

A Level Biology B

H422/01 Fundamentals of biology

Question Set 4

1. (a) (i) The human papillomavirus (HPV) can infect the skin and mucous membranes of the body.

Most cases of HPV infection are eradicated naturally by the immune system.

Statements **A** to **F** below summarise, in random order, the stages of an immune response to the virus.

- A** T helper cells are activated and divide by mitosis.
- B** B cells are activated, divide by mitosis and then differentiate.
- C** Viral antigens are presented.
- D** T helper cells release cytokines.
- E** Plasma cells synthesise and release antigen-specific antibodies.
- F** The virus is engulfed and digested.

Place the letters **A** to **F** representing the statements into the correct order in the boxes below. Statement **D** has been done for you.

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[2]

- (a) (ii) Describe the role of T killer cells in the immune response to HPV.

[1]

- (b) (i) Sometimes HPV cannot be eradicated naturally by the immune system. Persistent HPV infection is the main cause of cervical cancer.

A vaccine against the **HPV-16** and **HPV-18** strains is offered to females aged 12 to 14 years. Scientists wanted to determine whether the vaccine should be given over two or three doses.

They compared the effectiveness of two-dose and three-dose regimes by measuring antibody levels in the blood one month and three years after completion.

The results are summarised in Table 34 below.

Data group	Number of subjects	HPV-16 antibody level (mMU dm ⁻³)		HPV-18 antibody level (mMU dm ⁻³)	
		Median	Range	Median	Range
Two-dose regime after one month	102	830	761–882	812	704–866
Two-dose regime after three years		739	729–755	214	101–483
Three-dose regime after one month	116	829	781–893	820	794–860
Three-dose regime after three years		731	718–754	747	709–773

Table 34

Using the information in Table 34, evaluate the effectiveness of different vaccination regimes.

[4]

- (b) (ii) Antibody levels were also measured two weeks after the first dose of vaccine. They were significantly lower than those measured after the second and third doses of vaccine.

Explain why.

[3]

Total Marks for Question Set 4: 10

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