InkBiology

QUESTION WORKBOOK

Pharming, recombinant medicines and synthetic biology

Gene regulation, genomics and biotechnology · Unit B17

OCR A 6.1.3 · Edexcel A 8.17, 8.18 · Edexcel B 7.4 vi · CAIE 19.2

15 questions · 51 marks

NAVY SCREEN EDITION

Every question in this book has a code beside its number.
Type inklearning.co.uk/q/ followed by the code to open that question online.

inklearning.co.uk/biology/ · youtube.com/@InkPhysics

SECTION A · Short, 1 to 2 marks

A1 PS-Q15

State what is meant by pharming, and state one advantage milk has as a starting material for purification compared with mammalian cell culture medium. [2]

SECTION B · Standard, 3 to 5 marks

B1 PS-Q1

A company will synthesise DNA of any sequence to order and sell it to research laboratories, and has patented the engineered yeast it uses in its own drug production. Evaluate the biosecurity and ownership concerns raised by work of this kind. [5]

B2 PS-Q2

Describe how a goat is engineered to secrete a human protein into its milk, and describe why the protein appears there and nowhere else in the animal. [4]

B3 PS-Q3 Discuss the welfare arguments for and against producing medicines in the milk of transgenic livestock. [4]

B4 PS-Q8 Compare producing a human protein in mammalian cell culture with producing the same protein in the milk of a transgenic goat, referring to typical yield and to the starting material that has to be purified. [4]

B5 PS-Q9 Describe how the artemisinin supply chain changed once an engineered yeast pathway became available, referring to what the yeast is engineered to produce and to what happens to that product afterwards. [4]

B6 PS-Q10 Discuss the argument that patenting an engineered organism or a standard genetic part slows down, rather than speeds up, the wider benefit of synthetic biology. [4]

B7 PS-Q4 State the condition treated with recombinant factor VIII, state the condition treated with recombinant adenosine deaminase, and state what recombinant factor VIII replaced. [3]

B8 PS-Q5 Insulin is manufactured in genetically modified bacteria, but factor VIII is made in cultured mammalian cells. Explain why factor VIII cannot be produced usefully in **Escherichia** coli. [3]

B9 PS-Q6 A transgenic goat secretes antithrombin at 2.5 g per dm^3 of milk and yields 800 dm^3 of milk in a year. A mammalian cell culture yields 50 mg of the same protein per dm^3 of medium. Calculate the mass of antithrombin one goat supplies in a year, and calculate the volume of culture medium needed to match it. [3]

B10 PS-Q7 Outline what synthetic biology adds to genetic engineering, referring to standard parts, genome synthesis and engineered pathways. [3]

B11 PS-Q11 Describe why founder transgenic animals must be screened for mosaicism before a production line is established. [3]

B12 PS-Q12 A regulator requires every batch of a drug produced in the milk of a transgenic herd to be tested, and requires the herd itself to be certified free of particular infections. Explain the reason for each requirement. [3]

B13
PS-Q13

Explain why the goats used to produce a licensed drug in their milk must be kept in a closed, contained herd rather than allowed to breed with ordinary goat populations. [3]

B14
PS-Q14

A synthesis company screens every DNA order against a database of known dangerous pathogen sequences before manufacturing it. Suggest what this screening is intended to prevent, and suggest one limitation of relying on it. [3]

THIS BOOK ONLINE

Scan the code, or type the address, to open the questions in this book online:

inklearning.co.uk/biology/practise/questions/pharming-recombinant-medicines-and-synthetic-biology/