



HSC Trial Examination 2019

Biology

Solutions and marking guidelines

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Section I

| Answer and explanation | Syllabus content, outcomes and targeted performance bands |
|--|--|
| <p>Question 1 B</p> <p>Needing two parents is a disadvantage because they have to come together, which takes more time than asexual reproduction. Genetic variation is an advantage as it gives rise to different individuals with, for example, different resistances to diseases that might kill all genetically identical organisms. Sexual reproduction is more complex than asexual reproduction. Sexual reproduction does produce fewer offspring than asexual reproduction but this is not seen as an advantage.</p> | <p>Mod 5 Reproduction/Genetic Variation BIO12–12 Band 2</p> |
| <p>Question 2 A</p> <p>Budding involves a new organism developing from an outgrowth or bud due to cell division at one particular site. In sporulation a vegetative cell forms a single spore which, after germination, develops into a single cell. Binary fission involves a single cell splitting into two identical daughter cells. Fertilisation involves two cells merging. Budding most closely matches the diagram.</p> | <p>Mod 5 Reproduction BIO12–12 Band 2</p> |
| <p>Question 3 C</p> <p>Cells sometimes make mistakes during the copying process and these can lead to single nucleotide polymorphisms, or SNPs. SNPs can generate biological variation between people by causing differences in the recipes for proteins that are written in genes. While some SNPs lead to differences in health or physical appearance, most SNPs seem to lead to no observable differences between people. DNA is passed from parent to child, so you inherit your SNPs from your parents.</p> | <p>Mod 5 Genetic Variation BIO12–12 Bands 2–3</p> |
| <p>Question 4 C</p> <p>The zygote (a diploid cell) results from the union of a male gamete (haploid) and female gamete (haploid). The complete genetic information from both gametes is passed onto the zygote.</p> | <p>Mod 5 Reproduction/Genetic Variation BIO12–12 Band 3</p> |
| <p>Question 5 D</p> <p>For one set of parents, neither of them has the characteristic, but it appears in their offspring and so must be recessive. Most sex-linked alleles are located on the X chromosome. A male only receives these alleles from his mother. A male therefore needs only one copy of a sex-linked recessive allele to show the recessive trait. A female must inherit two such recessive alleles (one from both parents) to exhibit the trait. Hence there should be very few females showing the characteristic if it is sex-linked. This is not shown in the pedigree so it is most likely not sex-linked.</p> | <p>Mod 5 Genetic Variation BIO12–7, BIO12–12 Bands 3–4</p> |
| <p>Question 6 B</p> <p>The genes of the organism have been modified by humans using the addition of outside genetic material. No breeding for a desired characteristic over generations was carried out. It only adds/replaces relatively short DNA sequences.</p> | <p>Mod 6 Genetic Technologies BIO12–13 Bands 2–3</p> |
| <p>Question 7 D</p> <p>Mutations can sometimes be beneficial. Germ-line mutations occur in sex cells (gametes), which transmit genetic material to offspring (and future generations). Somatic cells are body cells, not sex cells.</p> | <p>Mod 6 Mutation BIO12–13 Band 3</p> |

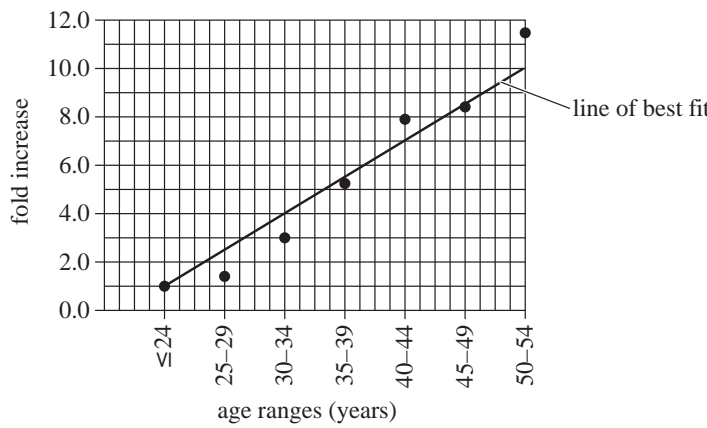
| Answer and explanation | Syllabus content, outcomes and targeted performance bands |
|---|---|
| <p>Question 8 A</p> <p>Gene flow occurs when genes are exchanged between two separate populations – for example, when animals migrate to a new area. Genetic drift is a random change in allele frequency in a population. The offspring of birds (animals) are produced by sexual reproduction. Evolution is the cumulative inherited change in a population of organisms through time, leading to the appearance of new forms. Response A most closely matches the description.</p> | <p>Mod 6 Mutation BIO12–4, BIO12–13</p> <p style="text-align: right;">Band 4</p> |
| <p>Question 9 C</p> <p>Meiosis is cell division involving sex cells (not body cells). It reduces the chromosome number by half and creates four daughter cells, each of which is genetically distinct from the parent cell.</p> | <p>Mod 6 Mutation BIO12–12</p> <p style="text-align: right;">Band 4</p> |
| <p>Question 10 B</p> <p>Most organisms have ‘non-coding’ DNA segments present, much in excess of ‘coding’ DNA segments. The structure is similar to ‘coding’ DNA segments. Non-coding DNA segments do have some uses (for example, transfer RNA, regulatory RNA and ribosomal RNA, and they can determine the expression of some genes).</p> | <p>Mod 6 Mutation BIO12–12</p> <p style="text-align: right;">Bands 2–4</p> |
| <p>Question 11 B</p> <p>Only glands and muscles can be effectors. Muscles contract in response to stimuli. Only glands release hormones.</p> | <p>Mod 8 Non-infectious Disease BIO12–14</p> <p style="text-align: right;">Band 1</p> |
| <p>Question 12 A</p> <p>Chemoreceptors detect changes in pH. All of the other receptors mentioned in the responses do not measure pH. When the diaphragm contracts and air is inhaled, pH increases as the blood becomes less acidic.</p> | <p>Mod 8 Non-infectious Disease BIO12–14</p> <p style="text-align: right;">Band 4</p> |
| <p>Question 13 C</p> <p>Filtration occurs in the glomerulus. Absorption and secretion occur in other parts of the kidney. Urine can be made more dilute if there is an excess of water in the body, but this does not occur in the glomerulus.</p> | <p>Mod 8 Non-infectious Disease BIO12–14</p> <p style="text-align: right;">Band 3</p> |
| <p>Question 14 A</p> <p>Incidence is a measure of new cases of a disease. As the new cases have decreased, the information is about incidence. Prevalence refers to how many individuals in the population have the disease and mortality refers to how many individuals die from the disease. Frequency could apply to any data.</p> | <p>Mod 8 Non-infectious Disease BIO12–14</p> <p style="text-align: right;">Band 2</p> |
| <p>Question 15 D</p> <p>The data refers to education for pre-school parents so the strategy is education campaigns. There is no mention of any other strategies in the data.</p> | <p>Mod 8 Non-infectious Disease BIO12–14</p> <p style="text-align: right;">Band 2</p> |
| <p>Question 16 A</p> <p>Innate immunity relates only to the non-specific barriers to entry of the pathogen. The barriers are not specific to macroorganisms and no antibodies are produced. Individual factors that fight pathogens are too general.</p> | <p>Mod 7 Infectious Disease BIO12–13</p> <p style="text-align: right;">Band 3</p> |
| <p>Question 17 A</p> <p>Vaccination reduces the number of hosts in a population to in turn reduce the viability of the pathogen. Failing to immunise offers no protection. The term does not relate to cows literally and does not relate to people who have had the disease.</p> | <p>Mod 7 Infectious Disease BIO12–13</p> <p style="text-align: right;">Band 5</p> |

| Answer and explanation | Syllabus content, outcomes and targeted performance bands |
|---|---|
| <p>Question 18 D</p> <p>Koch was not looking for a cure to smallpox, nor was he directly investigating methods of vaccination. He was developing what would become his postulates for linking a specific pathogen to a specific disease. Pasteur was investigating the presence of microbes in air and, while the other options relate to his experimental method, they are not the purpose of the investigation.</p> | <p>Mod 7 Infectious Disease BIO12–13</p> <p style="text-align: right;">Band 4</p> |
| <p>Question 19 A</p> <p>A vector is the entity that transports the pathogen but does not become the pathogen. While some pathogens can exist outside a cell, this does not relate to the function of a vector.</p> | <p>Mod 7 Infectious Disease BIO12–13</p> <p style="text-align: right;">Band 3</p> |
| <p>Question 20 B</p> <p>The implanted tissue is made up of foreign cells. While all responses except for D relate to the immune response, only B relates to the attack on the transplanted tissue.</p> | <p>Mod 7 Infectious Disease BIO12–13</p> <p style="text-align: right;">Band 4</p> |

Section II

| Sample answer | | | | Syllabus content, outcomes, targeted performance bands and marking guide |
|--|---|--|---|--|
| Question 21 | | | | |
| <i>Fertilisation</i> | <i>Implantation</i> | <i>Hormonal control of pregnancy</i> | <i>Hormonal control of birth</i> | Mod 5 Cell Replication BIO12–12 Bands 2–5 • Draws a table with headings. AND • Gives features of all FOUR of: <ul style="list-style-type: none"> • fertilisation • implantation • hormonal control of pregnancy • hormonal control of birth 4 |
| This is the union of two gametes (sex cells) – eggs (female) and sperm (male). | This is the adherence (sticking) of a fertilised egg to a surface in the reproductive tract, (usually to the uterine wall). | For example, progesterone increases blood flow to the womb. (It also stimulates glands in the womb to produce nutrients that sustain the early embryo and helps to establish the placenta.) | This involves oxytocin, oestrogen, progesterone and prostaglandin. For example, oxytocin induces uterine muscles to contract. | • Draws a table with headings. AND • Gives THREE sets of features 3 • Draws a table with headings. AND • Gives TWO sets of features 2 • Gives some relevant information. 1 |
| Question 22 | | | | |
| (a) | | | | Mod 5 DNA and Polypeptide Synthesis BIO12–5, BIO12–12 Band 2 • Gives FOUR correct bases. 2 • Gives at least TWO correct bases 1 |
| <i>Base</i> | guanine | thymine | cytosine | adenine |
| <i>Complementary base</i> | cytosine | adenine | guanine | thymine |
| (b) The overall structure of DNA is made up of two strands that are linked together like rungs on a ladder. These strands are twisted into a double helix. Each strand is made up of nucleotides (A, C, G and T), which match up with their complementary bases. Adenine pairs with thymine and cytosine pairs with guanine. The two strands are held together by (weak) hydrogen bonds. Watson and Crick proposed that in replication, DNA opens down the centre of the two strands – resembling a zipper coming apart. Each exposed strand is used as a template on which a new DNA strand is built, following the complementary base sequence. Again, the pairs of strands are held together by hydrogen bonds. | | | | Mod 5 DNA and Polypeptide Synthesis BIO12–12 Bands 2–6 • Gives a detailed description. AND • Uses the Watson and Crick model. 3 • Gives a sound description. AND • Uses the Watson and Crick model. 2 • Gives a sound description 1 |

| Sample answer | Syllabus content, outcomes, targeted performance bands and marking guide |
|--|---|
| Question 23 | |
| <p>There are some similarities in the techniques used in DNA sequencing and DNA profiling (fingerprinting). DNA sequencing determines the order of nucleotides (AGTC) in DNA. It enables the mapping of the genome (genetic makeup) of a species. DNA profiling, on the other hand, identifies the unique genome of individuals.</p> <p>DNA sequencing tends to be used by scientists investigating the sequence of a piece of DNA to understand more about its function. Sequencing uses electrophoresis to separate pieces of DNA that differ in length by only one base. DNA profiling first makes many copies of a short stretch of DNA and then also uses electrophoresis. DNA profiling uses repetitive sequences of DNA that are extremely variable, and unrelated individuals are unlikely to have the same sequences.</p> <p>DNA sequencing is more expensive and slower than DNA profiling but gives more information. DNA sequencing can be used to decide if a sample came from a particular person, or to identify the parents of a child. Knowledge of the genome has the potential to help diagnose and find therapies for inherited diseases. DNA profiling does not provide information about an individual’s complete DNA sequence. It tends to be used in forensic science to match samples with those of suspects or victims of crimes. It can also be used to determine genetic family relationships.</p> | <p>Mod 5 DNA and Polypeptide Synthesis BIO12–7, BIO12–12 Bands 2–6</p> <ul style="list-style-type: none"> • Describes features of DNA sequencing. <p>AND</p> <ul style="list-style-type: none"> • Describes features of DNA profiling. <p>AND</p> <ul style="list-style-type: none"> • Gives comparison of the two technologies 5–6 <hr/> <ul style="list-style-type: none"> • Describes features of DNA sequencing. <p>OR</p> <ul style="list-style-type: none"> • Describes features of DNA profiling. <p>AND</p> <ul style="list-style-type: none"> • Gives comparison of the two technologies 3–4 <hr/> <ul style="list-style-type: none"> • Describes features of DNA sequencing. <p>OR</p> <ul style="list-style-type: none"> • Describes features of DNA profiling 2 <hr/> <ul style="list-style-type: none"> • Gives some relevant information 1 |
| Question 24 | |
| <p>The entire set of genes in an organism is known as its genotype. This instructs how the organism grows and develops. The physical appearance and biochemical characteristics of an organism are the phenotype. These traits in humans include height, eye colour and blood type. Phenotypic expression in an individual is a result of the interaction of its genotype and the environment.</p> <p>Some traits (for example, eye colour) are completely determined by genotype. Others are easily altered by the environment, such as height and weight (which are affected by nutrition).</p> <p>Genetically identical individuals can show variations in phenotype. These include the different fingerprint patterns of identical twins, as well as different coat patterns exhibited by some animals. Cloned animals can show different coat patterns and personalities.</p> <p>The sex of some fish and vertebrates can be determined as genotypic, or it can be temperature-dependent; the ambient temperature during sensitive periods of early development of these species determines whether an individual becomes male or female.</p> | <p>Mod 6 Mutation BIO12–7, BIO12–12 Bands 2–6</p> <ul style="list-style-type: none"> • Defines the term ‘genes’. <p>AND</p> <ul style="list-style-type: none"> • Defines the term ‘phenotype’. <p>AND</p> <ul style="list-style-type: none"> • Assesses the effect of genes. <p>AND</p> <ul style="list-style-type: none"> • Assesses the effect of environment 4–5 <hr/> <ul style="list-style-type: none"> • Any THREE of the above points 3 <hr/> <ul style="list-style-type: none"> • Any TWO of the above points 2 <hr/> <ul style="list-style-type: none"> • Any ONE of the above points. 1 |

| Sample answer | Syllabus content, outcomes, targeted performance bands and marking guide | | | | | | | | | | | | | | | | |
|--|---|---------------|-----|-----|-------|-----|-------|-----|-------|-----|-------|-----|-------|-----|-------|------|---|
| Question 25 | | | | | | | | | | | | | | | | | |
| <p>(a)</p>  <table border="1" data-bbox="199 369 909 795"> <caption>Data points from the scatter plot</caption> <thead> <tr> <th>Age Range (years)</th> <th>Fold Increase</th> </tr> </thead> <tbody> <tr> <td>≤24</td> <td>1.0</td> </tr> <tr> <td>25-29</td> <td>1.5</td> </tr> <tr> <td>30-34</td> <td>3.0</td> </tr> <tr> <td>35-39</td> <td>5.5</td> </tr> <tr> <td>40-44</td> <td>8.0</td> </tr> <tr> <td>45-49</td> <td>8.5</td> </tr> <tr> <td>50-54</td> <td>11.5</td> </tr> </tbody> </table> | Age Range (years) | Fold Increase | ≤24 | 1.0 | 25-29 | 1.5 | 30-34 | 3.0 | 35-39 | 5.5 | 40-44 | 8.0 | 45-49 | 8.5 | 50-54 | 11.5 | <p>Mod 6 Inheritance Patterns in a Population/Mutation BIO12-6, BIO12-13 Bands 2-5</p> <ul style="list-style-type: none"> • Uses an appropriate scale. <p>AND</p> <ul style="list-style-type: none"> • Plots points accurately. <p>AND</p> <ul style="list-style-type: none"> • Draws a line of best fit. <p>AND</p> <ul style="list-style-type: none"> • Labels the axes 3 <hr/> <ul style="list-style-type: none"> • Any THREE of the above points 2 <hr/> <ul style="list-style-type: none"> • Any TWO of the above points 1 |
| Age Range (years) | Fold Increase | | | | | | | | | | | | | | | | |
| ≤24 | 1.0 | | | | | | | | | | | | | | | | |
| 25-29 | 1.5 | | | | | | | | | | | | | | | | |
| 30-34 | 3.0 | | | | | | | | | | | | | | | | |
| 35-39 | 5.5 | | | | | | | | | | | | | | | | |
| 40-44 | 8.0 | | | | | | | | | | | | | | | | |
| 45-49 | 8.5 | | | | | | | | | | | | | | | | |
| 50-54 | 11.5 | | | | | | | | | | | | | | | | |
| <p>(b) The (very small) chance of having a child with achondroplasia increases with the age of the parents.</p> | <p>Mod 6 Mutation BIO12-13 Band 2</p> <ul style="list-style-type: none"> • Gives an appropriate hypothesis 1 | | | | | | | | | | | | | | | | |
| <p>(c) (i) mutagens</p> | <p>Mod 6 Mutation BIO12-13 Band 2</p> <ul style="list-style-type: none"> • Gives correct name 1 | | | | | | | | | | | | | | | | |
| <p>(ii) Any two of:</p> <ul style="list-style-type: none"> • some chemicals • electromagnetic radiation (for example, gamma rays, X-rays and ultra-violet light) • increased temperature | <p>Mod 6 Mutation BIO12-13 Band 2</p> <ul style="list-style-type: none"> • Gives TWO factors 1 | | | | | | | | | | | | | | | | |
| Question 26 | | | | | | | | | | | | | | | | | |
| <p>(a) A range of sources were used. These included textbooks specific to the course from major scholastic publishers. Websites selected were preferably from educational organisations. Any websites used were checked to see if they agreed with other sites and were up-to-date.</p> | <p>Mod 6 Genetic Techniques BIO12-5, BIO12-13 Bands 2-4</p> <ul style="list-style-type: none"> • Gives at least TWO ways used to ensure validity 2 <hr/> <ul style="list-style-type: none"> • Gives ONE way used to ensure validity 1 | | | | | | | | | | | | | | | | |

| Sample answer | Syllabus content, outcomes, targeted performance bands and marking guide |
|--|---|
| <p>(b) An ethical use is one that conforms to society’s rules or standards. Biotechnology uses organisms and biological processes to make products intended to improve the quality of human life. It can be as simple as the cross-breeding of plants and animals, but in recent years has become much more sophisticated.</p> <p>There are wide ranges of opinion as to what is ‘ethical’ and what is not. Most areas of biotechnology have professional bodies to judge on ethical issues. However, these may not always match community expectations, which can differ in various parts of the world.</p> <p>The following examples are areas of biotechnology that are usually viewed as being ethical: development of pest-resistant grains, getting organisms to produce new drugs, producing vaccines using the eggs of hens and the development of new biofuels for vehicles.</p> <p>Using stem cells to regenerate damaged human tissues and perhaps regrow entire organs is not always agreed by all to be an ethical way to use human material. Human cloning and gene editing of human embryos is illegal in many countries and there seems to be a broad consensus amongst scientists that it is unethical. However, it has been reported that these procedures have been carried out (Sataline and Sample 2018, ‘Scientist in China defends human embryo gene editing’, <i>The Guardian</i>, https://www.theguardian.com/science/2018/nov/28/scientist-in-china-defends-human-embryo-gene-editing). Another unethical use of biotechnology is the production of ‘bioweapons’ – for example, bacteria and viruses that can cause disease and death.</p> <p>Biotechnology, like most technologies, has the potential to help humanity and also cause harm. It is important that all aspects should be considered to see that they conform to ethical standards.</p> | <p>Mod 6 Genetic Techniques BIO12–7, BIO12–13 Bands 2–4</p> <ul style="list-style-type: none"> • Defines the term ‘ethical’. <p>AND</p> <ul style="list-style-type: none"> • Analyses ethical uses of biotechnology. <p>AND</p> <ul style="list-style-type: none"> • Gives at least TWO examples 4–5 <hr/> <ul style="list-style-type: none"> • Defines the term ‘ethical’. <p>AND</p> <ul style="list-style-type: none"> • Analyses ethical uses of biotechnology. <p>AND</p> <ul style="list-style-type: none"> • Gives ONE example 3 <hr/> <ul style="list-style-type: none"> • Describes ethical uses of biotechnology. <p>AND</p> <ul style="list-style-type: none"> • Gives ONE example 2 <hr/> <ul style="list-style-type: none"> • Gives some relevant information 1 |
| <p>Question 27</p> | |
| <p>(a)</p> <pre> graph TD A[person consumes sugar-rich food] --> B[blood sugar level rises] B --> C[pancreas increases the release of insulin (and decreases glucagon)] C --> D[glucose in the blood is converted to glycogen] D --> E[normal blood sugar] E --> A </pre> | <p>Mod 8 Non-infectious Disease BIO12–15 Bands 2–4</p> <ul style="list-style-type: none"> • Draws diagram showing all FOUR of: <ul style="list-style-type: none"> • increase in blood sugar levels • pancreas releasing insulin • glucose being converted to glycogen, lowering the blood sugar • a feedback loop presentation 4 <hr/> <ul style="list-style-type: none"> • Any THREE of the above features 3 <hr/> <ul style="list-style-type: none"> • Any TWO of the above features 2 <hr/> <ul style="list-style-type: none"> • Any ONE of the above features 1 |

| Sample answer | Syllabus content, outcomes, targeted performance bands and marking guide |
|---|---|
| <p>(b) Blood sugar is increasing away from the normal state, so the body responds by increasing insulin to reduce the blood sugar. This means the body is having a negative response to the change (increased blood sugar) to return to normal levels. The body responds in this way to achieve a constant internal environment (homeostasis).</p> | <p>Mod 8 Non-infectious Disease BIO12–15 Band 4</p> <ul style="list-style-type: none"> • Demonstrates how the response is negative (by reversing the action taking place). <p>AND</p> <ul style="list-style-type: none"> • Explains that this action returns the body to a normal state – that is, normal blood sugar. <p>AND</p> <ul style="list-style-type: none"> • Refers to this being a part of maintaining homeostasis 3 <hr/> <ul style="list-style-type: none"> • Demonstrates how the response is negative (by reversing the action taking place). <p>AND</p> <ul style="list-style-type: none"> • Explains that this action returns the body to a normal state – that is, normal blood sugar 2 <hr/> <ul style="list-style-type: none"> • Demonstrates how the response is negative (by reversing the action taking place). 1 |
| <p>Question 28</p> | |
| <p>First question: <i>Do you play a lot of sports?</i> This is important as wearing glasses may be difficult if the child is very active, and they may prefer to wear contact lenses or have surgery. Second question: <i>How do you feel about placing something on the surface of your eye? For example, how do you feel when eye drops are put in your eyes?</i> This is important as a child may have difficulty in handling the contact lenses close to their eye. It may cause so much stress that contact lenses become impractical.</p> | <p>Mod 8 Non-infectious Disease BIO12–15 Bands 3–4</p> <ul style="list-style-type: none"> • States TWO relevant questions with TWO relevant explanations 4 <hr/> <ul style="list-style-type: none"> • States TWO relevant questions with ONE relevant explanation 3 <hr/> <ul style="list-style-type: none"> • States TWO relevant questions 2 <hr/> <ul style="list-style-type: none"> • States ONE relevant question 1 |
| <p>Question 29</p> | |
| <p>(a) Asbestos is a the harmful substance that causes mesothelioma.</p> | <p>Mod 8 Non-infectious Disease BIO12–15 Band 2</p> <ul style="list-style-type: none"> • Identifies a substance. <p>AND</p> <ul style="list-style-type: none"> • States the corresponding disease 2 <hr/> <ul style="list-style-type: none"> • Identifies a substance 1 |
| <p>(b) The incidence of mesothelioma in Australia is between 700 and 800 new cases per year. The mortality rate is approximately 94%.</p> | <p>Mod 8 Non-infectious Disease BIO12–15 Band 3</p> <ul style="list-style-type: none"> • Provides data for the incidence AND mortality 2 <hr/> <ul style="list-style-type: none"> • Provides data for the incidence OR mortality 1 |
| <p>(c) Wearing protective clothing and masks on worksites that have asbestos would ensure that people would not breathe in the asbestos dust that damages lungs.</p> | <p>Mod 8 Non-infectious Disease BIO12–15 Band 4</p> <ul style="list-style-type: none"> • States a relevant strategy 1 |

| Sample answer | Syllabus content, outcomes, targeted performance bands and marking guide |
|---|---|
| <p>(d) Initially those responsible for producing the materials containing asbestos denied any knowledge of the danger. This meant that it was harder to prove that it was the building material that was causing the disease.</p> <p>Epidemiology provided evidence of the link between the exposure to asbestos and the incidence of mesothelioma. It made a link between a specific type of work and the disease.</p> | <p>Mod 8 Non-infectious Disease BIO12–15 Band 3</p> <ul style="list-style-type: none"> • States an advantage. 1 |
| Question 30 | |
| <p>(a) Obesity is caused by excessive kilojoule intake. It contributes to many conditions – for example, high blood pressure. (Genetic conditions causing obesity are very rare.)</p> | <p>Mod 8 Non-infectious Disease BIO12–15 Bands 2–3</p> <ul style="list-style-type: none"> • Identifies a nutritional disease. <p>AND</p> <ul style="list-style-type: none"> • Outlines an impact of the disease 2 <hr/> <ul style="list-style-type: none"> • Identifies a nutritional disease 1 |
| <p>(b) A person could reduce their kilojoule intake and increase their activity to burn kilojoules in order to reduce the impact of the obesity.</p> | <p>Mod 8 Non-infectious Disease BIO12–15 Bands 2–3</p> <ul style="list-style-type: none"> • Describes the treatment of the disease . . . 1 |
| Question 31 | |
| <p>(a) A prion is a non-cellular pathogen.</p> | <p>Mod 7 Infectious Disease BIO12–14 Bands 1–2</p> <ul style="list-style-type: none"> • Identifies an example of a non-cellular pathogen 1 |
| <p>(b) Prions are altered proteins. They do not have any cellular structure and are not living.</p> | <p>Mod 7 Infectious Disease BIO12–14 Bands 1–2</p> <ul style="list-style-type: none"> • Explains the classification of the pathogen 2 <hr/> <ul style="list-style-type: none"> • Describes the classification of the pathogen 1 |
| <p>(c) Pathogenic prions cause proteins they come in contact with to change shape. These prions are found in tissue of the nervous system. They are consumed or can be transmitted via surgical equipment. They may also be passed on via corneal transplants.</p> | <p>Mod 7 Infectious Disease BIO12–14 Bands 3–4</p> <ul style="list-style-type: none"> • Describes transmission of the pathogen 2 <hr/> <ul style="list-style-type: none"> • Identifies ONE detail of transmission of the pathogen 1 |
| <p>(d) As prions are not living, they do not have specific adaptations in an evolutionary sense. They are just chemicals that enter cells through pores in cell membranes (protein channels).</p> | <p>Mod 7 Infectious Disease BIO12–14 Band 4</p> <ul style="list-style-type: none"> • Outlines an adaptation related to entry into a host 2 <hr/> <ul style="list-style-type: none"> • Identifies a feature related to entry into a host 1 |

| Sample answer | Syllabus content, outcomes, targeted performance bands and marking guide |
|---|---|
| Question 32 | |
| <p>Myrtle rust is a disease that affects Australian plants such as bottlebrush and tea tree. The fungus that causes the disease, <i>Austropuccinia psidii</i>, is an introduced species. It results in deformed leaves, heavy defoliation of branches and stunted growth.</p> | <p>Mod 7 Infectious Disease BIO12–14 Band 3</p> <ul style="list-style-type: none"> • States a fungal disease of plants. AND • Describes evidence of an infection in an Australian plant 3 <hr/> <ul style="list-style-type: none"> • States a fungal disease of plants. AND • States ONE example of evidence of an infection in an Australian plant 2 <hr/> <ul style="list-style-type: none"> • States a fungal disease of plants 1 |
| Question 33 | |
| <p>Florence Nightingale found that many soldiers died while hospitalised during the Crimean War, but not from their injuries – instead it was from infection. She insisted on cleanliness in wards, with quick removal of human waste and fresh water supply. She also ensured that windows were open to allow fresh air to flow through the wards. This was before Pasteur had conducted his famous experiments proving that microbes lived in the air. These methods were successful as they improved the survival rates of patients, removing the environment in which pathogens could multiply.</p> | <p>Mod 7 Infectious Disease BIO12–14 Bands 4–5</p> <ul style="list-style-type: none"> • Describes a strategy from history to prevent disease. AND • Makes a statement to evaluate the strategy. AND • Provides evidence that the strategy was effective 4 <hr/> <ul style="list-style-type: none"> • Identifies a strategy from history to prevent disease. AND • Makes a statement to evaluate the strategy. AND • Provides evidence that the strategy was effective 3 <hr/> <ul style="list-style-type: none"> • Identifies a strategy from history to prevent disease. AND • Makes a statement to evaluate the strategy 2 <hr/> <ul style="list-style-type: none"> • Identifies a strategy from history to prevent disease 1 |

| Sample answer | Syllabus content, outcomes, targeted performance bands and marking guide |
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| Question 34 | |
| <p>The B cells are exposed to cytokines produced by helper T cells, which stimulate differentiation of the B cells. The B cells then become plasma cells and produce antibodies specific to the antigen. Some B cells differentiate to become helper B cells. This has a great impact on the individual’s ability to fight diseases, as the helper B cells will rapidly become plasma B cells on any subsequent exposure to the antigen.</p> | <p>Mod 7 Infectious Disease BIO12–14 Bands 4–5</p> <ul style="list-style-type: none"> • Describes the response in relation to plasma cells AND helper B cells. <p>AND</p> <ul style="list-style-type: none"> • Links the response to the reduced impact of the pathogen 4 <hr/> <ul style="list-style-type: none"> • Describes the response in relation to plasma cells OR helper B cells. <p>AND</p> <ul style="list-style-type: none"> • Links the response to the reduced impact of the pathogen 3 <hr/> <ul style="list-style-type: none"> • Identifies a response. <p>AND</p> <ul style="list-style-type: none"> • Links the response to the reduced impact of the pathogen 2 <hr/> <ul style="list-style-type: none"> • Identifies a response 1 |
| Question 35 | |
| <p>Antiviral medication works in various ways – for example, binding to a host cell’s receptor site to prevent the virus from entering the cell. The medication does not attack the virus directly, but it disrupts its life cycle. Antiviral medication has been used to treat influenza A. As antiviral medication only prevents the infection from getting worse, it is important to take the medication early. Some antiviral medication for influenza A has been found to reduce the mortality rate of the infection.</p> | <p>Mod 7 Infectious Disease BIO12–14 Bands 4–5</p> <ul style="list-style-type: none"> • Describes how ONE pharmaceutical strategy works. <p>AND</p> <ul style="list-style-type: none"> • Assesses its effectiveness 2 <hr/> <ul style="list-style-type: none"> • Describes how ONE pharmaceutical strategy works. 1 |

