D1.3 Mutation and gene editing (HL)

What the Cell · DP Biology · worksheet · HL statements D1.3.8–10

Name _____ **Date** _____ **Total** _____ / 30

About 30 minutes. The number of marks shows how many separate points to make.

Section A: Recall

6 marks

1 **Define** gene knockout. D1.3.8 **[1]**

2 **State** two features that make the mouse a useful model organism. D1.3.8 **[2]**

3 **State** the role of Cas9. D1.3.9 **[1]**

4 **Distinguish** between conserved and highly conserved sequences. D1.3.10 **[2]**

Section B: Understanding

12 marks

5 **Explain** how a knockout mouse can show the function of a gene. D1.3.8 **[3]**

6 **Outline** how CRISPR-Cas9 is used to edit a chosen gene. D1.3.9 **[3]**

7 **Describe** one successful use of CRISPR-Cas9. D1.3.9 **[2]**

8 **Explain** two hypotheses for why some sequences are highly conserved. D1.3.10 **[4]**

Section C: Working with evidence

8 marks

All data in this section are invented for practice. The patterns are realistic.

9 D1.3.8

Mice with one gene knocked out (KO) were compared with normal (wild-type) mice of the same age, fed the same diet.

Measurement at 16 weeks	Wild-type (n = 12)	Knockout (n = 12)
Body mass / g	28 ± 2	52 ± 4
Food eaten per day / g	3.9 ± 0.3	6.8 ± 0.5
Blood glucose / mmol dm^{-3}	7.1 ± 0.6	12.4 ± 1.5

a **Calculate** the percentage difference in body mass of the knockout mice compared with wild-type. **[2]**

b **Suggest** a function of the knocked-out gene, using the data. **[2]**

c **Explain** why the diet and age of the mice were kept the same. **[2]**

d **Discuss** whether the results show that the same gene controls appetite in humans. **[2]**

Section D: Longer answer

4 marks

10 **Evaluate** the use of gene knockout in model organisms to study human genes. D1.3.8 **[4]**