Name _____

Genetic Engineering In Agriculture (p. 238 – 242)

I. Improving Crops

p. 238

1. **List five ways in which plants have been genetically modified to help farmers.**
   1. Insect Resistance
   2. Disease Resistance
   3. Frost Resistance / Drought Resistance
   4. Herbicide Resistance ("Round-Up")
   5. Delayed Fruit Ripening (ethylene → tomatoes)

Year 2000
52% soybeans
25% corn
↓
Genetically Modified

2. **Why was rice genetically modified in Asia?**
   - Rice is a major food source (low iron + beta carotene)
   (millions were iron deficient + poor vision) ↳ makes Vitamin A (needed for vision)

II. Risks Of Genetically Modified Crops

1. **Define the term *glyphosate*.**

   Glyphosate – biodegradable weed killer
   (corn + soybeans genetically modified to be resistant)

2. **List four concerns about the use of genetically modified crops.**
   1. Glyphosate-resistant weeds (no weed control alternatives)
   2. Allergies to products of genetically modified rice
   3. Invasive genetically modified plants (Monsanto)
   4. Pest resistance to genetically modified toxins

III. Gene Technology In Animal Farming

State 4-H
↓
Fair?

1. **Why is altering the growth hormone gene (Somatotrophin) important to farmers?**
   Increase size + production (milk)
   ↳ Greater profits!!!

2. **Define the term transgenic animals.**

   Transgenic Animals – animals that have foreign DNA in their cells

3. **How are human proteins made using transgenic animals?**
   (1.) Human genes added to farm animals (2.) Farm animal produces complex human proteins in milk (3.) Proteins extracted from milk by pharmaceutical companies

Name _____

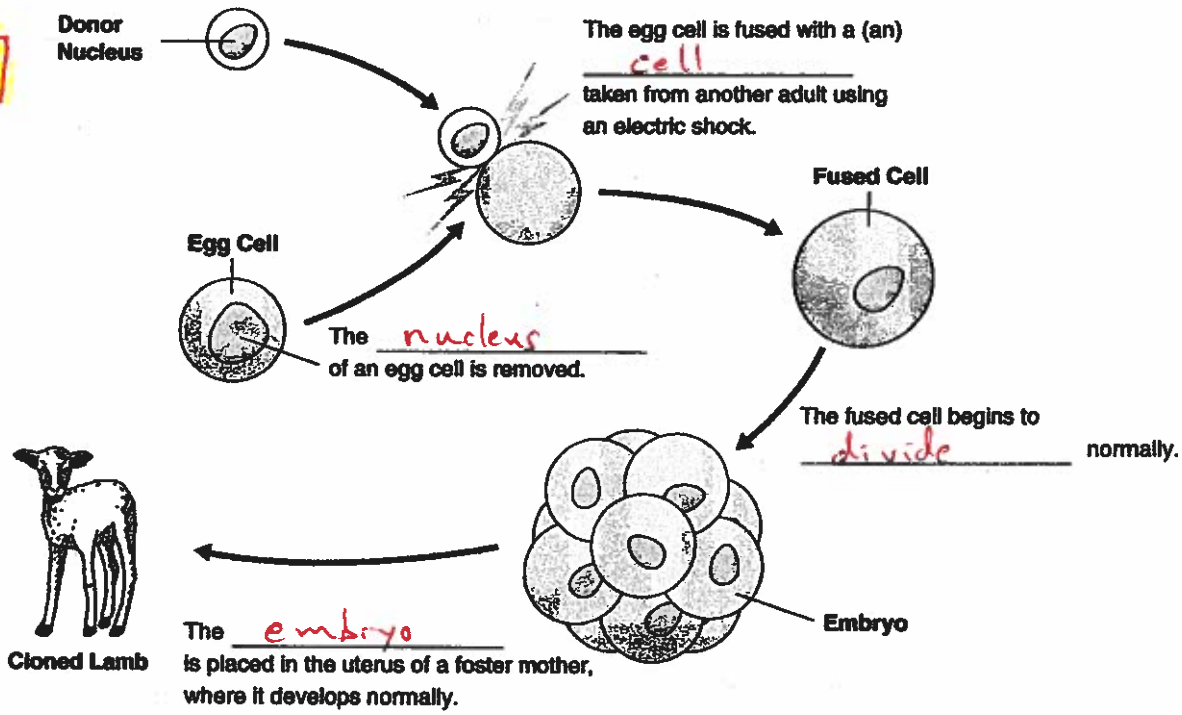
4. **Who cloned the first sheep on July 5th, 1996?**

Ian Wilmut

Dolly (sheep)
↳ Bonnie (offspring)

5. **Complete the sentences in the diagram below to show the steps in cloning a sheep.**

p. 240-241



IV. Problems With Cloning

1. **Define the term genomic imprinting.**

p. 242

Genomic Imprinting – process of conditioning DNA during early stages of development (turns genes "on" + "off")

2. **Why has the absence of genomic imprinting led to problems with clones as adults?**

Normally genomic imprinting takes months + years
(Cloning = minutes → critical errors in development)

3. **The cloning of humans is illegal in most countries.**

Circle One : True False

- What happens if it goes wrong?
- Are there cloned humans on this planet?