Unit 5 · Applied Biology

WORKSHEET

Full marks 42

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 42

1 Key words [4]

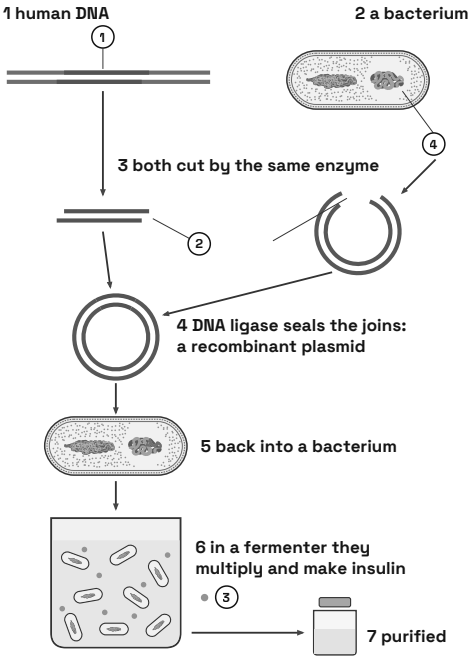
Fill in the blanks with words from the box. Two words in the box are not needed. Each blank carries 0.5 mark.

allograft	**clone**	**DNA ligase**	**gel electrophoresis**	**meiosis**	**mitosis**	**plasmid**
restriction enzymes	**short tandem repeats**	**xenograft**				

DNA fingerprinting compares the numbers of repeats at chosen places on the chromosomes; short repeated pieces of 2 to 6 bases are called _____. The pieces of DNA are separated by size by _____. An organism with exactly the same genes as its single parent is a _____. A clone grows by _____ alone. In genetic engineering, _____ cut DNA, and _____ joins the backbones of two pieces. A small ring of DNA used to carry a new gene into a bacterium is a _____. A kidney given by one person to another is an _____.

2 Label the diagram [2]

The diagram shows how human insulin is made by genetic engineering. Write the word or words that belong in place of 1 to 4. Each carries 0.5 mark.



1. _____ 2. _____

3. _____ 4. _____

3 Multiple choice [5]

Choose the correct option for each of the following questions.

i. In gel electrophoresis, the DNA pieces that travel farthest are the: [1]

a. largest
b. smallest
c. most positively charged
d. ones nearest the negative electrode

ii. A clone made by somatic cell nuclear transfer gets its nuclear genes from: [1]

a. the egg donor
b. the surrogate mother
c. the animal whose body cell gave the nucleus
d. all three mothers equally

iii. Which of these is a natural clone? [1]

a. a calf born from a cow and a bull
b. non-identical twins
c. potato plants grown from the tubers of one plant
d. a mule

iv. The Biological Weapons Convention came into force in: [1]

a. 1925
b. 1945
c. 1975
d. 2016

v. In a kidney transplant, the new kidney's renal artery is usually joined to the recipient's: [1]

a. aorta, where the old kidney's artery was
b. external iliac artery, in the pelvis
c. renal vein
d. urinary bladder

4 Very short answers [4]

Write very short answers to the following questions.

a. About what percentage of the DNA of any two people is the same? [1]

b. Towards which electrode does DNA move in a gel, and why? [1]

c. What did the Geneva Protocol of 1925 ban? [1]

d. Name the test that mixes a recipient's blood serum with a donor's cells before a transplant. [1]

5 Short answers [6]

Write short answers to the following questions.

a. DNA fingerprinting can be done from a drop of blood but not from red blood cells alone. [2]

b. Biological weapons are banned. [2]

c. A kidney transplant patient must take immunosuppressant medicines for life. [2]

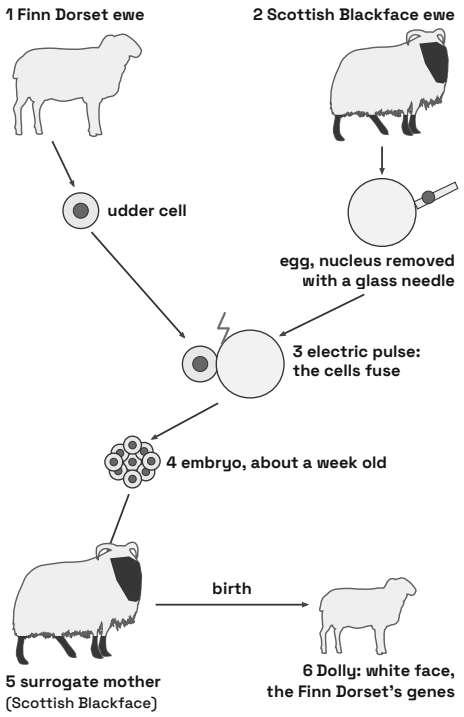
6 Long answers [12]

Write long answers to the following questions.

a. How does cloning minimize variation? Evaluate its effects. [4]

b. Governments once claimed that biological weapons had certain advantages. Write two of these claims, as claims. Then give two reasons why these weapons are banned and why the claims don't justify them. [4]

c. Study the diagram of how Dolly was made, and answer. **[4]**



i. Which sheep gave Dolly her nuclear genes? Name its breed.
ii. Why was the nucleus taken out of the egg?
iii. What two things did the electric pulse do?
iv. Dolly's mitochondria did not come from the same sheep as her nucleus. Where did they come from?

7 Numerical problems **[6]**

Solve the following problems. Show your working.

a. At four places on different chromosomes, a crime-scene DNA profile has repeat numbers shared by 1 in 5, 1 in 10, 1 in 12 and 1 in 20 people. What is the chance that a person chosen at random matches at all four places? **[2]**

Answer:

Science Playground, Katunje, Bhaktapur
https://science-playground.com/learn/grade-10-optional-science/applied-biology

b. Of 277 cells fused with eggs, 29 grew into embryos and 1 became a living lamb. What percentage of the fused cells became embryos, and what percentage of the embryos became a lamb? **[2]**

Answer: _____

c. A colony of bacteria carrying the insulin gene doubles every 20 minutes. Starting from one bacterium, how many will there be after 4 hours, if nothing stops them? **[2]**

Answer: _____

8 Think **[3]**

Nepal has not approved GM crops for farming. Suppose a variety of maize, engineered to resist a pest that destroys many farmers' crops, was offered to Nepal. List two reasons for allowing it and two reasons for caution, and say what you would want tested first.

9 Activity: Organ transplantation in Nepal (Practical 10) (not marked)

Find out from newspapers, reliable websites (government and hospital sites, national newspapers) or a health worker, and fill in the table. Use it to write your report of two or three pages.

Find out	What I found	Where I found it, and the date
Which organs and tissues are transplanted in Nepal, and at which hospitals		
The number of kidney transplants in a recent year, and how many people are waiting		
What the law says about who may donate, and why		
How a person can pledge to donate their organs or eyes after death		
The problems that remain		