

Inheritance and selection/fit and healthy

9A & 9B

31 min

31 marks

Q1-L4, Q2-L4, Q3-L5, Q4-L5, Q5-L7, Q6-L7

1. The table shows the mass of water, fat, fibre and vitamin C in 100 g of potato cooked in three different ways.

| | water, in g | fat, in g | fibre, in g | vitamin C, in mg |
|--------------------------------------|------------------------|----------------------|------------------------|-----------------------------|
| 100 g of chips | 57 | 7 | 2 | 9 |
| 100 g of boiled, peeled potato | 80 | hardly any | 1 | 6 |
| 100 g of potato baked in its skin | 63 | hardly any | 3 | 14 |

- (a) Use information from the table to help you fill the gaps in the following sentences.

- (i) Chips are crisper than boiled potatoes because chips contain **less**

.....

1 mark

- (ii) Most of the fibre in a baked potato is in the of the potato.

1 mark

- (b) Use the information in the table to work out how much vitamin C there is in:

200 g of chips mg;

200 g of potato baked in its skin mg.

1 mark

(c) People do **not** always eat a balanced diet.

Draw **one** line from each fact about a person's diet to the organ it harms.
Draw only **three** lines.

fact about the diet

organ harmed

not enough calcium

heart

not enough fibre

intestine

too much fat

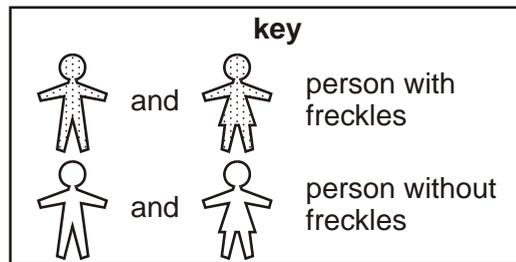
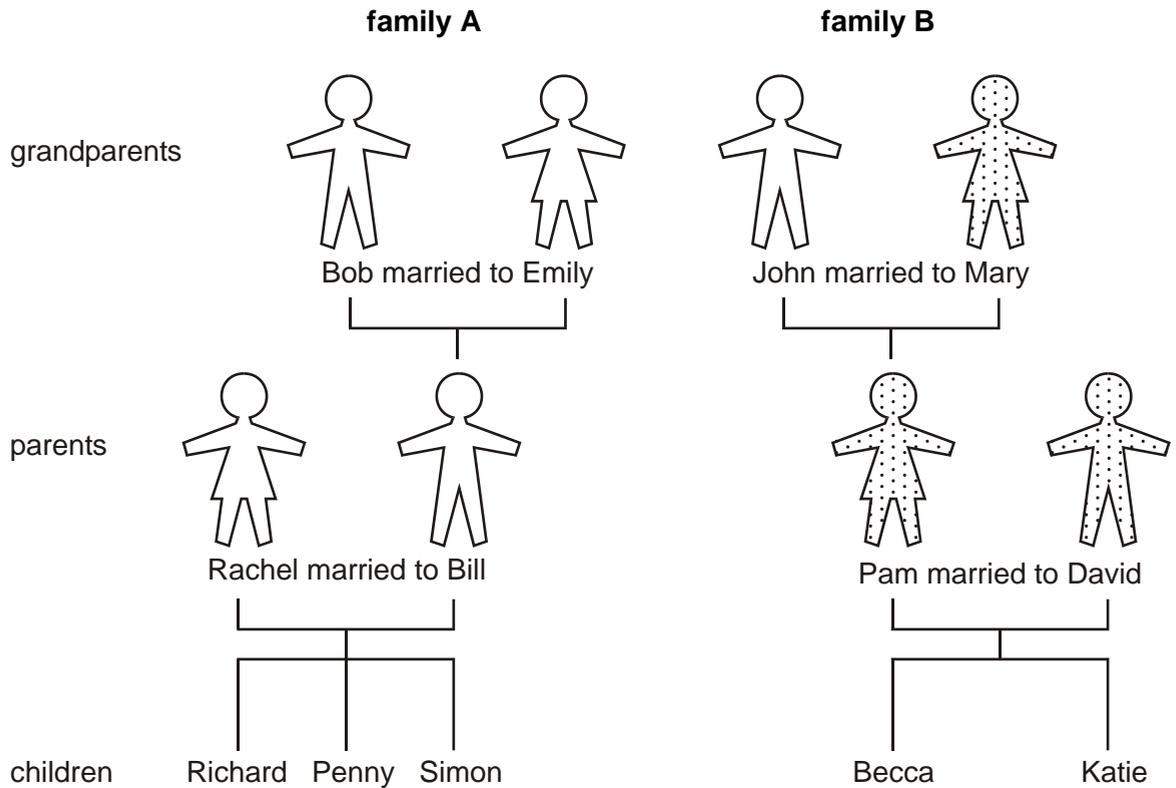
lung

bones

3 marks

Maximum 6 marks

2. The diagram shows two families. Some of the people in the diagram have freckles.



(a) (i) Which children are most likely to have freckles?
Tick the correct boxes.

| | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Richard | Simon | Katie | Penny | Becca |
| <input type="checkbox"/> |

1 mark

(ii) How did you decide?

.....

.....

1 mark

(iii) Suggest why Bill does **not** have freckles.

.....
.....

1 mark

(b) (i) Which **two** cells pass on information from parents to their children?
Tick the **two** correct boxes.

| | | | |
|----------------|--------------------------|-------------|--------------------------|
| bone cell | <input type="checkbox"/> | cheek cell | <input type="checkbox"/> |
| egg cell | <input type="checkbox"/> | muscle cell | <input type="checkbox"/> |
| red blood cell | <input type="checkbox"/> | sperm cell | <input type="checkbox"/> |

1 mark

(ii) Which organ system produces these two cells?
Tick the correct box.

| | |
|---------------------|--------------------------|
| circulatory system | <input type="checkbox"/> |
| digestive system | <input type="checkbox"/> |
| reproductive system | <input type="checkbox"/> |
| respiratory system | <input type="checkbox"/> |

1 mark

maximum 5 marks

3. Sailors used to suffer from an illness called scurvy caused by a poor diet on long journeys. James Lind was a doctor who tested treatments for scurvy. He predicted that **all acids cure scurvy**.



I think that all acids will cure scurvy.

He gave 6 pairs of sailors with scurvy exactly the same meals but he also gave each pair a different addition to their diet.

| pair of sailors | addition to their diet | effect after one week |
|-----------------|--|-----------------------|
| 1 | some apple cider | beginning to recover |
| 2 | 25 drops of very dilute sulphuric acid to gargle with* | still had scurvy |
| 3 | 2 teaspoons of vinegar | still had scurvy |
| 4 | half a pint of sea water* | still had scurvy |
| 5 | 2 oranges and 1 lemon | recovered |
| 6 | herbs and spices and acidified barley water | still had scurvy |

- (a) Does the evidence in the table support the prediction that all acids cure scurvy? Tick the correct box.

yes

no

Use the table to explain your answer.

.....

.....

1 mark

(*) DANGER! DO NOT TRY THIS.

- (b) (i) Give the **one** factor James Lind **changed** in this experiment.
(This is called the independent variable.)

.....

1 mark

- (ii) Give the factor James Lind **examined** in this experiment.
(This is called the dependent variable.)

.....

1 mark

- (c) James Lind's evidence suggested that oranges and lemons cured scurvy.

At a later time, other scientists did the following:

- They separated citric acid from the fruit.
- They predicted that citric acid would cure scurvy.
- They tested their prediction by giving pure citric acid as an addition to the diet of sailors with scurvy.
- They found it did **not** cure scurvy.

The scientists had to make a different prediction.

Suggest a new prediction about a cure for scurvy that is consistent with the evidence collected.

.....
.....

1 mark

- (d) Explain why it is necessary to investigate the effects of changes in diet over a period of more than one week.

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.....
.....
.....

1 mark

Maximum 5 marks

4. The table shows the recommended daily intake of energy and some of the nutrients needed by different groups of people.

| group of people | energy, in kJ | nutrients | | | | |
|-----------------|---------------|---------------|--------------------|-----------|----------------|------|
| | | protein, in g | carbohydrate, in g | fat, in g | minerals, in g | |
| | | | | | calcium | iron |
| male 15–18 | 11510 | 55.2 | 360 | 109 | 1000 | 11.3 |
| female 15–18 | 8830 | 45.0 | 276 | 84 | 800 | 14.8 |
| male 19–50 | 10600 | 55.5 | 331 | 100 | 700 | 8.7 |
| female 19–50 | 8100 | 45.0 | 253 | 77 | 700 | 14.8 |
| pregnant female | 8900 | 81.0 | 278 | 84 | 700 | 14.8 |

- (a) (i) Explain why two 16 year-old males of the same weight might need different amounts of energy.

.....

1 mark

- (ii) Which **two** types of nutrient provide most of the energy in our diet?

1.
 2.

2 marks

- (b) (i) Calculate the difference in the recommended daily intake of calcium for a 15 year-old male and a 30 year-old male.

..... mg

1 mark

- (ii) Calcium is needed for healthy bones. Explain the difference in the amount of calcium needed each day by a 15 year-old male and a 30 year-old male.

.....

1 mark

- (c) Look at the table. Explain the difference in the amount of protein needed by a 25 year-old pregnant female and a 25 year-old female who is **not** pregnant.

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1 mark

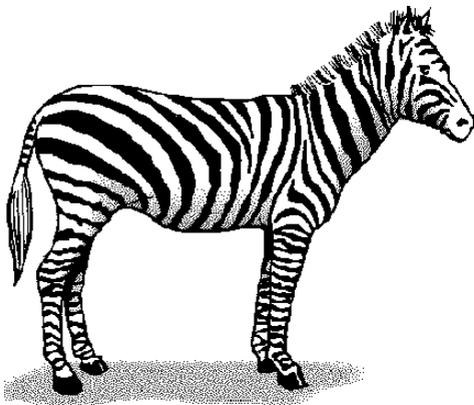
- (d) Iron is needed to make blood.
Explain why a 15 year-old female might need more iron than a 15 year-old male.

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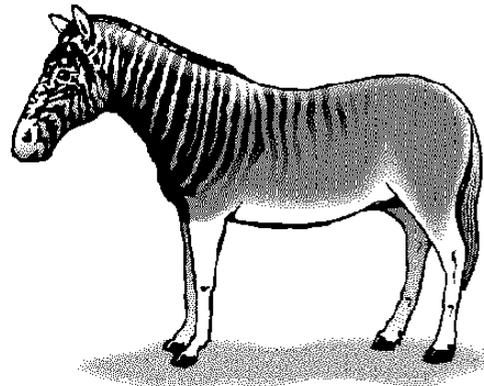
1 mark

Maximum 7 marks

5. The quagga is an extinct animal that lived in Africa. Quaggas belonged to the same group as zebras.
The drawings below show a zebra and a quagga.



Zebra



Quagga

- (a) Zebras and quaggas used to breed with each other. The offspring contained a combination of both zebra and quagga genes (genetic information).
How were zebra **and** quagga genes passed on from the parents to their offspring?

.....
.....

1 mark

- (b) These days there are some zebras that still show some quagga features. Scientists are using zebras to try to produce quaggas by selective breeding. Describe the steps in this selective breeding process.

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.....

3 marks
Maximum 4 marks

6. The drawings show Sofia taking part in four different sports.



The table below shows the average energy needed for each sport for one hour.

| sport | average energy need for one hour (kJ) |
|----------|---------------------------------------|
| bowling | 1030 |
| tennis | 1760 |
| football | 2260 |
| running | 3700 |

- (a) (i) Sofia plays football for two hours each week. She also goes bowling for two hours each week.
Explain why Sofia uses up her food reserves more quickly when playing football than when bowling.

.....

1 mark

- (ii) Athletes should **not** drink alcohol before taking part in sport.
Give **two** effects of alcohol which would affect an athlete's performance.

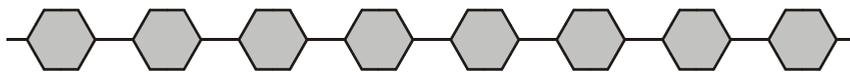
1.

1 mark

2.

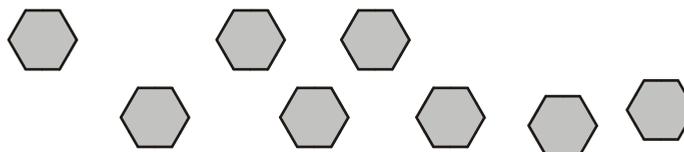
1 mark

- (b) Some athletes take glucose tablets before a 100 metre race.
They can also obtain glucose from starch in their diet.
A starch molecule is made up of many glucose molecules joined together as shown below.



part of a molecule of starch

In the digestive system, starch is broken down into glucose:



molecules of glucose

An athlete can obtain energy more quickly by eating glucose rather than starch.
Explain why.

.....
.....

1 mark
maximum 4 marks