National 5 Biology

Unit 1

Cell Biology

Ink Exercise Five

Genetic Engineering

Name: _____

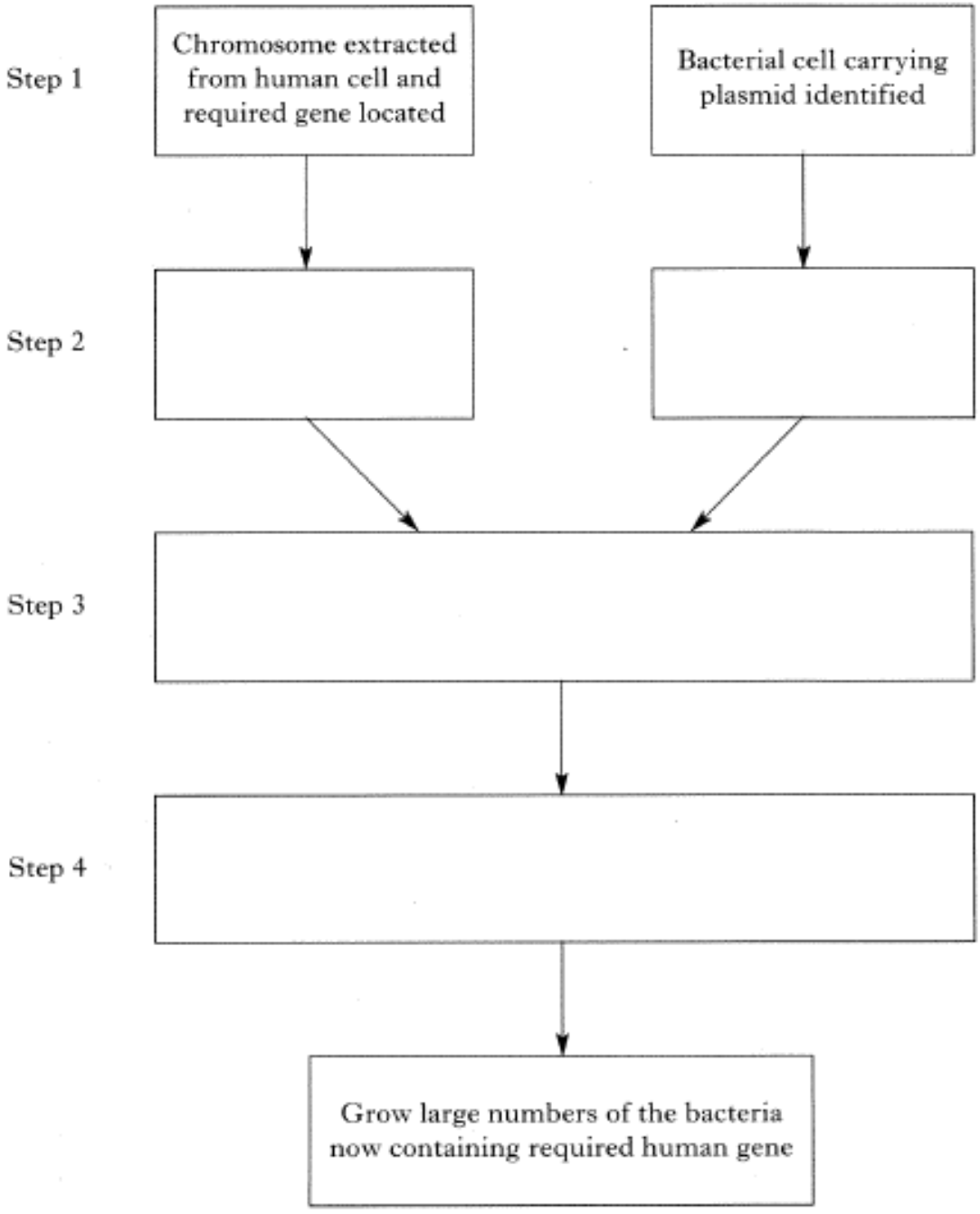
Class: _____

1. Name a human hormone that can be produced by genetic engineering

_____

1

2. In the boxes below, describe each of the steps carried out to transfer successfully a human gene into a bacterial cell

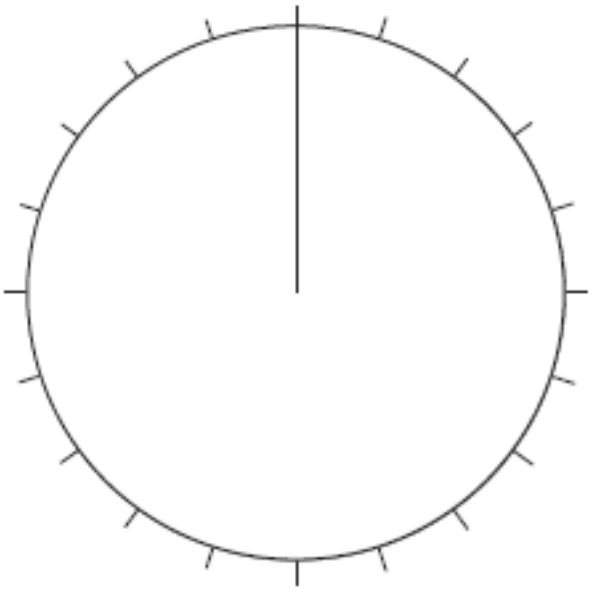


4

3. A manufacturer uses genetic engineering techniques to make a variety of products. The table below shows each product as a percentage of their total production in 2010.

Product	*Percentage of total production*
Antibiotics	30
Insulin	40
Detergents	20
Antifreeze	10

Use the information in the table to complete the pie chart.



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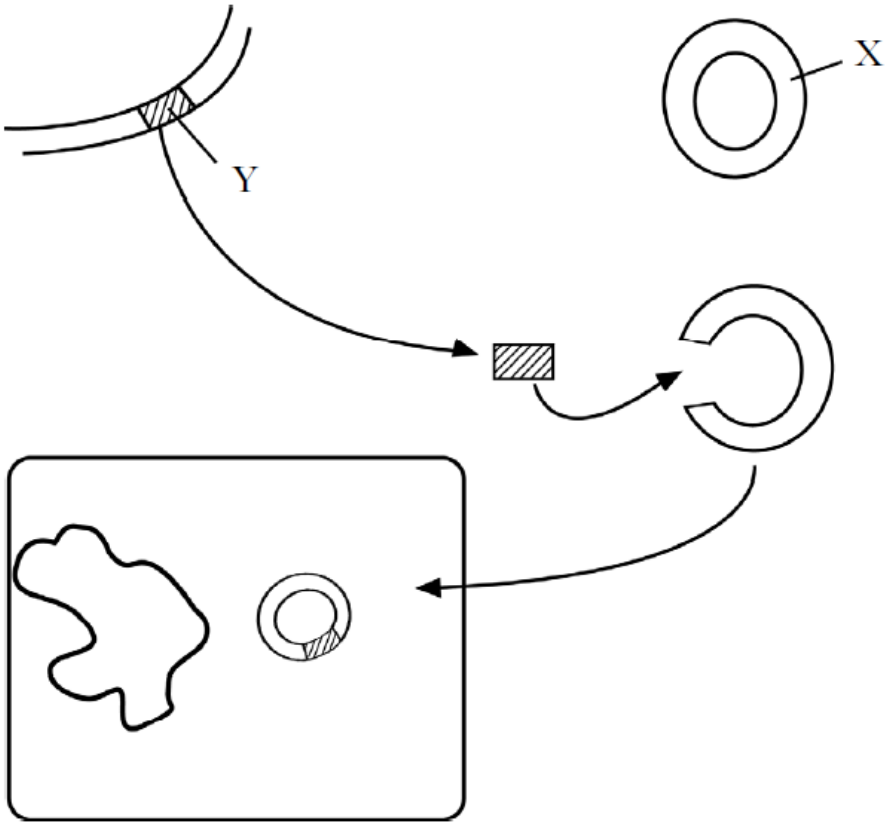
4. The diagram below shows stages in the process of genetic engineering.



a. Name parts X and Y

X _____ Y _____

2

b. Describe the next stage needed to produce insulin for use as a medicine

_____

_____

1

5. Read the following passage and answer the questions based on it.

Genetic modification (GM) of crops began with the discovery that the soil bacterium *Agrobacterium* could be used to transfer useful genes from unrelated species into plants. The Bt gene is one of the most commonly inserted. It produces a pesticide toxin that is harmless to humans but is capable of killing insect pests. Many new crop types have been produced. Most of these are modified to be pest, disease or weedkiller resistant and include wheat, maize, oilseed rape, potatoes, peanuts, tomatoes, peas, sweet peppers, lettuce and onions.

Supporters argue that drought resistant or salt resistant varieties can flourish in poor conditions. Insect-repelling crops protect the environment by minimizing pesticide use. Golden rice with extra vitamin A or protein-enhanced potatoes can improve nutrition.

Critics fear that GM foods could have unforeseen effects. Toxic proteins might be produced or antibiotic-resistance genes may be transferred to human gut bacteria. Modifies crops could become weedkller resistant "superweeds". Modified crops could also accidently breed with wild plants or other crops. This could be serious if, for example, the crops which had been modified to produce medicines bred with food crops.

Investigations have shown that accidental gene transfer does occur. One study showed that modified pollen from GM plants was carried by the wind for tens of kilometers. Another study proved that genes have spread from the USA to Mexico.

a. What role does the bacterium Agrobacterium play in the genetic modification of crops?

_____ 1

b. Crops can be genetically modified to make them resistant to pests, diseases and weedkillers. Give another example of genetic modification that has been applied to potatoes.

_____ 1

c. Explain why a plant, which is modified to be weedkiller resistant could be:
Useful to farmers

_____ 1

A problem for farmers

_____ 1

d. Give one example of a potential threat to health by the use of GM crops.

_____

_____ 1

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Areas I need to work on: