education
Department: Education
GAUTENG PROVINCE

GAUTENG DEPARTMENT OF EDUCATION

EKUDIBENG

JUNE EXAMINATION

2011

GRADE 12: Life Sciences

TOTAL : 150

TIME: 2.5 HOURS

INSTRUCTIONS AND INFORMATION

1. **Answer ALL the questions.**
2. **Write ALL the answers in the answer book.**
3. **Number the answers correctly according to the numbering system used in this question paper.**
4. **Present your answers according to the instructions of each question.**
5. **All drawings should be done in pencil and labeled in blue ink.**
6. **Only draw diagrams or flow charts when asked to do so.**
7. **The diagrams in this question paper are not all drawn to scale.**
8. **Non-programme calculators, protractors and compasses may be used.**
9. **Do not use graph paper.**
10. **Write neat and legibly.**
11. **Good luck!!!!!!**

SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A – D) next to the question number (1.1.1 – .1.7) in the ANSWER BOOK, for example 1.1.8 D.

1.1.1 The offspring of a homozygous white guinea-pig which had been crossed with homozygous black guinea-pig were all grey. What percentage of the F_2 generation will be grey if two grey guinea-pigs were mated?

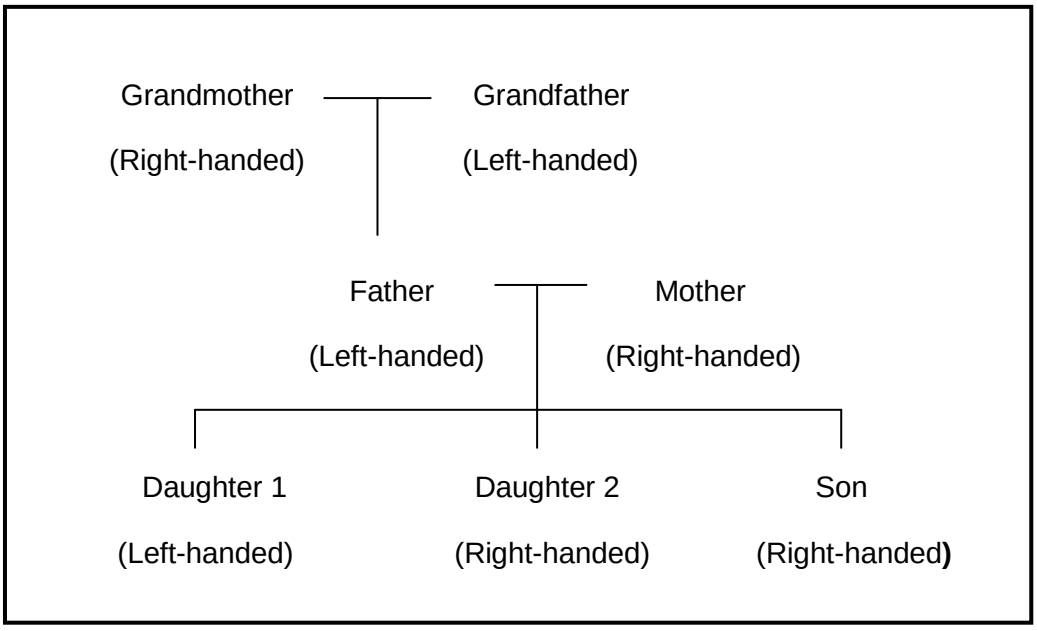
A 75%

B 50%

C 34%

D 25% (2)

1.1.2 In a human family, the gene for right-handedness **(R)** is dominant over the gene for left- handedness. The pedigree diagram of three generations is shown below.



Which one is the correct expression of the genotypes of the following three individuals shown in the pedigree diagram?

	Grandmother	**Father**	**Daughter 1**	
A	Rr	Rr	RR	
B	Rr	RR	Rr	
C	RR	Rr	rr	
D	Rr	rr	rr	(2)

1.1.3 The gene alleles which produce red flowers and white flowers in a specific species of plant exhibits incomplete dominance, producing pink offspring. If two plants with pink flowers are mated the phenotype of the offspring will be …..

A All red

B 3 red and 1 pink

C 1 red, 1 white and 2 pink

D All pink (2)

1.1.4 An example of non-random mating is …

A artificial selection

B inbreeding

C natural selection

D macroevolution (2)

1.1.5 If there is gene flow between two beetle populations that live on opposite sides of a river, then the two populations will …

A become genetically isolated from each other

B evolve into different species

C develop gene pools that are similar

D both become extinct (2)

5x2 = (10**)**

1.2 Give the correct **term** for each of the following descriptions. Write only the term next to the question number (1.3.1 to 1.3.5) on your answering sheet

1.2.1 The scientist that argued that organisms undergo certain changes during their lifetime and these changes are inherited by their offspring. (1)

1.2.2 A genetic syndrome in which the person lacks the ability to produce the pigment melanin. (1)

1.2.3 The point at which two chromatids of a chromosome are joined together (1)

1.2.4 The weak bond which occurs between the two nitrogen bases in the DNA ladder. (1)

1.2.5 The process through which the most offspring, with desirable features for survival, will be produced for the next generation. (1)

.. 5x1 = (5)

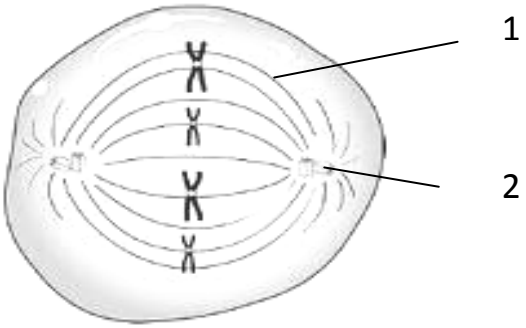
1.3 Choose an item in COLUMN II that matches the description in COLUMN I. Write only the letter (A-H) next to the question number (1.3.1 -1.3.5) on your answer sheet, for example 1.3.6. J

COLUMN 1	COLUMN II
1.3.1 The position of a gene on a chromosome.	A. Allele
1.3.2 The crossing of closely related individuals.	B. Lamarck
1.3.3 The formation of new species on an ecological, reproductive and genetic level.	C. Speciation
1.3.4 Proposed the 'law' of use and disuse to support his theory of evolution.	D. Analogous
1.3.5 Structures that have similar functions and appearance but have different origins.	E. Inbreeding
	F. Locus
	G. Darwin
	H. Homologous

5x1=(5)

1.4 Study the diagram below and answer the questions that follow.

Meiosis in a cell



1.4.1 Which phase of meiosis does the diagram represent? (1)

1.4.2 Provide labels for number 1 and 2. (2)

1.4.3 How many chromosomes are in a diploid cell of this organism? (2)

1.4.4 How many chromosomes will be present in each daughter cell after meiosis .. has been completed? (2)

1.4.5 Draw a cell which represents the above cell in the phase following this one. .. Write the name of this phase in the heading of the drawing. (3)

1.4.6. During which phase does crossing over take place? (1)

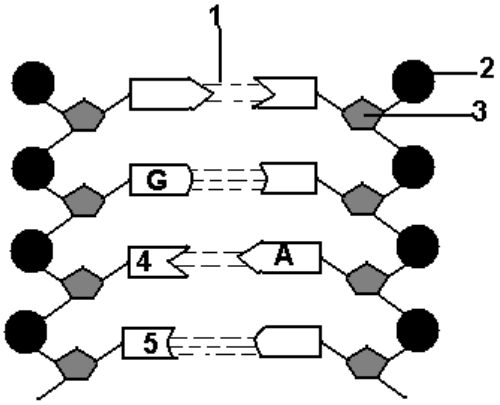
1.4.7 What is the importance of meiosis? (3)

1.4.8 Which type of mutation could take place during the phase mentioned in 1.4.6? (2)

1.4.9 Name three genetic disorders that are caused by mutations. (3)

(19)

1.5 Study the following diagram and then answer the questions that follow:



KEY:
A - Adenine
G - Guanine

1.5.1) Identify the molecule in the above diagram. (1)

1.5.2) Label the parts numbered 1- 5. (5)

1.5.3) What is collective name for the parts numbered 2, 3 and 4? (1)

1.5.4) Using the above diagram write down the sequence of the 4 bases on an m-RNA molecule which uses the left strand of the molecule as a template. Start from the top part of the molecule. (2)

1.5.5) Name two places in a cell where this molecule can be found. (2)

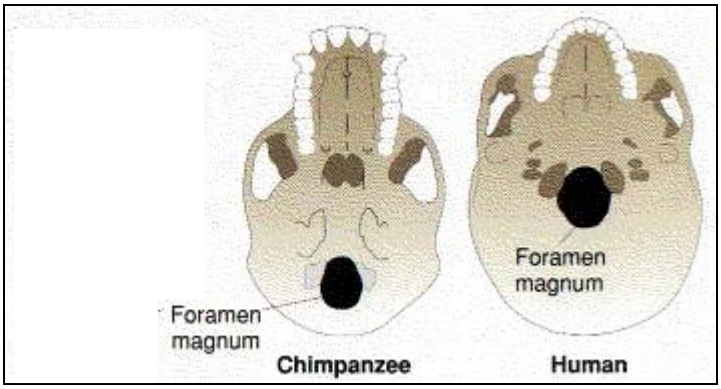
(11)

Total Section A = (50)

SECTION B

QUESTION 2

2.1 Study the following diagram and answer the questions following the diagram.



2.1.1 State three differences between the facial features of a human and that of a chimpanzee. (3)

2.1.2 State which organism is bipedal and give a reason why by using the information on the diagram. (3)

2.1.3 Name four characteristics that humans share with other primates. (4)

(10)

2.2 The given table shows the brain volume (in cm^3) of 5 hominin species. Study the table and answer the questions that follow:

Hominin species	**Brain volume(cm^3)**
1	400
2	500
3	800
4	1100
5	1400

2.2.1 Choose the Hominin species from the list below that is represented by 1-5 in the above table, and write the name next to the correct number.

Homo sapiens	*Homo erectus*	*Homo habilis*
Australopithecus africanus	*Australopithecus afarensis*	

(5)

2.2.2 Draw a bar graph to represent the data in the table. Use the names of the species on the appropriate axis. (7)

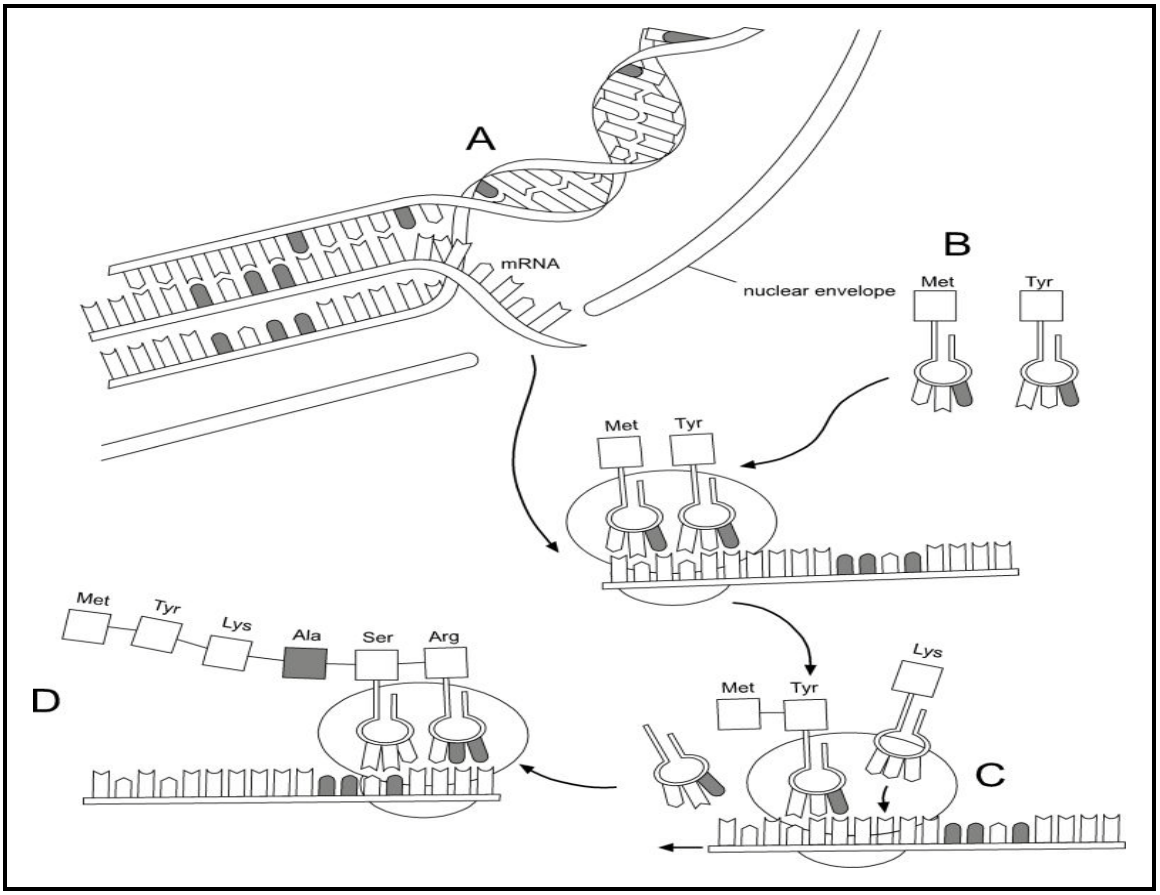
2.2.3 Using the data in the table state which hominid species is the oldest and give a reason for your answer. (2)

2.2.4 Which genus (*Homo or Australopithecus)* is associated with the making of tools and the development of language? Motivate your answer. (3)

2.2.5 Name three *Australopithecus* fossils that were found in South Africa (3)
(20)

QUESTION 3

3.1 Study the diagram below on protein synthesis and answer the questions below :



3.1.1 State the name of the process happening at A. (1)

3.1.2. Briefly discuss what happens at A. (3)

3.1.3 State the name of the structures indicated at B and also write down which type of molecule they are transporting. (2)

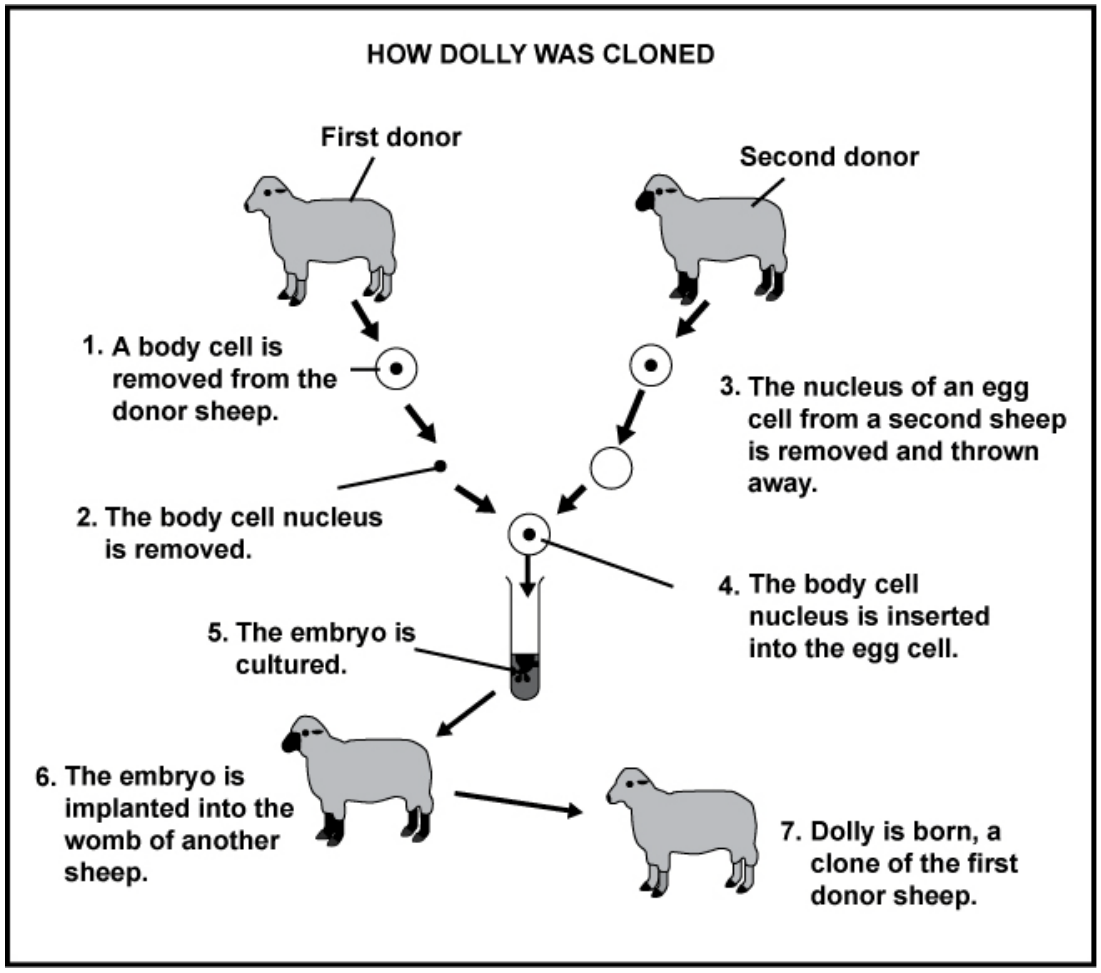
3.1.4 State the name of the process happening at C . (2)

3.1.5 Write down the sequence of the bases on the codon of the m-RNA that will correspond with the anti- codon (UUU) of the structure carrying Lysine (Lys). (2)

3.1.6 What is the end product of this whole process? (1)

(11)

3.2 Study the diagram below that shows the cloning of a sheep named Dolly.



3.2.1) Why was the body cell nucleus inserted into the egg cell? (2)

3.2.2) Will Dolly have any characteristics of the second donor sheep? (2)

3.2.3) Explain your answer to the previous question. (2)

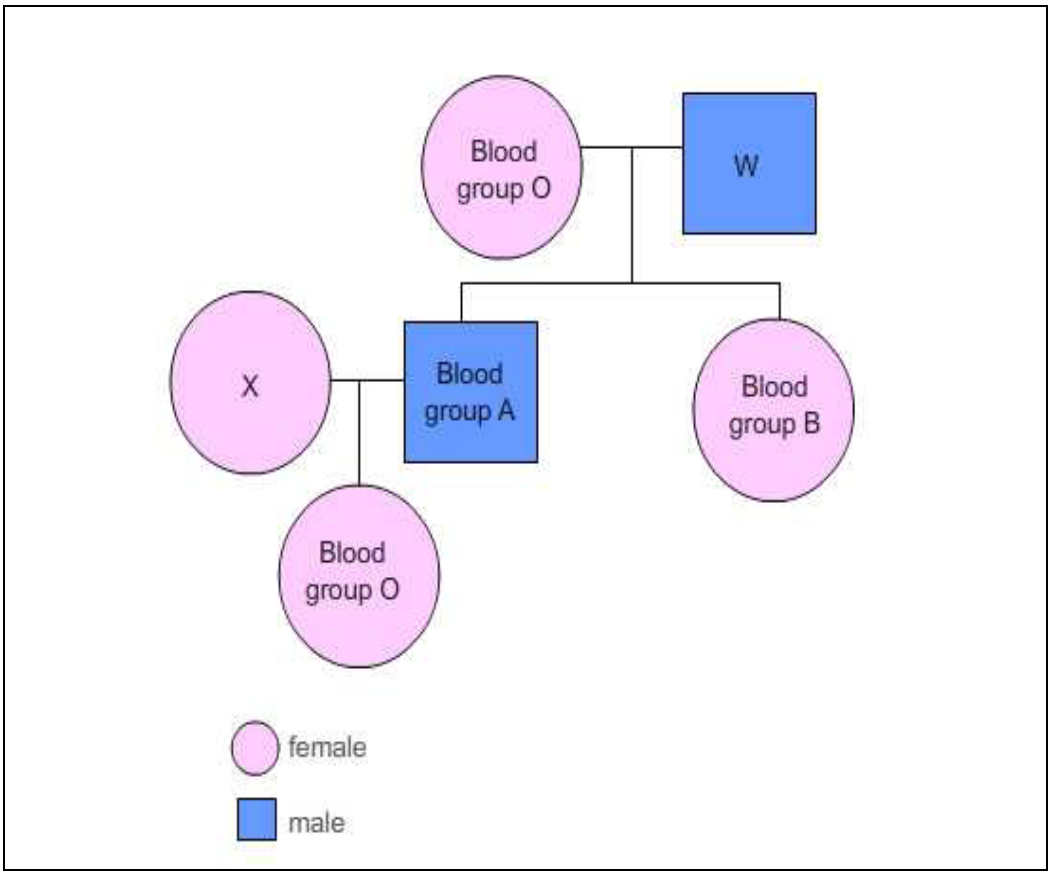
3.3.4) Number 5 on the diagram states that 'the embryo is cultured'.

Through which process of cell division does the embryo develop? (2)

(8)

3.3. It is possible to trace the inheritance of characteristics such as blood groups and genetic disorders over a number of generations.

The pedigree diagram below shows the blood groups of individuals of a family. The blood groups are indicated inside the circle or square. The blood groups of individuals W and X are not indicated.



3.3.1. Write down all the possible genotypes of individuals:

i) W (2)
ii) X (2)

3.3.2) Haemophilia is a blood clotting disorder. Explain why mainly males suffer from this disorder. (3)

3.3.3) Use a punnet square or a monohybrid crossing to determine what the possible genotypes of the children will be when someone with a blood group O have children with a person with the following genotype: I^BI^B. (4)

(11)

Total: Section B = [60]

SECTION C

QUESTION 4

4.1 In an investigation a biotechnologist injected chimpanzee blood into a rabbit. The immune system of the rabbit recognised the chimpanzee blood protein as foreign and produced antibodies. The rabbit's antibodies were then extracted and developed as a serum.

When the serum is added to blood samples in different test tubes removed from of a variety of different animals, a precipitate forms. The more precipitate forms, the more closely related the animal is to the chimpanzee.

Study the table below and answer the questions that follow.

Table that shows the percentage precipitate formed with the blood of each of the tested animal species.

Animal species	Percentage precipitate formed
Gorilla	Very high
Baboon	High
Monkey	Moderate
Pig	Very low

a) What is the composition of the serum? (2)

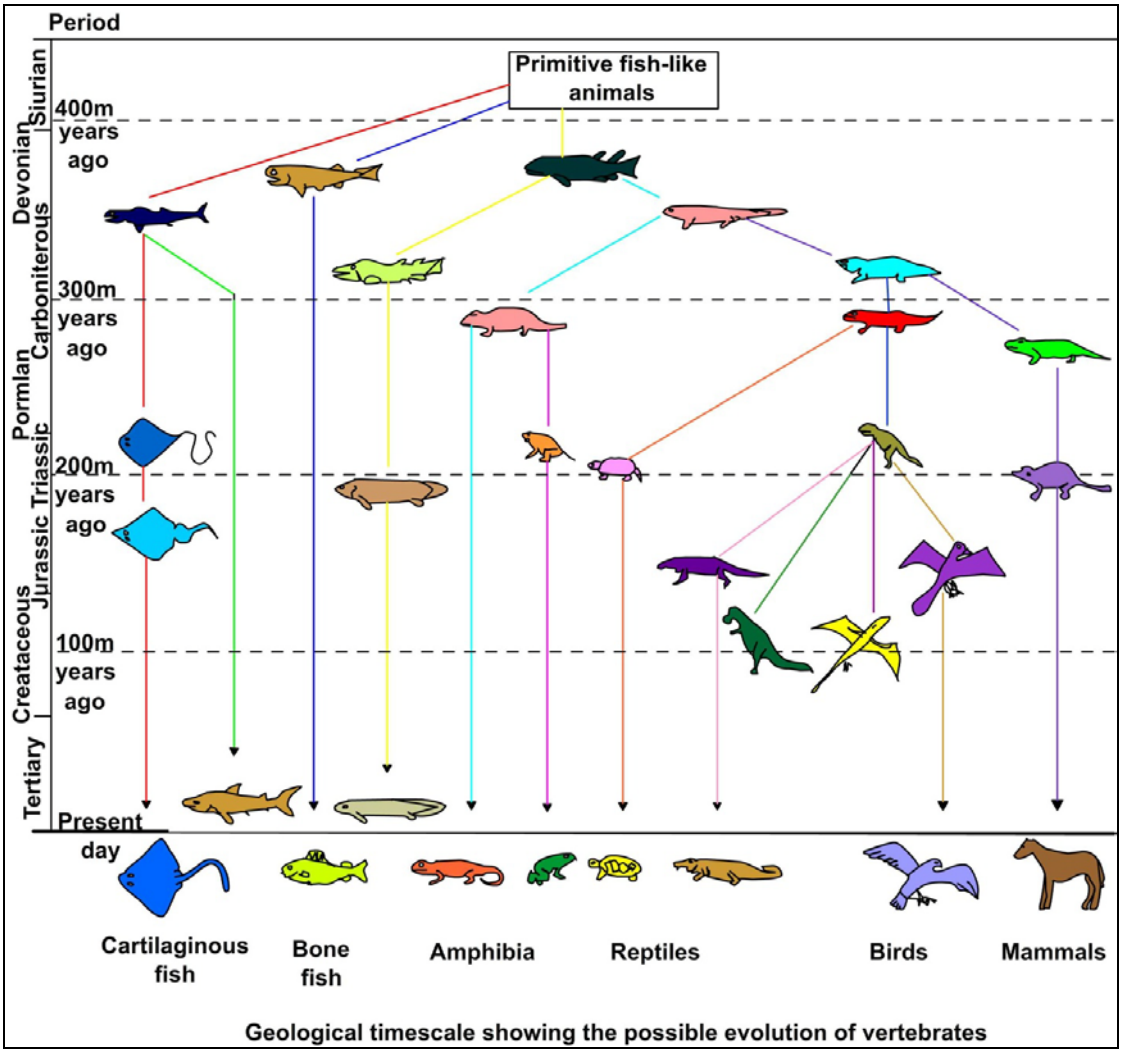
b) According to the above information, which animal is least related to chimpanzees? Give a reason for your answer. (3)

c) Formulate a hypothesis for the investigation above. (2)

d) Name two variables that had to be kept constant in this investigation. (2)
(**9)**

4.2 The geological timescale below shows the possible evolution of vertebrates.

Study the timescale and answer the questions that follow.



Geological timescale showing the possible evolution of vertebrates

4.2.1) In which period did the common ancestor of mammals and reptiles appear? (1)

4.2.2) According to the time scale, would it be acceptable to say that amphibia are primitive reptiles? Give a reason for your answer. (3)

4.2.3) Which group of animals went extinct in the Cretaceous period? (1)

4.2.4) Explain how scientists can determine that these animals mentioned in 4.2.3 became extinct 100 millions years ago. (2)

4.2.5) One of the theories on how these animals in 4.2.3 became extinct, is that it happened because of an Ice Age. Discuss how an Ice Age could have forced these animals into extinction. (4)

(11)

4.3 Genetic engineering is fast becoming a very important scientific, agricultural, economical and medical tool. Discuss the importance of genetic engineering by discussing its uses. Also discuss the ethical arguments for and objections against genetic engineering. What legislation do you think should be in place to regulate genetic engineering?

Synthesis = (3)

(20)

TOTAL SECTION C: 40

TOTAL PAPER: 150