Surname	Centre Number	Candidate Number
Other Names		2

GCE AS/A level

1072/01

S15-1072-01

BIOLOGY – BY2

P.M. MONDAY, 1 June 2015

1 hour 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**5**	
2.	**10**	
3.	**10**	
4.	**10**	
5.	**13**	
6.	**12**	
7.	**10**	
Total	**70**	

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ADDITIONAL MATERIALS

In addition to this paper you may require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use pencil or gel pen. Do not use correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet. If you run out of space, use the continuation pages at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

The quality of written communication will affect the awarding of marks.

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Answer **all** *questions.*

1. The Snow Leopard, *Panthera uncia,* is an endangered species of big cat that is found in the mountainous regions of central Asia.

(a) (i) Complete the table below for the classification of the snow leopard. [2]

Kingdom	Animalia
Phylum	Chordata
	Mammalia
Order	Carnivora
	Felidae
Genus	
Species	

(ii) The snow leopard belongs to the phylum Chordata. Excluding characteristics common to the phylum in general, state **one** characteristic that is common to all vertebrates. [1]

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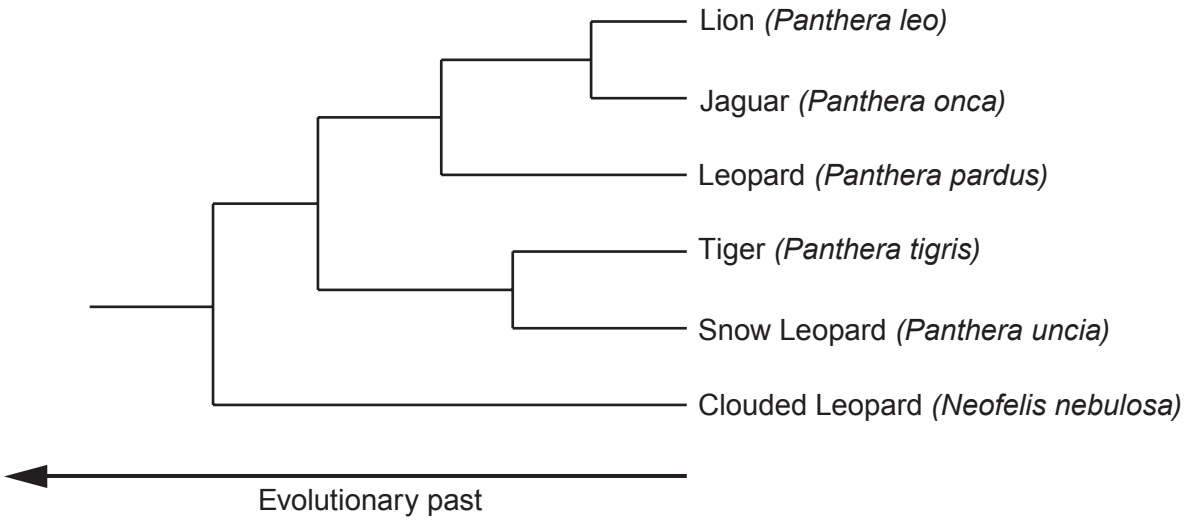
(b) Below is part of the phylogenetic tree for the Felidae.



(i) Using evidence from the diagram, state which **two** cat species are likely to be most closely related. [1]

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(ii) Explain how the results of DNA profiling tests could have been used to determine that these two species were the most closely related. [1]

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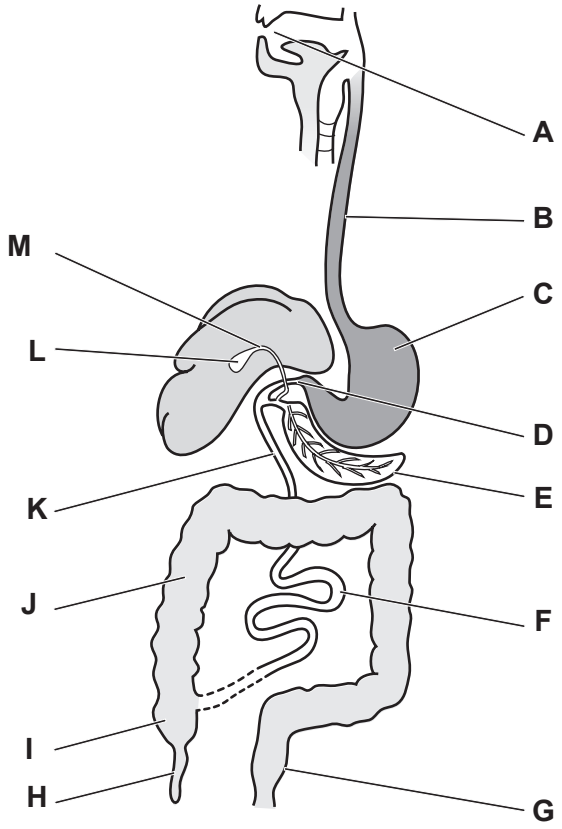
2. Below is a diagram of the human gut.



(a) Using the letters from the diagram, indicate where the following occur. (Letters may be used once, more than once or not at all.) [4]

	Letter(s)
The main sites of mechanical digestion	
The site of lipase production	
The chemical digestion of protein begins	
The final stages of carbohydrate digestion	

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(b) The liver produces bile which contains both bile salts and hydrogen carbonate ions. Bile is stored in the gall bladder and is secreted into the duodenum. Bile salts emulsify lipids by breaking large lipid droplets into many smaller lipid droplets.

(i) Explain the importance of this process in the digestion of lipids. [2]

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(ii) Using your knowledge of digestion, suggest a function of the hydrogen carbonate ions. [1]

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(c) Humans are the primary host of the pork tapeworm, *Taenia solium*.

(i) Draw a labelled arrow on the diagram opposite to show where the adult tapeworm would be located. [1]

(ii) Using your knowledge of the tapeworm, explain why the tapeworm would be located in this region. [2]

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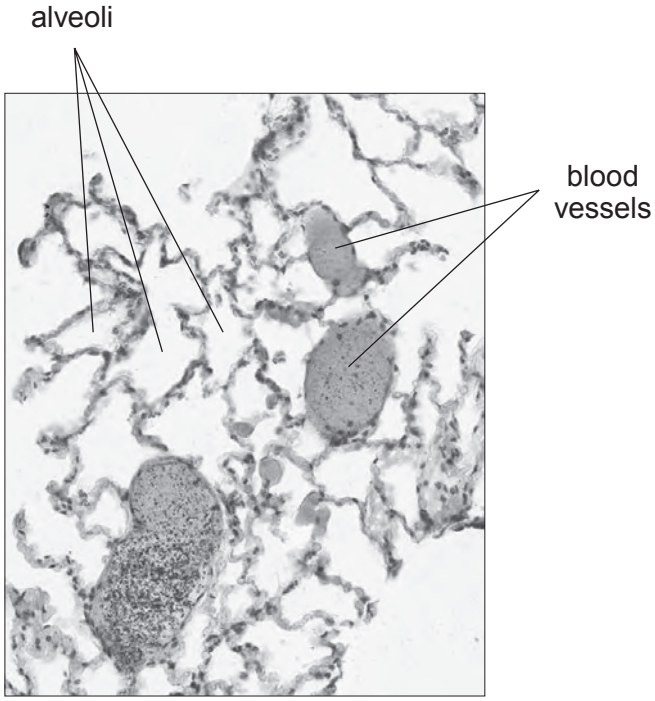
3. Shown below is a micrograph of a section through part of a mammalian lung.



(a) Describe and explain how **two** features **shown in the micrograph** are adaptations for efficient gas exchange. [4]

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(b) (i) Describe and explain the process of expiration in a mammal. [4]

(ii) Mammals have a high oxygen demand. Suggest why they need a complex ventilation mechanism. [2]

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Turn over.

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4. There are two types of reproduction, asexual and sexual.

(a) Explain **one** advantage to an organism in reproducing:

(i) asexually; [1]

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(ii) sexually. [1]

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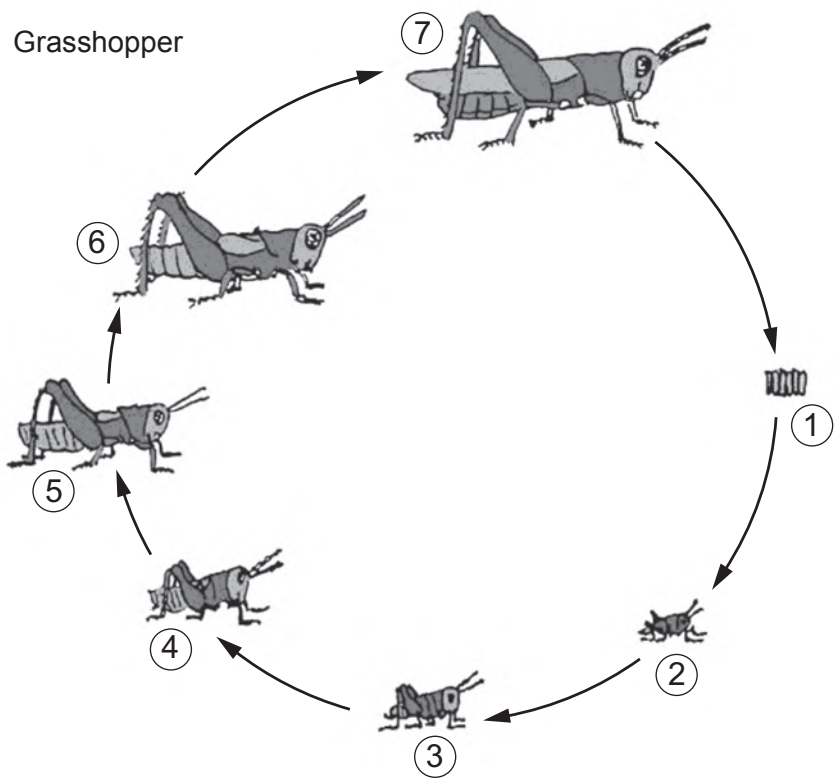
(b) Below is a diagram showing the lifecycle of a grasshopper.



(i) What is the name given to the type of insect lifecycle above? [1]

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(ii) A single stage in the insect's lifecycle is represented by the numbers 2-6. State the name given to this stage. [1]

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(iii) Describe **two** ways in which the lifecycle of a butterfly would differ from the lifecycle shown opposite. [2]

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(c) Below is a table showing aspects of reproduction in three different species of fish.

fish	diameter of egg (mm)	number of eggs released per year
cod	0.13	$3\text{-}7 \times 10^6$
dogfish	15.0	144
stickleback	2.0	60

Using the information above, suggest which species of fish:

(i) shows the greatest degree of parental care, give a reason for your answer; [2]

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(ii) will be the most developed when it hatches, give a reason for your answer. [2]

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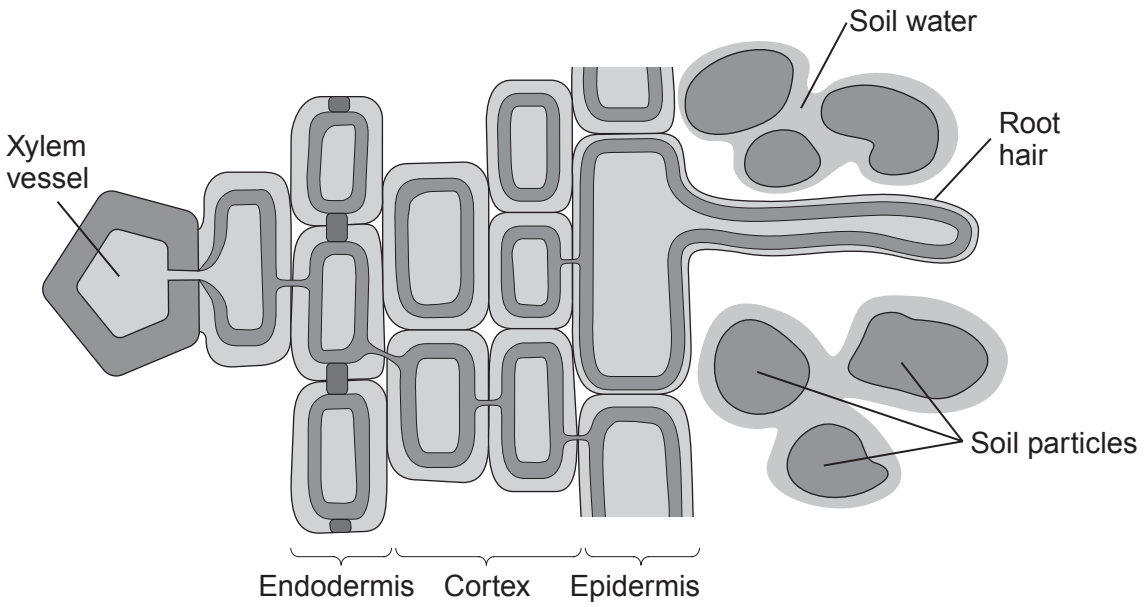
5. Shown below is a diagram of a cross section through a root.



(a) Explain how a root hair cell is adapted to its function. [1]

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(b) Water can travel across the root via the apoplast and symplast pathways. Describe the difference between these two pathways. [2]

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(c) Describe and explain the role of the endodermis in the uptake of water into the xylem vessels and in generating root pressure. [4]

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(d) The transport of organic molecules through a plant can be monitored using radioactive tracers. If a plant is supplied with carbon dioxide containing the radioactive isotope, ^{14}C, then the radioactive carbon will be incorporated into organic molecules which can then be located using autoradiography.

(i) Name the leaf tissue where ^{14}C is incorporated into organic molecules. [1]

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(ii) Name the carbohydrate that is transported through the plant. [1]

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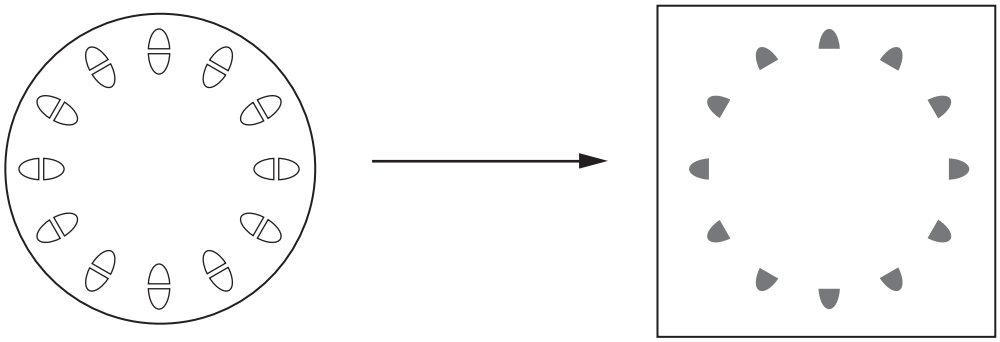
(e) Below is a transverse section of a dicotyledon stem and an autoradiogram of the same section.



Transverse section of stem Autoradiogram

What conclusion about the transport of carbohydrates can be drawn from the autoradiogram? [1]

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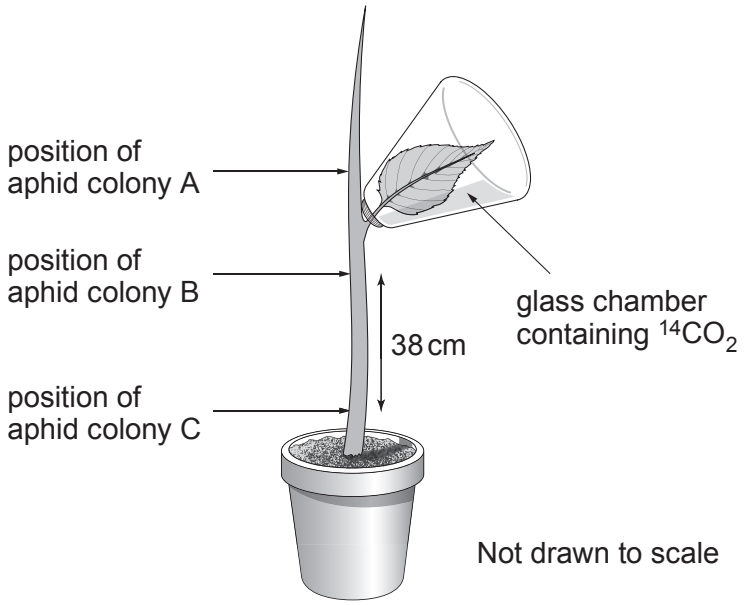
(f) In an experiment, a single leaf of a plant was supplied with radioactively labelled carbon dioxide. Colonies of aphids were allowed to feed at various locations on the plant, as shown in the diagram below. During feeding, the aphids were anaesthetised and their bodies removed leaving their mouthparts in the plant. The solution of organic molecules flowing out of the mouthparts was then analysed.



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Aphid colony	Time after the start of the experiment when radioactivity was first detected in aphid mouth parts (hours)
A	1.0
B	1.0
C	2.5

(i) How does the evidence from the experiment show that there is bidirectional movement of organic molecules in the plant? [1]

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(ii) Use the information provided to calculate the rate of translocation ($cm\,min^{-1}$) of organic molecules through this plant. [2]

..... $cm\,min^{-1}$

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6. *(a)* Cardiac muscle is said to be myogenic (spontaneously active). What does this term mean? [1]

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(b) Describe the role of the following in the cardiac cycle:

(i) the sino-atrial node; [2]

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(ii) the Purkyne (Purkinje) fibres. [2]

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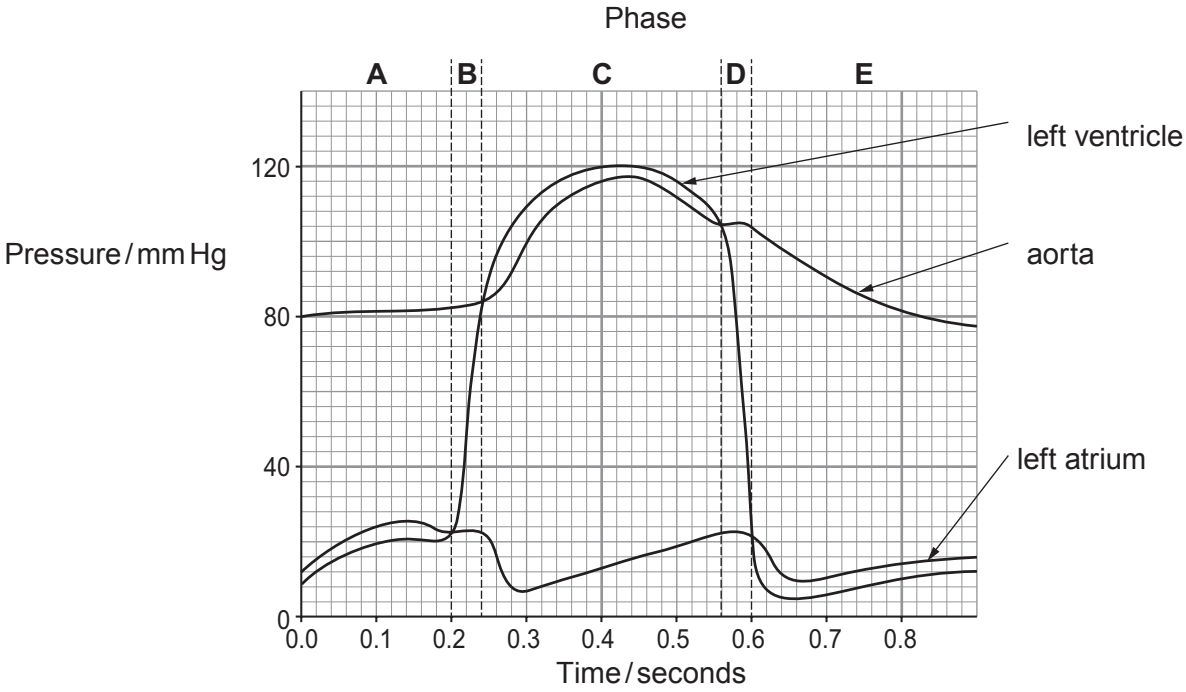
(c) Below is a graph showing the pressure changes in the left side of the heart during one cardiac cycle.



(i) From the graph state the time when the following events occur. [2]

Event	Time / seconds
The atrio-ventricular (bicuspid) valve closes	
The aortic (semi lunar) valve closes	

(ii) Using the letters **A**-**E** from the top of the graph, state **a** phase when the following events occur. [3]

Event	Phase
Blood is flowing from the atria to the ventricles	
Blood is flowing from the ventricle to the aorta	
When there is no overall movement of blood through the heart	

Examiner only

(iii) Explain how blood is prevented from flowing from the left ventricle to the left atrium. [2]

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7. Answer **one** of the following questions.
Any diagrams included in your answer must be fully annotated.

Either, *(a)* Tissue fluid is important in exchange. Give an account of the formation of tissue fluid and how it is returned to the circulation. [10]

Or, *(b)* Describe the role of haemoglobin in the transport of oxygen. Explain how this is affected by different environmental conditions. [10]

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END OF PAPER

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Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

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