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Biology marking guide and response

Sample external assessment 2020

Science (95 marks)

Assessment objectives

This assessment instrument is used to determine student achievement in the following objectives:

1. describe and explain biodiversity, ecosystem dynamics, DNA, genes and the continuity of life, and the continuity of life on Earth
2. apply understanding of biodiversity, ecosystem dynamics, DNA, genes and the continuity of life, and the continuity of life on Earth
3. analyse evidence about biodiversity, ecosystem dynamics, DNA, genes and the continuity of life, and the continuity of life on Earth to identify trends, patterns, relationships, limitations or uncertainty
4. interpret evidence about biodiversity, ecosystem dynamics, DNA, genes and the continuity of life, and the continuity of life on Earth to draw conclusions based on analysis.

Note: Objectives 5, 6 and 7 are not assessed in this instrument.

Introduction

The Queensland Curriculum and Assessment Authority (QCAA) has developed mock external assessments for each General senior syllabus subject to support the introduction of external assessment in Queensland.

An external assessment marking guide (EAMG) has been created specifically for each mock external assessment.

The mock external assessments and their marking guides were:

- developed in close consultation with subject matter experts drawn from schools, subject associations and universities
- aligned to the external assessment conditions and specifications in General senior syllabuses
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Purpose

This document consists of an EAMG and an annotated response.

The EAMG:

- provides a tool for calibrating external assessment markers to ensure reliability of results
- indicates the correlation, for each question, between mark allocation and qualities at each level of the mark range
- informs schools and students about how marks are matched to qualities in student responses.

The annotated response:

- demonstrates the qualities of a high-level response
- has been annotated using the EAMG.

Mark allocation

Where a response does not meet any of the descriptors for a question or a criterion, a mark of ‘0’ will be recorded.

Where no response to a question has been made, a mark of ‘N’ will be recorded.

External assessment marking guide

Paper 1: Multiple choice

Question	Response
1	B
2	D
3	B
4	A
5	D
6	A
7	D
8	D
9	B
10	D
11	A
12	A
13	B
14	B
15	C
16	D
17	D
18	C
19	B
20	D
21	C
22	B
23	C
24	C
25	B

Paper 1: Short response (25 marks)

Question		Sample response	The response	Notes
26		Mutations result from environmental pressures over time and result in new alleles in a population. Mutations that enhance survival will result in a selection advantage. The frequency of particular alleles may vary within a species.	• identifies that mutations – result in new alleles [1 mark] – result in selective advantage [1 mark] – result from environmental pressures over time [1 mark] – result from small scale variation of allele frequencies within species [1 mark]	
27	a	Although Strain M1 and M2 appear to have achieved higher selection coefficient for competitive ability, the error bars overlap with the result for the wild type. Therefore, no difference in results can be confidently identified. Growth rate and maximal growth rate for the WT strain were similar to M1 and M2 strains.	• identifies that error bars overlap and therefore there is no difference in results [1 mark] • provides a conclusion from the data about competitive ability and growth rate being similar for WT and M1/M2 strains [1 mark]	
	b	There was no significant difference in the maximal growth rate between mutant and wild type bacteria. The mutations did not provide a selective advantage.	• identifies that there was no significant difference in maximal growth rate[1 mark] • identifies that the mutations did not provide a selective advantage [1 mark]	
28	a	Species C and D.	• provides C and D [1 mark]	
	b	There would have been divergent diversification.	• provides divergent [1 mark]	
	c	TT = 25% Tt = 50% tt = 25%	• provides TT = 25%, Tt = 50% and tt = 25% [1 mark] • provides Trait 1 = 75% and Trait 2 =	

Question		Sample response	The response	Notes
		Phenotype 1 = 75% Phenotype 2 = 25% Inheritance pattern for Phenotype 1 is autosomal dominant.	25% [1 mark] • provides autosomal dominant for inheritance pattern [1 mark]	
29	a	Evidence of a biotic change is that the species diversity decreases in strata 3, 4 and 5. The evidence in each stratum is different. This could indicate that abiotic changes (linked to strata types) influenced the diversity of species. Another piece of evidence of a change to the ecosystem is that the species types change after stratum 6.	• identifies evidence of a biotic change [1 mark] • identifies evidence of an abiotic change [1 mark] • identifies evidence of another abiotic change or another biotic change [1 mark]	Acceptable evidence of biotic change may include – species types change after stratum 6 – stratum 1 has the highest count of organisms – species diversity decreases in strata 3, 4 and 5. – … Acceptable evidence of abiotic change may include – the evidence in each stratum is different – …
	b	$D = \frac{s}{\sqrt{N}}$ $D = \frac{4}{\sqrt{6}}$	• shows substitution correctly performed [1 mark]	
		D = 1.6	• provides 1.6 for D [1 mark]	

Question		Sample response	The response	Notes
	c	Not all biota are preserved as fossils.	• identifies a limitation [1 mark]	Acceptable limitations may include – not all biota are preserved as fossils – two species that may look similar may not be distinguishable in the fossil record – the fossils that are preserved are not a representative sample – ....

Question	Sample response	The response	Notes
30	Surveying technique: line transect, positioned in the direction of the environmental gradient. Provides a good method of visualising change along a gradient. Provides less data on relative density of individual species Sampling method: systematic sampling. Taking samples at fixed intervals allows a clear environmental gradient to be established. If a minimum number of samples which should be taken to be representative isn't estimated before commencing the survey, the cost per unit effort will be disproportionately high.	• identifies a valid technique [1 mark] • identifies a strength of the technique [1 mark] • identifies a limitation of the technique [1 mark] • identifies systematic sampling as the sampling method [1 mark] • identifies a strength of systematic sampling [1 mark] • identifies one limitation of systematic sampling [1 mark]	Valid techniques are – belt transect – point line transect. Acceptable strengths may include – provides a good method of visualising change along a gradient – can be completed quickly – allows for comparison of limitations – .... Acceptable limitations may include – provides less data on relative density of individual species – a continuous line transect could be very time consuming if there is dense plant cover – .... Acceptable strengths may include – that it allows a clear environmental gradient to be established can be completed quickly – ... Acceptable limitations may include – potential cost of collecting a representative sample – ...

Paper 2: Short response (45 marks)

Question	Sample response	The response	Notes
1	Region/s of DNA that are made up of nucleotides.	• defines gene [1 mark]	Acceptable definitions are – region/s of DNA that are made up of nucleotides – the molecular unit of heredity.
2	The process of classifying an old growth forest (based on its dominant tree species and specific old-growth characteristics) enables managers/decision makers to make decisions about its management. Agreement about the classification allows stakeholders to make decisions to serve a wide range of values. Classification helps to support effective management of activities such as prescribed burning. Classification of ecosystems helps to support understanding of their unique interactions and therefore the effect of specific human impacts. This can lead to longer term resilience.	• identifies that classification enables decision making [1 mark] • identifies that decisions serve a range of values [1 mark] • identifies an effective management technique [1 mark] • identifies that classification supports long-term ecosystem resilience [1 mark]	Also accept other valid responses. Effective management techniques may include – prescribed burning – control and removal of exotic species – designing special harvest plans – conservation and recreational use.

Question	Sample response	The response	Notes
3	DNA is usually circular in prokaryotes and linear in eukaryotes. This is because prokaryotes evolved first. The genome of prokaryotes is significantly smaller than eukaryotes, i.e. the prokaryotes genome only contains a single copy of each gene. This results in fewer noncoding sequences for prokaryotes.	• identifies two differences [2 marks] OR • identifies one difference [1 mark] • explains two of the identified differences [2 marks] OR • explains one of the identified differences [1 mark]	Differences and explanations may include – eukaryotes wrap their DNA around proteins called histones. Most prokaryotes do not have histones. In eukaryotes, histones help package DNA into smaller spaces, whereas prokaryotes compress their DNA to fit into smaller spaces through supercoiling – extrachromosomal plasmids encode nonessential prokaryotic genes; these are not commonly present in eukaryotes. This is because the DNA in eukaryotes is larger and contains a higher percentage of noncoding genetic material – prokaryotic DNA is located in the cytosol, whereas DNA is found in chromosomes (the nucleus) in eukaryotes. This means that transcription and translation occur simultaneously in prokaryotes, whereas, in eukaryotes, transcription occurs in the nucleus and translation in the cytoplasm. – …
4	A restriction enzyme (endonuclease) is chosen to digest (cut) the selected plasmid at, or near, the recognition site. The same restriction enzyme (endonuclease) is used to digest (cut) the target gene fragment. This usually produces complementary ‘sticky ends’ that join by base pairing after target gene is inserted. DNA ligase is then used to catalyse a reaction which links the phosphate group of one DNA strand to the hydroxyl group of the other DNA strand to form a single sugar-phosphate backbone/combined piece of DNA.	• describes the role of the restriction enzyme and the – plasmid [1 mark] – target gene [1 mark] • describes the insertion of the target gene [1 mark] • describes the joining of the DNA fragment [1 mark]	

Question		Sample response	The response	Notes
5		Homologous chromosomes are chromosome pairs inherited from each parent. They are similar in gene position but may contain different alleles. Homologous chromosomes line up with the orientation of each homologous pair being random - not affected by the orientation of any other homologous pair. One of each homologous chromosome moves to a different pole of the cell, independent of each other, eventually into separate gametes. The gametes produced at the end of meiosis contain a mixture of maternal and paternal genes and leads to variation in the offspring produced.	• identifies relevant features of homologous chromosomes [1 mark] • identifies that pairs of homologous chromosomes randomly orient [1 mark] • identifies that assortment of chromosomes into the gametes occur independently of each other [1 mark] • identifies cells produced at end of meiosis contain a mixture of maternal and paternal genes and provides the variation [1 mark]	Also accept a correctly annotated diagram.
6	a	Changes to the sex chromosomes	• identifies the change [1 mark]	Acceptable changes are – changes to the sex chromosomes – changes to chromosome pair 23 – absent Y chromosome.
	b	Turner syndrome	• provides Turner syndrome [1 mark]	
7	a	There is a common ancestor.	• identifies a correct assumption [1 mark]	Acceptable assumptions are – there is a common ancestor/ancestry – each branch bifurcates/divides into two branches – there is always a physical change.
	b	*C. psittacula* It has the shortest genetic distance from the common ancestor.	• identifies *C. psittacula* [1 mark] • provides a valid reason [1 mark]	

Question		Sample response	The response	Notes
	c	Genetic distance is less than 0.02, indicating a high level of DNA similarity.	• identifies degree of similarity [1 mark]	
	d	Two other types of evidence are comparative genomic data and comparative anatomy.	• identifies comparative genomic data [1 mark] • identifies comparative anatomy [1 mark]	
8	a	A: assimilation of food by the organisms at the trophic level. F: energy lost in the form of faeces and other excretory products	• identifies the transfer at A [1 mark] • identifies the transfer at F [1 mark]	
	b	Autotrophs convert solar radiation to chemical energy via photosynthesis. Chemical energy transferred from autotroph to herbivore via assimilation or consumption.	• correctly explains the transformation [1 mark] • correctly explains the transfer [1 mark]	
	c	The processes are more efficient than subsequent transfer processes.	• explains that later trophic energy transfers are less efficient [1 mark]	
9		Pioneer species such as grasses grow back first. Fast growing trees develop while shade-tolerant species develop in the understory. The sere is overtaken by a dominant climax species.	• correctly explains the first stage of succession [1 mark] • correctly explains the second stage of succession [1 mark] • correctly explains the third stage of succession [1 mark]	
10	a	Cassowary	• identifies cassowary as keystone species [1 mark]	

Question		Sample response	The response	Notes
	b	The ecosystem will collapse. Seeds of fruit trees are not dispersed and all other organisms in the ecosystem rely on fruit trees.	• identifies that ecosystem will collapse [1 mark] • provides a valid reason [1 mark]	
	c	The mechanism that would most likely influence gene flow would be geographical isolation. Species which are separated geographically may find it difficult to breed, thus reducing gene flow. Also, species which are separated geographically may have reduced fitness and fecundity.	• correctly identifies mechanism [1 mark] • provides reduced gene flow as a reason [1 mark] • provides reduced fitness as a reason [1 mark]	Acceptable mechanisms are – geographical isolation – ecological isolation.
11	a	In both forests, soil respiration is lowest in January and highest in July. Also, in both forests, litterfall is lowest in December and highest in October. However, the range of soil respiration in the secondary forest (SF) is lower compared to the primary forest (PF). This is because there is less biomass in the soil of the secondary forest (SF).	• identifies a valid similarity of soil temperature data [1 mark] • identifies a valid similarity of litterfall data [1 mark] • identifies a valid difference in trends [1 mark] • identifies a valid significance of the trends [1 mark]	Accept other valid similarities, differences and significances, e.g. both forests exhibited similar temporal variations.
	b	Carrying capacity would increase leading to increased levels of litterfall. This is because nutrients for primary producers are a density-independent factor.	• identifies a valid effect [1 mark] • provides a valid reason [1 mark]	Accept other valid effects and reasons, e.g. – effect: the carrying capacity of soil microorganisms may increase – reason: increasing the availability of nutrients may enhance litter decomposition which would have an increased positive effect on soil respiration.

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

Paper 1: Short response(30 marks)

Question		Sample response	The response	Notes
21		$N = \frac{26 \times 50}{10}$ N = 130	• shows substitution correctly performed [1 mark] • calculates population size [1 mark]	Allow follow-through error for population size.
22	a	House mouse and New Holland mouse are early successional species taking advantage of the habitat created by the pioneer plants as indicated by their rapid population growth in the first two years. Brown antechinus populations increase after the drop in mouse numbers, indicating possible competition for the same resources. Bush rat populations are low throughout, there is a small increase at the same time as the mouse and antechinus, then a decline as they are possibly occupying a similar niche and are not as competitive.	• identifies three valid relationships [3 marks] OR • identifies two valid relationships [2 marks] OR • identifies one valid relationship [1 mark]	Acceptable valid relationships may include: – brown antechinus and Northern brown bandicoot succeed over time, possibly due to occupying different niches – brown antechinus and Northern brown bandicoot regulate house mouse and New Holland mouse populations – …

Question		Sample response	The response	Notes
	b	Brown antechinus will be the most abundant species. This is because brown antechinus numbers have steadily increased to become the most abundant over time after their initial drop.	• identifies brown antechinus as the most abundant species [1 mark] • provides a valid reason [1 mark]	Acceptable valid reasons may include – brown antechinus numbers have steadily increased over time and were the most abundant in year 5. – house mouse and New Holland mouse populations peaked two years after the fire, and may have been outcompeted for available resources. – bush rat numbers showed an initial increase and in decline with numbers consistently lower than Brown antechinus for the 5 years. – northern brown bandicoot numbers increased but peaked at a lower number than antechinus. – …
23		1. Microhabitat occupation by individuals of a population may drive local extinctions or microevolution. 2. When managing ecosystems, it is important to understand how disturbances will affect microhabitats within an ecosystem differently.	• provides two valid reasons [2 marks] OR • provides one valid reason [1 mark]	Acceptable valid reasons may include – the variety of habitats will influence sampling. – disturbances to microhabitats may cause local extinctions or microevolution. – …
24		UV radiation changes the DNA structure, e.g. bends the DNA, causing the DNA to be read incorrectly and leading to mutation. UV radiation breaks the DNA molecule potentially causing a mutation, e.g. cancer, if DNA repair doesn't occur.	• explains how changes in DNA structure cause mutations [1 mark] • explains how breaks in DNA cause mutations [1 mark]	

Question	Sample response	The response	Notes
25	Evolutionary radiation: Ordovician Mass extinction: Ordovician-Silurian	• identifies a correct geological period for evolutionary radiation [1 mark] • identifies a correct geological period for mass extinction [1 mark]	Periods of evolutionary radiation are – Ordovician – Cretaceous – Palaeogene – Cambrian – Triassic. Periods of mass extinction are – Ordovician-Silurian/end of Ordovician – Devonian-Carboniferous/end of Devonian – Permian-Triassic/end of Permian – Triassic-Jurassic/end of Triassic – Cretaceous-Palaeogene/end of Cretaceous.
26	1. Over-exploitation. Endangered species due to harvesting species from the wild at rates faster than natural populations can recover. 2. Habitat change. Reduced populations due to loss of natural habitat.	• identifies over-exploitation as a driver [1 mark] • identifies the direct impact of over-exploitation [1 mark] • identifies habitat change as a driver [1 mark] • identifies the direct impact of habitat change [1 mark]	
27	*P.pardus* is more closely related to *P.tigris* as they have a more recent common ancestor.	• identifies P.pardus is more closely related [1 mark] • provides a valid reason [1 mark]	

Question		Sample response	The response	Notes
28	a	Population M and R could form new species because they would both be genetically/reproductively isolated. The effect of genetic drift is strongest in smaller populations, so both population M and R are more likely to be affected by this, creating divergence and possible speciation.	• identifies that population M could form a new species [1 mark] • identifies that population R could form a new species [1 mark] • provides a valid reason for population M & R (isolated populations) [1 mark] • provides a second valid reason for population M & R (size of population and genetic drift) [1 mark]	
	b	Population T would gain a selective advantage. Prior to isolation, T would have the greatest diversity of genotypes due to the highest amount of gene flow. T has the largest population; therefore, it has a higher probability of survival and reproduction.	• identifies the population T would gain a selective advantage [1 mark] • provides two valid reasons [2 marks]	
29		Genotype of IV-4 = X^DX^d Genotype of mate = X^dY Possible genotypes of offspring: X^DX^d, X^dX^d, X^DY, X^dY Probability of male with syndrome — 25%.	• identifies X^DX^d as genotype of individual IV-4 [1 mark] • identifies X^dY as genotype of mate [1 mark] • states X^DX^d, X^dX^d, X^DY, X^dY as the genotypes of offspring [1 mark] • provides 25% as the probability of offspring being male with the syndrome [1 mark]	Allow follow-through error for genotypes of offspring and probability of male with trait.

Paper 2: Short response (43 marks)

Question	Sample response	The response	Notes
1	In parapatric speciation, two subpopulations of a species evolve reproductive isolation from each other but continue to exchange genes. There is no specific barrier to gene flow so the population is continuous, but has non-random mating. A smaller population is isolated, usually at the periphery of a larger group, with unequal gene flow remaining between the two populations.	• describes two subpopulations with reproductive isolation and gene exchange [1 mark] • describes the population as continuous with non-random mating [1 mark] • describes a one of the subpopulations as smaller with unequal gene flow between the two populations [1 mark]	
2	1. Rank-based structure of classifying organisms. 2. Three kingdoms, divided into phyla/division, classes, orders, families, genera and species. With an additional rank below species. 3. Uses binomial nomenclature to name classified organisms at the Genus species level. 4. Uses morphological features of organisms to create groups according to their similarities/features of the groups become more similar at each lower taxon.	• provides four features of the Linnaean system of classification [4 marks] OR • provides three features of the Linnaean system of classification [3 marks] OR • provides two features of the Linnaean system of classification [2 marks] OR • provides one feature of the Linnaean system of classification [1 mark]	Four features of the Linnaean system are: – hierarchical structure – three kingdoms – binomial nomenclature – use of morphological features.

Question	Sample response	The response	Notes
3	1. Maintains biodiversity. 2. Controls populations.	• identifies two roles [2 marks] OR • identifies one role [1 mark]	Acceptable roles may include: – maintains biodiversity – controls populations – provides critical resources for a wide range of species – maintains balance of ecological relationships.
4	Secondary succession has occurred. The process of succession was started by harvesting which occurred at sere 2. The soil was not destroyed. This is a main difference between primary and secondary succession. In seres 3 to 5 we can see that pioneer species are replaced with climax species.	• identifies secondary succession [1 mark] • identifies start of process at sere 2 [1 mark] • identifies that soil is not destroyed [1 mark] • identifies that climax species overtake pioneer species in sere 3 to 5 [1 mark]	
5	An inherited genotype variation is a permanent alteration in the DNA sequence. Variations can cause no change, a small change or a large change in phenotypes. Changes in control genes can cause major changes in body morphology.	• identifies that inherited genotype variations are permanent alterations in the DNA sequence [1 mark] • identifies that inherited genotype variations can be none, small or large [1 mark] • identifies that inherited genotype variations change control genes [1 mark]	Accept gene or genotype instead of DNA sequence. Also accept valid examples for control genes.

Question	Sample response	The response	Notes
6	Reduced genetic diversity results in increased levels of inbreeding leading to lower levels of individual fitness, e.g. reduced fecundity results in lower numbers of healthy offspring. A decrease in the variety of inheritable alleles decreases population's ability to evolve. Reduced genetic diversity results in a reduction in the genetic ability of the species to adapt to environmental changes.	• explains that reduced genetic diversity results in – lower levels of individual fitness [1 mark] – decreased genetic ability of a population to evolve [1 mark] – reduced genetic ability to adapt to environmental changes [1 mark]	
7	Fragment lengths of greater than 35 base pairs show success rates over 80%. Loci 2, 3 and 4 could all be used to obtain successful amplification data.	• Identifies that fragment lengths of over 35bp are required for PCR success of over 80% [1 mark] • identifies loci 2, 3 and 4 can all be used for successful amplification [1 mark]	Also accept base pairs for bp. Also accept: – fragments lengths of over 35bp have higher rates of PCR success – fragment lengths of 85 base pairs have the highest success rate (i.e. almost 100%).

Question	Sample response	The response	Notes
8	The purpose of the field investigation is to assess the vertical vegetation structure by considering the vegetation cover. The ecological surveying technique used would be a point transect. The sampling size would be determined by a sampling fraction. Bias would be minimised by calibrating the equipment used to measure the vegetation cover. The data would be presented as a bar graph with associated errors bars. Data analysis would use standard error or confidence intervals.	• describes the purpose in terms of the vegetation structure and a dependent variable [1 mark] • identifies an ecological surveying technique [1 mark] • describes – sampling process [1 mark] – minimisation of bias [1 mark] – presentation of data [1 mark] – analysis of data [1 mark]	Examples of vegetation structure are: – vertical – horizontal. Examples of dependent variables may include: – number/width/density of vegetation layers – maximum canopy height – leaf area index. Accept other suitable responses that allow for collection of categorical/ordinal data based on the stimulus. Response will need to align to the purpose selected. Do not accept randomisation/random sampling/systematic sampling as these are not techniques used in stratified sampling. Allow responses that describe data presented as a correlation value (Spearman) if purpose allowed for collection of ordinal data.

Question		Sample response	The response	Notes
9		The role of helicase is to unwind the DNA strand and break the hydrogen bonds between the two strands. In comparison DNA polymerase works in pairs to copy one DNA molecule to produce two new DNA strands. It pairs with nucleotides present on each original DNA strand in specific combinations. DNA polymerase adds free nucleotides to 3' end on the newly formed strand, elongating it in the 5' to 3' direction. It also proofreads the strand to preserve the integrity of the original DNA strand.	• explains that helicase – unwinds the DNA strand [1 mark] – breaks hydrogen bonds [1 mark] • explains that DNA polymerase – makes a copy of DNA [1 mark] – pairs nucleotides [1 mark] – forms the new strand in the 5' to 3' direction [1 mark] – proofreads the new strand [1 mark]	
10	a	Model B is affected by a density-dependent factor. Model B overshoots past the maximum carrying capacity and then stabilises around that population.	• identifies an affected model [1 mark] • provides a valid reason [1 mark]	Acceptable affected models and reasons are: – Model B overshoots *K* (maximum) and oscillates around that value. – Model C oscillates around *K* (reduced).
	b	The decrease in population of Model C could have been caused by reduced availability of food or competition.	• identifies two factors [2 marks] OR • identifies one factor [1 mark]	Acceptable factors may include: – competition – predation – disease – migration – an abiotic disturbance – examples of any of the factors above. – ...

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Question	Sample response	The response	Notes
11	Both processes involve the formation of haploid cells by meiosis. Therefore, oocytes and spermatocytes will have half the chromosomes/genetic information of the diploid/somatic cells. In spermatogenesis, 4 spermatocytes are produced whilst in oogenesis, 1 oocyte and 3 polar bodies are produced. There will be more spermatocytes produced compared to oocytes/less reproductive opportunities for successful fertilisation of oocytes. In spermatogenesis, spermatocytes are continuously produced whilst in oogenesis, oocytes are generated before birth. Spermatocytes are produced throughout a male lifespan whilst oocyte maturation often does not continue into menopause.	• identifies three of the similarities or differences [3 marks] OR • identifies two of the similarities or differences [2 marks] OR • identifies one of the similarities or differences [1 mark] • identifies three associated significances [3 marks] OR • identifies two associated significances [2 marks] OR • identifies one associated significance [1 mark]	Acceptable responses may include: – Both processes involve the formation of haploid cells by meiosis. Oocytes and spermatocytes will have half the chromosomes/genetic information of the diploid/somatic cells. – In spermatogenesis, 4 spermatocytes are produced while in oogenesis, 1 oocyte and 3 polar bodies are produced. There will be more spermatocytes produced compared to oocytes/less reproductive opportunities for successful fertilisation of oocytes. – In spermatogenesis, spermatocytes are continuously produced while in oogenesis, oocytes are generated before birth. Spermatocytes are produced throughout a male lifespan while oocyte production ceases when there are no more oocytes/at menopause. – In spermatogenesis, small, motile spermatocytes are produced whilst in oogenesis a large immotile oocyte is produced. Spermatocytes viability requires it to have strong motility, which affects the fertilisation opportunity for the oocyte. – …