

4 Red-green colour blindness is an inherited condition.

The table shows some statistics on red-green colour blindness in some countries.

Country	Population size in millions	Number of people who are red-green colour blind in millions	Percentage of population who are red-green colour blind (%)
India	1380		5.2
Japan	126	3.024	2.4
Malaysia	32	1.024	
Philippines	108	3.024	2.8

(a) Complete the table to show the number of people who are red-green colour blind in India and the percentage of people who are red-green colour blind in Malaysia.

(2)

(b) The percentage of males in Malaysia who are red-green colour blind is 6.7% and the percentage of females who are red-green colour blind is 0.4%.

(i) Calculate the ratio of red-green colour blind males to red-green colour blind females in Malaysia.

(1)

Answer _____

(ii) Explain why the percentage of red-green colour blind males is greater than the percentage of red-green colour blind females.

(4)

Handwriting practice lines consisting of multiple sets of three horizontal lines (top, middle, bottom) for writing an answer.

(Total for Question 4 = 7 marks)

- 8 The drawing shows a speckled chicken. These chickens have a mixture of black and white feathers.



The colour of the feathers of a chicken is an example of codominance.

One parent of this speckled chicken had white feathers and the other parent had black feathers.

- (a) Describe the difference between each of the following pairs of terms, using feather colour to illustrate your answer.

- (i) Gene and allele

(3)

Handwriting practice lines consisting of a solid top line, a dashed middle line, and a solid bottom line. There are seven sets of these lines provided for the student to write their answer.

(ii) Genotype and phenotype

(3)

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(b) A black chicken was mated with a speckled chicken. They had 25 chicks.

Determine the expected number of speckled chicks.

You **must** use a genetic diagram.

(3)

Answer

(c) In an experiment, several pairs of speckled chickens were mated together.

They produced 480 chicks.

The table shows the expected number of speckled chicks, white chicks and black chicks. It also shows the actual number of each type of chick.

Steps in the calculation for the statistics test	Colour of feathers of chicks		
	Speckled	White	Black
Observed number (O)	243	125	112
Expected number (E)	240	120	120
(O-E)			
$\frac{(O-E)^2}{E}$			

This table can be used in a statistics test.

(i) Name the statistics test being used to analyse these data.

(1)

(ii) Complete this table to show the missing values.

(2)

(iii) Calculate $\sum \frac{(O-E)^2}{E}$

(1)

Answer

(iv) Explain how a critical value table could be used to accept or reject a null hypothesis for this experiment.

(2)

(Total for Question 8 = 15 marks)

TOTAL FOR PAPER = 80 MARKS

2 Exercise requires the effective coordination of different systems.

The photograph below shows a squash player about to hit the ball.

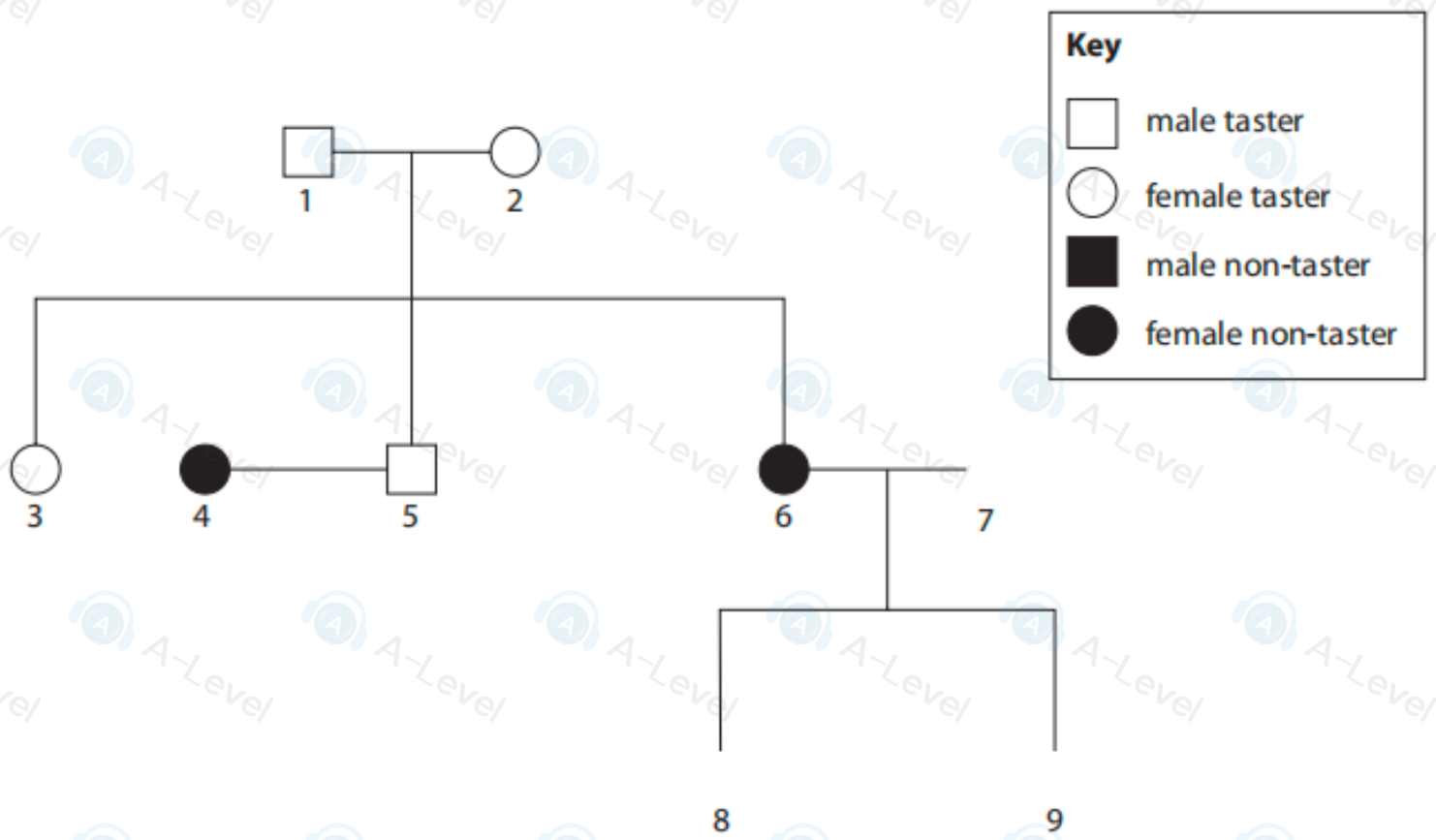


Source: https://en.wikipedia.org/wiki/File:Nicol_David.jpg#/media/File:Nicol_David.jpg

4 Phenylthiocarbamide (PTC) is a chemical that has a very bitter taste to some individuals (tasters).

The ability to taste PTC is determined by a gene that codes for a bitter-taste receptor on the tongue.

The pedigree diagram shows some of the tasters and non-tasters in a family.



(a) Complete the diagram to show the following information:

- individual 7 as a male taster
- individual 8 as a male non-taster
- individual 9 as a female taster.

(1)

(b) Describe the difference between each of the following pairs of terms, using the information in the pedigree diagram to illustrate your answer.

(i) Gene and allele

(2)

(ii) Genotype and phenotype

(2)

(c) Explain which is the dominant allele.

Use the information in the pedigree diagram to support your answer.

(2)

(d) Explain why this gene is unlikely to be located on the X chromosome.

Use the information in the pedigree diagram to support your answer.

(2)

(Total for Question 4 = 9 marks)
