

91159



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

2

SUPERVISOR'S USE ONLY

Level 2 Biology, 2018

91159 Demonstrate understanding of gene expression

9.30 a.m. Friday 23 November 2018
Credits: Four

| Achievement | Achievement with Merit | Achievement with Excellence |
|---|--|---|
| Demonstrate understanding of gene expression. | Demonstrate in-depth understanding of gene expression. | Demonstrate comprehensive understanding of gene expression. |

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should attempt ALL the questions in this booklet.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–10 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

TOTAL

ASSESSOR'S USE ONLY

QUESTION THREE: METABOLIC PATHWAY

Labrador coat colour is caused by a metabolic pathway. The main coat colours are black, yellow and brown. However, a pigment intensity gene (Gene D) controls the intensity of pigment in the hair shaft. A mutation to Gene D causes any pigment present to dilute (decrease intensity).

**Black, yellow,
and brown labradors**

Dilute black

Dilute brown

Dilute yellow

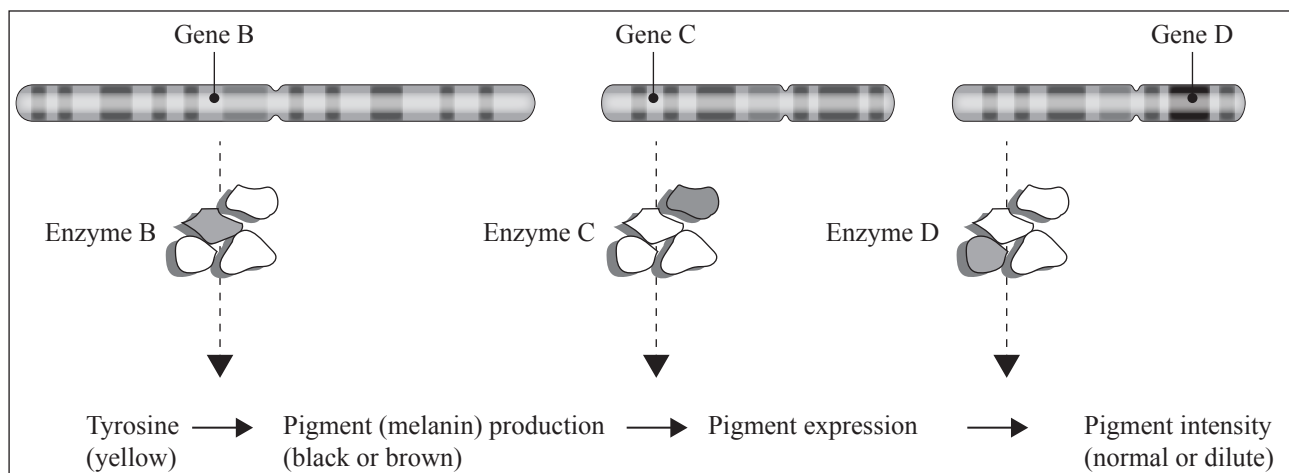
[www.labrador-retriever-guide.com/
englishlabrador.htm](http://www.labrador-retriever-guide.com/englishlabrador.htm)

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[/www.onmountainthyme.com/
labrador-retrievers.html](http://www.onmountainthyme.com/labrador-retrievers.html)

[www.
labradortraininghq.
com/labrador-breed-
information/silver-
labrador-retriever/](http://www.labradortraininghq.com/labrador-breed-information/silver-labrador-retriever/)

Simplified metabolic pathway of coat colour expression



Discuss how the presence or absence of products from a specific point in the metabolic pathway produces the expression of coat colour in Labrador dogs.

In your answer, you should reference specific points and include:

- a description of the function of gene B and enzyme B
- a description of the function of gene C and enzyme C
- an explanation of a metabolic pathway
- a discussion of which genes and enzymes need to be functioning to produce black, yellow, and brown coat colour
- a discussion of which genes and enzymes need to be functioning to produce dilute black, dilute yellow, and dilute brown coat colour.

