

## Model Answers: Hard

Q1

The correct answer is **A** because:

- **Restriction enzymes** are needed to cut a desired **gene** from human DNA (if the objective is to produce a human protein).
- The same enzymes are then used to cut open a **plasmid** leaving **sticky ends** that will have the same base sequence at the ends of the human DNA sequence.
- **Ligase** can then be used to join the two strands together in the **plasmid**. This creates a **recombinant plasmid**. **Recombinant** means that the organism has had its **genetic sequence** changed.

Q2

The correct answer is **C** because at 5 days this would give you the highest **yield** of penicillin. Penicillin is produced in a **batch culture** so you would want to harvest with the highest yield possible. This is also the point at which the mass of living organisms has reduced.

Q3

The correct answer is **C** because this is the stain with the highest percentage stain removal with the washing powder with enzyme (94% stain removal).

Q4

The correct answer is **D** because the difference between the volume of carbon dioxide at 30°C and 40°C is 11 cm<sup>3</sup>, as at 30°C the volume produced was 4 cm<sup>3</sup> and at 40°C the volume produced is 15 cm<sup>3</sup>.

Q5

The correct answer is **B** because:

- **Restriction enzymes** are used to cut DNA at a certain sequence. This leaves short chains of single stranded DNA known as **sticky ends**.
- The plasmid to which the isolated gene is to be inserted is cut with the same **restriction enzyme** so that it has **complementary sticky ends**.
- **Sticky ends** are made in step 1 and 2.