**Review Worksheet ANSWERS – Antibiotics and Antivirals**

1: What are antibiotics?

(2 marks)

*A class of drugs (1) used to combat micro-organisms such as bacteria (1)*

2: How do bacteriocidal antibiotics work?

(4 marks)

*They kill bacteria (1) by inhibiting cell wall synthesis (1), inhibiting bacterial enzymes (1), and inhibiting bacterial protein translation (1)*

3: How do bacteriostatic antibiotics work?

(3 marks)

*They inhibit bacterial reproduction (1) by inhibiting protein production (1) inhibiting bacterial metabolism (1) and inhibiting bacterial DNA replication.*

4: Amir gets a bacterial wound infection. It doesn’t respond to the usual antibiotics. Amir’s doctors decide to do a culture and sensitivity test on a sample from Amir’s wound. Explain how a culture and sensitivity test works and describe how Amir’s doctor will be able to tell which antibiotics may be effective for Amir’s wound infection.

(5 marks)

*Culture Sensitivity tests work by*

*1: Inoculating (smearing) a petri dish with a sample of the bacteria of interest. (1)*

*2: Placing paper discs saturated with different antibiotics on the dish. (1)*

*3: Culturing the bacteria (1)*

*4: Bacteria will not grow around the paper discs with the antibiotics that work.(1) These are the antibiotics that may be used to treat bacteria.(1)*

5: Why is antibiotic resistance a problem in human health?

(3 marks)

*Antibiotic resistance means that fewer and fewer antibiotics (1) will work for some types of infections (1), which may then be unable to be treated, causing severe illness and death. (1)*

6: What factors can contribute to antibiotic resistance?

(3 marks)

* + *Overuse of antibiotics, even when not necessary. (1)*
  + *Agricultural use as ‘growth promoters’ in livestock. (1)*
  + *Incorrect prescribing: giving an antibiotic that won’t work, or as a preventative without good reason. (1)*

7: What type of pathogen do antivirals treat?

(1 mark)

*Viruses (1)*

8: How do antiviral medications work?

(2 marks)

*Target specific viral proteins (1) to inhibit the development of the virus(1).*

9: Fill in the following table showing what is happening to membrane channels, ion movement and the membrane potential at each stage of an AP.

(14 marks)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Membrane channel activity** | **Ion movement** | **Membrane potential** |
| **Resting Membrane Potential (RMP)** | *Gated Na+ and K+ channels are closed. (0.5)*  *Na+/K+ pump working (0.5)* | *Na+ diffuses constantly across the membrane (0.5)*  *Na+/K+ pump uses ATP (active transport) to move 3 Na+ out of the cell and 2 K+ in, so inside is relatively negative (0.5)* | *-70 millivolts (mV) (0.5)* |
| **Depolarisation** | *Local stimulation causes some Na+ to move into the cell. (0.5)  If the threshold potential is reached: (0.5)*  *Gated Na+ channels open (0.5)* | *Na+ floods into the cell through the Na+ channels. (0.5) Inside of cell becomes relatively positive. (0.5)*  *Na+ still diffusing across and Na+/K+ pump still working but not enough to maintain RMP. (0.5)* | *Threshold: -55 mV (0.5), then rising to peak depolarisation of +30 mV (0.5)* |
| **Repolarisation** | *Membrane potential of +30mV (0.5) triggers opening of gated K+ channels (0.5)* | *K+ floods from inside of cell to outside. (0.5)*  *Inside becomes relatively more negative. (0.5)*  *Na+/K+ pump and Na+ diffusion still working but not enough to overcome other ion movement (0.5)* | *From +30mV (0.5), then falling to -70mV again. (0.5)* |
| **Hyperpolarisation** | *K+ channels stay open for a while (0.5)* | *K+ continues to move in. (0.5)*  *Na+/K+ pump and Na+ diffusion still working but not enough to overcome other ion movement. (0.5)* | *Membrane Potential falls to below -70mV (0.5)* |
| **Return to RMP** | *K+ and Na+ channels close (0.5)* | *Na+/K+ pump works to pump 3 Na+ out of the cell and 2 K+ in. (0.5) Ion distribution eventually stabilises to resting levels (0.5) with more Na+ outside, making inside relatively negative. (0.5)* | *Membrane potential climbs to*  *-70mV and stabilises. (0.5)* |