Question 40 **(12 marks)**

1. **(1 mark) Recombinant DNA / genetic engineering (1)**
2. **(1 mark) DNA ligase (1)**
3. **(3 marks) Structure A is a plasmid (a circular strand of DNA inside a bacterial cell) (0.5) that has been treated with the same restriction enzyme as the gene of interest(0.5) so that it has the same sticky ends (0.5) allowing the gene to be spliced in. It acts as a vector (0.5) to carry the gene of interest (0.5) into a bacterial cell, creating a transgenic organism (0.5).**
4. **(1 mark) Producing massive amounts of insulin (1), OR human growth hormone (1) OR Factor VIII (1). Only choose one for 1 mark.**
5. **(6 marks)**

**Gene of interest isolated from healthy human cell (0.5) by cutting with a restriction enzyme (0.5) leaving sticky ends (0.5)**

**A plasmid is isolated from a bacterial cell (0.5) and treated with the same restriction enzyme (0.5), producing the same sticky ends (0.5)**

**Human gene can then be spliced into plasmid (0.5) matching the sticky ends (0.5), and fused using DNA ligase (0.5)**

**The plasmid containing the human gene acts as a vector (0.5) and is inserted in a new bacterium (0.5) making a transgenic organism (0.5) which now carries the gene for production of the hormone of interest (0.5)**

**The transgenic bacterium is then grown in culture (0.5) and will produce large amounts of hormone (0.5) which can be refined for human use (0.5)**

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