PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



MARK SCHEME

TOPIC 3: GENETICS (PACK 1)

SCORE	PERCENTAGE
/51	%

STEMUP

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Mark Scheme

Q1.

	Answer	Acceptable answers	Mark
(i)	met, val, lys met – val – lys MET VAL LYS	Accept mix of upper and lower case Accept: metvallys / metvalys Not necessary to separate the words out.	**(1)**
(ii)	translation	Accept spellings such as transation, transalation reject: transcription	**(1)**
(iii)	**D** ribosome		**(1)**

Q2.

Question number	Answer	Additional guidance	Mark
(i)	T T G A T T G C G T A A A A C T A A C G C A T T award 1 mark for all the As and Ts in the top line correctly paired (1) award 1 mark for all the Cs and Gs in the top line correctly paired (1)	accept lower case letters	(2) AO2 1

Question number	Answer	Mark
(ii)	B 4 **The only correct answer is B** ***A*** *is incorrect because each 3 amino acids would need 9 bases to be present* ***C*** *is incorrect 6 amino acids would need 18 bases* ***D*** *is incorrect because 12 amino acids would need 36 bases*	(1) AO2 1

Question number	Answer	Mark
(iii)	D double helix **The only correct answer is D** ***A*** *is incorrect because a DNA molecule is not three separate strands* ***B*** *is incorrect because the DNA molecule consists of two strands* ***C*** *is incorrect because a DNA molecule is a double helix not a single helix*	(1) AO1 1

Q3.

Question number	Answer	Mark
(i)	A they have membrane-bound organelles **The only correct answer is A** **B** *is not correct because they have a nucleus* ***C*** *is not correct because they do not have a cell wall* ***D*** *is not correct because this is not a specific feature of eukaryotic cells*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
(ii)	genetic analysis / based on {DNA/genetics} / DNA of Archaea more similar to eukaryotes (1)	accept more knowledge because of better microscopes	**(1)** **AO1 1**

Q4.

Question number	Answer	Mark
(i)	A they have membrane-bound organelles **The only correct answer is A** **B** *is not correct because they have a nucleus* ***C*** *is not correct because they do not have a cell wall* ***D*** *is not correct because this is not a specific feature of eukaryotic cells*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
(ii)	genetic analysis / based on {DNA/genetics} / DNA of Archaea more similar to eukaryotes (1)	accept more knowledge because of better microscopes	**(1)** **AO1 1**

Q5.

Question number	Answer	Additional guidance	Mark
(i)	An explanation linking **two** from: • (protease) breaks down proteins (1) • in the {cell/nuclear} membrane (1) • destroys enzymes (that may break down the DNA) (1)	accept break down the {cell/nucleus/cell wall}	**(2)** **AO1 2**

Question number	Answer	Additional Guidance	Mark
(ii)	to precipitate the DNA / because DNA is insoluble in ethanol	accept to see the DNA	**(1)** **AO1 2**

Q6.

Question number	Answer	Additional guidance	Mark
(i)	One mark for gametes One mark for the offspring 25 (%) (1)	accept aA accept ecf from the Punnett square	**(3)** **AO3 2a+2b** **Exp**

	A	a
A	AA	Aa
a	Aa	aa

Question number	Answer	Additional guidance	Mark
(ii)	An answer linking the following: • genetic variation increase / (offspring) show variation (1) • more likely to survive {a disease / environmental change / selection pressure} / allows evolution/survival of the fittest (1)	 accept different combination of alleles accept allows dispersal of offspring through seeds accept other examples of a survival reason e.g natural disaster	**(2)** **AO2 1**

Q7.

Question number	Answer	Mark
	An explanation that combines identification - application of knowledge (1 mark) and reasoning/justification - application of understanding (1 mark): • each parent carries a recessive/O allele (1) • offspring inherit two recessive/O alleles (1)	**(2)**

Q8.

Question number	Answer	Mark
(i)	Total percentage for AT bases = 56.8 % (1) Remainder shared between 2 bases 43.2 ÷ 2 = 21.6 %	**(2)**

Question number	Answer	Mark
(ii)	An explanation that combines identification of knowledge (1 mark) and reasoning/justification – understanding (2 marks): • the percentage of each of the bases are different (1) • so bases cannot be complementary to one another (1) • so will not form a double helix / will form a single strand (1)	(3)

Q9.

Question number	Answer	Additional Guidance	Mark
	division 0.0062 ÷ 2 / 6.2 ÷ 2 (1) **OR** unit conversion 0.0031 x 1000 / 0.0062 x 1000 (1) 3.1 (picograms)	award full marks for correct answer with no working accept 6.2/ 0.0031 for 1 mark with no working	**(2)** AO2(1)

Q10.

Question number	Answer	Additional Guidance	Mark
	division 0.0062 ÷ 2 / 6.2 ÷ 2 (1) **OR** unit conversion 0.0031 x 1000 / 0.0062 x 1000 (1) 3.1 (picograms)	award full marks for correct answer with no working accept 6.2/ 0.0031 for 1 mark with no working	**(2)** AO2(1)

Q11.

Question number	Answer	Mark
(i)	Total percentage for AT bases = 56.8 % (1) Remainder shared between 2 bases 43.2 ÷ 2 = 21.6 %	**(2)**

Question number	Answer	Mark
(ii)	An explanation that combines identification of knowledge (1 mark) and reasoning/justification – understanding (2 marks): • the percentage of each of the bases are different (1) • so bases cannot be complementary to one another (1) • so will not form a double helix / will form a single strand (1)	**(3)**

Q12.

	Answer	Acceptable answers	Mark

	A description to include two of the following: genetic (variation) (1) due to mutation (1) due to sexual reproduction / interbreeding / hybridisation (1) environmental (variation) (1)	Accept references to different genes/DNA Accept named environmental change e.g.change in climate	**(2)**

Q13.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	nucleus (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	**C** In DNA, the bases A - T are complementary		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)	A definition including two of the following: • a sperm fuses with egg / penetrates the egg (1) • nuclei/genetic information fuses /combines (1) • reference to haploid gametes /gametes have 23 chromosomes (1) • reference to cell made being diploid / has 23 pairs of chromosomes / zygote formed (1)	Ignore sperm meets egg	**(2)**

Question Number	Answer	Acceptable answers	Mark
(c)(i)	A description that includes the following: • (aerobic) respiration / using glucose / using oxygen (1) • energy released (for movement / swimming / metabolism)(1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
(c)(ii)	An explanation including **two** of the following: • a change in a base/base sequence/order of bases / a change in mRNA (1) • named change e.g. addition/deletion (1) • reference to change in an amino acid / order of amino acids (1)	Accept codon, triplet, genetic code for base. substitution/deletion/other named gene mutation.	**(2)**

Q14.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	nucleus (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	**C** In DNA, the bases A - T are complementary		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)	A definition including two of the following: • a sperm fuses with egg / penetrates the egg (1) • nuclei/genetic information fuses /combines (1) • reference to haploid gametes /gametes have 23 chromosomes (1) • reference to cell made being diploid / has 23 pairs of chromosomes / zygote formed (1)	Ignore sperm meets egg	**(2)**

Question Number	Answer	Acceptable answers	Mark
(c)(i)	A description that includes the following: • (aerobic) respiration / using glucose / using oxygen (1) • energy released (for movement / swimming / metabolism)(1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
(c)(ii)	An explanation including **two** of the following: • a change in a base/base sequence/order of bases / a change in mRNA (1) • named change e.g. addition/deletion (1) • reference to change in an amino acid / order of amino acids (1)	Accept codon, triplet, genetic code for base. substitution/deletion/other named gene mutation.	**(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