Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Biological molecules

Time allowed: 50 minutes

Subject code **0610**

Biology

Questions from Paper 1, Paper 2, Paper 3 and Paper 6

You must have: a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.

Total marks

/ 36

Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.

Information

- This paper has 10 questions worth 36 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1 A test was performed on a food substance. A positive result was shown by a colour change to blue-black.

What solution was used for the test?

A biuret solution

B DCPIP solution

C iodine solution

D Benedict's solution

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Answer C

2 Which row is correct for a positive food test for vitamin C?

	colour of the food test reagent at the start	heat required	final colour of the food test reagent
A	colourless	yes	purple
B	blue	no	colourless
C	colourless	no	blue
D	blue	yes	orange

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Answer B

3 Four foods were tested for each of the following nutrients:

fat (using ethanol);

protein (using the biuret test);

reducing sugar (using Benedict's solution),

Which food contains protein and fat?

	colour of result of food test		
	purple / lilac	brick-red / orange	milky-white
A	✓	✗	✓
B	✓	✗	✗
C	✗	✓	✓
D	✗	✓	✗

key

✓ = nutrient present

✗ = nutrient absent

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Answer A

4 Large biological molecules are made of smaller molecules.

Which row correctly matches the large molecule with the smaller molecules?

	large molecule	smaller molecules
A	cellulose	fatty acids
B	fat	amino acids
C	protein	amino acids
D	starch	fatty acids

Carbohydrates, fats, proteins and DNA Click for more variations

Answer C

5 The bases on one strand of a DNA molecule have the sequence CAGCT.

What is the sequence of bases on the other strand?

A CAGCT **B** GTCGA **C** TGATC **D** GCTAG

Carbohydrates, fats, proteins and DNA Click for more variations

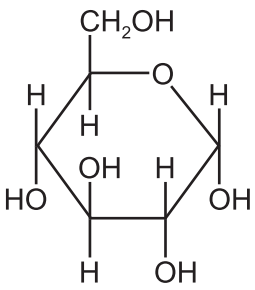
Answer B

6 The diagrams show four molecules.

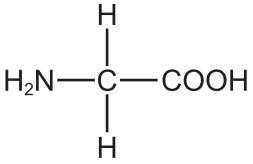
C represents carbon, H represents hydrogen, O represents oxygen and N represents nitrogen.

Which structure is an amino acid?

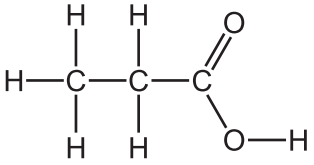
A



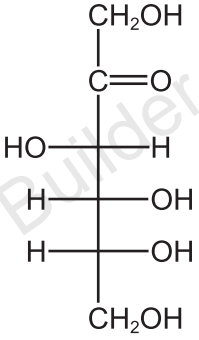
B



C



D



Carbohydrates, fats, proteins and DNA Click for more variations

Answer B

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7 A chromosome was analysed and found to have 6125 pairs of bases. The type of each base was identified and 2345 of the bases were G.

How many of the bases in this chromosome are T?

A 1435 **B** 3780 **C** 6125 **D** 7560

Carbohydrates, fats, proteins and DNA Click for more variations

Answer B

8 This question is about biological molecules.

Choose words or phrases from the list to complete the sentences.

Each word or phrase may be used once, more than once, or not at all.

calcium	**carbon**	**carbon dioxide**	**carbohydrate**
cellulose	**chloroplasts**	**fat**	**glycerol**
glycogen	**iron**	**methane**	**nitrogen**
oxygen	**protein**	**starch**	

Fats are composed of the elements ..... , hydrogen and ..... only. All proteins contain these three elements and the element ..... .

Glucose is a type of ..... .

Animals store excess glucose as ..... in the liver.

Plants store excess glucose as ..... . Plants also convert glucose to ..... which is used to make cell walls.

[7]

[Total: 7]

Carbohydrates, fats, proteins and DNA Click for more variations

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8	carbon ; oxygen ; nitrogen ; carbohydrate ; glycogen ; starch ; cellulose ;	**7**	carbon and oxygen in either order

9 Fig. 1.1 shows a bird's egg. Part of the shell has been removed.

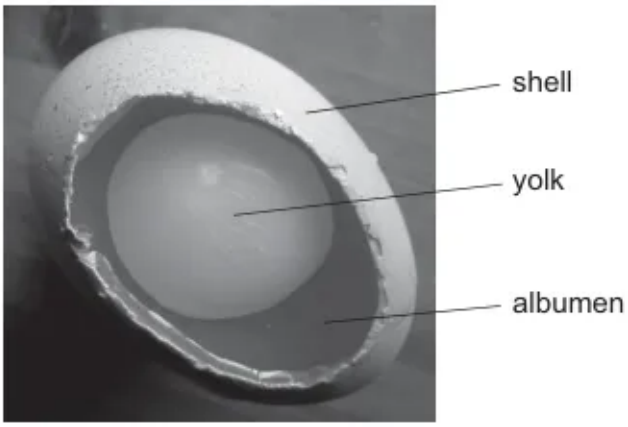


Fig. 1.1

Approximately 90 % of albumen is water. The remaining 10 % is made up of other substances such as reducing sugar.

(a) Describe how you could safely test a sample of albumen for reducing sugar.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) A student tested some albumen for the presence of protein using Biuret reagent. The solution changed colour. It was a positive result.

Describe this colour change.

.....

.....

..... [1]

(c) Fig. 1.2 shows an experiment to investigate the effect of acid on albumen.

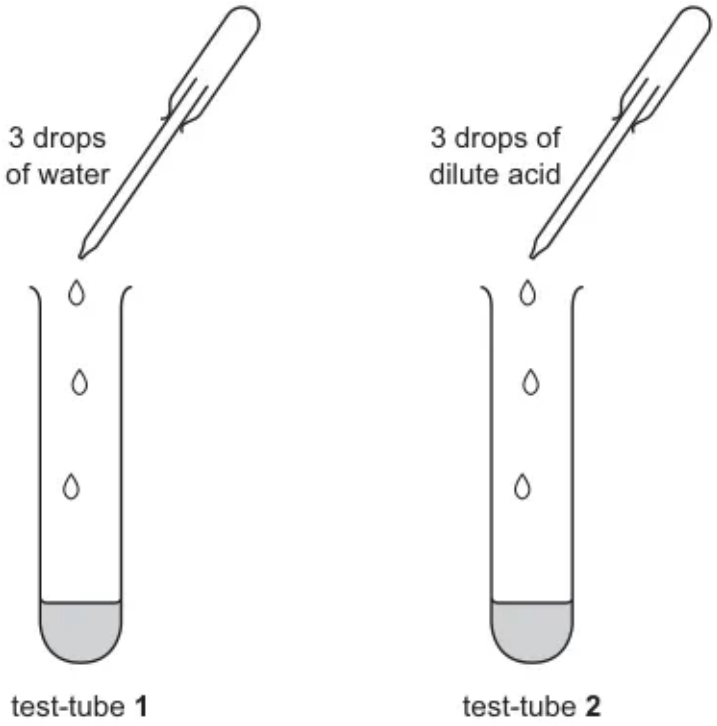


Fig. 1.2

The test-tubes were observed after five minutes.
The results are shown in Table 1.1.

Table 1.1

test-tube	observation
1	stayed as a clear liquid
2	changed from a clear liquid to a white solid

(i) State a conclusion that can be made from these results.

.....

.....

..... [1]

(ii) State why water was added to test-tube **1**.

.....

..... [1]

(d) Fat is present in the yolk.
A student carried out the emulsion test on a sample of yolk and it gave a positive result.
State what the student would observe.

.....

..... [1]

(e) Two students wanted to investigate the effect of concentration of acid on albumen.

For this investigation, suggest a suitable:

variable to change; .....

variable to measure or observe; .....

variable to control. ..... [3]

[Total: 11]

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9 (a)	Benedict's reagent / solution / test; heat / boil; *safety feature:* goggles / water bath / tongs; *correct colour change:* blue to green / yellow / orange / red;	[4]	**A** Bendicts / Benedicks **A** Fehlings / copper sulphate and sodium hydroxide **I** copper sulphate alone **I** warm / burn **A** hair tied back / gloves / lab coat **A** turquoise for blue **R** if omit blue Mark each point independently
(b)	blue to purple / mauve / lilac / violet;;	[1]	**R** blue to purple black Need starting colour and end colour for the mark
(c) (i)	*conclusion* – acid damages / reacts with / denatures the albumen ;	[1]	**R** restating the results
(ii)	control / comparison / to maintain volume in test tube;	[1]	**I** makes solution neutral / to see the effect of the acid

(d)	cloudy / white solid / milky / white (emulsion) ;	[1]	**A** turbid / turpid
(e)	*variable to change:* concentration / strength of acid / pH of acid; *variable to measure: rate /* speed of change (to cloudy) / amount of white solid / degree of cloudiness ; *variable to control:* volume or amount of albumen / temperature;	[3]	**I** pH unqualified / volume or amount of acid / type of acid **A** suitable changes to albumen **I** colour change **A** same type of albumen / same egg / type of egg **I** volume of acid
		[Total: 11]	

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10 The sweet potato, *Ipomoea batatus*, is a different species to the Irish potato, *Solanum tuberosum*.

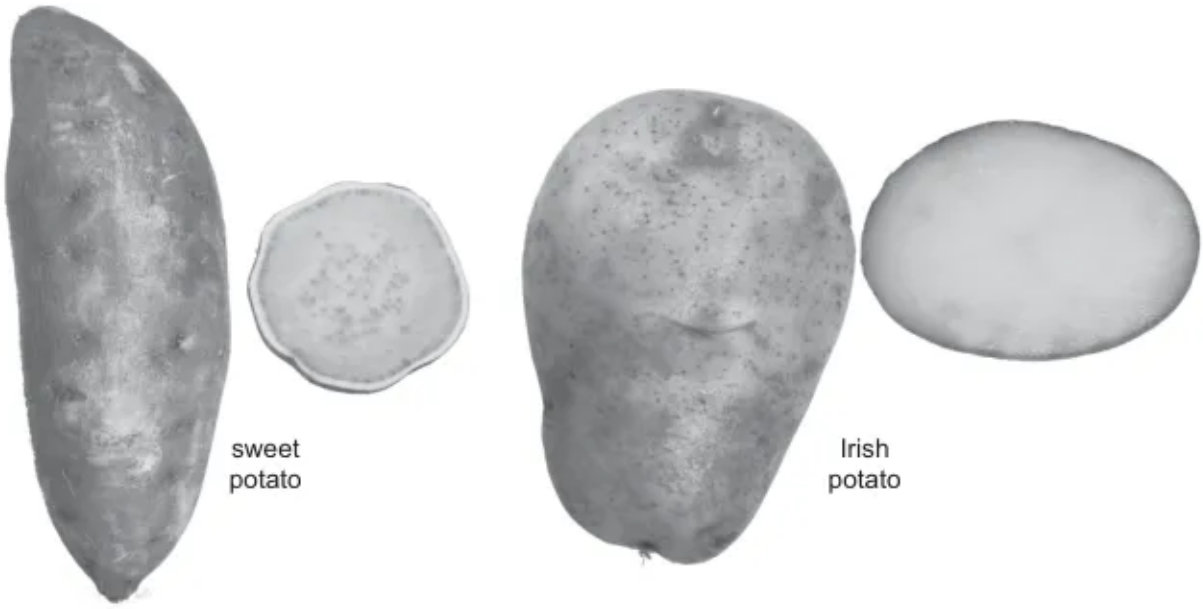


Fig. 2.1

(a) (i) Describe **one** similarity, visible in Fig.2.1, between the two species of potato.

.....

..... [1]

(ii) Complete Table 2.1 to show two differences, visible in Fig 2.1, between the two species of potato.

Table 2.1

	sweet potato	Irish potato
difference 1		
difference 2		

[2]

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(b) Potato crops are grown for their carbohydrate content.

Describe how you could safely test the two species of potato to compare their carbohydrate content.

test for starch .....

.....

.....

.....

.....

test for reducing sugar .....

.....

.....

.....

.....

.....

.....

.....

.....

.....

[8]

[Total: 11]

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10 (a) (i)

One visible from;
Skin / peel / outer wall / shell;
outer layer darker than inside;
side buds / spots / 'eyes' present;
inner tissue – similar colour;

[1]

(ii)

feature	sweet potato	irish potato
inner tissue	spotted / speckled	no spots, uniform;
skin / peel / wall	darker thicker	lighter; thinner;
shape of ends	pointed / slanted (both ends)	rounded (both ends) ;
overall shape	long / narrow	short / round / more circular / oval;
margin	two layers visible not smooth / uneven	one layer; smooth;
section shape	circular /rounded smaller	oval; larger;
stalk / root *	absent	present;

[max 2]

I. differences in composition – starch / storage.

Any **two** differences.
Comments should match and accept one difference per printed row on the question paper.
Both spaces on mark scheme for 2 differences can refer to the same feature e.g. skin or margin.

Look for comparative terms … '-er'.

* scar or hairs at the base.

(b)

1. *starch*
equal sample size of each potato; ONCE
iodine <u>solution</u> / iodine in KI / iodine reagent;
same concentration / volume of iodine solution;
expected colour change; (yellow / orange / red brown to blue / blue black / purple)
compare colour change; (how fast / darker) (using colorimeters)

Safety – **one** from:
Tie back hair / tie; ONCE
Safety goggles / spectacles; ONCE
Lab coat; ONCE

[max 3]

2. equal samples – same volume of water / same preparation / grinding; ONCE
Benedict's reagent;
same volume / amount of Benedict's solution;
heating;
expected colour change; (blue → green / orange / red)
compare colours; (intensity of colour – or timing of colour change) (use of colorimeters)

Safety – **one** from:
water bath;
test-tube holders;
same as above

[max 5]
[8 marks]

A. drops of iodine if stated number of drops but ignore vague references such as few or several.
'same volume of iodine solution' = 2.
I. using ethanol.
Need original and final colours for expected change.

A. chemical components / Fehling's / Clinistix. (pink → dark blue)
Not just warm but heat – maybe used a boiling water bath = 2 marks.
Need original and final colours for expected change.
I. repeats.

If describe biuret ignore description of test but allow safety point.

[Total: 11]

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