## SECTION A

### QUESTION 1

1.1  1.1.1  D✓✓
1.1.2  B✓✓
1.1.3  C✓✓
1.1.4  C✓✓
1.1.5  A✓✓  \((5 \times 2)\)  \((10)\)

1.2  1.2.1  Fallopian tube✓/oviduct
1.2.2  Graafian follicle✓
1.2.3  Umbilical vein✓
1.2.4  Oxytocin✓
1.2.5  Seed✓
1.2.6  Cervix✓  \((6)\)

1.3  1.3.1  E✓
1.3.2  G✓
1.3.3  F✓
1.3.4  I✓
1.3.5  A✓
1.3.6  D✓  \((6)\)

1.4  1.4.1  Transcription✓  \((1)\)
1.4.2  5✓  \((1)\)
1.4.3  GCU✓ – CAU✓ – UGG✓  \((3)\)
1.4.4  (a) The sequence of the amino acids will change✓/the actual amino acids could change and a new/different protein could form✓  \((2)\)

(b) Mutation✓  \((1)\)
1.5
1.5.1 Anaphase II✓
1.5.2 Chromatids✓ are pulled towards the poles✓
1.5.3 A Spindle fibre✓
     B Cell membrane✓
1.5.4 (a) 8✓
     (b) 4✓
1.5.5 Ovary✓
1.5.6 No✓
1.5.7 Humans would have 23✓ chromosomes/46 chromatids in this phase. In this diagram only 4 chromosomes✓/8 chromatids are shown/incorrect✓ number ✓ of chromosomes
1.5.8 - Reduction/halving of chromosome number✓/keep chromosome number constant from generation to generation/prevents doubling of chromosome number at fertilisation
- Promotes/contributes to genetic variation✓
     Formation of gametes/cells containing one allele of a gene pair✓
     *(Mark first TWO only)*

1.6
1.6.1 The flowers with petals attracted more insects✓ for pollination✓ than the flowers without petals
     OR
     The flowers without petals may not have attracted insects✓ therefore less pollination✓
1.6.2 Some of the pollen tubes that developed were from the same flower✓/self-pollination occurred and only make little growth into the style✓ /not all pollen grains make it to the ovary/does not fertilise the ovule
1.6.3 Repeat the investigation and use the average✓
     Increasing the size of the sample✓
     Use the same size flowers✓
     Use the same colour flowers✓
     Use the flowers of the same apple tree✓
     Ensure that all the flowers are pollen-free at the beginning of the investigation✓
     Use the same number of flowers✓
     The same number of days for pollination✓/prevention of pollination/
     for fertilisation to take place any ◢\�
     *(Mark first THREE only)*

**TOTAL SECTION A:** 50
SECTION B

QUESTION 2

2.1 2.1.1 A - prostate gland
      B - vas deferens / sperm duct
      E - urethra
      G - nucleus

2.1.2 C - Stores sperms temporarily/sperms mature here
        \textbf{(Mark first ONE only)}

        F - Contain enzymes to break down the cell membrane of the egg cell
        \textbf{(Mark first ONE only)}

2.1.3 D - testis / seminiferous tubules

2.1.4 To keep the testes at a temperature that is (about 3 \degree C) lower than body temperature
        A lower temperature is necessary for the production of healthy sperm
        so that healthy sperms can survive

2.1.5 (a) Interstitial cells / Cells of Leydig
        (b) Testosterone

2.1.6 (a) Severing of the vas deferens
        Will not allow sperms to pass to urethra and into the female and hence no fertilisation results

        (b) Yes

        (c) HI virus is carried in body fluids / seminal fluids / saliva / blood
            Can infect a person through open wounds / blood transfusion / sexual intercourse
            Therefore vasectomy does not stop the transmission of HIV

2.2 2.2.1 Accept day 14 or day 15

2.2.2 Days 0 - 7

2.2.3 - Causes the follicle to burst open / stimulates ovulation
        \textbf{(Mark first ONE only)}

2.2.4 - LH levels remain low up to day 12/13
        - Then it increases sharply up to day 14
        - After which it decreases and remains low

2.2.5 As the oestrogen level increases ✓
the thickness of the endometrium also increases ✓ (2)

2.2.6 Maintain the increase in the thickness of the endometrium ✓
for greater chance of implantation ✓ (2)

2.2.7 No ✓ (1)

2.2.8 The progesterone level ✓ has dropped ✓/not maintained/corpus luteum has started to degenerate (2)
(13) [30]
QUESTION 3

3.1
3.1.1
(a) $I^A I^B \checkmark \checkmark$
(b) $I^A i \checkmark / I^A I^o \checkmark \checkmark / i^B I^o \checkmark \checkmark / i^o i^o \checkmark \checkmark$

3.1.2 It is a sex-linked\* disease
caused by a recessive allele\*
 carried on the X\* chromosome
Males need only one recessive allele\* to have the disease because they have XY combination,
while females have to have both recessive alleles\* to have haemophilia because they have an XX combination

3.2
3.2.1 Normal female: Chromosome pair 23 = XX\*
Female with Turner's syndrome: Only one X\* chromosome

3.2.2 She will not be able to have children\* since her sex organs will not develop\*/no menstrual cycle because there are underdeveloped gonads and therefore no hormones

(Mark first ONE only)

3.3
3.3.1 $\frac{102}{120} \checkmark \times \frac{100}{1} \checkmark$
= $85\% \checkmark \checkmark$

3.3.2 Equal number of boys and girls\*
Take a much larger sample\*/repeat samples in another school/another population
(Mark first TWO only)

3.4
$P_1$ phenotype Black x Brown\*
genotype Bb x bb\*

Meiosis

G $B, b \times b \checkmark$

Fertilisation

$F_1$ genotype Bb and bb\*
phenotype Black and brown\*

1 mark for stating $P_1$ and $F_1$
1 mark for stating meiosis and fertilisation

Any (6)
3.5 - Although contraceptives are easily available nowadays, many teenagers are not well informed about them ✓
- Some people feel that morality has decreased significantly ✓
- Families, nowadays, are less likely to provide teenagers with care and discipline ✓
- Teenagers are more exposed to sex in the media in these days ✓
- Teenagers are increasingly able to make their own decisions ✓
- Abortions are now legal and easily available ✓

(Mark first FOUR only) any (4)

TOTAL SECTION B: 60
SECTION C
QUESTION 4

4.1

4.1.1 1 : 2 : 1

4.1.2

The proportions of different genotypes for coat colour of cattle

The proportions of different genotypes for coat colour of cattle

RR

WW

RW

Rubric for the mark allocation of the pie chart

<table>
<thead>
<tr>
<th>Correct type of graph</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caption</td>
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<tr>
<td>Correct proportions of slices</td>
<td>1: 1 correct slice 2: 2 to 3 correct slices</td>
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<tr>
<td>Label / key for each slice</td>
<td>1 mark for each label</td>
</tr>
</tbody>
</table>

NOTE: If the wrong type of graph is drawn: marks will be lost for "correct type of graph" as well as for drawing the slices in correct proportions.

4.1.3 Both alleles for fur colour are equally dominant and therefore both are expressed in the phenotype

OR

Neither of the alleles for red or white colour are dominant over each other and therefore no one colour alone is expressed/masked in the phenotype
4.2 4.2.1  - Determine the sample size ✓/ number of boys and girls per grade 
- Design a table to record the results ✓
- Organise the ink pad and paper to take the fingerprint type of each learner ✓/ organise a way to obtain fingerprints 
- Time and place to be arranged ✓

(Mark first FOUR only)  (4)

4.2.2  (a) Number of learners ✓ with different fingerprint types ✓  (2)

(b) No ✓  (1)

(c) Results indicate ✓ that most learners ✓ have the plain loop type ✓ of fingerprinting  any 2

OR

Results indicate ✓ that learners with a plain arch ✓ do not make up the largest number ✓  any 2

OR

Results ✓ are not in line with the conclusion ✓  (2)

4.2.3 (a) Advantages

Criminals can be identified ✓/ biological evidence
Deceased bodies can be identified ✓

(Mark first TWO only)  (2)

(b) Disadvantages

People can be framed ✓
Infringing on the rights of people ✓/ invasion of privacy
It is costly ✓

(Mark first TWO only)  (13)

4.3 Advantages of using GMO's as a source of food

- Control pests with specific genes inserted into the crop ✓ which is less harmful to the environment than pesticides ✓/ Reduce the need for the use of chemicals
- Selecting the best genes to produce better resistant crops ✓/ stronger offspring to withstand harsh environmental conditions ✓
- Using specific genes to increase crop yields ✓/ life stock improvement for food security ✓
- Selecting genes to increase shelf life of plant products ✓ so that there is minimal waste ✓
- Selecting genes that delay ripening of fruits ✓ to meet the demand ✓ locally and internationally
- Using specific genes to improve nutritional value ✓ of food for better health ✓
- Using specific genes to introduce new traits in crops ✓ to suit specific needs ✓ of a population (e.g. to increase vitamin A in food)  any (6 x 2)  (12)
### ASSESSING THE PRESENTATION OF THE ESSAY

<table>
<thead>
<tr>
<th>Marks</th>
<th>Descriptions</th>
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<tbody>
<tr>
<td>3</td>
<td>Well structured – demonstrates insight and understanding of question</td>
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<tr>
<td>2</td>
<td>Minor gaps in the answer</td>
</tr>
<tr>
<td>1</td>
<td>Attempted but with significant gaps in the answer</td>
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<tr>
<td>0</td>
<td>Not attempted/nothing written other than question number</td>
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(3) (15) [40]

**TOTAL SECTION C:** 40

**GRAND TOTAL:** 150