Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

A: **antigen-binding site** (end of the Fab)

B: **light chain**

C: **Fc region**

2.2

(a) **IgG**

(b) **IgA**

2.3

MHC I

CD8 T cells

2.4

there are many V, D and J gene segments

one of each is chosen and joined at random

bases are added or lost at the joins, and heavy and light chains pair at random

3.1

(a) **IgG**

(b) the **Fc** region, bound by the FcRn receptor

(c) **IgA**, on the lining of the gut

(d) about **3–4 months**

(e) the mother's IgG has been broken down and the baby is not yet making much of its own

3.2

(a) **CD8** (cytotoxic) T cells

(b) no viral peptide is shown on the surface, so CD8 T cells cannot recognise and kill the cell

(c) an **NK cell**: MHC I normally switches NK cells off, so its loss lets them kill ("missing self")

3.3

(a) **patient 1**: IgM is made first in a new infection

(b) past infection or vaccination: IgG lasts for years

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(c) it is a pentamer with five Fc regions close together, so one molecule can bind C1q and start the classical pathway

(d) the constant region (heavy chain class) changes; the variable region, and so the target, stays the same