PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



MARK SCHEME

TOPIC 5: HEALTH, DISEASE AND THE DEVELOPMENT OF MEDICINES (PACK 4)

SCORE	PERCENTAGE
/94	%

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Mark Scheme

Q1.

Question number	Answer	Additional Guidance	Mark
	An explanation linking three of the following: • they are immune (to *Clostridium tetani*) (1) • because the vaccination contained an antigen / bacteria have antigens (1) • **memory lymphocytes** (1) • leading to the production of antibodies (1) • leading to a **secondary** (immune) response (1)	accept idea of inactive/dead bacteria in the vaccine accept bacteria killed {faster/ quicker/quickly}	**(3)** AO2(1)

Q2.

Question number	Answer	Additional guidance	Mark
	An explanation linking: • BMI calculation takes into account height / divides mass by height^2 (1) • the obese man must be shorter / the normal man is taller (1)	ignore references to muscle mass accept BMI relies on measurements of height and weight/mass accept equation for BMI accept the men are different heights	**(2)** **AO2 1**

Q3.

Question number	Answer	Additional guidance	Mark
	An explanation linking: • BMI calculation takes into account height / divides mass by height^2 (1) • the obese man must be shorter / the normal man is taller (1)	ignore references to muscle mass accept BMI relies on measurements of height and weight/mass accept equation for BMI accept the men are different heights	**(2)** **AO2 1**

Q4.

Question number	Answer	Additional Guidance	Mark
	An explanation linking three of the following: • they are immune (to *Clostridium tetani*) (1) • because the vaccination contained an antigen / bacteria have antigens (1) • **memory lymphocytes** (1) • leading to the production of antibodies (1) • leading to a **secondary** (immune) response (1)	accept idea of inactive/dead bacteria in the vaccine accept bacteria killed {faster/ quicker/quickly}	**(3)** AO2(1)

Q5.

Question Number	Answer	Additional Guidance	Mark
(i)	Any **two** from: • wear gloves (1) • clean the area of skin where blood being removed (1) • cover the wound after (1) • use a sterile needle (1)	 accept wash hands / wear a mask accept disinfect / clean the wound ignore clean accept sit the person down (1) ignore references to removing the correct volume of blood	**(2)** **AO2 2**

Question Number	Answer	Additional Guidance	Mark
(ii)	• heterozygous An explanation linking: • affected offspring must have inherited the recessive allele (1) • unaffected offspring must have inherited dominant allele (1)	accept carrier / dominant and recessive allele / Hh accept one offspring is homozygous recessive accept one / two offspring are homozygous dominant accept a **labelled** Punnett square for any mark point	**(3)** **AO3**

Q6.

Question Number	Answer	Mark
(i)	C aseptic **The only correct answer is C** ***A*** *is not correct because clinical is not a technique* ***B*** *is not correct because diagnostic does not prevent contamination* ***D*** *is not correct because lysogenic describes a stage of the virus lifecycle*	**(1)** **AO1 2**

Question Number	Answer	Additional Guidance	Mark
(ii)	Any **two** from: • keep the lid on at all possible times (1) • use sterile equipment (1) • autoclave agar (1) • wear gloves / mask (1) • work close to a Bunsen (burner) (1)	 accept a method of sterilising equipment e.g. flaming loops / disinfect the working area accept use sterile growth medium	**(2)** **AO1 2**

Q7.

Question number	Answer	Mark
	An explanation that combines identification - application of knowledge (1 mark) and reasoning/justification - application of understanding (2 marks): • stent inserted into blood vessel and is expanded (1) • stent opens /widens blood vessel (1) • greater blood flow (through blood vessel) (1) • more oxygen delivered to body organ (1)	(3)

Q8.

Question Number	Answer	Mark
	World Health Organization / WHO	(1) AO1 1

Q9.

Question number	Answer	Mark
(i)	C	(1)

Question number	Answer	Mark
(ii)	An explanation that combines identification via a judgement (1 mark) to reach a conclusion via reasoning (2 marks): • male Q (1) • higher BMI / less exercise / higher fat intake (1) • so more risk of fatty deposits / plaques in arteries / atherosclerosis / restricted blood flow to heart (1)	(3)

Q10.

Question number	Answer	Additional guidance	Mark
	Any one from: • mammals may be harmed • drugs may affect other mammals in a different way(1)	 other mammals systems work in a different way from humans	 **(1)**

Q11.

Question Number	Answer	Additional guidance	Mark
(i)	Any two from: • wash hands after contact (1) • avoid direct contact / wear {gloves/protective clothes} (1) • wear a (protective) mask (1) • **sterilise** equipment {before /after} use (1)	 accept hand gels accept protect your face be immunised (1)	**(2)** AO 2 2

Question Number	Answer	Additional guidance	Mark
(ii)	subtraction 5943 - 2830 = 3113 (1) 3113 ÷2830 x 100 = 110 %	accept 5943 - 2830 ÷ 2830 award full marks for correct numerical answer without working accept other valid methods for the calculation	**(2)** AO 2 1

Question Number	Answer	Mark
(iii)	A it does not have flagella **1. The only correct answer is A** ***B*** *is not correct because plasmids do not allow motility.* ***C*** *is not correct because it does have ribosomes.* ***D*** *is not correct because acrosomes are not found in bacteria.*	**(1)** AO 2 1

Q12.

Question Number	Answer	Additional guidance	Mark
(i)	Any two from: • wash hands after contact (1) • avoid direct contact / wear {gloves/protective clothes} (1) • wear a (protective) mask (1) • **sterilise** equipment {before /after} use (1)	 accept hand gels accept protect your face be immunised (1)	**(2)** AO 2 2

Question Number	Answer	Additional guidance	Mark
(ii)	subtraction 5943 - 2830 = 3113 (1) 3113 ÷2830 x 100 = 110 %	accept 5943 - 2830 ÷ 2830 award full marks for correct numerical answer without working accept other valid methods for the calculation	**(2)** AO 2 1

Question Number	Answer	Mark
(iii)	A it does not have flagella **1. The only correct answer is A** ***B*** *is not correct because plasmids do not allow motility.* ***C*** *is not correct because it does have ribosomes.* ***D*** *is not correct because acrosomes are not found in bacteria.*	**(1)** AO 2 1

Q13.

Question Number	Answer	Mark
	D testing using cultured cells → testing in healthy volunteers → double blind trials on patients **1. The only correct answer is D** ***A*** *is not correct because the medicine is tested on cultured cells first.* ***B*** *is not correct because double blind trials are used after testing in healthy volunteers.* ***C*** *is not correct because the medicine is tested on cultured cells first.*	**(1)** AO 1 1

Q14.

Question Number	Answer	Mark
	D testing using cultured cells → testing in healthy volunteers → double blind trials on patients **1. The only correct answer is D** ***A*** *is not correct because the medicine is tested on cultured cells first.* ***B*** *is not correct because double blind trials are used after testing in healthy volunteers.* ***C*** *is not correct because the medicine is tested on cultured cells first.*	**(1)** AO 1 1

Q15.

Question number	Answer	Mark
	C mass and height **The only correct answer is C** ***A*** *is not correct because waist circumference is not used to calculate BMI* ***B*** *is not correct because neither waist circumference nor hip circumference are used to calculate BMI* ***D*** *is not correct because hip circumference is not used to calculate BMI*	**(1)** AO1(1)

Q16.

Question number	Answer	Mark
	C mass and height **The only correct answer is C** ***A*** *is not correct because waist circumference is not used to calculate BMI* ***B*** *is not correct because neither waist circumference nor hip circumference are used to calculate BMI* ***D*** *is not correct because hip circumference is not used to calculate BMI*	**(1)** AO1(1)

Q17.

Question number	Answer	Mark
	C white blood cell **The only correct answer is C** ***A is not correct because the HIV virus does not destroy red blood cells*** ***B is not correct because the HIV virus does not destroy nerve cells*** ***D is not correct because the HIV virus does not destroy sperm cells***	**(1)** **AO1 1**

Q18.

Question number	Answer	Mark
	C white blood cell **The only correct answer is C** ***A is not correct because the HIV virus does not destroy red blood cells*** ***B is not correct because the HIV virus does not destroy nerve cells*** ***D is not correct because the HIV virus does not destroy sperm cells***	**(1)** **AO1 1**

Q19.

Question number	Answer	Mark
(i)	B many deaths were not confirmed to be caused by Ebola **The only correct answer is B** **A** *is not correct because people are not immune to Ebola* ***C*** *is not correct because Ebola spreads easily* ***D*** *is not correct because Ebola causes symptoms*	**(1)** **AO2 1**

Question number	Answer	Additional Guidance	Mark
(ii)	(exchange of) bodily fluids / named body fluids / contact with body fluids	accept any contact or body fluid transmission	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
(iii)	A description including: • virus particles are assembled (1) • virus lyses the cell / virus exits the cell (1)	accept virus is made/produced ignore virus reproduces	**(2)** **AO2 1**

Q20.

	Answer	Acceptable answers	Mark
(a)(i)	(1600 + 1000) – (1400 + 200) Or 2600 – 1600 Or (1600 – 1400) + (1000 – 200) or 200 + 800 (1) = 1000	2 marks for bald answer - 1000	**(2)**
(a)(ii)	Description including **two** of the following: • no (overall) / little effect on cases of meningitis B (1) • (significant overall) decrease in meningitis C	fluctuates a little / rises and then goes slightly down	**(2)**

(1)

- correct manipulation of data (1)

(b)	**A** ☒antigens		**(1)**
(c)(i)	A description linking three of the following • inject mammal / named mammal with antigen (1) • (select) B lymphocytes / lymphocyte that produces the (specific) antibody / spleen cells(1) • fuse with tumour / myeloma cells (1) • (to produce a) <u>hybridoma</u> (which divide)(1) • antibodies are isolated / screened(1)	Accept animal for mammal Accept B cells Accept cancer cells Ignore antibodies produced	**(3)**
(c)(ii)	An explanation linking **two** of the following: • antibody (only) attach to cancer cell (1) • drug / radioactive source / toxin bound to antibody / alerts immune system to target cancer cells (1) • no / fewer adverse effect to non cancerous cells (1)	Accept named effect	**(2)**

Q21.

Question Number	Answer	Acceptable answers	Mark
	A description including the following (immunisation) introduces an antigen/(immunisation) causes an immune response (1) (B) lymphocytes (1) production of antibodies (1) (the production of) memory lymphocytes (1)	 accept immune system recognises an antigen (in the immunisation) ignore white blood cells	**(3)**

Q22.

Question number	Answer	Additional guidance	Mark
(i)	• radius 10 mm ± 1 mm (1) • area = πr^2 (1) • area 314 (mm^2) (1) answer must be to 3 significant figures	if radius outside range but area calculated max 2 marks award full marks for correct numerical answer without working	**(3)**

Question number	Answer	Additional guidance	Mark
(ii)	An explanation that combines identification via a judgement (1 mark) to reach a conclusion via justification/reasoning (1 mark): • antiseptic 1 has a larger zone of inhibition (1) • so more of *Streptococcus pyogenes* have been killed (1)	ecf from (a)(i)	**(2)**

Question number	Answer	Additional guidance	Mark
(iii)	• to provide optimal growth conditions	*S. pyogenes* grow at body temperature	**(1)**

Q23.

Question Number	Answer	additional guidance	Mark
(i)	differentiation (1)	accept specialisation	(1) AO 2 1

Question Number	Answer		Mark
(ii)	A logical description including two of the following: • many plants produced (1) • quicker than sexual reproduction (1) • genetically identical/ clones produced (1) • with the desired characteristics (1) • plants from {endangered/rare} plants (1)	accept gives more of that plant/higher yield of that plant ignore plants grow faster obtain plants difficult to grow from seed (1)	(2) AO 1 1

Question Number	Answer	Additional guidance	Mark
(iii)	Any two from: • sterilises agar growth medium (1) • destroys unwanted {bacteria /pathogens/fungi/microorganisms/viruses} /there is no contamination (1) • so microorganisms don't {affect growth of plantlets / don't compete with plantlets/ don't use nutrients needed by plantlets} (1)	ignore prevents microorganisms getting in accept only the plantlets grow	(2) AO 2 2

Question Number	Answer	Additional guidance	Mark
(iv)	• mutation / disease	accept different alleles/ genotypes/genetic variation	(1) AO 2 1

Q24.

Question Number	Answer	Additional guidance	Mark
(i)	• spread {each bacterial species/the bacteria} on a different agar plate, add myxopyronin discs and incubate the plates (1) • {measure / compare} the zone of inhibition (1)	accept filter discs for myxopyronin discs accept descriptions of a zone of inhibition	(2) AO 1 2

Question Number	Answer	Additional guidance	Mark
(ii)	An explanation that links four of the following: • antibiotics destroy bacteria / prevent them reproducing (1) • doesn't affect {eukaryotic cells/host cells/human cells/human RNA polymerase} (1) • prevents production of mRNA /prevents RNA polymerase binding (1) • during transcription /prevents transcription (1) • prevents proteins being produced /no protein synthesis (1)	ignore inhibit the bacteria/inhibit cell processes accept does not harm humans accept RNA polymerase produces mRNA	(4) AO 2 1

Q25.

Question number	Answer	Additional guidance	Mark
(i)	An explanation including **four** of the following: • by natural selection / evolution (1) • mutation in the bacterium /variation in the population (1) • only the resistant bacteria **survived treatment by antibiotics /** resistant bacteria survive when people **don't finish the course** (1) • the resistant bacteria {reproduce / divide} (1) • offspring inherit the resistance / resistance passed onto future generations / process repeats increasing level of resistance (1)	accept *Klebsiella* for bacteria accept they evolve accept some bacteria have a {**gene/allele**} for antibiotic resistance accept non-resistant bacteria killed **by antibiotics** ignore offspring are identical	**(4)** **A02 1**

Question number	Answer	Additional guidance	Mark
(ii)	people not completing their course of antibiotics/overuse of antibiotics	accept acted as a selection pressure accept being used to treat viruses/examples ignore misuse unqualified	**(1)** **AO1 1**

Question number	Answer	Mark
(iii)	B it does not have a nucleus **The only correct answer is B** ***A*** *is incorrect because prokaryotic cells do not have chloroplasts* ***C*** *is incorrect because prokaryotic cells have ribosomes* ***D*** *is incorrect because prokaryotic cells can reproduce without a host*	**(1)** **AO1 1**

Q26.

	Answer	Acceptable answers	Mark
(i)	(1600 + 1000) – (1400 + 200) Or 2600 – 1600 Or (1600 – 1400) + (1000 – 200) or 200 + 800 (1) = 1000	2 marks for bald answer - 1000	**(2)**
(ii)	Description including **two** of the following: • no (overall) / little effect on cases of meningitis B (1) • (significant overall) decrease in meningitis C (1) • correct manipulation of data (1)	fluctuates a little / rises and then goes slightly down	**(2)**

Q27.

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

Question Number	Answer	Acceptable answers	Mark
(a)(i)2	memory lymphocytes (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	**B** hybridomas		**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(iii)	**Two** of the following: pregnancy testing (1) locating the position of blood clots (1) locating the position of cancers (1)	 accept detecting blood clots accept detecting cancer cells	**(2)**

Question Number	Answer	Acceptable answers	Mark
(b)(i)	A comparison including two from: first response • delay in production of antibodies (1) • less antibodies produced (1) • production of antibodies slower (1)	or a second response • no delay in production of antibodies (1) • more antibodies produced (1) • production of antibodies faster (1) accept comparisons of data ignore references to decrease in antibody number	**(2)**

Question Number	Answer	Acceptable answers	Mark
(b)(ii)	faster recovery / {no/less} symptoms of infection / increased chance of survival / kills pathogen faster(1)	accept more memory lymphocytes produced/ immune / fights infection faster	**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(iii)	**B** Edward Jenner		**(1)**

Q28.

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

Question Number	Answer	Acceptable answers	Mark
(a)(i)2	memory lymphocytes (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	**B** hybridomas		**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(iii)	**Two** of the following: pregnancy testing (1) locating the position of blood clots (1) locating the position of cancers (1)	 accept detecting blood clots accept detecting cancer cells	**(2)**

Question Number	Answer	Acceptable answers	Mark
(b)(i)	A comparison including two from: first response • delay in production of antibodies (1) • less antibodies produced (1) • production of antibodies slower (1)	or a second response • no delay in production of antibodies (1) • more antibodies produced (1) • production of antibodies faster (1) accept comparisons of data ignore references to decrease in antibody number	**(2)**

Question Number	Answer	Acceptable answers	Mark
(b)(ii)	faster recovery / {no/less} symptoms of infection / increased chance of survival / kills pathogen faster(1)	accept more memory lymphocytes produced/ immune / fights infection faster	**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(iii)	**B** Edward Jenner		**(1)**

Q29.

Question Number	Answer	Acceptable answers	Mark
(i)	**An explanation linking three from the following** urine sample (1) coloured bead attached to a (mobile monoclonal) antibody (1) antibody {specific to/detects/binds to} { hormone/hCG} (1) immobile antibody at test strip (1) colour accumulates in positive test window (1)	accept named female sex hormones	**(3)**

Question Number	Answer	Acceptable answers	Mark
(ii)	**An explanation linking two of the following** chemotherapy/radiotherapy drug attached to the monoclonal antibody (1) less use of the drug (1) only binds to cancer cells/doesn't target normal cells (1) reduces side effects/named side effects (1)	monoclonal antibody binds to {**tumour markers/cancer antigens**} (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
(iii)	hybridoma (cell)		**(1)**

Q30.

Question Number	Answer	Additional Guidance	Mark
(i)	Any **two** from: • wear gloves (1) • clean the area of skin where blood being removed (1) • cover the wound after (1) • use a sterile needle (1)	 accept wash hands / wear a mask accept disinfect / clean the wound ignore clean accept sit the person down (1) ignore references to removing the correct volume of blood	**(2)** **AO2 2**

Question Number	Answer	Additional Guidance	Mark
(ii)	• heterozygous An explanation linking: • affected offspring must have inherited the recessive allele (1) • unaffected offspring must have inherited dominant allele (1)	accept carrier / dominant and recessive allele / Hh accept one offspring is homozygous recessive accept one / two offspring are homozygous dominant accept a **labelled** Punnett square for any mark point	**(3)** **AO3**