

This is the **Higher Separate** version — includes all Higher Tier content (marked ★) and all Separate Science content.

Cloning produces genetically identical copies of an organism without sexual reproduction.

- ★ **HT** Tissue culture: plant cells from shoot tip grown in sterile nutrient medium → genetically identical plants. Fast, used commercially
- ★ **HT** Embryo splitting: early embryo divided → each cell grows into identical organism → implanted in surrogates
- ★ **HT** Adult cell cloning: nucleus from body cell inserted into enucleated egg → embryo develops → surrogate mother. Example: Dolly the sheep (1996)
- ★ **HT** Issues: ethical concerns, low success rate (Dolly: 277 attempts), animals may age prematurely

Key Terms

Clone	Genetically identical copy of an organism
Adult cell cloning	Using nucleus from body cell to create an embryo with identical DNA to the donor

■ **Exam Tip:** Adult cell cloning: 1) Remove nucleus from body cell. 2) Remove nucleus from egg. 3) Insert body cell nucleus into enucleated egg. 4) Stimulate to develop. 5) Implant in surrogate. Know these steps.