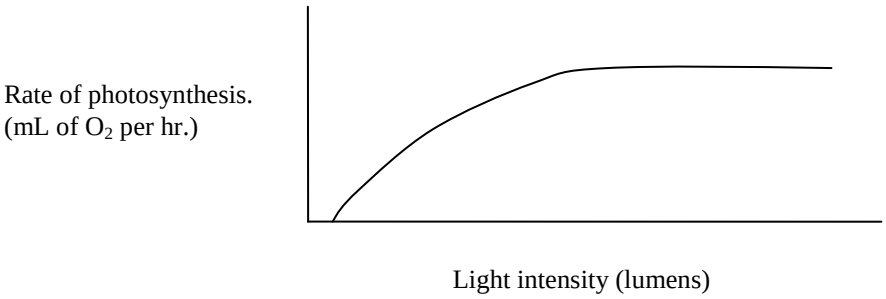
Questions 23 and 24 refer to the drawing below.

Garry set up the apparatus below to investigate the effect of different light intensities on the rate of photosynthesis.

The rate of photosynthesis was measured by recording the volume of oxygen generated per hour.



The graph below shows the results of his experiment.



23. Which one of the following is the best conclusion that Garry can draw from these results?

(A) Light intensity has no effect on the rate of photosynthesis.

(B) As light intensity increases, the rate of photosynthesis increases proportionately.

(C) Within a certain range, light intensity directly affects the rate of photosynthesis.

(D) Light intensity has an unpredictable effect on the rate of photosynthesis.

24. In the environment of the pond, light intensity can be classified as:

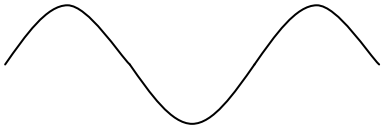
(A) a biotic factor

(B) a reactant

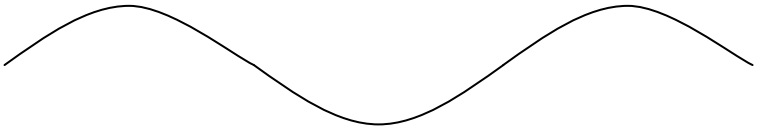
(C) a product

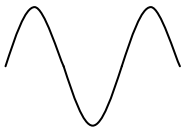
(D) an abiotic factor

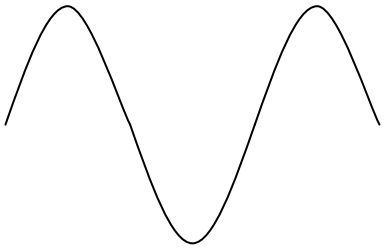
25. The drawing below represents an ocean wave.



Which one of the following represents a wave with half the wave length of the wave above?

(A) 

(B) 

(C) 

(D) 

Questions 26 – 28 refer to the information below.

The Codling moth (*Cydea pomonella*) is an introduced species from Europe. Its caterpillars are a serious pest of commercially produced apples. It also attacks pears, cherries and other fruits, but with different survival rates.

The table below summarises some findings about codling moth caterpillar survival in apples.

Large Apples			**Small Apples**		
No. of eggs laid	Average no. of caterpillars surviving		No. of eggs laid	Average no. of caterpillars surviving	
	Red apples	Green apples		Red apples	Green apples
1	0.95	0.94	1	0.94	0.94
2	1.84	1.85	2	1.68	1.70
3	2.58	2.53	3	1.98	2.00
4	3.10	3.11	4	2.11	2.10

26. Which variable **does not** have a significant effect on caterpillar survival?

(A) fruit type

(B) apple size

(C) apple colour

(D) initial number of eggs laid

27. Which situation will give an individual caterpillar the best chance of survival?

(A) To be 1 of 4 eggs laid on a large green apple

(B) To be laid on a large apple, regardless of the number of eggs.

(C) To be the only egg laid, regardless of apple colour or size.

(D) To be 1 of 4 eggs laid on any apple, regardless of size or colour.

28. Apples damaged by caterpillars fall to the floor of the orchard and are broken down by fungi and bacteria. This is important in an ecosystem, as it:

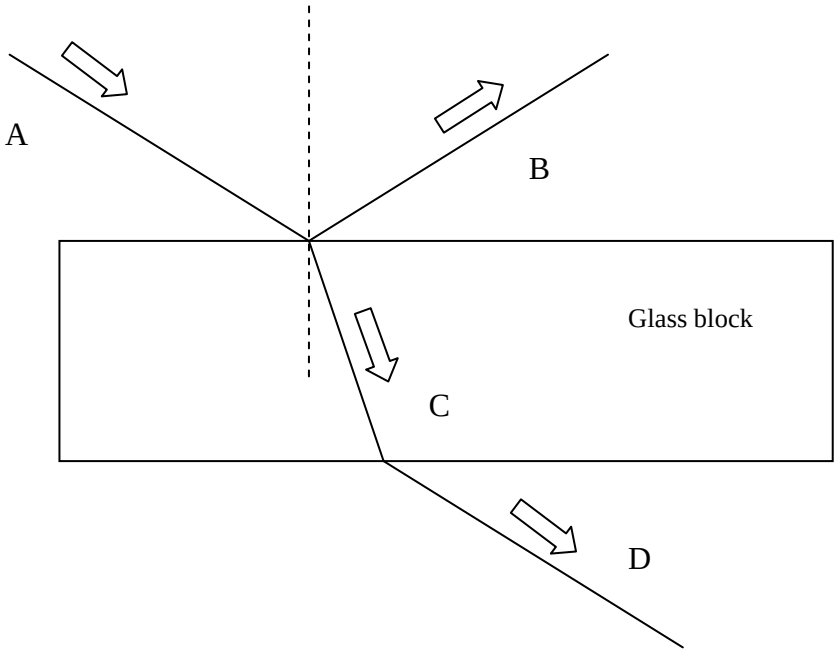
(A) stops the moths from spreading.

(B) gets rid of the dead fruit.

(C) distracts predators from the healthy apples.

(D) recycles the nutrients in the apples.

29. The drawing below shows the path followed by a ray of light as it encounters a glass block.



Which one of the rays of light above is the product of reflection?

(A) A

(B) B

(C) C

(D) D

30. When looking into water, underwater objects always appear to be closer than they really are. This is a consequence of:

(A) refraction

(B) scattering

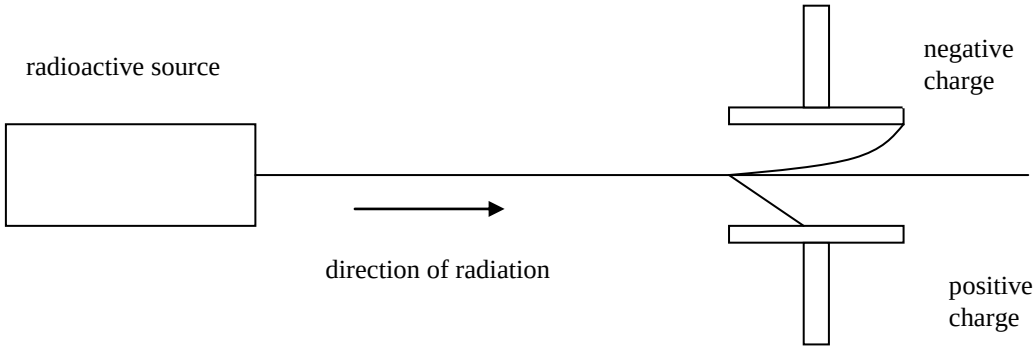
(C) reflection

(D) absorption

31. Radioactive sources emit nuclear radiation. The three types of nuclear radiation are as follows:

- α particles – consisting of 2 protons and 2 neutrons.
- β particles – consisting of a single electron.
- γ rays – a high energy electromagnetic radiation.

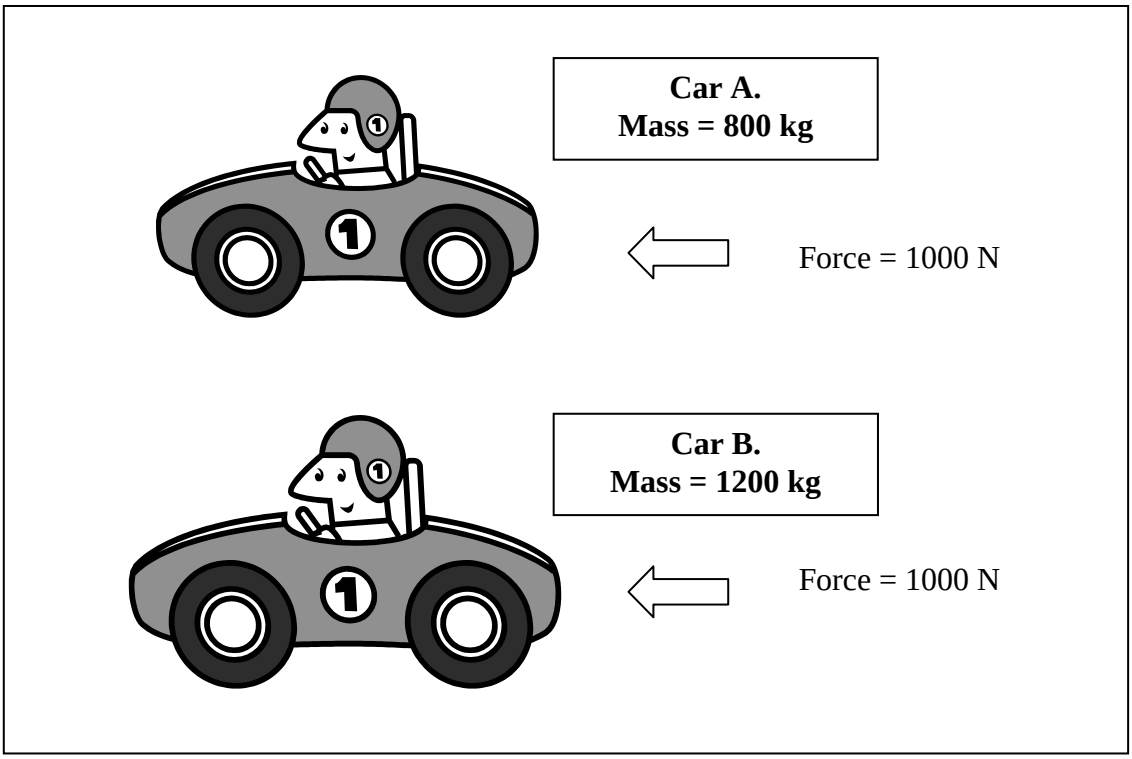
The diagram below shows how the different types of radiation behave when they pass through an electrostatic field.



Which one of the following choices correctly identifies the properties of the three types of radiation?

	Attracted to a negative charge	Attracted to a positive charge	Attracted to neither charge
(A)	β	γ	α
(B)	β	α	γ
(C)	α	β	γ
(D)	α	γ	β

Questions 32 and 33 refer to the drawing below



The two cars are identical in every respect except their mass.

32. When pushed with equal force car A will accelerate at a greater rate than car B. Which one of Newton's Laws does this best illustrate?

(A) The Law of Universal gravitation

(B) The First Law of Motion

(C) The Second Law of Motion

(D) The Third Law of Motion

33. If both cars were travelling at the same constant speed and an identical braking force was applied to each, which one of the following statements would be true?

(A) Both cars would stop at the same time.

(B) Car A would stop first.

(C) Car B would stop first.

(D) Both cars would slow down, but neither would stop unless the force propelling them was removed.

34. An unknown disease has broken out amongst the workers in an office block. The health authorities are keen to establish its cause. The key points are summarised below.

- All the people who work on the second floor of the block have developed skin rashes, headaches and nausea.
- Some people who visit the floor have developed milder symptoms.
- No-one who has not spent time on the floor has the disease.
- The families of the workers are unaffected
- Workers recover after a few days away, but the symptoms recur when they return to work.
- The water supply to the floor has been tested and is free of microbial or chemical contamination.
- Sufferers have been tested and show no sign of an infectious organism.

Based on this information, which one of the following is the most likely cause of the disease?

(A) A chemical toxin in the air conditioning of the second floor.

(B) A highly infectious virus carried by one of the workers on the second floor.

(C) A fungal disease from the plants kept on the second floor.

(D) Food poisoning from the nearby canteen.

35. Which one of the following facts best supports the theory of Continental Drift. - The idea that the Earth's plates have moved over time?

(A) There is evidence that huge tidal waves have occurred in the past.

(B) The Pacific Ocean is ringed by areas of high volcanic activity

(C) Some of the oldest rocks in the world are found in Australia.

(D) Fossil seed ferns are found in Australia, Antarctica and South America.

36. Movement of the Earth's crustal plates is due to gravitational forces and convection currents in the:

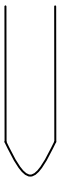
(A) hydrosphere

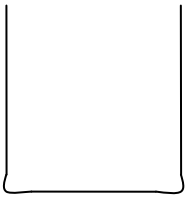
(B) lithosphere

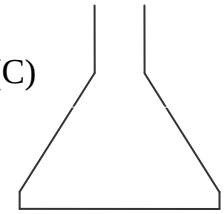
(C) outer core

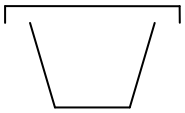
(D) mantle.

37. Choose, from the equipment shown below, the piece of apparatus which you would use to heat 100 mL of liquid while carefully stirring it.

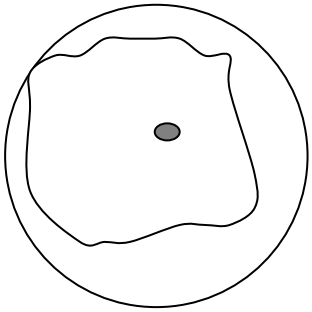
(A)  test tube

(B)  beaker

(C)  flask

(D)  crucible

38. The drawing below shows a cell as it appears under the microscope at X100 magnification. (The circle represents the total field of view)



Which one of the following describes how it would appear at X400?

(A) Only a small part of the cell would be visible.

(B) The whole cell would be visible, but it would completely fill the field of view.

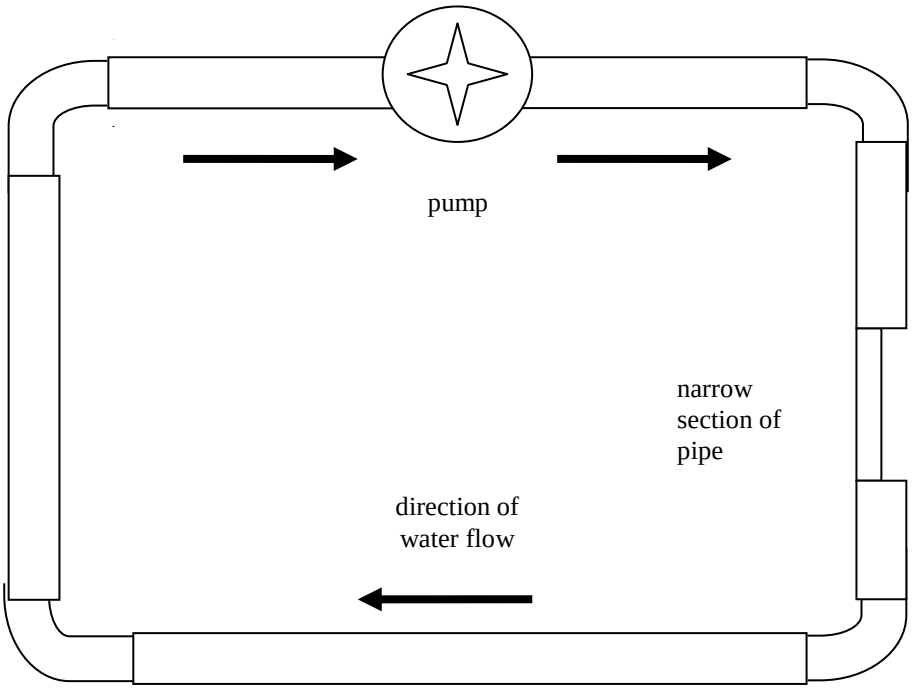
(C) Its appearance would be essentially the same.

(D) It would appear much smaller.

Questions 39 and 40 refer to the drawing below.

A group of students were asked to assemble some water pipes and a pump in a way which is similar to the way in which an electric circuit is constructed.

The drawing below shows what they made.



39. Which feature of their model represents the battery?

(A) the water

(B) the pump

(C) the thick pipe

(D) the thin pipe

40. Which feature of their model represents the electric current?

(A) the amount of water flowing

(B) the pressure of the water

(C) the diameter of the pipes

(D) the power of the pump

Questions 41 – 50 refer to the Stimulus Booklet. Detach the Stimulus Booklet and use it to help you answer these questions.

Questions 41 and 42 refer to Source A in the Stimulus Booklet.

41. Which is the major source of atmospheric pollution by oxides of nitrogen in the United States?

(A) power generation

(B) transport

(C) manufacturing processes

(D) other combustion

42. The formula NO_x is used to represent the oxides of nitrogen in this source material.

Which one of the following statements best explains why this representation is used?

(A) There is no fixed ratio in which nitrogen and oxygen atoms combine to form an oxide of nitrogen.

(B) Nitrogen and oxygen can combine in several different ratios to give several different oxides with different formulae.

(C) Oxides of nitrogen are mixtures and therefore can exist in a range of ratios.

(D) The exact formula of the oxide of nitrogen is unknown.

Question 43 refers to Source B in the Stimulus Booklet.

43. The fossil record of the horse shows a considerable change over the last 60 million years.

The fossil record of the crocodile, however, over an even longer period of time, shows comparatively little change.

Which one of the following offers the best explanation for the small amount of change in the crocodile?

(A) The environment in which the crocodile lives has changed very little over that time.

(B) Reptiles are less subject to natural selection than mammals, therefore evolution is much slower.

(C) 'The Survival of the Fittest'. Crocodiles are 'fitter' than horses in an evolutionary sense and have therefore survived better.

(D) Crocodiles live for a long time. Rates of evolution are much slower in long-lived species.

Question 44 refers to Source C in the Stimulus Booklet.

44. What is the difference in CO_2 emissions between the Honda Civic Hybrid and the Honda Civic VTi auto? (in g/km)

(A) 1.5

(B) 2.6

(C) 60

(D) 9,200

Questions 45 – 50 refer to Source D in the Stimulus Booklet.

45. Which label identifies the site of fertilisation?

(A) A

(B) B

(C) C

(D) D

46. Which label identifies the site of implantation and development of the embryo?

(A) A

(B) B

(C) C

(D) D

47. Which human reproductive structure performs the equivalent function to the anther of the flower?

(A) penis

(B) testis

(C) vagina

(D) ovary

48. Which human reproductive structure performs the equivalent function to the stigma of the flower?

(A) penis

(B) testis

(C) vagina

(D) ovary

49. By around the age of 50 most women reach menopause. This is where they cease ovulating and their menstrual periods stop.

Women who have recently reached menopause often have very high FSH levels.

Which one of the following is the best explanation for this?

(A) There are no follicles left to use the FSH and so it builds up in the body.

(B) The oestrogen which usually 'switches off' FSH production is no longer being produced by 'ripening' eggs in the ovaries.

(C) The pituitary gland typically becomes overactive in older people.

(D) Other glands in the body also start producing FSH.

50. Questions of reproduction, contraception and medical assistance with fertility are always quite controversial.

Who should make the decisions about what should and what should not be legal?

(A) Religious people with a good understanding of morality.

(B) The families of people who would benefit from the technology.

(C) Well-informed representatives of the whole of society.

(D) Scientists with a good understanding of the technology.

Section 1 (continued)

Part B

Questions 51 – 60 (10 marks)

Use the Section 1 Part B Answer Sheet for Questions 51 – 60.

Instructions on answering Questions 51 – 60

- Write firmly and clearly.
- Use BLOCK LETTERS for words.

Like this:

A	**L**	**P**	**H**	**A**	**B**	**E**	**T**

NOT like this:

a	**l**	**p**	**h**	**a**	**b**	**e**	**t**

- Numbers must be used for numerical answers.
- Decimal points and negative signs must be clearly shown in separate boxes.
- Do NOT let any part of the letter or number touch the sides of the answer boxes.
- Examples:

-3 x 1.5 =

-	**4**	**.**	**5**			

How many days are in a week?

7	

What is the fifth month?

M	**A**	**Y**				

- If you make a mistake, put a line through the incorrect answer, and write the correct answer above the boxes.

M A Y

~~**J**~~	~~**U**~~	~~**N**~~	~~**E**~~			

Questions 51 - 54 refer to the Stimulus Booklet.

Questions 51 and 52 refer to Source A

51. What do we call a solution with a pH less than 7?

52. Acid rain dissolves marble statues. Marble consists mainly of calcium carbonate. Name the gas that would be generated in this reaction.

Question 53 refers to Source B.

53. What is the name of the layer of the tooth which protects the rest of the tooth from wear?

Question 54 refers to Source C.

54. What would be the Greenhouse Rating of a car which emitted 390 g CO_2/ km?

Question 55 and 56 refer to Source D.

55. Which hormone stimulates a follicle to make an egg 'ripen'?

56. Reproduction is mainly co-ordinated by the hormonal system. What is the name of the other co-ordination system in the body?

57. What is the name of the 'sphere' which includes the rocks of the Earth's crust?

58. What do we call the cloud of gas and dust from which new stars condense?

59. What is the name of a section of DNA which determines a particular characteristic?

60. Name the piece of laboratory equipment which you would use to measure a force.

2008 School Certificate **Trial**

Science

Student Number

Section 2 Student Name_____ Class___

40 marks

Allow about 50 minutes for this section

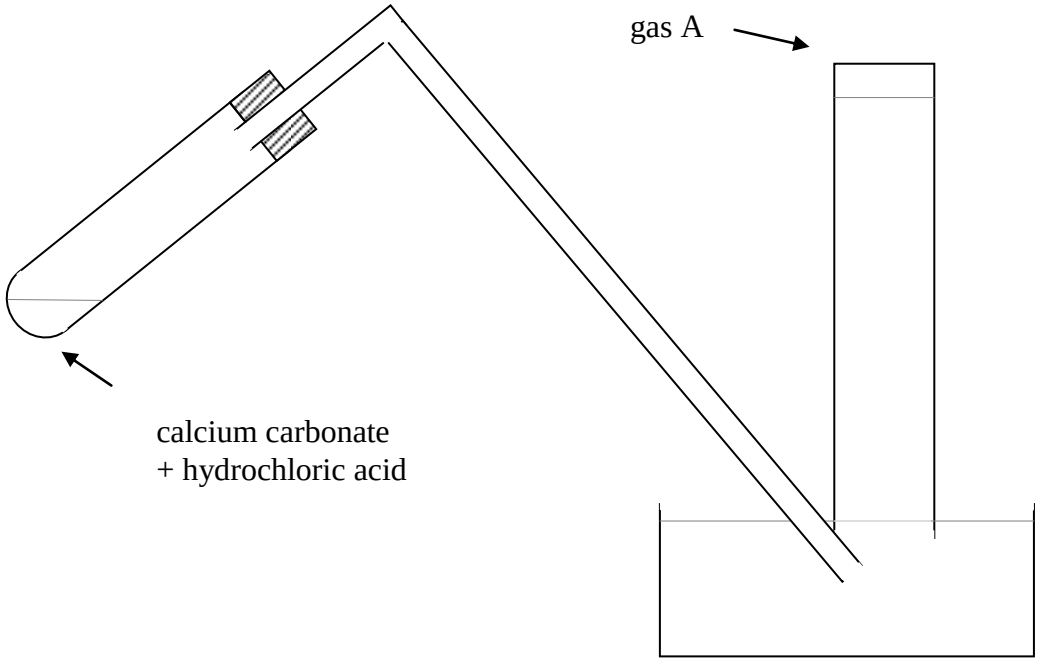
Questions 61-66 40 marks

Answer the questions in the spaces provided.

Marks

Question 61 (7 marks)

Sarah used the apparatus below to investigate the effect of acid concentration on the rate of reaction between hydrochloric acid and calcium carbonate.



The table below summarises her results.

Concentration of hydrochloric acid (arbitrary units)	Time taken to produce 20 mL of gas A (seconds)
0.25	156
0.5	64
1.0	25
1.5	15
2.0	10
2.5	8

(a) Name TWO variables which she would need to keep the same in this experiment. **2**

……...

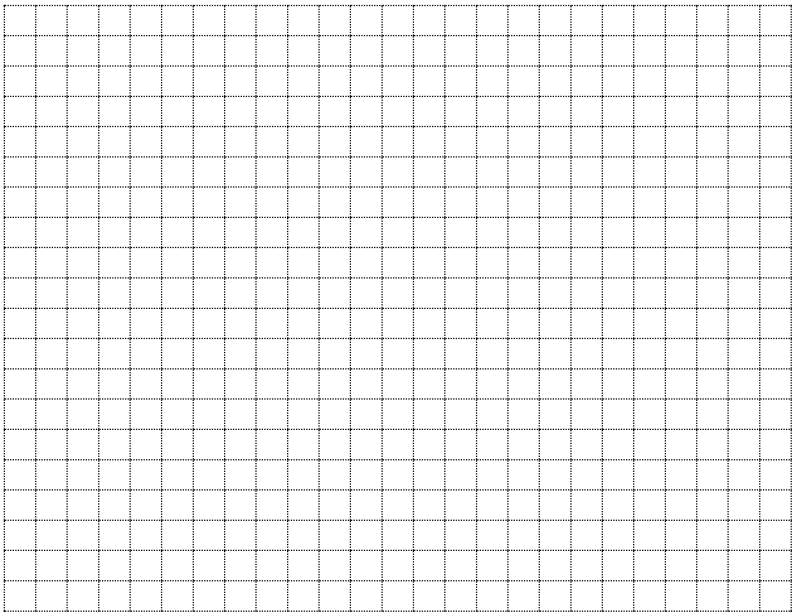
……...

Question 61 continues on page 29.

Marks

Question 61 (continued)

(b) Draw a graph of these results on the grid below. **3**



2

(c) Justify ONE safety measure that Sarah would need to take during the experiment.

……...

……...

……...

……...

Marks

Question 62 (6 marks)

Refer to Source A in the Stimulus Booklet to help you answer this question.

(a) Acid rain is a much greater problem in North America and Europe than it is in Australia. **1**

Suggest a reason for this.

……...

……...

(b) Write word equations to summarise the two reactions which give rise to sulfuric acid. **3**

……...

……...

……..

(c) Acid rain generally falls some distance downwind from the sources of the gases which cause it. For example, the gases causing acid rain in Sweden come mainly from Germany and those causing acid rain in Quebec come mainly from the northern United States. **2**

Write ONE ethical justification for continuing the practices which produce these gases, and ONE ethical justification for discontinuing them, in the boxes below.

An ethical justification FOR
An ethical justification AGAINST

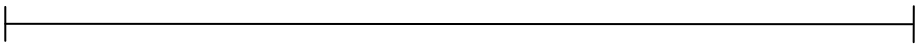
Marks

Question 63 (7 marks)

Refer to Source B in your Stimulus Booklet to help you answer this question.

(a) Construct a timeline to show the relative ages of the five species of horse shown in the Stimulus Booklet. **2**

Use the line below.



(b) One of the trends evident from the fossil record of the horse is the steady increase in height, from Hyracotherium at 0.4 m, to the modern day Equus at 1.6 m. **2**

Describe one other trend evident from the horse fossil record.

……...

……...

……...

……...

(c) Scientists have suggested that the changes which occurred during horse evolution happened because of a change in the environment in which the horse lived. **3**

Explain, in terms of Darwin's Theory of Natural Selection, how an increase in size could have come about.

……...

……...

……...

……...

……...

……...

Marks

Question 64 (4 marks)

The statement below appeared in an article about advances in technology during the Twentieth Century. **4**

> ***"No Twentieth Century technological advances have changed our lives more than those which have harnessed the waves of the electromagnetic spectrum for communication"***

Discuss this statement, with reference to at least TWO technological advances.

……...

……...

……...

……...

……...

……...

……...

……...

……...

……...

……...

……...

Marks

Question 65 (11 marks)

Refer to Source C in your Stimulus Booklet to help you answer this question.

(a) Explain how hybrid cars achieve their higher fuel efficiency. **3**

……...

……...

……...

……...

……...

……...

(b) You have decided to purchase a hybrid vehicle. Your friend disagrees with your choice and says that they are too expensive. **2**

Justify the choice to buy a hybrid vehicle, both from an *environmenta*l point of view and from an *economic* point of view.

An *environmental* justification
An *economic* justification

Question 65 continues on page 34.

Marks

Question 65 (continued)

(c) Some people claim that hybrid cars have lower rates of acceleration than their non-hybrid equivalents. **6**

Describe an experiment you could perform to test this hypothesis.

……...

……...

……...

……...

……...

……...

……...

……...

……...

……...

……...

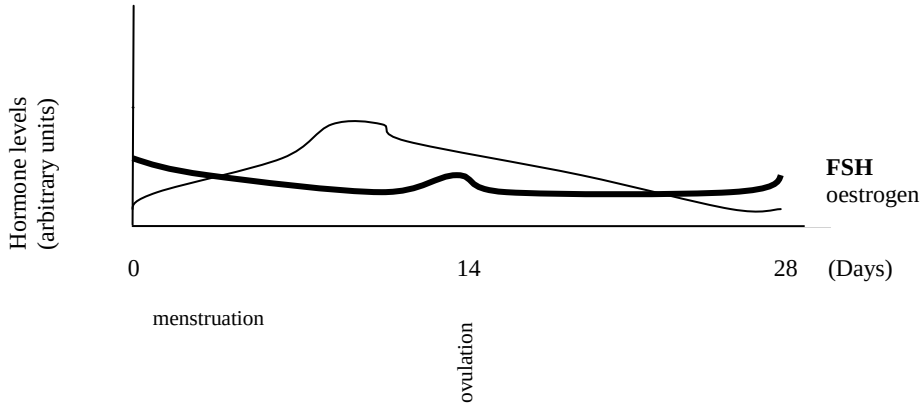
……...

Marks

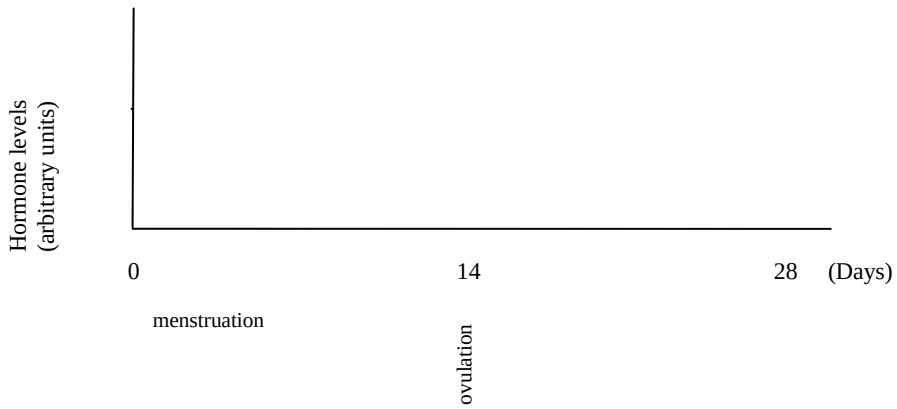
Question 66 (5 marks)

Refer to Source D in your Stimulus Booklet to help you answer this question.

(a) The graph below shows how the levels of FSH and oestrogen vary over the 28 days of the menstrual cycle. **2**



On the axes below, add lines to show how the levels of LH and progesterone vary during the cycle. (Make sure you clearly label which is which)



Question 66 continues on page 36.

Marks

Question 66 (continued)

(b) The contraceptive pill is a widely used method of preventing pregnancy. It functions by preventing ovulation. As no egg is released it isn't possible to become pregnant. **3**

The morning-after pill functions mainly by making the lining of the uterus inhospitable to a fertilised egg, preventing it from implanting and thereby preventing pregnancy.

There is a wide range of opinion on the ethics of both methods. Some people oppose both methods, many others have no objections to either.

There is generally more opposition to the morning-after pill than to the conventional contraceptive pill.

Discuss why, from an ethical point of view, this might be.

……...

……...

……...

……...

……...

……...

End of Exam

Sydney Technical High School

2008 Science Trial SC examination. Marking Guidelines and model Answers.

(It should be remembered that model answers are just that – they don't represent the minimum acceptable answer. Student responses should be marked from the marking criteria.)

Section I. Part A. Multiple Choice

1	**A**	11	**A**	21	**D**	31	**C**	41	**B**
2	**D**	12	**D**	22	**A**	32	**C**	42	**B**
3	**D**	13	**B**	23	**C**	33	**B**	43	**A**
4	**B**	14	**C**	24	**D**	34	**A**	44	**C**
5	**B**	15	**A**	25	**B**	35	**D**	45	**A**
6	**C**	16	**C**	26	**B**	36	**D**	46	**D**
7	**D**	17	**C**	27	**C**	37	**B**	47	**B**
8	**C**	18	**B**	28	**D**	38	**A**	48	**C**
9	**A**	19	**D**	29	**B**	39	**B**	49	**B**
10	**D**	20	**B**	30	**A**	40	**A**	50	**C**

Section I. Part B.

51	**A**	**C**	**I**	**D**											
52	**C**	**A**	**R**	**B**	**O**	**N**		**D**	**I**	**O**	**X**	**I**	**D**	**E**	
53	**E**	**N**	**A**	**M**	**E**	**L**									
54	**1**	**.**	**5**												
55	**F**	**S**	**H**												
56	**N**	**E**	**R**	**V**	**O**	**U**	**S**								
57	**L**	**I**	**T**	**H**	**O**	**S**	**P**	**H**	**E**	**R**	**E**				
58	**N**	**E**	**B**	**U**	**L**	**A**									
59	**G**	**E**	**N**	**E**											
60	**S**	**P**	**R**	**I**	**N**	**G**		**B**	**A**	**L**	**A**	**N**	**C**	**E**	

(alternative answers possible at teacher's discretion)

Section 2.

Question 61.

(a)

Marking criteria	Marks
• 2 correct variables named.	**2**
• 1 correct variable named.	**1**

Same amount of $CaCO_3$, same temperature each time.

(b)

Marking criteria	Marks
• Correct axes, conc acid (X) vs time (Y) • Axes linear • Axes labelled and units indicated • Line graph, both lines on same graph • Accurate plot • Lines of bet fit drawn, not extending beyond data. • Suitable use of space	**3**
• 5 of the above	**2**
• 3 of the above	**1**
• Less than 3 of the above	**0**

(c)

Marking criteria	Marks
• Safety measure named AND justified	**2**
• Safety measure named	**1**

Eye protection should be worn to protect eyes from splashes of acid.

Question 62.

(a)

Marking criteria	Marks
• One good reason	**2**

There is far more power generation and transport in N America and Europe than in Australia. Therefore much more SO_2 and NO_x is generated.

(b)

Marking criteria	Marks
• Both sets of reactants and products correctly transcribed. • Correct format used (arrow etc)	**3**
• 2 of the above	**2**
• 1 of the above	**1**

Sulfur dioxide + oxygen → sulfur trioxide
Sulfur trioxide + water → sulfuric acid

(c)

Marking criteria	Marks
• Ethical justification FOR described • Ethical justification AGAINST described	**2**
• One of the above OR. • both, less well done	**1**

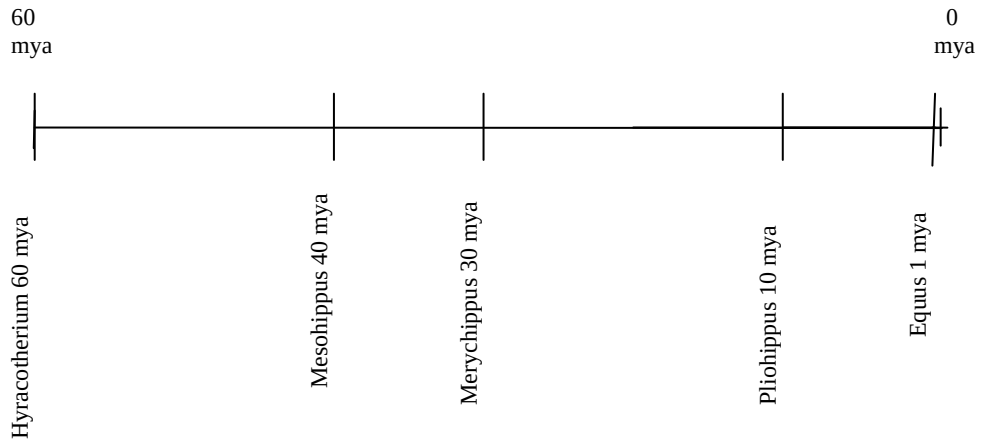
FOR The industry creating the problem provides employment and livelihoods for a very large number of people and is therefore justified.

AGAINST The pollution problems are suffered by people who don't benefit from the industries which make them. This is unjust.

Question 63

(a)

Marking criteria	Marks
• At least TWO dates included to give scale • At least THREE of the species included within 3mm of the correct place	**2**
• One of the above	**1**



(b)

Marking criteria	Marks
• Feature showing change named • Trend described	**2**
• Feature showing change named	**1**

The shape of the forefoot has changed. There has been a progressive reduction in the number of toes used to walk on.

(c)

Marking criteria	Marks
Any 3 of: • Size variation in ancestral population stated or implied • Reason for advantage of larger size proposed • Greater survival and reproductive success of animals with favourable trait inferred • Subsequent increase of this trait in population inferred	**3**
• Two of the above	**2**
• One of the above OR • some mention of 'survival of the fittest'	**1**

There would have been genetically based variation in height in the ancestral population. In a changing environment, greater height might have been advantageous, so the taller animals would have survived and reproduced more successfully than the others. Over time the favourable characteristic of greater height would become more widespread in the population.

Question 64.

Marking criteria	Marks
• points given for, or for and against the statement. • 2 technological devices referred to (one or both can be communication devices) • For each device a description of how an aspect of life has been changed (situation before and after should be given) • Both devices discussed can support the statement, or one could be discussed to give a contrary view	**4**
• points given for, or for and against the statement. • 2 technological devices referred to (one or both can be communication devices) • For just one device a description of how an aspect of life has been changed (situation before and after should be given) • Both devices discussed can support the statement, or one could be discussed to give a contrary view	**3**
• Two devices described, changes not fully described.	**2**
• Two devices named OR one described.	**1**

Communication devices certainly did change life in the C20 to an enormous extent, but probably no more than developments in other areas. The commercial development of the radio allowed instantaneous mass communication whereas before only newspapers, which were much slower and more limited in their audience, provided this. People became much better informed about world affairs and much more susceptible to advertising. On the other hand, advances in medicine have also had an enormous effect on our lives. Before antibiotics many diseases and infections resulted in death, while nowadays death from a bacterial infection is rare.

Question 65.

(a)

Marking criteria	Marks
• Explanation of role of battery in storing energy • Statement or implication that this energy would otherwise be lost to the car. • Description of role of electric motor in using this energy to help drive car	**3**
• Two of the above	**2**
• One of the above	**1**

Hybrids achieve higher fuel efficiency because they have electric batteries which can store energy that the car would normally lose while braking. This electrical energy is then used to drive an electric motor which reduces the load on the petrol motor.

(b)

Marking criteria	Marks
• Environmental justification given • Economic justification given	**2**
• One of the above OR • Both poorly done	**1**

Environmental – Using a hybrid car will greatly reduce the CO_2 you personally put into the atmosphere – reducing your personal contribution to global warming.
Economic – Although the purchase price of the hybrid is higher than the conventional vehicle its high fuel efficiency means that it will be cheaper to run and within a few years this will outweigh the initial higher cost.

(c)

Marking criteria	Marks
• Suitable equipment listed or mentioned in a feasible, step wise method • Independent and dependent variable identified or obvious from method • Hybrid and non-hybrid both tested • At least 2 controlled variables named • Method of quantitatively measuring dependent variable explained • Multiple tests.	**6**
• 1 – 5 of the above	**1-5**

Equipment:
6 new Honda Civic Hybrids
6 new Honda Civic VTi autos
Test track
Stopwatch

Method:
- Use the stopwatch to record the time taken for a Hybrid to travel 100metres, accelerating as fast as it can from a standing start.
- Repeat this 3 times for each car, using all 6 hybrids. Calculate the average time from the 18 trials.
- Repeat this whole procedure using the non hybrid cars.
- Compare the average times. The car with the lowest time has the fastest acceleration.
- For this to be a fair test the cars must be run over the same stretch of track, wind conditions should be the same, tyres should be inflated to the same extent and the same driver should be used.

Question 66.

(a)

Marking criteria	Marks
• LH line drawn showing a spike before day 14 • Progesterone line shows rise after day 14, slowly dropping around day 22 (only expect detail that can be deduced from the description in the stimulus booklet)	**2**
• One of the above	**1**

(b)

Marking criteria	Marks
• Point made that day after pill 'kills' a fertilised egg • Contrast with contraceptive pill made • Explanation that some people regard a fertilised egg as the same as a living being. And having same rights	**3**
• Two of the above	**2**
• One of the above	**1**

Some people believe that life begins at fertilisation. For them a blastocyst about to implant is a living being and the morning after pill effectively kills it by preventing it from implanting. This is seen as unethical. The contraceptive pill on the other hand works by preventing ovulation – fertilisation doesn't occur, no embryo is 'killed'.