

edexcel 

A2

Biology

**LATEST
SYLLABUS**



Unit 4 Solved Past Papers



Click the topic to access it quickly

Unit 4 (WBI14/01) · Questions & Answers by Topic

Past-paper questions classified by topic · click a chapter to jump

1.	Photosynthesis: light-dependent reactions	15 questions
2.	Photosynthesis: light-independent reactions	6 questions
3.	Ecology: sampling & succession	21 questions
4.	Global warming	18 questions
5.	Evolution	6 questions
6.	DNA profiling	6 questions
7.	Forensics	6 questions
8.	Viruses & bacteria	12 questions
9.	Active immunity	18 questions
10.	Microbiology	19 questions

Edexcel IAL Biology - Solved Past Paper

January 2026 · Unit 4: Energy, Environment, Microbiology and Immunity (WBI14/01)

Question 6 · Porcine circovirus & a pig vaccine

● hard ● medium ● easy

● 6 (a)(i)

Identify (multiple choice) · [1 mark]

Which holds the DNA strand in a circular structure?

Model answer

✓ D - phosphodiester bonds between mononucleotides (joining the sugar-phosphate backbone into a loop).

Mark scheme 1 mark

✓ D - phosphodiester bonds between mononucleotides (1)

Do not accept: rows A, B or C - hydrogen bonds join base pairs (two strands), and phosphodiester bonds do not form between base pairs

Examiner's insight

Weaker learners need to learn the key features of viruses and DNA structure more accurately.

● 6 (a)(ii)

Identify (multiple choice) · [1 mark]

Which other virus has an icosahedral capsid?

Model answer

✓ B - human immunodeficiency virus (HIV).

Mark scheme 1 mark

✓ B - HIV (1)

Do not accept: rows A, C or D - Ebola and TMV are helical, lambda phage is complex

Examiner's insight

HIV has a polyhedral (icosahedral) capsid.

● 6 (a)(iii)

Identify (multiple choice) · [1 mark]

Which pair of viruses have no envelope?

Model answer

✓ C - lambda phage (lambda phage) and tobacco mosaic virus (TMV).

Mark scheme 1 mark

✓ C - lambda phage and TMV (1)

Do not accept: rows A, B or D - both Ebola and HIV have envelopes

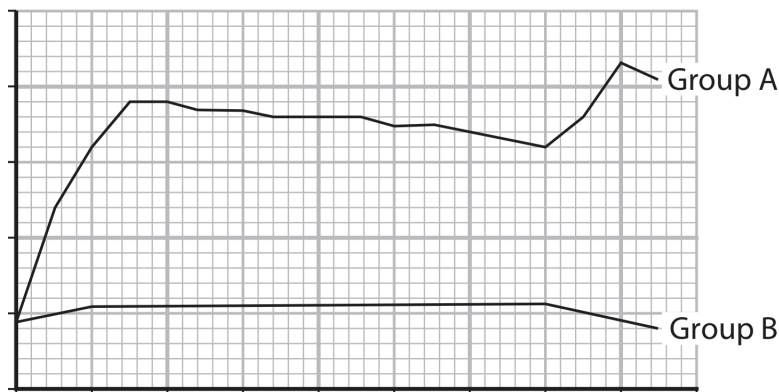
Examiner's insight

lambda phage and TMV both lack an envelope.

● 6 (b)(i)

Explain · [3 marks]

Explain why host cell DNA polymerase is needed to replicate the viral DNA.



Number of days after birth	Concentration of antibodies against PCV in the blood of the piglets / a.u.	
	Group A piglets	Group B piglets
0	3.9	0.7
10	3.2	0.8
20	3.0	2.6
40	2.9	2.9

Model answer

✓ Because PCV does not contain (cannot make) its own DNA polymerase. ✓ To replicate the viral DNA, a complementary copy of the strand has to be made – the viral DNA is replicated when the host cell replicates its own DNA. ✓ The DNA polymerase lines up the nucleotides and forms the phosphodiester bonds between them.

Mark scheme any 3 marks

- ✓ PCV does not contain / cannot make its own DNA polymerase (1)
- ✓ a complementary copy / strand has to be made (1)
- ✓ viral DNA is replicated when host cell DNA is replicated (1)
- ✓ DNA polymerase lines up the nucleotides (1)

Accept: the virus for PCV; formation of phosphodiester bonds

Examiner's insight

Only stronger responses explained DNA replication in the context of the PCV virus.

● 6 (b)(ii)

Explain · [3 marks]

Explain how one gene (ORF1) can code for two different proteins in eukaryotic cells.

Model answer

✓ The gene is transcribed into a pre-mRNA copy. ✓ **Post-transcriptional** modification of the pre-mRNA then occurs – the introns (and some exons) are removed by splicing. ✓ Splicing the exons in different ways (alternative splicing) forms different mRNA sequences, which are translated into different proteins.

Mark scheme any 3 marks

- ✓ a pre-mRNA copy of the gene is made (1)
- ✓ post-transcriptional modification of the pre-mRNA occurs (1)
- ✓ introns (and some exons) are removed / spliced (1)
- ✓ forming different mRNA sequences that are translated into different proteins (1)

Accept: alternative splicing; exons rearranged

Examiner's insight

Weaker responses confused this with epigenetic modification, or did not explain it in enough detail - this is alternative splicing.

● *6 (c)

Explain (levels) · [6 marks]

Explain the results shown in the graph (gilt antibodies) and the table (piglet antibodies). Use your knowledge.

Model answer

✓ Graph, group A: some antibodies are present at day 0 because the gilts had been exposed to PCV before; the day-0 and day-20 vaccines each trigger a secondary immune response, so the antibody level rises to about day 30. ✓ The level then falls slightly to day 140 as antibodies are broken down and cross the placenta into the piglets, rises again after the day-140 vaccine, and drops at day 160 as antibodies pass into the milk when the gilts suckle their young. Group B, unvaccinated, has low antibodies that fall as they are broken down and cross the placenta. ✓ Table, group A piglets: they have high antibodies at birth from **natural passive immunity** (received from the mother across the placenta), which fall slowly as the antibodies are broken down – with no **natural active immunity**, as the virus is destroyed before the piglet can respond. ✓ Table, group B piglets: they have very low antibodies at birth (their mothers had little to pass on), which then increase because the piglets become infected with PCV and mount a primary immune response (**natural active immunity**).

Mark scheme 6 marks (levels)

- ✓ group A gilts: antibodies rise after each vaccine (secondary response); fall as they cross the placenta / into milk
- ✓ group B gilts: low antibodies that fall (broken down / cross placenta)
- ✓ group A piglets: high antibodies at birth - natural passive immunity from the mother; fall

slowly

- ✓ group B piglets: low at birth; rise as they are infected with PCV -> primary response / natural active immunity
- ✓ Level 3: both the graph AND the table explained

How to reach full marks

Levels question - explain BOTH the graph (group A vs B gilts) AND the table (their piglets), not just one. Graph, group A: some antibodies present at day 0 (previously exposed/vaccinated); after the day-0 and day-20 vaccines the antibody level rises (secondary immune responses); it then falls slightly to day 140 as antibodies are broken down and cross the placenta into the piglets; it rises again after the day-140 vaccine, then drops at day 160 as antibodies pass into the milk (suckling). Group B (unvaccinated): low antibodies that fall as they are broken down / cross the placenta. Table: group A piglets have high antibodies at birth (natural passive immunity from the mother) which fall slowly (no natural active immunity, as the virus is destroyed before a response); group B piglets have very low antibodies at birth (little to pass on) which then rise because they become infected with PCV, mounting a primary immune response (natural active immunity). Level 3 needs both the graph and the table explained.

Examiner's insight

Weaker responses confined their explanation to the graph OR the table, and often included many details of the specific immune response that was not being assessed here.

Revise from your notes

- Virus characteristics, types & passive immunity: 18.1 Characteristics Of Viruses · 18.3 Different Types Of Viruses · 17.3 Passive And Active Immunity
- DNA replication & RNA splicing - revise from Unit 2: 8.4 The Process Of DNA Replication · 9.2 Transcription / splicing - (Unit 2)

PHOTOSYNTHESIS II



4 Photosynthesis involves the fixation of carbon dioxide in chloroplasts.

- (a) Place a cross ☒ in the box next to the region of the chloroplast that would be involved in the fixation of carbon dioxide.

(1)

- ☐ A crista
- ☐ B granum
- ☐ C matrix
- ☒ D stroma

Calvin cycle



- (b) An investigation was carried out into the effect of reducing the carbon dioxide available for photosynthesis. Cells of a unicellular alga were suspended in a solution containing 1.0% carbon dioxide. After 250 seconds, the carbon dioxide in the solution was reduced to 0.003%.

The cells were illuminated with a bright light and some were removed at regular time intervals for 500 seconds. The concentrations of ribulose bisphosphate (RuBP) and glycerate 3-phosphate (GP) in the cells were measured.

- (i) Suggest **two** reasons why a suspension of cells of a unicellular alga, in a solution, is more suitable for this investigation than using leaves.

(2)

All cells are identical this way, so fair comparison

Cells are identical in their surface area, mass and genotype

It is much easier to control the supply of carbon dioxide, GP and RuBP this way

- (ii) Suggest why it would be advisable to illuminate the cells at a high light intensity during this investigation.

(3)

Light is needed for light-dependent reaction which produce ATP and reduced NADP

Both products are required for the light-independent reactions

Light is a limiting factor for photosynthesis so it shouldn't be supplied in short amounts

This ensures that carbon dioxide is the only limiting factor

SAMPLING & SUCCESSION

The three statements below show the conclusions recorded by different students following the seashore study of periwinkles.

Place a cross ☒ in the box next to one statement that could form a valid conclusion using the information shown in the graph opposite.

(1)

- ☐ **A** All periwinkles are affected by the height above sea level
- ☒ **B** The height above sea level influences the distribution of different species of periwinkle
- ☐ **C** Neither of the species of periwinkle is affected by the height above sea level

- (v) With reference to the data in the graph, discuss the validity of statements **A**, **B** and **C**.

(4)

Statement A is not valid because the graph only provides information about two species

Statement B is valid because density of both species changes as height changes
As height increases *L. littorea* tends to increase, while *L. obtusa* tends to decrease
Competition not a (significant) factor as both species can be found at same height

Statement C is not valid because density of species changes as height changes
No information is mentioned about other factors that influence distribution

(Total for Question 3 = 12 marks)

Edexcel IAL Biology - Solved Past Paper

October 2023 · Unit 4: Energy, Environment, Microbiology and Immunity (WBI14/01)

Question 2 · Inflammation, interferon & the antibody response

● hard ● medium ● easy

● 2 (a)(i)

Name · [1 mark]

Name the two other characteristics of inflammation.

Model answer

✓ Pain and swelling (loss of function is also acceptable).

Mark scheme 1 mark

✓ pain and swelling / pain and loss of function / swelling and loss of function (1)

Accept: hurts / tender / dolor; oedema

Examiner's insight

Most could name two other characteristics.

● 2 (a)(ii)

Explain · [2 marks]

Explain how heat helps the body respond to infection.

Model answer

✓ The higher **temperature** speeds up enzyme (lysozyme) activity. ✓ So pathogens are destroyed faster by phagocytes; a high enough **temperature** also denatures the pathogens' own enzymes, inhibiting them.

Mark scheme any 2 marks

✓ higher temperature speeds up enzyme / lysozyme activity (1)

✓ pathogens destroyed faster by phagocytes / lysozymes (1)

✓ high temperature denatures pathogens' enzymes so they cannot reproduce (1)

Accept: increases the immune response; infected cells damaged

Do not accept: viruses killed

Examiner's insight

Most knew heat affects enzymes, but fewer linked the increased enzyme activity to faster destruction by phagocytes, and very few contrasted the host's enzymes with the pathogens'.

● 2 (b)

Describe · [2 marks]

Describe how interferon helps the body respond to infection.

Model answer

✓ Interferons are antiviral proteins secreted by virus-infected cells. ✓ They prevent viral replication (synthesis of viral proteins / spread of the virus) and help activate macrophages and T killer cells.

Mark scheme any 2 marks

- ✓ interferons are secreted by infected cells (1)
 - ✓ they are anti-viral proteins (1)
 - ✓ preventing viral replication / synthesis of viral proteins / spread (1)
 - ✓ involved in activation of macrophages / T killer cells (1)
- Accept:** prevent viruses entering / binding to cells; activation of the cell-mediated response

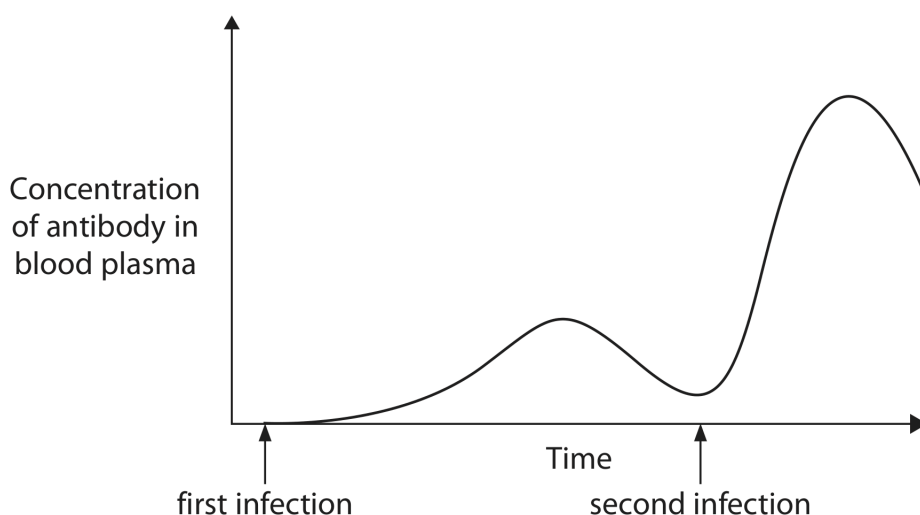
Examiner's insight

Several described the effect on viruses but few used the mark allocation to give the two-mark level of detail.

● **2 (c)**

Compare and contrast · [3 marks]

Compare and contrast the antibody concentration after the first and second infection.

**Model answer**

- ✓ **Similarity** - the antibody concentration rises (and later falls) after both infections. ✓
- Difference** - after the second infection the antibody rises sooner (almost immediately). ✓
- Difference** - after the second infection it rises higher and faster.

Mark scheme similarity + 2 differences

- ✓ concentration rises (and falls) in both (1)
- ✓ rises sooner / immediately after the second infection (1)
- ✓ rises higher after the second infection (1)
- ✓ rises faster after the second infection (1)

Examiner's insight

Compare-and-contrast is now familiar, and some excellent responses were seen.

Revise from your notes

- Inflammation, interferons & immunity: 15.3 Inflammation · 15.5 Interferons · 16.5 The Humoral Immune Response · 17.2 Immunity

- *(b) Large areas of land may need to be cleared in order to produce biofuels. This might involve deforestation.

Discuss why the production of biofuels may not be carbon neutral.

(5)

- Biofuel production may overall result in more atmospheric carbon dioxide
- Carbon neutrality means that carbon dioxide produced during combustion equals that used during production of the biofuel (photosynthesis)
- Deforestation results in a net increase in carbon dioxide as there are less
- Burning of trees while clearing the land produces CO₂
- Decomposition of dead trees may also release methane
- Trees absorb carbon dioxide by photosynthesis
- Transportation and production of biofuels might also involve the use of fossil fuel which leads to the production of more CO₂

- (c) Explain how the combustion products, from the burning of fuels, may lead to global warming.

(4)

- Greenhouse gases such as CO₂ and CH₄ build up a layer in the upper atmosphere
- This layer absorbs IR that is reflected from the surface of Earth
- The higher the level of the greenhouse gases causes an enhanced greenhouse effect
- which leads to a higher temperature of our planet

Edexcel IAL Biology - Solved Past Paper

June 2023 · Unit 4: Energy, Environment, Microbiology and Immunity (WBI14/01) · Question 6
Malaria & vaccine development

● hard ● medium ● easy

● 6 (a)

State · [1 mark]

State the meaning of the term infection.

Model answer

✓ The entry (invasion) of a pathogen inside the cells or tissues.

Mark scheme 1 mark

✓ entry / invasion of a pathogen inside cells / tissues (1)

Accept: named pathogen e.g. Plasmodium / sporozoites; a named cell / tissue if correct

Ignore: body

Examiner's insight

Some good definitions, but many referred to the 'body' rather than cells or tissues and lost the mark. Learn accurate definitions of specification terms.

● 6 (b)(i)

Identify (multiple choice) · [1 mark]

Which is the approximate death rate from malaria in 2019?

Model answer

✓ B - 1 in 600: $229 \times 10^6 \text{ cases} \div 4.09 \times 10^5 \text{ deaths} = 560 \sim 600$.

Mark scheme 1 mark

✓ B - 1 in 600 (1)

Do not accept: rows A, C or D - $229 \times 10^6 \div 4.09 \times 10^5 = 559.9 \sim 600$

Examiner's insight

Divide cases by deaths.

● 6 (b)(ii)

Identify (multiple choice) · [1 mark]

Which is the ratio of deaths in young children to other age groups?

Model answer

✓ D - 2.0 : 1.0: children $274\,000$ to others $(409\,000 - 274\,000 = 135\,000) = 2 : 1$.

Mark scheme 1 mark

✓ D - 2.0 : 1.0 (1)

Do not accept: rows A, B or C - $274\,000 : 135\,000 = 2 : 1$

Examiner's insight

Subtract the children's deaths from the total first.

● 6 (c)(i)

Suggest · [3 marks]

Suggest why sporozoites are used in the vaccine.

Model answer

✓ The sporozoites are more accessible to the immune system than the later stages (they are in the blood plasma). ✓ So memory cells can be generated against the sporozoites. ✓ So that on a real infection they are destroyed by the secondary immune response, preventing them entering and damaging the liver cells.

Mark scheme

any 3 marks

- ✓ sporozoites more accessible to the immune system (1)
- ✓ so memory cells are generated against them (1)
- ✓ so they are destroyed by the secondary immune response (1)
- ✓ to prevent them entering / damaging liver cells (1)

Accept: before they can develop into merozoites; phagocytosis by macrophages (not in the primary response)

Do not accept: 'antibodies destroy'

Examiner's insight

The best responses saw the vaccine generates memory cells for a secondary response. Very few scored three marks - they omitted accessibility or the protection of the liver cells.

● 6 (c)(ii)

Deduce · [3 marks]

Deduce why the two chemicals (one killing sporozoites, one killing merozoites) were injected with the vaccine.

Model answer

✓ Because the immune response takes time to develop, and the phagocytes may not engulf all the sporozoites. ✓ So a chemical is needed to kill any sporozoites that get into the liver, before they can produce merozoites. ✓ The second chemical kills the merozoites in case the first does not kill all the sporozoites - avoiding the **risk** of the person developing malaria from the live vaccine.

Mark scheme

any 3 marks

- ✓ the immune response takes time / phagocytes may not engulf all sporozoites (1)
- ✓ chemical needed to kill sporozoites that get into the liver (1)
- ✓ second chemical needed to kill merozoites if the first fails (1)
- ✓ to avoid the risk of developing malaria from the live vaccine (1)

Accept: the vaccine may be ineffective / immune system weakened

Examiner's insight

The first and last points were most common; the middle two were rare, as candidates did not treat the two chemicals separately. Each chemical has a different target, so each was included for a different reason - discuss them separately.

6 (c)(iii)

Explain · [3 marks]

Explain why the vaccine was effective against both strains of sporozoite.

Model answer

✓ Because the two strains share some of the same antigens. ✓ The vaccine stimulated an immune response and memory cells against these common antigens. ✓ So a secondary immune response destroyed both strains (engulfed by macrophages).

Mark scheme any 3 marks

- ✓ the two strains had some of the same antigens (1)
- ✓ the vaccine stimulated memory cells / antibodies to these common antigens (1)
- ✓ a secondary immune response took place (1)
- ✓ both strains were destroyed / engulfed by macrophages (1)

Accept: surface molecules / proteins

Examiner's insight

Candidates picked up the secondary-response marks but often omitted the ultimate destruction. A disappointing number realised the strains share common antigens - and 'antigen' is a key immunology term you must use here.

Revise from your notes

- Immunity, active immunity & the immune response: 17.2 Immunity · 17.3 Passive And Active Immunity · 16.5 The Humoral Immune Response

- (i) Enzymes can be used to produce protein fragments from the isolated protein.

Put a cross ☒ in the box next to the description that completes the following statement.

Enzymes are

(1)

- ☐ A fibrous proteins that decrease activation energy
- ☐ B fibrous proteins that increase activation energy
- ☒ C globular proteins that decrease activation energy
- ☐ D globular proteins that increase activation energy

- (ii) Put a cross ☒ in the box next to the term that completes the following statement.

Enzymes digest proteins into fragments using

(1)

- ☐ A condensation reactions
- ☐ B esterification reactions
- ☒ C hydrolysis reactions
- ☐ D polymerisation reactions

- (iii) Using your knowledge of gel electrophoresis in the analysis of DNA, suggest how gel electrophoresis could be used to analyse the protein.

(3)

Protein fragments are loaded on the gel

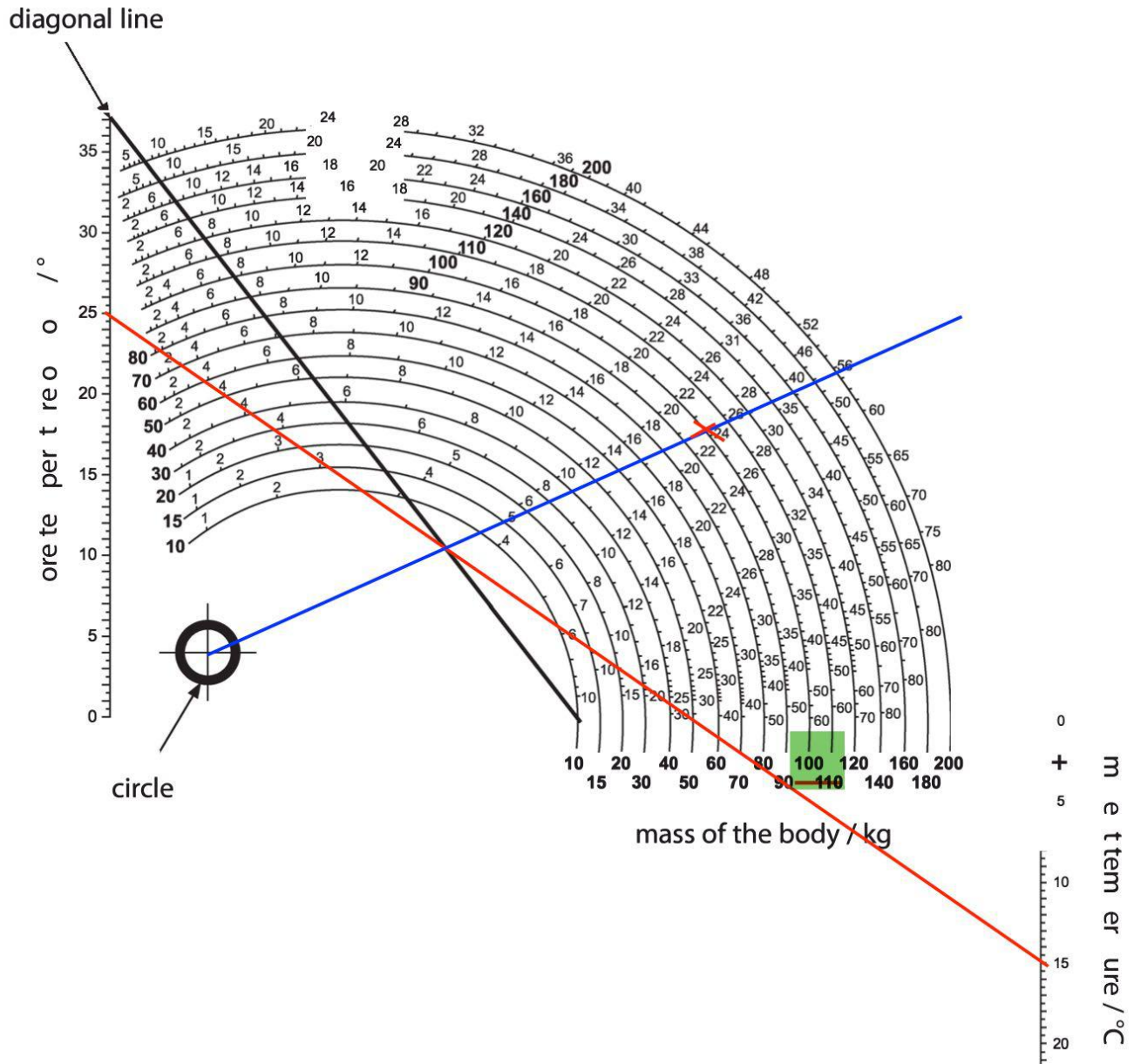
An electric current is then applied

Gel electrophoresis separates the protein fragments

Proteins can then be identified by the number and size of protein bands

Proteins can then be identified by the position of protein bands

Henssge nomogram



- (i) A body was found. The mass of the body was 100 kg and the core temperature of the body was 25°C. The ambient temperature was 15°C.

Use the Henssge nomogram to estimate the time of death.

(3)

time of death = **23 - 24** hours ago

Bacterial pathogens (TB)

Edexcel IAL Biology - Solved Past Paper

January 2024 · Unit 4: Energy, Environment, Microbiology and Immunity (WBI14/01)

Question 5 · TB & HIV co-infection

● hard ● medium ● easy

● 5 (a)

Explain · [4 marks]

Explain why HIV infection causes TB to be worse.

Model answer

✓ HIV targets and infects the T helper (CD4) cells, reducing their number as they are destroyed. ✓ This happens especially when HIV enters the lytic cycle. ✓ Without T helper cells the humoral immune response is not initiated (or is weaker), so the TB bacteria are not opsonised. ✓ So without antibody, phagocytosis of the Mtb is far less effective, and the TB gets worse.

Mark scheme any 4 marks

- ✓ HIV targets / infects T helper cells (1)
- ✓ number of T helper cells reduced / destroyed (1)
- ✓ without T helper cells the humoral response is not initiated / weaker (1)
- ✓ so Mtb are not opsonised (1)
- ✓ so phagocytosis of Mtb is not effective without antibody (1)

Accept: CD4 cells; person is immunocompromised; agglutination

Ignore: T killer cells not activated

Examiner's insight

Candidates scored the HIV marks, but few appreciated the effect of no antibodies on TB, so the opsonisation and phagocytosis marks were rarely awarded.

● 5 (b)(i)

Suggest · [2 marks]

Suggest two reasons why these figures are only estimates.

Model answer

✓ It is impossible to test everyone, and not everyone is willing (or has access to) testing - some have no symptoms, or HIV is dormant. ✓ People with HIV may not admit they are positive, and someone only recently infected (a small viral load) may give a false-negative result.

Mark scheme any 2 marks

- ✓ a reason for not testing everyone (1)
- ✓ a second reason for not testing everyone (1)

- (b) The flow diagram below shows the main stages in the life cycle of blowflies and beetles.

EGG → LARVA → PUPA → ADULT

- (i) Place a cross ☒ in the box next to the factor that would have the most effect on the rate of development of each stage of the life cycle of insects on this dead body.

(1)

☐ A interspecific competition

☐ B light

☐ C predation by birds

☒ D temperature

- (ii) Suggest how the pathologist might use the information in the table and the flow diagram to estimate the time of death of the young man.

(3)

The body has been dead for a while

As more than one species of insect are present

Every species of insects makes conditions suitable enough for the next species to inhabit the dead body. This is known as **succession**

TOD can be estimated with knowledge about the life cycle of the insects

For instance, blowfly have completed their life cycle which indicates that the TOD has happened long time ago

However, factors such as **temperature** could influence the development of insects

structure) of the membrane protein changes, forming a new (neo)antigen.

Mark scheme 2 marks

- ✓ a mutation changes the DNA / base sequence (1)
- ✓ so a new amino acid sequence / primary structure results (1)
- Accept:** change in the genetic code; change in one base / amino acid; polypeptide

Examiner's insight

Some over-complicated this with types of mutation and did not say the amino acid sequence would change.

● **7 (b)(ii)**

Explain · [4 marks]

Explain how vaccines containing the mRNA for neoantigens stimulate the immune response.

Model answer

✓ The mRNA is translated to produce the neoantigens. ✓ The body recognises these neoantigens as foreign, so macrophages engulf them and display them on their surface. ✓ The macrophages present the neoantigens to T helper (CD4) cells. ✓ Which then release cytokines to stimulate the immune response - activating B cells and T killer cells.

Mark scheme any 4 marks

- ✓ the mRNA results in the production of the neoantigens (1)
- ✓ the body recognises the neoantigens as foreign (1)
- ✓ macrophages engulf / express the neoantigens (1)
- ✓ macrophages present them to T helper / CD4 cells (1)
- ✓ which release cytokines to stimulate B cells / T killer cells (1)
- Accept:** mRNA translated; expressed on MHC; chemicals for cytokines
- Do not accept:** the mRNA itself expressed on the surface; B cells presenting the antigen

Examiner's insight

The same recurring immunology errors: the mRNA being expressed on the cell surface, B cells presenting the antigen, macrophages presenting to unspecified T cells, T helper becoming T killer, and no mention of cytokines.

● **7 (c)**

Explain · [2 marks]

Explain how monoclonal antibodies help destroy cancer cells.

Model answer

✓ The antibodies bind to the neoantigens, forming antigen-antibody complexes (opsonisation). ✓ So the cancer cells are engulfed and destroyed faster by macrophages (and agglutination stops them spreading).

Mark scheme 2 marks

- ✓ antibodies bind to the neoantigens / form an antigen-antibody complex (1)

- ✓ so cancer cells destroyed faster by macrophages / phagocytes (1)

Accept: opsonisation; agglutination; engulfed by macrophages faster; prevented from spreading

Do not accept: antibodies killing / destroying the cancer cells

Examiner's insight

Plenty of references to opsonisation, agglutination and neutralisation, but candidates do not appreciate the difference between them. 'Antibodies destroy the cancer cells' is a common misconception.

● 7 (d)

Explain · [2 marks]

Explain why large numbers of genetically identical T cells are needed.

Model answer

✓ Large numbers are needed to activate enough B cells and T killer cells (or to destroy enough cancer cells). ✓ And genetically identical cells (from the patient) will not be rejected by the immune system.

Mark scheme 2 marks

- ✓ large numbers needed to activate B cells / T killer cells (1)

- ✓ genetically identical cells will not be rejected (1)

Accept: large numbers of T killer cells to destroy cancer cells; need to be specific to the cancer antigens

Examiner's insight

Both mark points were seen, but rarely in the same response - candidates gave either the 'large number' point or the 'genetically identical' point, not both.

● 7 (e)

Suggest · [2 marks]

Suggest two features of a virus suitable for oncolytic virotherapy.

Model answer

✓ It must not be pathogenic - it must not cause disease or cancer itself. ✓ It must specifically target and be able to destroy the cancer cells, without affecting healthy cells.

Mark scheme any 2 marks

- ✓ must not be pathogenic / cause disease (1)

- ✓ must be specific to / target the cancer cells / neoantigens (1)

- ✓ must be able to destroy the cancer cells (1)

Accept: can enter / bind cancer cells; only affect cancer cells / not healthy cells

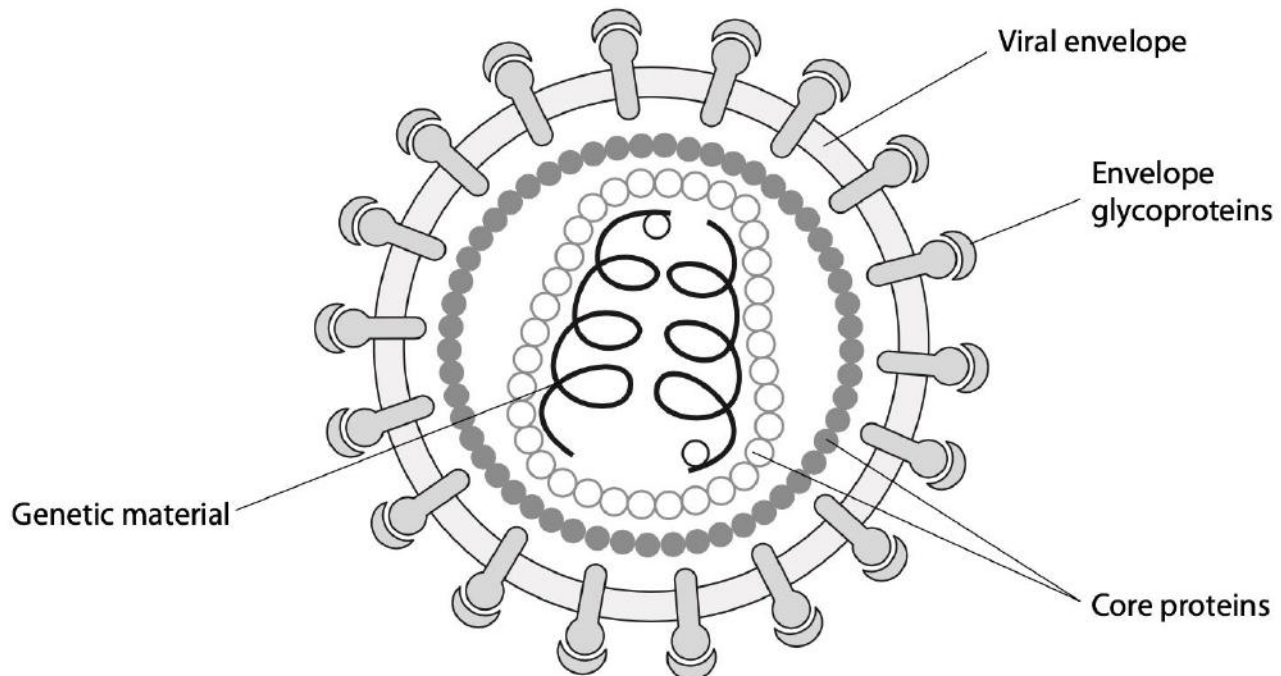
Examiner's insight

Between them candidates covered all three mark points but rarely wrote about more than one.

Revise from your notes

- Antibodies, immunity & the immune response: 16.3 Antibodies · 16.5 The Humoral Immune Response · 17.1 The Cellular Immune Response · 17.3 Passive And Active Immunity
- Mutations & neoantigens - revise from Unit 2: 9.1 Mutations · 9.4 Translation - (Unit 2)

3 The diagram below shows the structure of Human Immunodeficiency Virus (HIV).



(a) State how the genetic material in HIV differs from the genetic material in the bacterium *Mycobacterium tuberculosis* that causes TB.

(2)

RNA in HIV and DNA in bacterium

Circular in bacterium and linear in HIV

Plasmids in bacterium only

(b) One of the ways in which HIV may enter the blood is through the use of infected needles. Explain why unbroken skin is an effective barrier against HIV infection.

(2)

Keratin in the skin surface

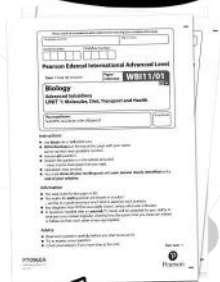
which is hard and impermeable

which creates a physical barrier

The Complete Course for IAL A2 Biology



Videos that cover the entire syllabus

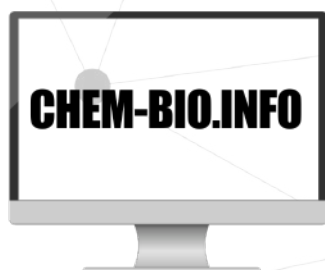
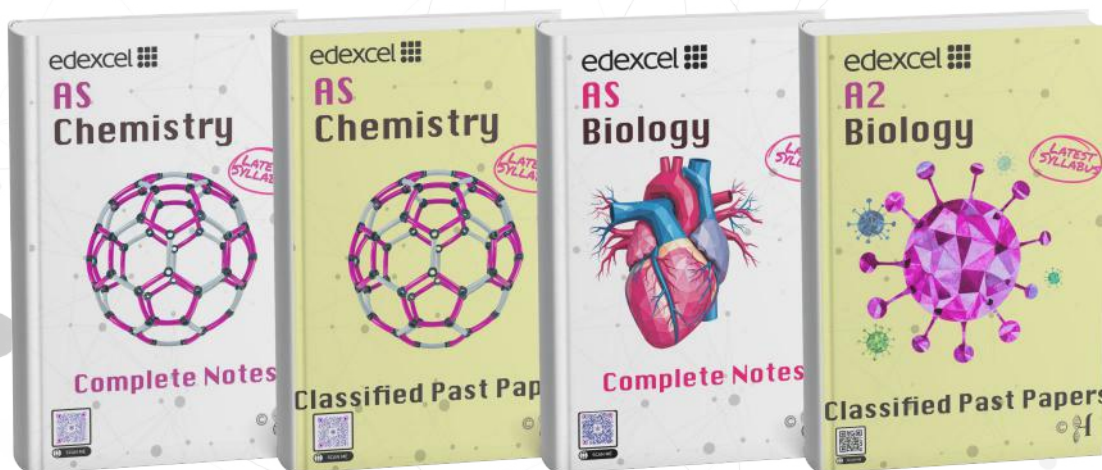


Exam-expert solved past papers



Test your knowledge on each topic.

JOIN NOW



WHATSAPP



51375709



50144115



chem_bio.info