PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



MARK SCHEME

TOPIC 3: GENETICS (PACK 2)

SCORE	PERCENTAGE
/32	%

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Mark Scheme

Q1.

Question Number	Answer	Acceptable answers	Mark
	A description linking three of the following (DNA is a) double helix (1) the sides of DNA are made from (alternating) sugars and phosphate (molecules) / sugar phosphate backbone (1) {paired / complementary} bases / A (joins to) T and C (joins to) G (1) (bases joined by/strands held together by) hydrogen bonds (1)	 Accept H bonds Ignore h or H_2 bonds	**(3)**

Q2.

Question Number	Indicative content	Mark
*	**AO1 6 marks** **Sexual reproduction** **Advantages** • creates variations in a species • some organisms in a species can survive selection pressure • allows for evolution **Disadvantages** • requires a mate to be found • time for fertilisation / pollination means the process takes longer • offspring can have features that are less advantageous than the parents. **Asexual reproduction** **Advantages** • no requirement to find a mate • rapid productive cycle • organisms with beneficial characteristics of the parent can be produced **Disadvantages** • there is no variation • a selection pressure could affect all organisms of a species.	**(6)**

Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. • Presents an explanation with some structure and coherence.
Level 2	3-4	• Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and /or developed. • Presents an explanation that has a structure which is mostly clear, coherent and logical.
Level 3	5-6	• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. • Presents an explanation that has a well-developed structure which is clear, coherent and logical.

Additional Guidance

Level 1	1-2	• A brief discussion of advantages or disadvantages for sexual OR asexual reproduction. • The response identifies the statements as advantageous or disadvantageous.
Level 2	3-4	• A brief discussion of advantages or disadvantages for sexual and asexual reproduction OR a brief discussion of the advantages and disadvantages for sexual or asexual reproduction. • The response is mainly error free and identifies the descriptions as advantageous or disadvantageous.
Level 3	5-6	• A detailed discussion of the advantages and disadvantages for sexual and asexual reproduction including the consequences of being genetically identical or genetically different. • The response is error free identifies all the discussion points as advantageous or disadvantageous.

Q3.

Question Number	Answer	Mark
(i)	B phenotype **1. The only correct answer is B** ***A*** *is not correct because genotype is the combination of alleles* ***C*** *is not correct because an allele is an alternative version of a gene* ***D*** *is not correct because gametes are sex cells*	**(1)** AO 1 1

Question Number	Answer	Additional guidance	Mark
(ii)	An explanation linking three of the following: • the first generation were heterozygous (1) • offspring {needed two wrinkled alleles/are homozygous} to have wrinkled seeds (1) • 25% offspring have wrinkled seeds (1) • wrinkled is recessive / round is dominant (1)	accept first generation are carriers accept traits for alleles accept 1 in 4 wrinkled seeds are homozygous recessive = 2 marks accept annotated Punnett squares/ genetic diagrams	**(3)** AO 2 1

Q4.

Question number	Answer	Mark
	An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (1 mark): • Mendel crossed homozygous tall and homozygous short pea plants and produced all tall offspring (1) • therefore all the offspring had a heterozygous genotype with one tall and one short allele showing that the tall allele is dominant (1)	**(2)**

Q5.

Question number	Answer	Additional guidance	Mark
	A description linking **two** from: • weak (1) • hydrogen bonds (1) • complementary bases (1) • A – T / C – G (1)	 accept H bonds reject hydro bonds accept the names of the base pair	**(2)** **AO1 1**

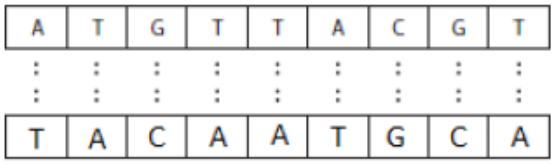
Q6.

Question number	Answer	Additional guidance	Mark
	A description linking **two** from: • weak (1) • hydrogen bonds (1) • complementary bases (1) • A – T / C – G (1)	 accept H bonds reject hydro bonds accept the names of the base pair	**(2)** **AO1 1**

Q7.

Question number	Answer	Mark
	An answer that combines the following points of application of knowledge and understanding to provide a logical description: • genetic variation means that some plants will be tolerant of drought conditions and these can be selected (1) • cross-pollinate these plants and grow the seeds under drought conditions (1) • select offspring and repeat over several generations (1)	**(3)**

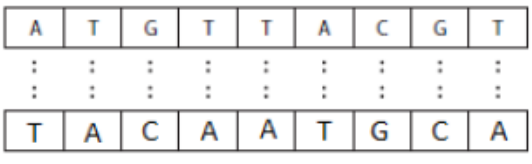
Q8.

Question number	Answer	Mark
(i)	 accept lower case letters	(1) AO1 1

Question number	Answer	Mark
(ii)	C a double helix with strands joined by hydrogen bonds between bases **The only correct answer is C** **A** *is not correct because DNA strands are not held together with strong bonds* ***B*** *is not correct because complementary bases do not form the helix* ***D*** *is not correct because there are two complementary strands*	(1) AO1 1

Question number	Answer	Additional guidance	Mark
(iii)	Mutation	accept genetic modification / genetic engineering / insertion / deletion / substitution	(1) AO1 1

Q9.

Question number	Answer	Mark
(i)	 accept lower case letters	(1) AO1 1

Question number	Answer	Mark
(ii)	C a double helix with strands joined by hydrogen bonds between bases **The only correct answer is C** **A** *is not correct because DNA strands are not held together with strong bonds* ***B*** *is not correct because complementary bases do not form the helix* ***D*** *is not correct because there are two complementary strands*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
(iii)	Mutation	accept genetic modification / genetic engineering / insertion / deletion / substitution	**(1)** **AO1 1**

Q10.

	Answer	Acceptable answers	Mark
(i)	Genus – Geospiza Species -conirostris	**accept geospiza** **accept Conirostris**	**(2)**
(ii)	A suggestion including two of the following: • (different beak sizes/adapted) enable different finches to feed on different food types (1) • less competition between species (1)	eat different foods accept comparison between 2 beaks and food source more species are able to co-exist (1)	**(2)**
(iii)	**B** ☒ geographic isolation		**(1)**

Q11.

	Answer	Acceptable answers	Mark
(i)	Genus – Geospiza Species -conirostris	**accept geospiza** **accept Conirostris**	**(2)**
(ii)	A suggestion including two of the following: • (different beak sizes/adapted) enable different finches to feed on different food types (1) • less competition between species (1)	eat different foods accept comparison between 2 beaks and food source more species are able to co-exist (1)	**(2)**
(iii)	**B** ☒ geographic isolation		**(1)**

Q12.

	Answer	Acceptable answers	Mark
a(i)	Genus – Geospiza Species -conirostris	**accept geospiza** **accept Conirostris**	**(2)**
a(ii)	A suggestion including two of the following: • (different beak sizes/adapted) enable different finches to feed on different food types (1) • less competition between species (1)	eat different foods accept comparison between 2 beaks and food source more species are able to co-exist (1)	**(2)**
a(iii)	**B** ☒ geographic isolation		**(1)**
b	A suggestion linking **three** of the following points: • variation between species/ beak sizes/ shapes (1) • due to mutation(1) • competition for resources (1) • survival of the fittest /those best adapted to the environment survived (1)		**(3)**

	• those who survive pass their genes/characteristics onto their offspring (1) • natural selection (1)		

Total for Question = 8 marks

Q13.

	Answer	Acceptable answers	Mark
a(i)	Genus – Geospiza Species -conirostris	**accept geospiza** **accept Conirostris**	**(2)**
a(ii)	A suggestion including two of the following: • (different beak sizes/adapted) enable different finches to feed on different food types (1) • less competition between species (1)	eat different foods accept comparison between 2 beaks and food source more species are able to co-exist (1)	**(2)**
a(iii)	**B** ☒ geographic isolation		**(1)**
b	A suggestion linking **three** of the following points: • variation between species/ beak sizes/ shapes (1) • due to mutation(1) • competition for resources (1) • survival of the fittest /those best adapted to the environment survived (1) • those who survive pass their genes/characteristics onto their offspring (1) • natural selection (1)		**(3)**

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Total for Question = 8 marks

Q14.

Question number	Answer	Mark
(i)	B	(1)

Question number	Answer	Mark
(ii)	TACGTACATGGC	(1)

Question number	Answer	Additional guidance	Mark
(iii)	• 3.33×10^{-10} equals 0.33 nm (1) • $0.33 \times 250 = 82.5$ (nm) (1)	maximum one mark if no conversion to nm award full marks for correct numerical answer without working	(2)

Q15.

Question number	Answer	Additional Guidance	Mark
	Any three from: • mitosis produces 2 cells and meiosis produces 4 cells (1) • mitosis produces **genetically** identical cells and meiosis produces **genetically** different cells (1) • mitosis produces diploid cells and meiosis produces haploid cells (1) • mitosis produces body cells and meiosis produces {gametes /sex cells} (1)	accept offspring for cells mitosis is involved in asexual reproduction and meiosis is involved in sexual reproduction (1)	**(3)** AO1 1