



# education

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Department:  
Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**LIFE SCIENCES P1  
ADDITIONAL EXEMPLAR 2008**

**MARKS: 150**

**TIME: 2½ hours**

**This question paper consists of 12 pages.**

**INSTRUCTIONS AND INFORMATION**

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start EACH question on a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. If answers are NOT presented according to the instructions of each question, candidates will lose marks.
6. ALL drawings should be done in pencil and labelled in blue or black ink.
7. Draw diagrams and flow charts ONLY when asked to do so.
8. The diagrams in this question paper may not necessarily be drawn to scale.
9. Do NOT use graph paper.
10. Non-programmable calculators, protractors and compasses may be used.
11. Write neatly and legibly.

**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 – 1.1.5) in the ANSWER BOOK, for example 1.1.6 D.

1.1.1 During which ONE of the following stages does replication of DNA occur?

- A Interphase
- B Prophase
- C Telophase I
- D Telophase 2

1.1.2 The ring of bacterial DNA that is separate from the organism's main DNA is known as a ...

- A protein.
- B plasmid.
- C mutation.
- D triplet.

1.1.3 A father has blood type B and a mother has blood type O. They have three children of their own and one adopted child. Sipho has blood type B, Thandiwe has blood type AB. Thuli has blood type O and Bongwiwe has blood type B. Which child is adopted?

- A Sipho
- B Thandiwe
- C Thuli
- D Bongwiwe

1.1.4 Two genes found on corresponding positions on homologous chromosomes are called ...

- A amino acids.
- B nucleotides.
- C alleles.
- D clones.

1.1.5 The difference between nucleic acids and nucleotides is that ...

- A nucleic acids are building blocks of nucleotides.
- B nucleotides are building blocks of nucleic acids.
- C nucleotides are larger than nucleic acids.
- D nucleic acids are in the nucleus and nucleotides are in the cytoplasm.

(5 x 2) (10)

1.2 Give the correct biological term for each of the following descriptions. Write only the term next to the question number (1.2.1 – 1.2.6) in the ANSWER BOOK.

1.2.1 The natural shape of a DNA molecule

1.2.2 The smallest unit of genetic material that codes for a particular characteristic

1.2.3 Unspecialised cells which have the genetic code and are capable of giving rise to any other cells of the same organism

1.2.4 The fusion of one male gamete with an ovum and another male gamete with an endosperm mother cell as in angiosperms

1.2.5 The remainder of the Graafian follicle, after ovulation, in the ovary

1.2.6 An individual that has one dominant and one recessive gene for a particular characteristic

(6)

1.3 Choose an item from COLUMN II that matches a description in COLUMN I. Write only the letter (A – G) next to the question number (1.3.1 – 1.3.5) in the ANSWER BOOK, for example 1.3.6 H.

| COLUMN I |   | COLUMN II |                     |
|----------|---|-----------|---------------------|
| 1.3.1    | All cells except sex cells                                  | A         | spermatogenesis     |
| 1.3.2    | A visual representation of an organism's chromosomes        | B         | sickle-cell anaemia |
| 1.3.3    | The inability of blood to clot                              | C         | karyotype           |
| 1.3.4    | The process by which spermatozoa are produced in the testis | D         | haemophilia         |
| 1.3.5    | The full complement of genes present in an organism         | E         | gametes             |
|          |   | F         | somatic             |
|          |   | G         | genome              |

(5 x 1)

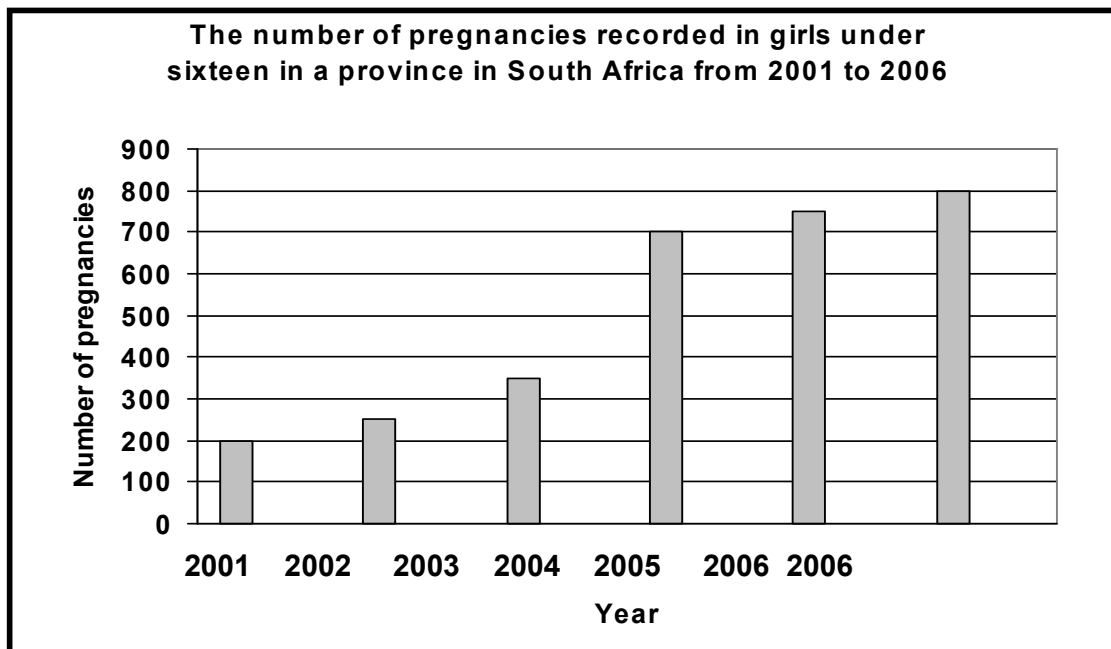
(5)

1.4 Arrange the following stages of childbirth in the correct order in which they occur. Write down only the LETTERS of the stages in the correct order.

- A The cervix dilates
- B Gentle contractions of the uterus begin
- C 'Breaking of the waters'
- D The umbilical cord is clamped and cut
- E The baby moves its position and faces backwards with its head near the cervix
- F The baby's head emerges from the vagina

(6)

1.5 Study the graph below which shows the number of pregnancies recorded of girls under sixteen in a province in South Africa from 2001 to 2006.



1.5.1 Between which two years did the greatest increase in the number of pregnancies occur?

(1)

1.5.2 What was the percentage increase in this period?

(1)

1.5.3 Draw a table to show the data from which this graph was drawn.

(6)

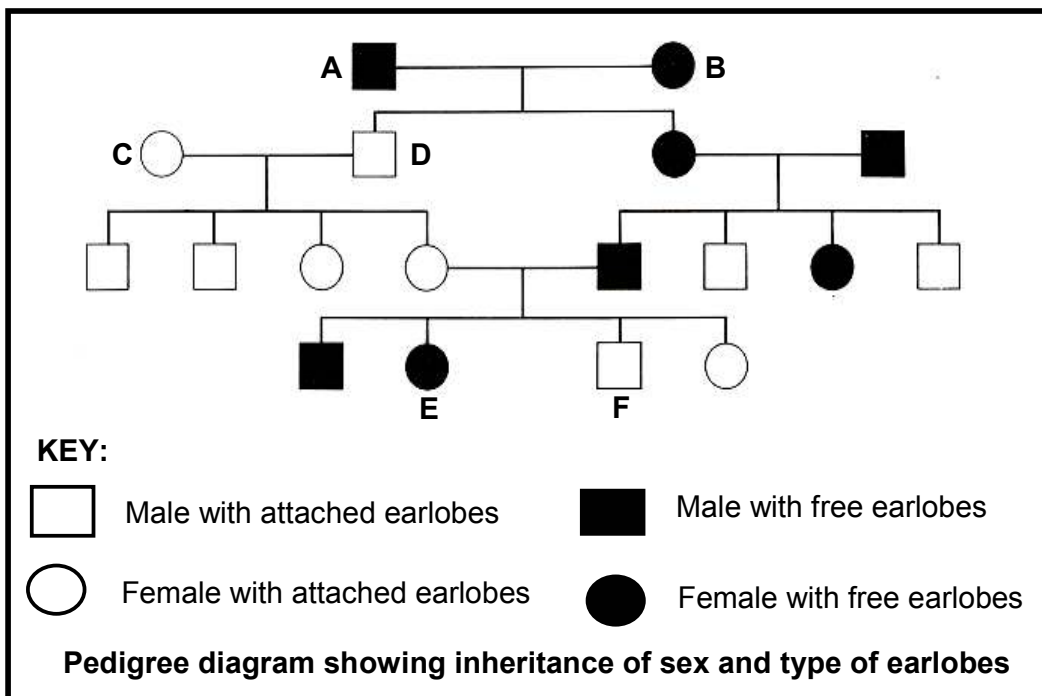
1.5.4 In a relationship, is it the man's or woman's responsibility to use contraception to prevent pregnancy?

(1)

1.5.5 Give a reason for your answer to QUESTION 1.5.4.

(1)

1.6 Study the family tree below which shows the inheritance of sex and type of earlobes over four generations of a family. In humans, free earlobes (F) is dominant over attached earlobes (f).



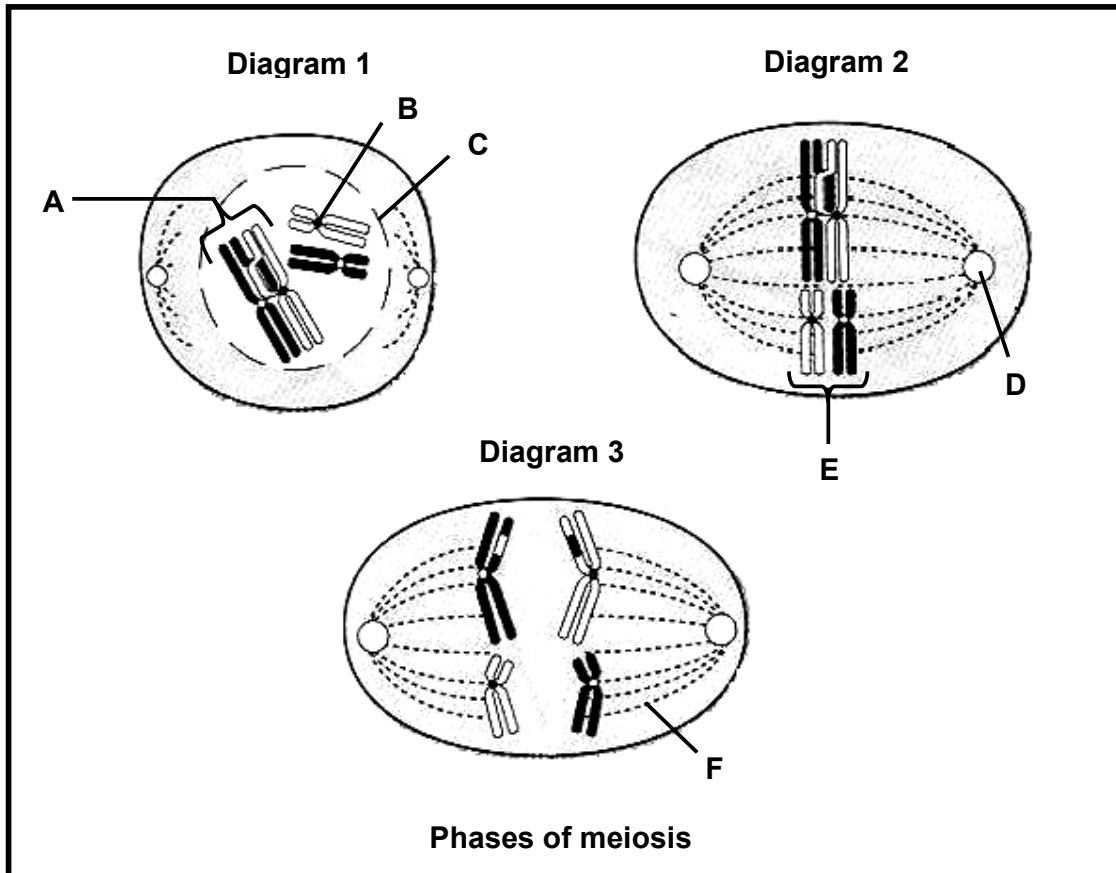
- 1.6.1 How many members of the family have free earlobes? (1)
- 1.6.2 What proportion of offspring in the fourth generation are females with attached earlobes? (2)
- 1.6.3 If the genotype of person A is FF, what will be the genotype of person B? (2)
- 1.6.4 Give a reason for your answer to QUESTION 1.6.3. (2)
- 1.6.5 Persons E and F are twins. Were they produced from a single fertilised egg cell or from two separately fertilised egg cells? (1)
- 1.6.6 Explain your answer to QUESTION 1.6.5. (2)
- 1.6.7 Is it possible for individuals C and D to have a child with free earlobes? (1)
- 1.6.8 Explain your answer to QUESTION 1.6.7. (2)

**TOTAL SECTION A: 50**

**SECTION B**

**QUESTION 2**

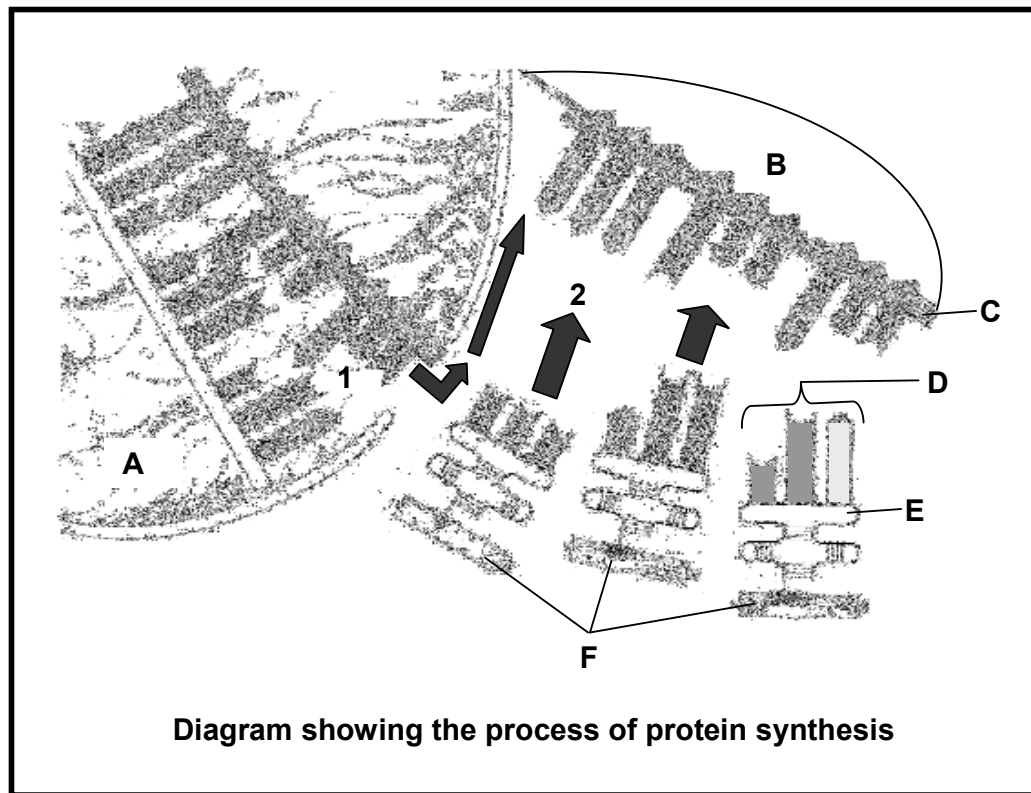
2.1 The diagrams below represent phases of meiosis.



- 2.1.1 Name the process taking place at A. (1)
- 2.1.2 Identify structures B, C, D and E. (4)
- 2.1.3 State ONE function of F. (2)
- 2.1.4 What phase of meiosis is represented in Diagram 2? (2)
- 2.1.5 Give a reason for your answer to QUESTION 2.1.4. (2)
- 2.1.6 How many chromosomes are shown in Diagram 3? (1)
- 2.1.7 Name ONE organ in the human female body where the process of meiosis will occur. (1)

2.2 Tabulate THREE differences between DNA and RNA. (7)

2.3 Study the diagram below which shows the process of protein synthesis.



2.3.1 Identify organelles A and B respectively. (2)

2.3.2 Label structures C, E and F respectively. (3)

2.3.3 Which stage of protein synthesis is represented at:

(a) 1 (1)

(b) 2 (1)

2.3.4 Write down the anticodon that reads from left to right at D. (3)

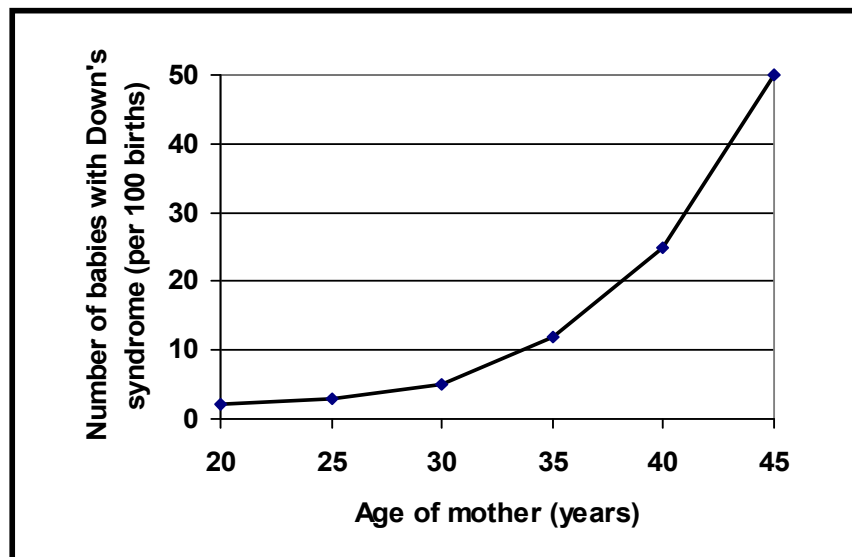
**[30]**

**QUESTION 3**

3.1 A learner wanted to investigate the relationship between the number of babies born with Down's syndrome and the age of their mothers. He obtained information by visiting the local hospitals.

3.1.1 State a hypothesis for the learner's investigation. (2)

Study the graph below which shows the results he obtained and answer the questions that follow.



3.1.2 Write down a caption for the graph. (1)

3.1.3 At what age are mothers at the highest risk of giving birth to a baby with Down's syndrome? (2)

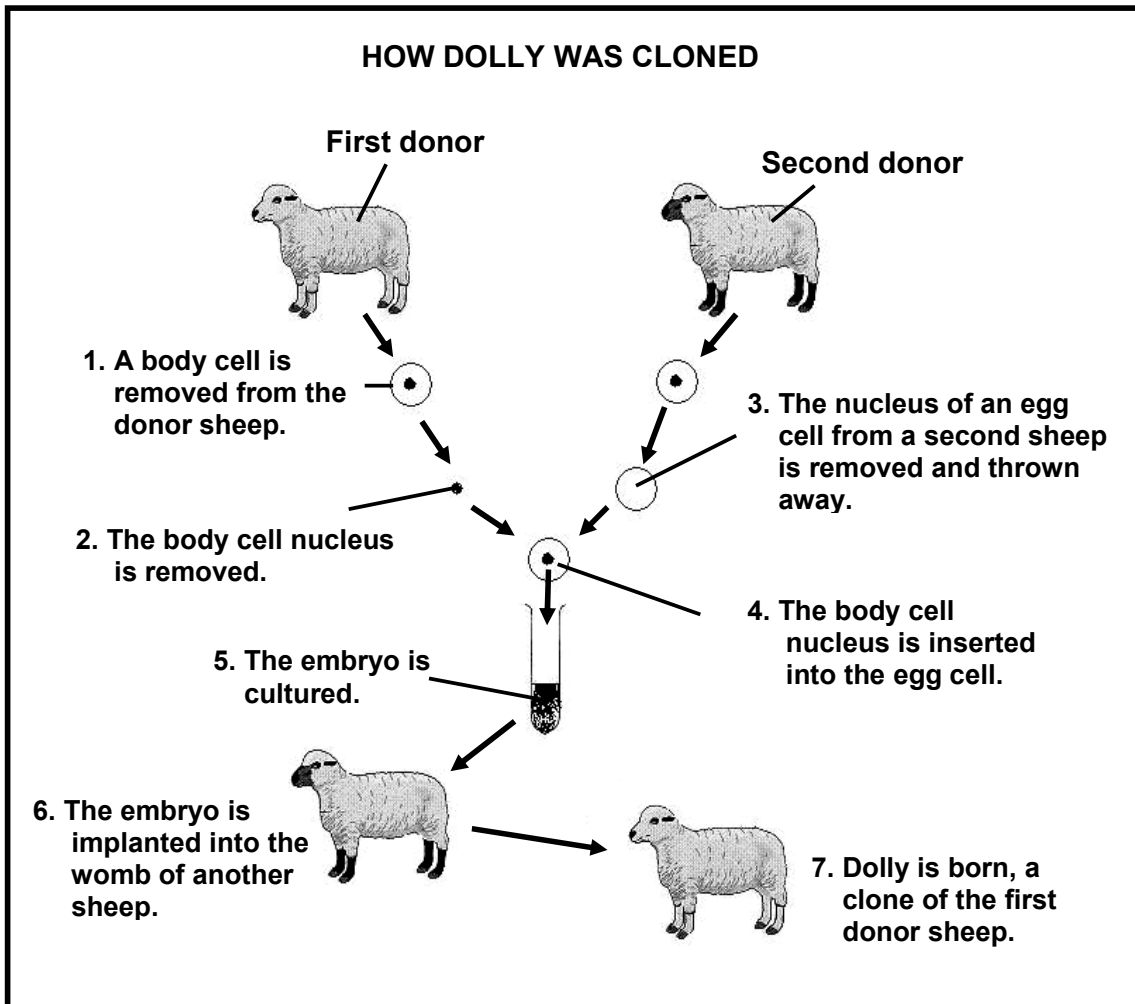
3.1.4 A 44-year-old woman wants to have a baby. What advice would you give her? (2)

3.1.5 List THREE symptoms of Down's syndrome. (3)

3.1.6 Explain the cause of Down's syndrome. (2)

3.2 In mice, brown (B) coat colour is dominant over grey (b) coat colour. Show a crossing between a heterozygous parent with a brown coat colour and one with a grey coat colour up to the F<sub>1</sub> generation. Also give the phenotypes of the F<sub>1</sub> generation. (8)

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



- 3.3.1 Why was it necessary to remove the nucleus from the egg cell of the second donor before the sheep could be cloned? (2)
  - 3.3.2 Would Dolly have any characteristics of the second donor sheep? (1)
  - 3.3.3 Explain your answer to QUESTION 3.3.2. (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? (1)
  - 3.3.5 Describe TWO reasons why people could be against genetic engineering. (4)
- [30]**

**TOTAL SECTION B: 60**

**SECTION C****QUESTION 4**

- 4.1 An investigation was carried out to determine the average height and average mass of human females and males from birth until twenty-two years of age in a population. The results are shown in the table below.

| AGE (years) | FEMALES    |           | MALES      |           |
|-------------|------------|-----------|------------|-----------|
|             | HEIGHT (m) | MASS (kg) | HEIGHT (m) | MASS (kg) |
| Birth       | 0,3        | 3,3       | 0,3        | 3,4       |
| 2           | 0,9        | 11,0      | 0,9        | 12,0      |
| 6           | 1,1        | 19,0      | 1,1        | 20,0      |
| 10          | 1,3        | 31,0      | 1,3        | 31,0      |
| 14          | 1,5        | 49,0      | 1,6        | 49,0      |
| 18          | 1,6        | 57,0      | 1,7        | 65,0      |
| 22          | 1,6        | 58,0      | 1,7        | 70,0      |

- 4.1.1 Draw bar graphs on the same system of axes to compare the mass of the females and males from birth to twenty-two years of age. (12)
- 4.1.2 Write down the age at which the height of the females and the males start to differ. (2)
- 4.1.3 Compare the trend for the mass of females and males from birth to 22 years. (4)
- 4.2 The table below shows the chromosome complement of human egg and sperm cells.

| EGG (23) | SPERM (23) | ZYGOTE (46) | SEX OF CHILD |
|----------|------------|-------------|--------------|
| 22 + X   | 22 + X     | (a)         | (c)          |
| 22 + X   | 22 + Y     | (b)         | (d)          |

- 4.2.1 Write down the letters (a) and (b) and next to each letter the chromosome complement that completes the table above. (2)
- 4.2.2 Write down the letters (c) and (d) and next to each letter the sex of the child that completes the table above. (2)
- 4.2.3 A woman has three children, all of whom are boys. What is the probability of her fourth child being a girl? Explain your answer. (3)

4.3 Read the passage below:

**TECHNOLOGY AND CHOOSING THE SEX OF A BABY**

At least 10 million female foetuses have been aborted in India over the past two decades. Population censuses in India show that the number of girls has been dropping steadily for the last twenty years relative to the number of boys.

Researchers say **that** the most likely reason for the drop is the availability of ultrasound, which allows parents to discover the sex of their child before birth.

Write a mini-essay in which you discuss your views on the advantages and disadvantages of using ultrasound to determine the sex of a child, the statement that 'daughters are a disadvantage' and what the future holds for males and females if abortion of female foetuses continues. (12)

Synthesis: (3)

NOTE: NO marks will be awarded for answers in the form of flow charts or diagrams.

**TOTAL SECTION C: 40**

**GRAND TOTAL: 150**