Unit 5

# Answers: Applied Biology

## Quick checks

**1** b

**2** b

**3** c

**4** b

**5** b

**6** c

**7** b

**1 a.** c

**1 b.** b

**1 c.** c

**1 d.** b

**1 e.** **b**

**1 f.** **c**

**1 g.** **c**

**1 h.** **a**

**1 i.** **b**

**2 a.**

**2 b.**

**2 c.**

**2 d.**

**2 e.**

**2 f.**

**2 g.**

**2 h.**

**3 i.**

| Cloning | Genetic engineering |
|---|---|
| Produces genetically identical copies of an organism. | Changes an organism's DNA. |
| The genes are not changed. | Genes are added, removed or changed, often from another species. |
| Uses asexual reproduction or nuclear transfer. | Uses restriction enzymes, ligase and vectors (recombinant DNA). |
| Example: Dolly the sheep; tissue-cultured bananas. | Example: bacteria making human insulin; Bt cotton. |

**3 ii.**

| Reproductive cloning | Therapeutic cloning |
|---|---|
| Aims to produce a whole new individual. | Aims to obtain stem cells to grow tissues for treatment. |
| The cloned embryo is placed in a mother's womb and grows to birth. | The embryo is used only for its stem cells, in the laboratory. |
| Example: Dolly. | Example: stem cells that could repair a patient's own tissue. |

**3 iii.**

| Living donor | Deceased donor |
|---|---|
| A healthy living person, usually a relative. | A person whose brain has died completely (or who has just died). |
| Can give one kidney or part of the liver. | Can give heart, lungs, liver, both kidneys, pancreas, corneas and tissues. |
| Can save one life at a time. | Can save several lives. |
| The donor needs an operation and lives on afterwards. | The family's consent is needed. |

**3 iv.**

| Allograft | Xenograft |
|---|---|
| A graft from another person (the same species). | A graft from another species, for example a pig. |
| Rejection is controlled by matching and immunosuppressants. | Rejection is very strong unless the animal's genes are changed. |
| Example: a kidney from a brother. | Example: a pig's heart valve; a gene-edited pig's kidney. |

**4 a.**

1.
2.
3.
4.
5.
6.

**4 b.** 1.

2.

3.

4.

**4 c.**

**4 d.** 1.

2.

3.

4.

5.

6.

**4 e.**

*E. coli*

4 f. **Cloning:**

**Genetic engineering:**

4 g.

**Good effects:**

**Bad effects:**

4 h.

**History:**

**Advantages claimed for them:**

**Disadvantages:**

4 i.

**Importance:**

4 j.

1.
2.
3.
4.
5.
6.

5 a.

$$\frac{1}{5} \times \frac{1}{10} \times \frac{1}{12} \times \frac{1}{20} = \frac{1}{12000}$$

**1 in 12,000.**

5 b.

**10.5%**

**3.4%**

5 c.

**4,096**