Biology AQA Topic 3 GCSE Mark Scheme

Q1. (a) Virus

- Point 1 – 1 mark: Virus

(b) Why antibiotics are not effective against viruses:

- Point 1 – 1 mark: Viruses live inside cells
- Point 2 – 1 mark: Antibiotics only kill bacteria, not viruses
  Total: 3 marks

Q2. (a) Protist

- Point 1 – 1 mark: Protist

(b) Ways to reduce spread of malaria:

- Point 1 – 1 mark: Use mosquito nets
- Point 2 – 1 mark: Kill mosquitoes or stop them breeding (e.g., insecticides, removing water sources)
  Total: 3 marks

Q3. (a) Dead or inactive forms of pathogens

- Point 1 – 1 mark: Dead or inactive pathogens (accept weakened pathogens or antigens)

(b) Explanation of vaccine protection:

- Point 1 – 1 mark: Body produces antibodies
- Point 2 – 1 mark: So the body can quickly respond if infected in future
  Total: 3 marks

Q4. (a) Body defences:

- Point 1 – 1 mark: Skin or stomach acid
- Point 2 – 1 mark: White blood cells or mucus or cilia

(b) Finishing antibiotics:

- Point 1 – 1 mark: To make sure all bacteria are killed
- Point 2 – 1 mark: Prevent bacteria becoming resistant
  Total: 4 marks

Q5. (a) Reason for not getting vaccinated:

- Point 1 – 1 mark: Fear of side effects or medical reasons or personal beliefs

(b) How not being vaccinated affects others:

- Point 1 – 1 mark: Increases spread of disease
- Point 2 – 1 mark: Puts others at risk, especially those who can't be vaccinated
  Total: 3 marks

Q6. (a) Placebo:

- Point 1 – 1 mark: A fake treatment or pill with no active drug

(b) Why double-blind trials are used:

- Point 1 – 1 mark: To prevent bias
- Point 2 – 1 mark: Neither patient nor doctor knows who gets real drug or placebo
  Total: 3 marks

Q7. (a) White blood cells

- Point 1 – 1 mark: White blood cells

(b) Role of antibodies:

- Point 1 – 1 mark: Bind to pathogens
- Point 2 – 1 mark: Help destroy or remove them
  Total: 3 marks

Q8. (a) Damages the immune system

- Point 1 – 1 mark: Destroys or weakens the immune system

(b) Reducing spread of HIV:

- Point 1 – 1 mark: Use condoms
- Point 2 – 1 mark: Don't share needles or give antiviral drugs
  Total: 3 marks

Q9. (a) Mosaic pattern on leaves or discolouration

- Point 1 – 1 mark: Mosaic pattern or discoloured leaves

(b) Effect on plant growth:

- Point 1 – 1 mark: Reduces photosynthesis
- Point 2 – 1 mark: Less energy for growth
  Total: 3 marks

Q10. (a) Engulfing pathogens (phagocytosis)

- Point 1 – 1 mark: Engulfing or digesting pathogens

(b) Other white blood cell defence:

- Point 1 – 1 mark: Producing antibodies
- Point 2 – 1 mark: Producing antitoxins
  Total: 3 marks

Q11. (a) Antibiotic resistance meaning:

- Point 1 – 1 mark: Bacteria are not killed by antibiotics anymore

(b) Why it's a problem:

- Point 1 – 1 mark: Infections are harder to treat
- Point 2 – 1 mark: May spread to others
  Total: 3 marks

Q12. (a) Preventing STIs:

- Point 1 – 1 mark: Use condoms or limit sexual partners

(b) Importance of early treatment:

- Point 1 – 1 mark: Prevents spread to others
- Point 2 – 1 mark: Stops serious health problems like infertility
  Total: 3 marks

Q13. (a) Meaning of communicable:

- Point 1 – 1 mark: Can spread from one person to another

(b) Ways pathogens spread:

- Point 1 – 1 mark: Air (e.g. coughs, sneezes)
- Point 2 – 1 mark: Touch, water, food, or insect bites
  Total: 3 marks

Q14. (a) Purpose of painkillers:

- Point 1 – 1 mark: To relieve symptoms like pain or fever

(b) Do painkillers cure diseases?

- Point 1 – 1 mark: No, they only relieve symptoms
- Point 2 – 1 mark: They don't kill pathogens
  Total: 3 marks

Q15. (a) Physical defence in plants:

- Point 1 – 1 mark: Waxy cuticle, bark, or cell walls

(b) Chemical defence in plants:

- Point 1 – 1 mark: Producing antibacterial chemicals or poisons
  Total: 2 marks

Q16.
(a) Name one type of pathogen:

- Point 1 – 1 mark: Virus / Bacteria / Fungi / Protist (any one)

(b) How pathogens can be spread:

- Point 1 – 1 mark: Through air (e.g. coughs, sneezes)
- Point 2 – 1 mark: Through water / direct contact / vectors / food
  Total: 3 marks

Q17.
(a) One chemical defence:

- Point 1 – 1 mark: Stomach produces hydrochloric acid
- Point 2 – 1 mark: Kills pathogens in food

(b) White blood cells:

- Point 1 – 1 mark: Engulf pathogens (phagocytosis)

- Point 2 – 1 mark: Produce antibodies
- Point 3 – 1 mark: Produce antitoxins to neutralise toxins
  Total: 5 marks

Q18.
(a) What is a vaccine:

- Point 1 – 1 mark: Dead or inactive form of a pathogen / antigens

(b) How vaccines protect:

- Point 1 – 1 mark: Stimulate white blood cells to produce antibodies
- Point 2 – 1 mark: Memory cells remain in the body
- Point 3 – 1 mark: Respond quickly to future infection

(c) Reason not to vaccinate:

- Point 1 – 1 mark: Fear of side effects / religious or personal beliefs
  Total: 5 marks

Q19.
(a) Why antibiotics don't work on viruses:

- Point 1 – 1 mark: Viruses live inside host cells
- Point 2 – 1 mark: Antibiotics cannot target viruses without harming host cells

(b) How resistant bacteria develop:

- Point 1 – 1 mark: Mutation causes resistance in some bacteria
- Point 2 – 1 mark: Non-resistant bacteria are killed by antibiotics
- Point 3 – 1 mark: Resistant bacteria survive and reproduce
  Total: 5 marks

Q20.
(a) What is a double-blind trial:

- Point 1 – 1 mark: Neither doctor nor patient knows who has the drug
- Point 2 – 1 mark: Compares new drug to placebo or standard treatment

(b) Why used:

- Point 1 – 1 mark: Prevents bias
- Point 2 – 1 mark: Ensures results are reliable **Total: 4 marks**

Q21.
(a) How skin prevents infection:

- Point 1 – 1 mark: Physical barrier
- Point 2 – 1 mark: Produces antimicrobial secretions

(b) One other barrier:

- Point 1 – 1 mark: Mucus / stomach acid / cilia / tears
  Total: 3 marks

Q22.
(a) Organism that spreads malaria:

- Point 1 – 1 mark: Mosquito

(b) Way to reduce spread:

- Point 1 – 1 mark: Use insecticide / mosquito nets / remove stagnant water
- Point 2 – 1 mark: Prevent mosquito breeding / anti-malarial drugs
  Total: 3 marks

Q23.
(a) How HIV is transmitted:

- Point 1 – 1 mark: Sexual contact / sharing needles / from mother to baby

(b) Effect on immune system:

- Point 1 – 1 mark: Attacks white blood cells
- Point 2 – 1 mark: Reduces immune response / leads to AIDS **Total: 3 marks**

Q24.
(a) Symptoms of measles:

- Point 1 – 1 mark: Fever / high temperature
- Point 2 – 1 mark: Red skin rash

(b) Controlling measles:

- Point 1 – 1 mark: Vaccination
  Total: 3 marks

Q25.
(a) How spread:

- Point 1 – 1 mark: Sexual contact

(b) Treatment changes:

- Point 1 – 1 mark: Previously treated with penicillin
- Point 2 – 1 mark: Now some strains are resistant / other antibiotics used **Total: 3 marks**

Q26.
(a) Type of white blood cell:

- Point 1 – 1 mark: Phagocyte / lymphocyte

(b) How it helps:

- Point 1 – 1 mark: Recognises pathogen
- Point 2 – 1 mark: Produces antibodies / engulfs pathogen
- Point 3 – 1 mark: Destroys or neutralises pathogen
  Total: 4 marks

Q27.
(a) Preclinical testing:

- Point 1 – 1 mark: Tested on cells / tissues / animals
- Point 2 – 1 mark: Checks for toxicity and efficacy

(b) Clinical trials test for:

- Point 1 – 1 mark: Dosage
- Point 2 – 1 mark: Side effects / effectiveness
  Total: 4 marks

Q28.
(a) Sign of disease:

- Point 1 – 1 mark: Discoloured leaves / stunted growth / spots

(b) Disease identification:

- Point 1 – 1 mark: Use testing kits / lab analysis
- Point 2 – 1 mark: Compare to symptoms in gardening manual / website **Total: 3 marks**

Q29.
(a) What is a monoclonal antibody:

- Point 1 – 1 mark: Identical antibodies
- Point 2 – 1 mark: Produced from a single clone of cells

(b) One use:

- Point 1 – 1 mark: Pregnancy tests / cancer treatment / diagnosing disease
  Total: 3 marks

Q30.
(a) How overuse leads to resistance:

- Point 1 – 1 mark: Bacteria mutate
- Point 2 – 1 mark: Resistant strains survive and multiply
- Point 3 – 1 mark: Resistance spreads

(b) Way to reduce resistance:

- Point 1 – 1 mark: Only use antibiotics when necessary / finish course **Total: 4 marks**

Q31. (a) Symptoms of TMV:

- Point 1 – 1 mark: Mosaic pattern on leaves
- Point 2 – 1 mark: Discolouration or stunted growth

(b) Effect on growth:

- Point 1 – 1 mark: Reduces photosynthesis
- Point 2 – 1 mark: Less glucose/energy for growth **Total: 4 marks**

Q32. (a) Advantage of disease-resistant crops:

- Point 1 – 1 mark: Higher yield / less crop loss / reduced pesticide use

(b) Ethical concern:

- Point 1 – 1 mark: Unknown long-term effects / potential impact on biodiversity / religious or cultural objections **Total: 2 marks**

Q33. (a) Difficulty developing antivirals:

- Point 1 – 1 mark: Viruses live inside cells
- Point 2 – 1 mark: Difficult to target virus without damaging body cells

(b) Importance of testing:

- Point 1 – 1 mark: Ensure safety / prevent harm
- Point 2 – 1 mark: Identify side effects before public use **Total: 4 marks**

Q34. (a) Investigation method:

- Point 1 – 1 mark: Soak paper discs in plant extract
- Point 2 – 1 mark: Place on agar plate with bacteria
- Point 3 – 1 mark: Measure clear zones to assess effectiveness

(b) Controlled variable:

- Point 1 – 1 mark: Temperature / amount of extract / time of incubation / bacterial strain **Total: 4 marks**

Q35. (a) Antitoxins:

- Point 1 – 1 mark: Chemicals that neutralise toxins

(b) Producing cells:

- Point 1 – 1 mark: White blood cells

(c) Defence action:

- Point 1 – 1 mark: Bind to toxins
- Point 2 – 1 mark: Neutralise toxins to prevent damage **Total: 4 marks**

Q36. (a) Binary fission:

- Point 1 – 1 mark: Cell splits into two
- Point 2 – 1 mark: Each new cell is genetically identical

(b) Bacteria calculation:

- Point 1 – 1 mark: 3 hours = 6 divisions (every 30 min)
- Point 2 – 1 mark: 2^6 = 64 bacteria **Total: 4 marks**

Q37. Immune response to viral infection:

- Point 1 – 1 mark: Virus enters cells and replicates
- Point 2 – 1 mark: White blood cells detect antigens
- Point 3 – 1 mark: White blood cells produce antibodies
- Point 4 – 1 mark: Antibodies bind to virus particles
- Point 5 – 1 mark: Other white blood cells engulf virus-infected cells
- Point 6 – 1 mark: Memory cells remain for faster response next time **Total: 6 marks**

Q38. (a) Monoclonal antibodies for cancer:

- Point 1 – 1 mark: Bind to specific cancer cell antigens
- Point 2 – 1 mark: Deliver drug/toxin directly to cancer cells
- Point 3 – 1 mark: Minimises damage to healthy cells

(b) Risk:

- Point 1 – 1 mark: Side effects / allergic reactions / immune response **Total: 4 marks**

Q39. (a) Early disease detection:

- Point 1 – 1 mark: Use of testing kits / lab testing / visual inspection

(b) Disease control:

- Point 1 – 1 mark: Use of pesticides or fungicides
- Point 2 – 1 mark: Remove infected plants or control vectors **Total: 3 marks**

Q40. (a) Effect of rose black spot:

- Point 1 – 1 mark: Causes black spots on leaves
- Point 2 – 1 mark: Reduces photosynthesis, affects growth

(b) Controlling spread:

- Point 1 – 1 mark: Remove and burn infected leaves / use fungicide **Total: 3 marks**

Q41. Virus vs. bacterial cell structure:

- Point 1 – 1 mark: Viruses are not cells, bacteria are cells
- Point 2 – 1 mark: Viruses have a protein coat, bacteria have a cell wall
- Point 3 – 1 mark: Viruses contain genetic material only, bacteria have cytoplasm and plasmids **Total: 3 marks**

Q42. (a) Reducing flu spread:

- Point 1 – 1 mark: Isolate infected students / encourage handwashing
- Point 2 – 1 mark: Vaccinate students / improve ventilation

(b) Herd immunity:

- Point 1 – 1 mark: Large proportion vaccinated
- Point 2 – 1 mark: Reduces spread, protects unvaccinated people **Total: 4 marks**

Q43. Vaccine development stages:

- Point 1 – 1 mark: Preclinical testing on cells and animals
- Point 2 – 1 mark: Clinical trials on healthy volunteers
- Point 3 – 1 mark: Low dose tested for safety
- Point 4 – 1 mark: Larger trials test effectiveness
- Point 5 – 1 mark: Peer review and licensing before public use **Total: 5 marks**

Q44. Antibiotics and viruses:

- Point 1 – 1 mark: Viruses live inside cells
- Point 2 – 1 mark: Antibiotics don’t kill host cells / only kill bacteria **Total: 2 marks**

Q45. Example of non-specific defence:

- Point 1 – 1 mark: Skin / mucus / stomach acid
- Point 2 – 1 mark: Acts as a barrier / kills pathogens / traps them **Total: 2 marks**