CSSA

CATHOLIC SECONDARY SCHOOLS ASSOCIATION OF NSW
2020 TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION
BIOLOGY – MARKING GUIDELINES

Section I

20 marks

Questions 1-20 (1 mark each)

Question	Answer	Outcomes Assessed	Targeted Performance Bands
1	D	BIO12-14	2-3
2	D	BIO12-15	2-3
3	C	BIO12-15	2-4
4	D	BIO12-14, BIO12-2	2-4
5	A	BIO12-13	2-4
6	C	BIO12-12 BIO12- 5	2-5
7	B	BIO12-12 BIO12- 4	2-5
8	B	BIO12-14 BIO12- 1, 4	3-5
9	A	BIO12-13 BIO12- 7	3-5
10	A	BIO12-12, BIO12-6	3-5
11	C	B12-14 BIO12- 6	3-5
12	C	BIO12-13 BIO12- 7	3-5
13	A	BIO12-13, BIO12-5	3-5
14	D	BIO12-15, BIO12-4 and 5	3-5
15	A	BIO12-14 and 15, BIO12-5	3-5
16	B	BIO12-15, BIO12-5	3-5
17	B	BIO12-12, BIO12-5	3-5
18	B	BIO12-13 and 14, BIO12-6	4-6
19	C	BIO12-14, BIO12-5	4-6
20	D	BIO12-12, BIO12-5 and 6	4-6

Section II

80 marks

Question 21 (2 marks)

Outcomes Assessed: **BIO12-12, BIO12-7**

Targeted Performance Bands: 2-4

Criteria	Marks
• Describes a feature of fertilisation in a NAMED mammal	2
• Identifies a feature of fertilisation	1

Sample Answer:

For successful internal fertilisation to occur in humans, sperm needs to reach the egg (oocyte) in the fallopian tube.

Question 22 (4 marks)

Outcomes Assessed: **BIO12-13, BIO12- 7**

Targeted Performance Bands: 2-4

Criteria	Marks
• Identifies the possible outcomes of a mutation in coding and non-coding DNA segments and correctly explains each	4
• Identifies the possible outcomes of a mutation in coding and non-coding DNA segments and correctly explains one	3
• Identifies a possible outcome of a mutation in coding OR non-coding DNA segments and correctly explains one	2
• Some relevant information	1

Sample Answer:

Mutation	Possible Outcome	Explanation
Coding segment of DNA	Disease could result in individual as non-functional protein is produced.	The mutation resulted in a change in the amino acid produced which could result in a non-functional protein being made as the polypeptide sequence is different to the original sequence that should have been produced.
Non-coding segment of DNA	No effect on the organism	The mutation did not result in a change in polypeptide synthesis because the DNA is not involved in coding for a particular trait.

Note: other possible answers are acceptable for the possible outcomes as long as the explanation is correct. For example, the possible outcome for a mutation in the coding segment of DNA could also have no effect. The explanation for this being that more than one codon codes for the same amino acid.

Question 23 (2 marks)

Outcomes Assessed: **BIO12-15, BIO12- 7**

Targeted Performance Bands: 2-4

Criteria	Marks
• Outlines problems in the function of the kidney	2
• Identifies a function of the kidney	1

Sample Answer:

The presence of large proteins like albumin in urine indicates that kidney is not functioning as it should at the glomerulus. Only small molecules including urea should be filtered while large proteins should remain in the blood due to their size.

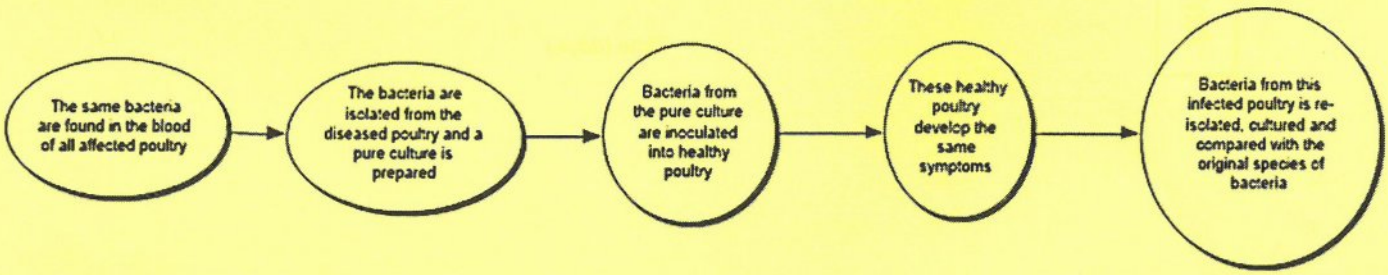
Question 24 (4 marks)

Outcomes Assessed: **BIO12-14, BIO12- 7**

Targeted Performance Bands: 2-5

Criteria	Marks
• Constructs a flowchart to demonstrate sequential steps using arrows, words, and/or diagrams • Includes all major steps in Koch's postulates	4
• Provides a list with all major steps in Koch's postulates	3
• Lists three steps in the correct sequence	2
• Provides some relevant information	1

Sample Answer:



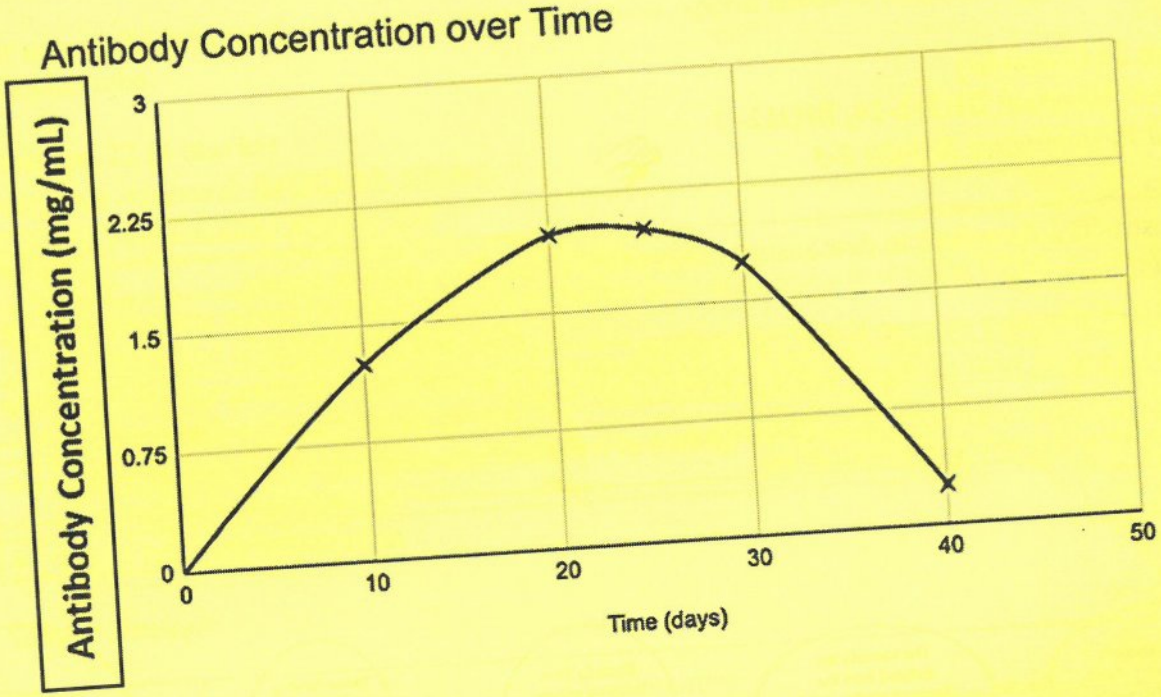
Question 25 (3 marks)

Outcomes Assessed: **BIO12- 6, BIO12- 7**

Targeted Performance Bands: 2-4

Criteria	Marks
• Constructs a curved line of best fit graph with: ○ axes labelled and scaled correctly ○ data plotted accurately	3
• Constructs a substantially correct graph	2
• Provides some relevant information	1

Sample Answer:



Question 26 (7 marks)

(a) (3 marks) ***Outcomes Assessed:*** **BIO12-12, BIO12-13, BIO12-7**

Targeted Performance Bands: 2-4

Criteria	Marks
• Demonstrates sound knowledge of plant reproduction and one named reproductive technology in agriculture • Clearly links knowledge of plant reproduction and the reproductive technology	3
• Demonstrates some knowledge of plant reproduction and one named reproductive technology in agriculture	2
• Names one reproductive technology OR • Outlines plant reproduction	1

Sample Answer:

Plants reproduce sexually by the process of pollination which is the transfer of pollen from the anther of one flower to the stigma of the same or a different flower. This knowledge allowed scientists to develop hybridisation by artificial pollination. Pollen from the anthers of a plant with favourable characteristics is transferred to the stigma of another plant with other favourable characteristics while preventing self-pollination. Example: Hybridisation in Australian wheat to select features such as narrow leaves to reduce water loss-suited to the dry Australian climatic conditions, improved yield and resistance to the fungal disease.

1

2

3

clonig

(b) (4 marks) ***Outcomes Assessed:*** **BIO12-13, BIO12-7**

Targeted Performance Bands: 2-4

Criteria	Marks
• Demonstrates knowledge of genetic modification in two named examples • Outlines benefits for society through use of genetic technology • Makes a judgement	4
• Demonstrates knowledge of genetic modification in one named example • Outlines a benefit for society through use of genetic technology • Makes a judgement	3
• Demonstrates knowledge of genetic modification in one named example • Outlines a benefit for society through use of genetic technology	2
• Provides some relevant information	1

Sample Answer:

transgenes

Golden rice is produced through genetic engineering techniques. Certain genes from daffodil and a bacterium are isolated and inserted into a rice genome to create Golden rice. Golden rice, unlike other rice contains beta carotene, which is converted to Vitamin A during metabolism. Vitamin A is required for healthy skin and good vision so Golden rice can be grown in developing countries where rice is a staple food. Genetically engineered rice is a great benefit to society.

Society has benefited from genetic engineering of bacteria to produce high quality insulin. The human insulin gene is isolated and inserted into the plasmids of bacteria. These transgenic bacteria are allowed to multiply and follow the instructions on the human gene and make human insulin. Humans with diabetes would need to have biochemically different insulin from pigs before genetic technology was developed. genetic modification has allowed diabetics to manage their disease and live a healthier life. Hence recombinant genetic modification has greatly benefited those members of society who are diabetic.

SNP - single base substitution (common type of variation possible)
haplotype - groups of SNPs and their various combinations tend to be inherited in groups (sub-groups = haplotype)

Question 27 (3 marks)

Outcomes Assessed: **BIO12-12, BIO12-5**

Targeted Performance Bands: **2-5**

Criteria	Marks
• Provides 2 valid conclusions that makes reference to the data and considers the sample size	3
• Provides a valid conclusion that makes reference to the data and/or considers the sample size	2
• Provides a valid conclusion	1

Sample Answer:

The table shows that the koala population in Campbelltown is the most genetically diverse as 4 haplotypes were identified even though only 24 koalas were tested. Three regions only had one haplotype, but in Tyagarah and Maitland only a small number of koalas were tested, and perhaps additional haplotypes might be identified if more koalas were tested. At Pine Creek we can be more certain of the lack of genetic diversity as the sample size was larger (50), but only one haplotype was detected.

Question 28 (3 marks)

Outcomes Assessed: **BIO12-14, BIO12-7**

Targeted Performance Bands:2-6

Criteria	Marks
• Describes a specific response to an infection in a named plant and explains how it increases the plant's chance of survival using cause and effect language	3
• Describes a specific response to an infection in a named plant	2
• Outlines a general response or symptom of infection in plants	1

Sample Answer:

Eucalyptus sideroxylon, or red ironbark produces a type of phytoalexin in response to infection. Phytoalexins have antimicrobial properties. There are different types, that work in a variety of ways to either inactivate the pathogen or reduce its ability to multiply and/or spread throughout the plant, thus increasing the plant's chance of survival.

Question 29 (4 marks)

Outcomes Assessed: **BIO12-12, BIO12-4, BIO12-5, BIO12-7**

Targeted Performance Bands: 2-6

Criteria	Marks
• Evaluates both the accuracy and effectiveness of the model demonstrating thorough knowledge of protein synthesis and clearly outlining which parts of the model are accurate/inaccurate and how the model is effective/ineffective	4
• Describes the accuracy and effectiveness of the model demonstrating sound knowledge of protein synthesis and outlining which parts of the model are accurate/inaccurate OR how the model is effective/ineffective	3
• Outlines the accuracy OR the effectiveness of the model and some aspect of the model that is accurate/inaccurate or effective/ineffective	2
• Provides some relevant information	1

Sample Answer:

The model shows the second stage of protein synthesis which is translation. During translation mRNA is used as a template. Anticodons of tRNA along with an amino acid bind to a corresponding codon of mRNA. Peptide bonds then form between the amino acids thus forming a polypeptide.

The model is not accurate as it contains the following errors:

Error 1: The model shows mRNA with the bases A, **T**, C and G. RNA contains the base uracil instead of thymine. The letter U should replace the letter T.

Error 2: The model does not show peptide bonds.

Error 3: Ribosome and tRNA are not drawn to scale (if drawn to scale the ribosome would be much larger in comparison to the tRNA).

The model is not effective at describing polypeptide synthesis. It is a model to explain translation. The process of transcription that precedes translation during polypeptide synthesis is not shown.

Question 30 (6 marks)

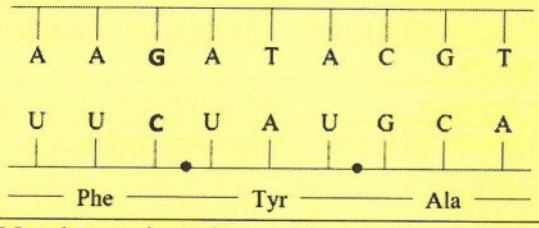
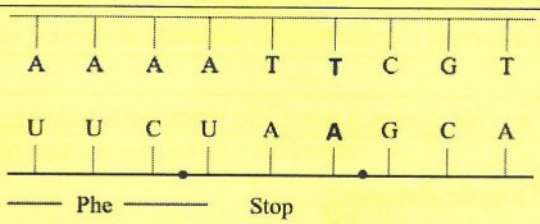
(a) (4 marks)

Outcomes Assessed: **BIO12-13, BIO12-7**

Targeted Performance Bands: 2-6

Criteria	Marks
• Draws labelled diagrams of two different point mutations	4
• Draws a labelled diagram of one other point mutation	3
• Uses a diagram to show a different point mutation	2
• Some relevant information	1

Sample Answer:

Type of point mutation	Silent mutation	Nonsense mutation
Diagram		
	No change in polypeptide sequence	Polypeptide synthesis stops due to STOP codon

Other responses may be accepted eg Frameshift mutation, Deletion, Insertion etc

(b) (2 marks)

Outcomes Assessed: **BIO12-13, BIO12-15, BIO12-7**

Targeted Performance Bands: 2-5

Criteria	Marks
• Describe the effects of a named genetic disease caused by a chromosomal mutation	2
• Gives details of a chromosomal mutation OR names a disease caused by a chromosomal mutation	1

Sample Answer:

A genetic disease caused by a chromosomal mutation is Down's syndrome. The effects of Down's syndrome may include short stature, intellectual disability and some characteristic facial features. This disorder arises as a result of a change in chromosome number. The individual has an extra copy of chromosome 21 caused by a random error in cell division.

Several Other answers may be accepted

- cystic fibrosis
- colour

Question 31 (6 marks)

(a) (2 marks)

Outcomes Assessed: **BIO12-15, BIO12-4, BIO12-5**

Targeted Performance Bands: 2-4

Criteria	Marks
• Correctly labels the amino acid and enzyme	2
• Correctly labels the amino acid OR enzyme	1

Sample Answer:

Amino acid = phenylalanine
Enzyme = phenylalanine hydroxylase

(b) (1 mark)

Outcomes Assessed: **BIO12-13, BIO12-15, BIO12-6**

Targeted Performance Bands: 2-4

Criteria	Mark
• Suggests a possible treatment/management strategy	1

Sample Answer:

Some possible responses could include. Other plausible responses may be accepted.
1. Include low levels of phenylalanine in diet by limiting the intake of foods rich in protein, such as meats, fish, eggs and dairy products.
2. Enzyme replacement therapy

(c) (3 marks)

Outcomes Assessed: **BIO12-15, BIO12-4, BIO12-5**

Targeted Performance Bands: 2-4

Criteria	Marks
• Identifies the correct profile • Explains 2 reasons why the profile is of a baby with PKU	3
• Identifies the correct profile • Gives a reason why the profile is of a baby with PKU	2
• Identifies the correct profile	1

Sample Answer:

Profile X because this profile shows that there is a high phenylalanine level (350µmol/L). This means that the baby does not have the enzyme phenylalanine hydroxylase in its blood. It is unable to make the enzyme due to a mutation in its DNA. The low tyrosine level at only 50µmol/L confirms this since its level would be greater if there was the enzyme phenylalanine hydroxylase which converts phenylalanine to tyrosine.

Question 32 (5 marks)

Outcomes Assessed: **BIO12-6**

Targeted Performance Bands: 2-4

(a) (1 mark)

Criteria	Mark
• Determines the mortality rate for Europe	1

Sample Answer:

7.56

(b) (3 marks)

Outcomes Assessed: **BIO12-14, BIO12-4, BIO12-5**

Targeted Performance Bands: 2-4

Criteria	Marks
• Outlines at least two relevant reasons why mortality rate **varies** across the different regions • Links reasons to the given data	3
• Outlines at least two relevant reasons why mortality rate **varies** across the different regions	2
• Some relevant information	1

Sample Answer:

Africa region has a very high mortality rate due to TB possibly due to (any ONE of the following):

- a lack of vaccination program so higher incidence leading to higher mortality rate
- a lack of education program that informs people of transmission modes of the disease so higher incidence leading to higher mortality rate
- a lack or shortage of public health care facilities where treatment can be accessed leading to higher mortality rate
- inability to afford the high cost of antibiotics and chronic shortage of drugs that are required to treat TB leading to higher mortality rate

AND

Western Pacific region has a low mortality rate due to TB possibly due to (any ONE of the following):

- national immunisation programs so low incidence leading to lower mortality rate
- many public health initiatives that informs people of transmission modes of the disease so lower incidence leading to lower mortality rate
- robust public and private health care facilities where treatment can be accessed at reasonable costs or free of cost leading to lower mortality rate

(c) (1 mark)

Outcomes Assessed: **BIO12-14, BIO12-1, BIO12-6**

Targeted Performance Bands: 4-6

Criteria	Mark
• Suggests a reason regarding controlling and preventing the spread of TB in some WHO regions.	1

Sample Answer:

Africa has a high population and many families live in close proximity (congested housing) which is likely to have caused 70000 cases in 2017.

OR

In the South-East Asia region 44900 cases may have been the result of very densely and highly populated areas.

Other appropriate answers to be accepted

Question 33 (4 marks)

(a) (1 mark)

Outcomes Assessed: **BIO12-12, BIO12-4, BIO12-7**

Targeted Performance Bands: 3-4

Criteria	Mark
• Uses correct symbols for both alleles by identifying the dominant and the recessive • Correctly states the genotypes of the two individuals	1

Sample Answer:

3 – X^rY 9 – X^RX^r

(b) (3 marks)

Outcomes Assessed: **BIO12-12, BIO12-6**

Targeted Performance Bands: 3-5

Criteria	Marks
• Correctly identifies the type of inheritance • Correctly identifies the genotype of the father and the mother • Uses cause and effect language to link the father's genotype to his daughters'	3
• Correctly identifies the type of inheritance • Correctly identifies the genotype of the father and the mother	2
• Provides some relevant information	1

Sample Answer:

Rickets is a genetic disease that is caused by a dominant allele carried on the X chromosome. Since Individual 1 is an affected male then his genotype would be X^RY and therefore the only allele he would pass on to his daughters is X^R. Since the affected allele is dominant all the daughters will have the disease since only one mutant allele on the X chromosome causes the disease.

Question 34 (5 marks)

Outcomes Assessed: BIO12-15, BIO12-1, BIO12-2

Targeted Performance Bands: 2-6

Criteria	Marks
• Identifies correct hypothesis • Describes a valid study incorporating the following: - large sample size, control group, some control of other variables, some statistical analysis and interpretation of data	5
• Identifies correct hypothesis • Describes THREE features of a valid study	4
• Identifies correct hypothesis • Outlines THREE features of a valid study	3
• Identifies correct hypothesis AND a feature of a valid study OR • Describes TWO features of a valid study	2
• Some relevant information	1

Sample Answer:

Hypothesis: Smoking e-cigarettes causes lung disease in the long term.
One method would be to set up a cohort study. Find a large group of smokers (about 10, 000 people) and a similar size group of non-smokers. Ensure that both groups have similar gender and age composition, and that both start the study with a similar distribution of general health conditions.
Follow each group over 20 – 30 years and record the incidence of development of lung disease. At the end of the study calculate the percentage of smokers who develop a lung disease and compare it to the percentage of non-smokers who develop a lung disease.

Question 35 (8 marks)

(a) (2 marks)

Outcomes assessed: BIO12-12, BIO12-5, BIO12-6

Targeted Performance Bands: 3-6

Criteria	Marks
• Correctly identifies the type of inheritance • Provides correct justification	2
• Correctly identifies the type of inheritance	1

Sample Answer:

Incomplete dominance. The heterozygote shows a third phenotype (grey feathers) different from that of the parents (black feathers and splashed-white feathers). This third phenotype is a blend of the parents' phenotypes.

(b) (3 marks)

Outcomes assessed: BIO12-12, BIO12-7

Targeted Performance Bands: 3-6

Criteria	Marks
• Draws a Punnett square using correct notation using correct parent genotypes • States the phenotypes of the offspring accurately	3
• Draws a Punnett square using correct parent genotypes OR using correct notation • States the phenotypes of the offspring accurately	2
• Provides some relevant information	1

Sample Answer:

Parents phenotypes male, non-barred x female, barred

Parents genotypes Z^aZ^a Z^AW

	Z^A	W
Z^a	Z^AZ^a	Z^aW
Z^a	Z^AZ^a	Z^aW

All male offspring genotype = Z^AZ^a

All female offspring genotype = Z^aW

(c) (3 marks)

Outcomes assessed: BIO12-12, BIO12-13, BIO12-6

Targeted Performance Bands: 4-6

Criteria	Marks
• Explains the outcomes of the program with reference to barred feathers • Describes a relevant breeding program	3
• Describes a relevant breeding program	2
• Provides any relevant information	1

Sample Answer:

To find out the genotype of the male barred (Z^AZ^A or Z^AZ^a) the farmer should perform a test cross with non-barred female (Z^aW).

- if all offspring barred, then it must be Z^AZ^A / homozygous.
- if some offspring non-barred, then it must be Z^AZ^a / heterozygous.

Question 36 (7 marks)

Outcomes Assessed: BIO12-13, BIO12-4, BIO12-7

Targeted Performance Bands: 2-6

Criteria	Marks
• Demonstrates an extensive knowledge of IVF and AI in agriculture, including benefits and disadvantages of each • Describes the economic benefits that IVF could provide over AI with reference to information provided • Provides a thorough justification • Communicates logically and succinctly with precise biological terms	7
• Demonstrates a thorough knowledge of IVF and AI in agriculture, including benefits and disadvantages of each • Outlines the economic benefits that IVF could provide over AI with reference to information provided • Makes a suitable judgement • Communicates logically using biological terms	6
• Demonstrates a sound knowledge of IVF and AI in agriculture, including benefits and disadvantages of each • Outlines the economic benefits of IVF OR AI • Communicates effectively using biological terms OR • Demonstrates a sound knowledge of IVF and AI in agriculture, including benefits and disadvantages of each • Outlines an economic benefit of IVF OR AI • Makes a supported judgement • Communicates effectively using biological terms	5
• Demonstrates a sound knowledge of benefits/disadvantages of IVF and AI in agriculture • Outlines an economic benefit of IVF OR AI • Communicates effectively using biological terms	4
• Demonstrates some knowledge of IVF AND/OR AI • Outlines the economic benefits of IVF OR AI	2-3
• Some relevant information	1

Sample Answer:

Artificial Insemination (AI) is a simple technique by which semen containing sperm from a male with desirable characteristics is inserted into the reproductive tract of a female with desirable characteristics. AI is conducted in farm animals as it has the capacity to produce offspring with favourable characteristics.

In Vitro Fertilisation (IVF) is a procedure whereby an egg is fertilized by sperm in a test tube or elsewhere outside the body.

Benefits of IVF over AI:

AI can be less precise when compared to IVF as IVF could select both the best sperm and oocytes for the production of offspring. With AI, there are varieties in sperms and only some may carry genes for desired characteristics.

IVF has the potential to be able to select for gender in the offspring while AI cannot.

IVF allows a cow with desirable traits to produce more calves in her lifetime than with AI. Her eggs can be used in surrogates to produce the offspring with the desired traits.

IVF can be beneficial in times of drought as the embryos from the desirable parents can be frozen and saved for the regeneration of superior cattle when optimal conditions occur.

Benefits of AI over IVF:

AI requires less specialised equipment than IVF.

AI is less costly compared to IVF.

For IVF to occur successfully, highly trained staff are needed as well as facilities, equipment and drugs whereas AI is a relatively simple process.

IVF may also have lower success rates of pregnancy than AI as AI has been used successfully in cattle for many years.

Economic benefits: (Only two required)

If the eggs could be harvested from the juvenile instead of from the sexually mature cows, as stated in the stimulus, the farmers would produce offspring from desirable cows in less time which will save money as it reduces the time from one generation to another. This would increase the frequency of the desired traits required by the agricultural industry in less time.

If this procedure could be applied in other agricultural animals, such as pigs, it could further benefit the industry by reducing costs and time to produce desired offspring.

It could also allow farmers to more efficiently use the herd by using the using the cows with the desirable traits as donors and using the cows with less desirable traits as surrogates.

From the information provided and after comparing the benefits of AI and IVF it is clear that IVF has greater advantages and economic benefits than AI in the agriculture industry.

Question 37 (7 marks)

Outcomes Assessed: **BIO12-15, BIO12- 3, BIO12- 5, BIO12- 7**

Targeted Performance Bands: 2-6

Criteria	Marks
• Explains the cause of a visual disorder • Explains the use of a technology used to treat or manage the disorder • Describes the process of secondary source data collection • Describes how relevance of secondary source information is ensured • Describes how reliability of secondary source information is ensured • Communicates logically and succinctly with precise biological terms	7
• Explains the cause a visual disorder • Explains the use of a technology used to treat or manage the disorder • Describes how relevance of secondary source information is ensured • Describes how reliability of secondary source information is ensured • Communicates logically using biological terms	6
• Describes a visual disorder • Describes a related technology used to manage or assist the effect of the disorder • Describes how reliability OR relevance of secondary source information is ensured • Communicates effectively using biological terms	5
• Describes a visual disorder • Describes a related technology used to manage or assist the effect of the disorder • Outlines the use of a technology used to treat or manage the disorder • Outlines how reliability OR relevance of secondary source information is ensured	4
• Names a visual disorder • Names a technology used to treat or manage the disorder • Outlines how reliability OR relevance of secondary source information is ensured	2-3
• Some relevant information	1

Sample Answer:

A cataract is a visual disorder caused by the clouding of the lens of the eye due to clumping of the protein in the lens. A symptom of a cataract developing is blurred vision. The development of a cataract will also make light from the sun or lamps seem too bright or glary and can cause a total loss of sight. Cataracts develop over a prolonged period and the degree of a cataract depends on factors such as lifestyle, age or disease (diabetes mellitus).

The technology used to prevent blindness from cataracts is the replacement of the cloudy lens with an artificial intraocular lens (IOL). One method is phacoemulsification where a small incision is made where the cornea meets the sclera. A probe is then inserted which emits high frequency vibration that breaks the lens into pieces. The lens is then suctioned out and replaced with an intraocular lens. The incision requires no stitches.

Question 37 (7 marks)

Outcomes Assessed: **BIO12-15, BIO12- 3, BIO12- 5, BIO12- 7**

Targeted Performance Bands: 2-6

Criteria	Marks
• Explains the cause of a visual disorder • Explains the use of a technology used to treat or manage the disorder • Describes the process of secondary source data collection • Describes how relevance of secondary source information is ensured • Describes how reliability of secondary source information is ensured • Communicates logically and succinctly with precise biological terms	7
• Explains the cause a visual disorder • Explains the use of a technology used to treat or manage the disorder • Describes how relevance of secondary source information is ensured • Describes how reliability of secondary source information is ensured • Communicates logically using biological terms	6
• Describes a visual disorder • Describes a related technology used to manage or assist the effect of the disorder • Describes how reliability OR relevance of secondary source information is ensured • Communicates effectively using biological terms	5
• Describes a visual disorder • Describes a related technology used to manage or assist the effect of the disorder • Outlines the use of a technology used to treat or manage the disorder • Outlines how reliability OR relevance of secondary source information is ensured	4
• Names a visual disorder • Names a technology used to treat or manage the disorder • Outlines how reliability OR relevance of secondary source information is ensured	2-3
• Some relevant information	1

Sample Answer:

A cataract is a visual disorder caused by the clouding of the lens of the eye due to clumping of the protein in the lens. A symptom of a cataract developing is blurred vision. The development of a cataract will also make light from the sun or lamps seem too bright or glary and can cause a total loss of sight. Cataracts develop over a prolonged period and the degree of a cataract depends on factors such as lifestyle, age or disease (diabetes mellitus).

The technology used to prevent blindness from cataracts is the replacement of the cloudy lens with an artificial intraocular lens (IOL). One method is phacoemulsification where a small incision is made where the cornea meets the sclera. A probe is then inserted which emits high frequency vibration that breaks the lens into pieces. The lens is then suctioned out and replaced with an intraocular lens. The incision requires no stitches.

In order to investigate cataracts and the technology used to assist the effects of cataract, we conducted a secondary source investigation.

Investigation to collect secondary data or information

First, we determined the type of information that is required to be collected and clarified the definition of the term "cataract". Next we located appropriate resources like the internet, textbooks, videos and scientific journals. From these resources we **selected** relevant, valid, reliable and current information about technology used to treat cataract. We finally **extracted** and collated summaries of the information by note-taking and after carefully organising this, prepared for presentation.

Ensuring relevance and reliability of the sources used

Information was selected only if the findings were **relevant** and related to the topic about cataracts and the technology used to treat cataracts. Only information that was applicable to cataracts and cataract surgical procedures was used for this investigation.

In order to evaluate the **reliability** of information, we compared information about cataracts and cataract surgery from a number of **reputable** sources, including science textbooks, .gov and .edu websites, videos from educational sources and online scientific journals to verify that the information in these various sources was **consistent** ie. was supported by that found in other sources.

Note: The above is a possible answer. A variety of different responses would be acceptable.