

**Dalkeith High School**  
**S3 Biology home learning**  
**Genetic Engineering and Therapeutic uses of cells**

1. Describe what the term 'genetic engineering' means.

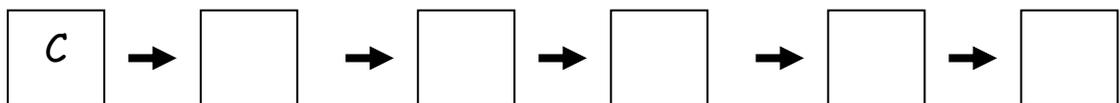
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2. The following is a list of steps involved in the commercial production of human insulin by bacteria. However, the steps are not shown in the correct order.

- A. Gene for human insulin is inserted into bacterium.
- B. Human insulin is extracted and purified.
- C. Gene for human insulin is isolated.
- D. Bacterial plasmid is opened with an enzyme
- E. Bacteria are grown and human insulin is produced
- F. Bacterial plasmid containing human insulin is sealed using an enzyme.

Insert letters into the boxes below to complete the correct order of the steps. The first step has been done for you.



3. Other than insulin, name another product which has been genetically engineered to treat people with a disorder or disease.

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4. Scientists can use stem cells to grow whole organs to use for organ transplants.

(a) What are stem cells?

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(b) Other than organ transplants, give one more example of how scientists can use stem cells.

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5. One advantage of genetically engineering plants to be drought resistant is that it can increase crop yield. The table below compares the yield in crops which have been genetically modified to be drought resistant with crops that have not been genetically engineered.

Crop Name	Yield without being genetically modified (tonnes per hectare)	Yield when genetically modified (tonnes per hectare)	Percentage increase in crop yield (%)
Rice	6.59	8.20	24.43
Wheat	7.60	9.42	
Maize (corn)	9.21	10.78	

(a) Complete the table to show the percentage change in yield for Wheat and Maize.

(b) What conclusion can be drawn about the effect of genetically engineering crops (to be drought resistant) on crop yield?

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