PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



MARK SCHEME

TOPIC 5: HEALTH, DISEASE AND THE DEVELOPMENT OF MEDICINES (PACK 1)

SCORE	PERCENTAGE
/66	%

STEMUP

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Mark Scheme

Q1.

Question number	Answer	Additional guidance	Mark
(i)	Any **one** from: • to prevent contamination (1) • {avoid / kill / remove} microorganisms (1) • prevent other microorganisms affecting the results (1)	accept bacteria / fungi /pathogen /virus for microorganism	**(1)** **AO2 1**

Question number	Answer	Additional guidance	Mark
(ii)	so the bacteria are not killed / so the bacteria are not {destroyed / harmed / damaged / burnt}	accept microorganism / pathogen for bacteria	**(1)** **AO2 1**

Question number	Indicative content	Mark
(iii)	**AO2 & AO3** Plan • soak one filter disc in antiseptic 1 • repeat for with fresh filter disc for antiseptic 2 • repeat with fresh disc for antiseptic 3 • soak fresh filter disc in distilled water • place one disc in each quarter and / space the discs out • label the Petri dish • incubate the petri dish Results • measure radius/diameter • calculate the zone of inhibition around each disc • using πr^2 • antiseptic which killed the most bacteria will have largest zone safety/aseptic • use aseptic techniques/description of techniques • work near a Bunsen • only lift the lid slightly/keep covered most of the time • use sticky tape to seal the lid to the base of the Petri dish on each side • wash hands Controlled variables • incubation time stated • appropriate temperature stated • same size filter disc • same volume of antiseptic / soaked for same time Control • soak a fresh filter disc in water or left dry • use a known substance that kills bacteria	**(6)** **AO2 2** **AO3 3a**

Level	Mark	Descriptor
	0	No awardable content
Level 1	1–2	• The plan attempts to link and apply knowledge and understanding of scientific enquiry, techniques and procedures, flawed or simplistic connections made between elements in the context of the question. (AO2) • Analyses the scientific information but understanding and connections are flawed. An incomplete plan that provides limited synthesis of understanding. (AO3)
Level 2	3–4	• The plan is mostly supported through linkage and application of knowledge and understanding of scientific enquiry, techniques and procedures, some logical connections made between elements in the context of the question. (AO2) • Analyses the scientific information and provides some logical connections between scientific enquiry, techniques and procedures. A partially completed plan that synthesises mostly relevant understanding, but not entirely coherently. (AO3)
Level 3	5–6	• The plan is supported throughout by linkage and application of knowledge and understanding of scientific enquiry, techniques and procedures, logical connections made between elements in the context of the question. (AO2) • Analyses the scientific information and provide logical connections between scientific concepts throughout. A well-developed plan that synthesises relevant understanding coherently. (AO3)

Level	Mark	Indicative content
	0	No rewardable material.
Level 1	1–2	• response gives at least one element of the plan or how the results would be measured • refers to one from a controlled variable, safety/aseptic working or a control
Level 2	3–4	• response provides a plan that would allow results to be obtained • refers to at least two points from at least one of controlled variables, safety/aseptic working or a control
Level 3	5–6	• produces an error free workable plan which includes safety/aseptic working **and** one variable controlled • the plan describes the use of a control

Level	Mark	Examples of answers
	0	No rewardable material.
Level 1	1–2	• Control the amount of antiseptic used – 1 mark • Spread the antiseptics on the plate and label the plate – 1 mark • Spread the antiseptics on the plate and label the plate, leave the plate to incubate for 24 hours – 2 marks
Level 2	3–4	• Soak the discs in the antiseptics and place them onto the agar plate, lift the lid only a little. After the bacteria have grown measure the zone of inhibition – 3 marks. (only one aspect from the second bullet point) • Soak the discs in the antiseptics and place them onto the agar plate, lift the lid only a little. Incubate the plate overnight. After the bacteria have grown measure the zone of inhibition – 4 marks. (two aspects from second bullet point) • Soak the discs in the antiseptics and place them onto the agar plate, add a 4th disc which is dry. Lift the lid only a little. Tape the plate and after the bacteria have grown measure the zone of inhibition – 4 marks.
Level 3	5–6	• Add the same volume of antiseptic onto the discs. Using sterile tongs place them onto the agar plate. Lift the lid only a little. Tape the plate and incubate the plate for a set time. After the bacteria have grown measure the zone of inhibition – 5 marks. • Soak the discs in the antiseptics and soak one disc in water. Using sterile tongs place them onto the agar plate. Lift the lid only a little. Tape the plate and incubate the plate for 24 hours. After the bacteria have grown measure the zone of inhibition – 6 marks. • Add the same volume of antiseptic onto the discs. Using sterile tongs place them onto the agar plate. Lift the lid only a little. Tape the plate and incubate the plate for a set time. After the bacteria have grown measure the zone of inhibition – 5 marks. • Soak the discs in the antiseptics and soak one disc in water. Using sterile tongs place them onto the agar plate. Lift the lid only a little. Tape the plate and incubate the plate for 24 hours. After the bacteria have grown measure the zone of inhibition – 6 marks.

Q2.

Question Number	Answer	Mark
(i)	9 -10 (%)	**(1)**

Question Number	Answer	Acceptable answers	Mark
(ii)	A suggestion to include two of the following more health awareness (1) more (NHS) support programmes (1) Increased use of nicotine replacement products as an alternative to smoking (1) increases in cost / taxation (1) new laws / smoking outdoors (1) more negative opinions against smokers (1)	 accept advertising on cigarette packets for this mp / people know more about the risks / awareness of passive smoking / health campaigns accept reference to other stop smoking aids such as patches, gum, e cigarettes etc accept restrictions in advertising Ignore references to age limits as this has not changed	**(2)**

Q3.

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**

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Q4.

Question number	Answer	Additional guidance	Mark
(i)	A comparison including **three** of the following: • the number of transplants needed increased rapidly but the number of donors {only increased slightly /remained low} (1) • from {2014 / 2015} the numbers of transplants required decreased (1) • the number of donors available was always lower than the number of transplants needed (1) • comparison of figures from the graph of the number of people needing an organ and donating an organ (1)	 accept peaked in {2014 / 2015} accept there are not enough donors for the transplants needed accept a comparative mathematical manipulation of the data	**(3)** **AO3 2ab**

Question number	Answer	Mark
(ii)	not enough donors are available / to increase the number of organs for donation / to meet the demand for organ transplants	**(1)** **AO3 2b**

Q5.

Question number	Answer	Mark
(i)	gonorrhoea	**(1)** **AO3 1a**

Question number	Answer	Additional guidance	Mark
(ii)	(66 000 000 ÷ 1000) = 66 000 (1) (66 000) x 3.7 =244 200 (people) or (3.7 ÷ 1000) = 0.0037 (1) (0.0037) x 66 000 000 = 244 200 (people) or (66 000 000 x 3.7) = 244 200 000 (1) (244 200 000 ÷ 1000) = 244200	award full marks for correct answer no working accept answers in standard form accept 244200 to any incorrect magnitude for one mark	**(2)** **AO2 1**

Question number	Answer	Additional guidance	Mark
(iii)	Any one from: • it is {**passed/spread**} from **person to person** (1) • caused by bacteria (1)	 accept **spread** by {sexual contact / body fluids} accept pathogen ignore caused by a virus	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
(iv)	Any one from: • avoid sexual contact (1) • use a {condom/femidom} (1) • screen people for an infection (1) • treat the infection/give antibiotics (1)	 accept use a barrier form of contraception ignore protection / contraception	**(1)** **AO2 1**

Question number	Answer	Additional guidance	Mark
(v)	An explanation including the following: • it is {killed/inhibited} by antibiotics (1) • because chlamydia is caused by bacteria (1)	accept disrupt cell processes (in bacteria) /prevent (bacteria) reproducing accept antibiotics are used to kill bacteria for 2 marks	**(2)** **AO2 1**

Q6.

Question Number	Answer	Additional Guidance	Mark
(i)	radius 4.5 mm (1) calculation (3.14 x 4.5 x 4.5 / 3.14 x 4.5^2) = 63.585 (1) evaluation 63.6 (mm^2)	award full marks for correct answer with no working accept 63.617 ecf if diameter used 254.469 / 254.34 for one mark ecf if diameter used 254.5 / 254.3 (mm^2) to 1 DP for two marks	**(3)** **AO2 1**

Question Number	Answer	Additional Guidance	Mark
(ii)	as a control / to compare	accept to see the effect without using toothpaste / to see the effect of just saliva	**(1)** **AO2 2**

Question Number	Answer	Additional Guidance	Mark
(iii)	Any **two** from: • the test only uses one species of bacteria (1) • there are still bacteria on the agar plate (1) • the test is not done on teeth (1) • the conditions in the mouth are different (1) • toothpaste is only used on teeth for a short time (1)	accept temperature in the mouth may not be 37°C accept the test only uses one type of toothpaste (1)	**(2)** **AO2 2**

Q7.

Question Number	Answer	Additional guidance	Mark
(i)	An answer including **two** from: • (communicable) is passed from **person to person** (1) • (communicable) caused by {pathogens / example of pathogen} (1) • (communicable diseases) cannot be inherited (1)	accept reverse arguments for non-communicable diseases	**(2)** **AO1 1**

Question Number	Answer	Additional Guidance	Mark
(ii)	An explanation including: • {cough / sneeze} into a tissue / avoid close contact with infected people / avoid cramped living conditions (1) • because spread of TB is airborne droplets / TB is spread through the air (1) **OR** • vaccination / immunisation (1) • to provide immunity / reduces the chance of a person getting infected (1) **OR** • treat infected people with **antibiotics** (1) • reduces the number of infected people (1)	accept regular hand washing / wear a mask / isolate an infected person accept spread by coughing / breathing it {in / out} accept reduces the chances of contact with an infected person	**(2)** **AO2 1**

Question Number	Answer	Additional guidance	Mark
(iii)	• suitable heading for each column, with country in the left column (1) • all data entered accurately (1)	accept country / region / number of people / people with TB countries can be entered in any order	**(2)** **AO2 1**

Q8.

Question Number	Answer	Mark
(i)	C cancer cell **The only correct answer is C** ***A*** *is not correct because a phagocytic cell is a white blood cell* ***B*** *is not correct because a red blood cell does not divide* ***D*** *is not correct because an epithelial cell does not divide rapidly*	**(1)** **AO1 1**

Question Number	Answer	Additional Guidance	Mark
(ii)	An explanation linking: • the shape of the antibody is complementary to the A antigen / antibodies only react with specific antigens • the B antigen has a different {shape / structure} (1) • (therefore) it will only **bind** to the A antigen / it will not bind to the B antigen (1)	 accept antigen A has a specific structure accept blood group B does not have the A antigen	**(3)** **AO2 1**

Q9.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	an increase in cases until **October** and then a decrease (in the number of cases) (1)	accept an increase in cases till **November** when it decreases	**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	1320 (1) 1320 – 168 = 1152	**2 marks for correct answer**	**(2)**

Question Number	Answer	Acceptable answers	Mark
(b)	exponential (growth)	log / logarithmic (growth)	**(1)**

Question Number	Answer	Acceptable answers	Mark
(c)	**A suggestion including two of the following** not everyone has been immunised (1) immigration introduces people who are not immunised (1) immunisation not fully effective (1) immunity can decrease with age (1)	 accept no herd immunity accept bacteria mutates (making immunisation ineffective) accept immunity requires boosters/loss of memory lymphocytes	**(2)**

Q10.

Question number	Answer	Additional guidance	Mark
i)	C		**(1)**

Question number	Indicative content	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)**

Q11.

Question Number	Answer	Additional Guidance	Mark
(i)	(8 x 4) = 32 (grams of alcohol) (1) 1.2 / 1.20 (x risk)	award full marks for the correct answer with no workings	**(2)** **AO3**

Question Number	Answer	Additional Guidance	Mark
(ii)	An answer including two from: • mutations in DNA (1) • cell division is uncontrolled (1) • leading to the formation of a tumour / growth / mass of cells (1)	 accept change in the gene/cell mutates accept {rapid / continuous} cell division	**(2)** **AO2 1**

Q12.

Question number	Answer	Additional guidance	Mark
	• 830 mm = 0.83 m (1) • 0.83/0.99 = 0.8383... = 0.84 to two d.p. (1) OR • 0.99 m = 990 mm (1) • 830/990 = 0.8383... = 0.84 to two d.p. (1) • Answer must be given to 2 decimal places	award full marks for correct numerical answer without working	**(2)**

Q13.

Question Number	Answer	Additional guidance	Mark
(i)	substitution (1) $72 \div 1.81^2$ evaluation (1) = 21.977 / 21.98 / 22 3 s.f. (1) 22.0	accept $72 \div 3.2761$ award 2 marks for correct evaluation award full marks for correct numerical answer without working accept 21.9 for 2 marks	**(3)** AO 1 1

Question Number	Answer	Additional guidance	Mark
(ii)	• the BMI shows male A is overweight but his waist:hip ratio {shows he is not abdominally obese / is below 0.9/is healthy} (1) • male A's weight distribution is not around the {vital organs/abdomen} (1)	 accept male A's weight is distributed evenly over the body accept more weight on the hips than the waist accept mass for weight	**(2)** AO 3 2a AO 3 2b

Q14.

Question Number	Answer	Additional guidance	Mark
(i)	substitution (1) $72 \div 1.81^2$ evaluation (1) = 21.977 / 21.98 / 22 3 s.f. (1) 22.0	accept $72 \div 3.2761$ award 2 marks for correct evaluation award full marks for correct numerical answer without working accept 21.9 for 2 marks	**(3)** AO 1 1

Question Number	Answer	Additional guidance	Mark
(ii)	• the BMI shows male A is overweight but his waist:hip ratio {shows he is not abdominally obese / is below 0.9/is healthy} (1) • male A's weight distribution is not around the {vital organs/abdomen} (1)	accept male A's weight is distributed evenly over the body accept more weight on the hips than the waist accept mass for weight	**(2)** AO 3 2a AO 3 2b

Q15.

Question number	Indicative content	Additional guidance	Mark
(i)	Substitution (1) 21.00 x 11.18 Evaluation (1) 234.78 3 significant figures 235	award full marks for correct numerical answer without working award 2 marks for correct evaluation ecf for the incorrect calculation correctly rounded to 3 s.f.	**(3)** **AO3 1a** **1b**

Question number	Indicative content	Additional guidance	Mark
(ii)	One from: • each country has a different size population (1) • allows comparisons to be made between countries (1)	 ignore it is easier to read/easier to analyse	**(1)** AO3 1a

Question number	Indicative content	Additional Guidance	Mark
(iii)	One from: • vaccination (1) • {reporting/diagnosis} systems (1) • {access to/quality of} healthcare (1) • environmental factors (1)	accept examples of relevant environmental factors e.g. population density, proximity of country to others. (1) accept herd immunity (1)	**(1)** AO2 1