

Model Answers: Hard

1

The correct answer is **C** because:

- Lung cancer would cause the symptoms of coughing up blood, pain when breathing and weight loss.
- Emphysema would cause the symptoms of shortness of breath, difficulty breathing and fatigue

2

The correct answer is **D** because the only statement that applies to both malaria and HIV is statement 3; the causative agents of both malaria and HIV (four species of *Plasmodium* and HIV respectively) can cross the placenta and be transmitted from mother to child.

- Statement 1 only applies to malaria (the insect vector being the female *Anopheles* mosquito).
- Statement 2 only applies to malaria in this case; the definition of endemic is a disease that is always found in a population. Although HIV as a disease is becoming endemic (with HIV-2, a second common type of the virus, being endemic in Western Africa) HIV epidemics occur outside of sub-tropical regions, with HIV epidemics emerging in the 1980's. An epidemic is a widespread outbreak of a disease in large numbers of individuals over a particular period of time, in a given area.

3

The correct answer is **A** because:

- Cholera is an infectious disease caused by the bacteria *Vibrio cholerae* which infects the small intestine of humans
- Infection with *Vibrio cholerae* leads to increased water loss and diarrhoea, which results in the pathogen being lost from the body in watery faeces
- Cholera is transmitted by **contaminated water**. When the water is contaminated by sewage the infection can easily be spread from one person to the next

4

The correct answer is **D** because:

- Measles is caused by a virus
- Many attempts have been made to eradicate malaria, either by controlling the vector or vaccination programs, none have been successful so far
- HIV/AIDS is transmitted through direct contact with body fluids

- Cholera is caused by a bacterium

5

The correct answer is **C** because:

- The parasite is transported by the blood to the liver
- In the liver, the parasite multiplies by mitosis and enters the red blood cells.
- While in the red blood cells the parasite produces gametes.

A is incorrect as it is the female *Anopheles* mosquito that bites and transmits the malaria parasite.

B is incorrect as the malaria parasite only enters red blood cells after it has multiplied at least once in the liver.

D is incorrect as The malaria parasite largely reproduces sexually in the mosquito's stomach.

6

The correct answer is **A** because:

- *Plasmodium vivax* is one of the parasites that causes malaria (the *Plasmodium* pathogens that cause malaria are often referred to as parasites)
- The malaria parasite infects erythrocytes (red blood cells) and multiplies inside them, eventually leading to the cell bursting (cell lysis) – this releases more parasites into the bloodstream
- The infection will reduce the number of red blood cells leading to a reduction in the ability of the body to transport oxygen to cells, this is **anaemia**
- The patient will have fevers due to the body reacting to the infection by raising the temperature

B is incorrect as this pathogen causes smallpox, smallpox does not cause anaemia.

C is incorrect as this pathogen causes tuberculosis. This infects and damages the lungs.

D is incorrect as this pathogen causes measles, the main symptom of which is a rash and fever

7

The correct answer is **D** because:

- The HIV targets T-helper cells.
- It infects and destroys these cells until the number are so low that the body is unable to defend itself against infection.
- Once the immune system is depleted **opportunistic infections** can occur, leading to the patient suffering from AIDS

The other cells are all cells of the immune system but are not cells targeted by HIV.

8

The correct answer is **B** because:

- In developing countries, the most effective method for controlling malaria is the prevention of mosquito biting
- The female *Anopheles* mosquito bites mainly at dusk and overnight, so the use of nets to prevent them biting whilst a person is sleeping helps prevent the spread of malaria
- Nets are a long-term and cost-effective method of preventing malaria in rural developing areas

A is incorrect as while this can provide a control method, spraying with *B. thuringiensis* is costly and needs to be applied regularly, not the most effective method in developing countries.

C is incorrect as vaccination programs are still in development, costly (and malaria is a disease predominantly affecting developing countries) and it is difficult to administer vaccines in developing rural communities.

D is incorrect as it is not possible to put oil on every puddle and standing water source so will not remove all breeding sites for mosquitos.

9

The correct answer is **B** because any infectious disease developing resistance is a concern as then the current treatments do not work and new ones will need to be developed – this takes time and costs a lot of money.

All the other options, whilst representing challenges in controlling the transmission of TB, are not the main concern

10

The correct answer is **B** because:

- *Plasmodium vivax* is one of the parasites that causes malaria
- The malaria parasite infects the erythrocytes (red blood cells)
- The infection will reduce the number of red blood cells and this causes anaemia

- The patient will have fevers due to the body reacting to the infection by raising the temperature

A is incorrect as this pathogen causes smallpox, smallpox does not cause anaemia

C is incorrect as this pathogen causes tuberculosis. This infects and damages the lungs.

D is incorrect as this pathogen causes measles, the main symptom of which is a rash and fever.