Surname	Centre Number	Candidate Number
Other Names		0

New GCSE

4461/01

SCIENCE A
FOUNDATION TIER
BIOLOGY 1

P.M. WEDNESDAY, 30 May 2012

1 hour

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**7**	
2	**6**	
3	**8**	
4	**8**	
5	**7**	
6	**6**	
7	**4**	
8	**7**	
9	**7**	
Total	**60**	

4461
010001

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.

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.

INFORMATION FOR CANDIDATES

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

You are reminded that assessment will take into account the quality of written communication used in your answer to question **8**.

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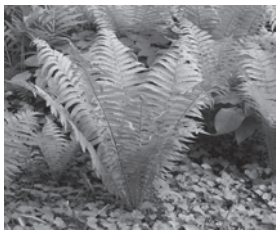
Answer **all** *questions.*

1. *(a)* Using a ruler draw lines to join each organism to its correct group. [4]

Organism		Group
7 cm	 Earthworm	Flowering plant
45 cm	 Fern	Micro-organism
85 cm	 Fox	Invertebrate animal
10 cm	 Dandelion	Vertebrate animal
0·001 mm	 Algae	Non-flowering plant

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(b) Give **one** difference between vertebrates and invertebrates. [1]

.....

(c) Name **one** type of micro-organism *not* shown on the diagram. [1]

.....

(d) Why do scientists need to give scientific names to organisms rather than using common names? [1]

.....

7

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2. Read the following information about hens.

- Many farmers keep hens for egg production.
- Large numbers of hens can be kept indoors. Some are kept in battery cages.

Caged hen

Non-caged hen

	Caged hens	Non-caged hens
Eggs produced per year by each hen	310	250
Food provided	less	more
Labour costs	less	more
Broken bones	often	rare
Movement	very restricted	not restricted
Space available per hen	560 cm^2	840 cm^2

From this information:

(a) (i) Over two years, how many more eggs are produced by a **caged hen**? Show your working. [2]

Answer .....

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(ii) Other than producing more eggs, give **one** advantage to a farmer of using cages for hens. [1]

.....

(b) Suggest **one** reason for the difference in broken bones found in caged and non-caged hens. [1]

.....

(c) State **one** way, shown in the photographs, in which the health of **caged hens** is poorer. [1]

.....

(d) From 2012 a new European law will require battery cages to have 750 cm^2 for each hen.

How will this make life better for the hens? [1]

.....

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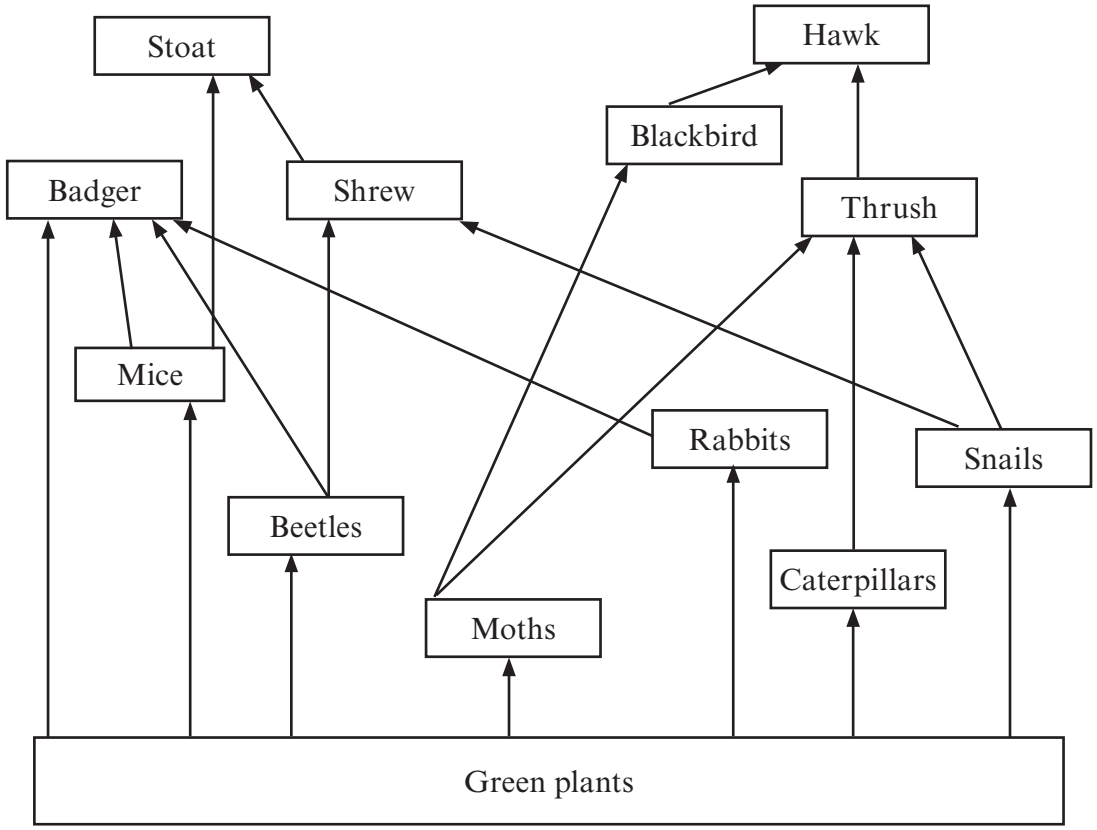
3. *(a)* Use the information in the food web below to answer the questions.



From the diagram:

(i) Name

I. one third stage consumer; ..... [1]

II. two herbivores; .... [1]

III. the producer. ..... [1]

(ii) Name **one** animal which is *both* a first stage and a second stage consumer. State what it eats. [1]

Animal .....

Food eaten .....

(iii) What is the source of energy for the producer? [1]

.....

(iv) How is the flow of energy shown in the food web? [1]

.....

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(b) The table below shows some trees and the number of herbivore species which feed on them.

Tree type	Number of herbivore species
oak	284
birch	229
ash	42
beech	64

From the table:

(i) What would happen to the number of herbivore species in a park if birch trees were replaced by ash trees? [1]

.....

(ii) Suggest **one** reason why an oak woodland has more carnivore species than a beech woodland. [1]

.....

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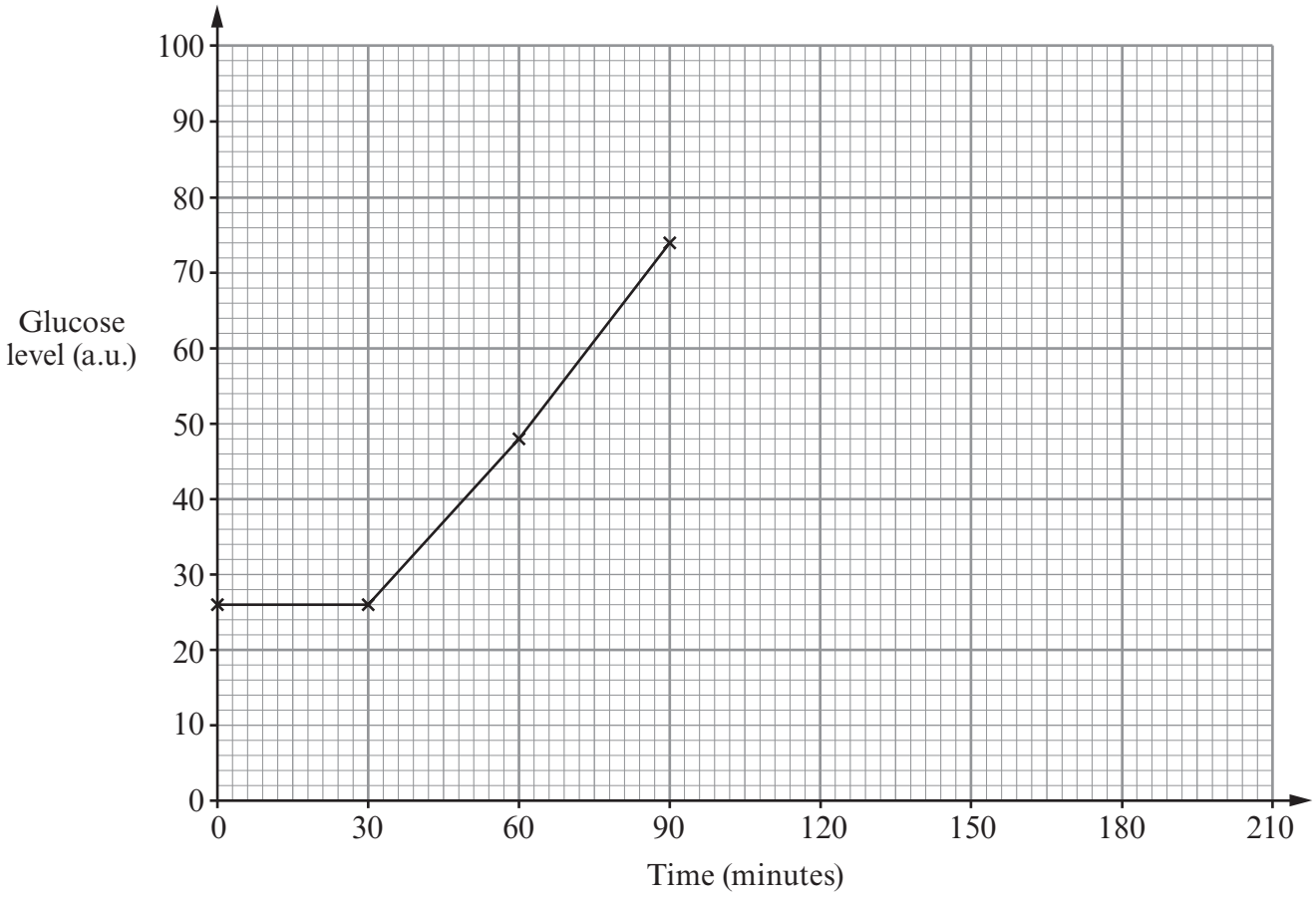
4. *(a)* The level of glucose in a person's blood was measured every 30 minutes for three and a half hours. During this time the person was given a drink containing glucose.
The results are shown below.

Time (minutes)	Glucose level (a.u.)
0	26
30	.....
60	.....
90	74
120	90
150	65
180	43
210	28



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(i) Use the graph opposite to complete the table of results above it. [1]

(ii) Complete the graph by plotting the results from 90 to 210 minutes. Join the plots with a ruler. [3]

(b) From the graph:

(i) At what time did the person take the glucose drink? [1]

.....

(ii) How does the level of glucose change between 60 and 150 minutes? [1]

.....

(c) The level of glucose in the blood is controlled by a hormone.

(i) Name the hormone. [1]

.....

(ii) Some people have a medical condition where they do not produce enough of this hormone. Name the condition. [1]

.....

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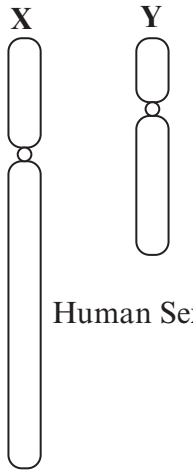
5. *(a)* Complete the sentences using some of the terms below. [4]

pairs proteins inherited DNA genes

Chromosomes in body cells are found in ..... . They are long strands of molecules of ..... . Chromosomes have ..... which determine ..... characteristics.

(b) Each human body cell has 46 chromosomes including a pair of sex chromosomes. There are two types of sex chromosomes **X** and **Y**.



Human Sex Chromosomes

(i) Complete the table below. [1]

Sex	Chromosomes
Female	..... and .....
Male	..... and .....

(ii) How many chromosomes are present in a human sperm cell? [1]

.....

(iii) What name is given to cells such as sperm and egg cells? [1]

.....

7

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6. In cats, the allele for short hair **(D)** is dominant to the allele for long hair **(d)**.

A cat with short hair was mated with a cat with long hair. All the offspring (**F1**) had short hair.

(a) (i) Complete the following to show the genotypes of the parents. [1]

I. The cat with short hair. .....

II. The cat with long hair. .....

(ii) Complete the Punnett square to show the cross between the cat with short hair and the cat with long hair. [2]

	Gametes		
F1			

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(b) (i) Complete the Punnett square to show the offspring produced on selfing (breeding together) two of the **F1** generation. [2]

F2

Gametes		

(ii) Complete the following to show the ratio of the different types of offspring appearing in the **F2** generation. [1]

..... homozygous dominant: ..... heterozygous: ..... recessive

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7. In 1982 the same species of pine tree was planted on both sides of a river valley in Wales. In 2011 the trees were surveyed at points **A**, **B** and **C** and the average heights of the trees were recorded.

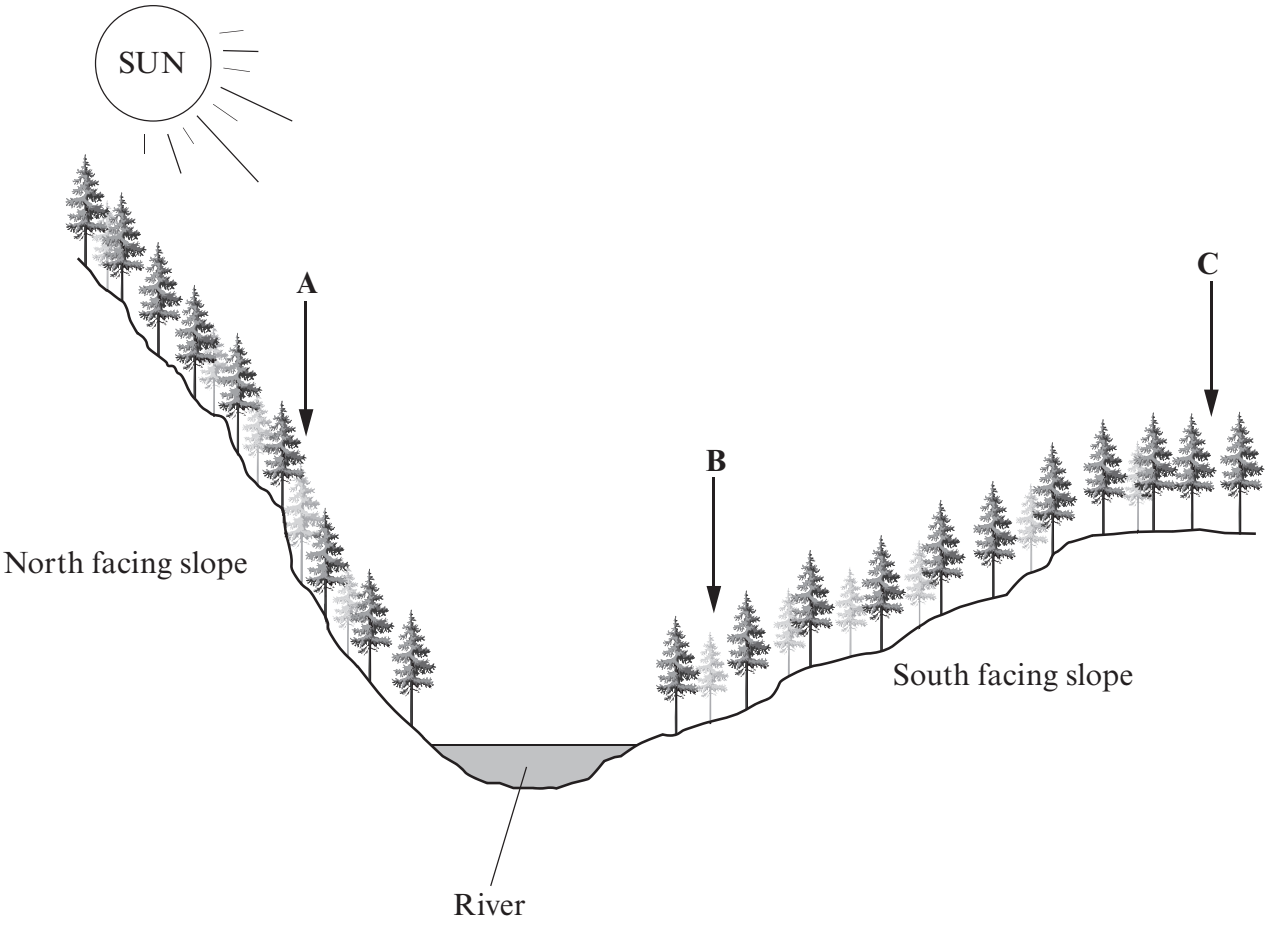

Table showing the average heights of the trees at survey points **A**, **B** and **C**.

Survey point	Average height of trees (m)
A	8.6
B	11.4
C	10.7

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(a) What term is used to describe the differences found between members of the same species? [1]

.....

(b) Suggest **two** environmental reasons for the differences in the average height of the trees growing at survey points **A** and **B**. [2]

(i) .....

.....

(ii) .....

.....

(c) All the trees growing at survey point **C** were growing under exactly the same environmental conditions, but the difference in height between the individual trees was as much as 0.5 m. Suggest a reason for this difference. [1]

.....

4

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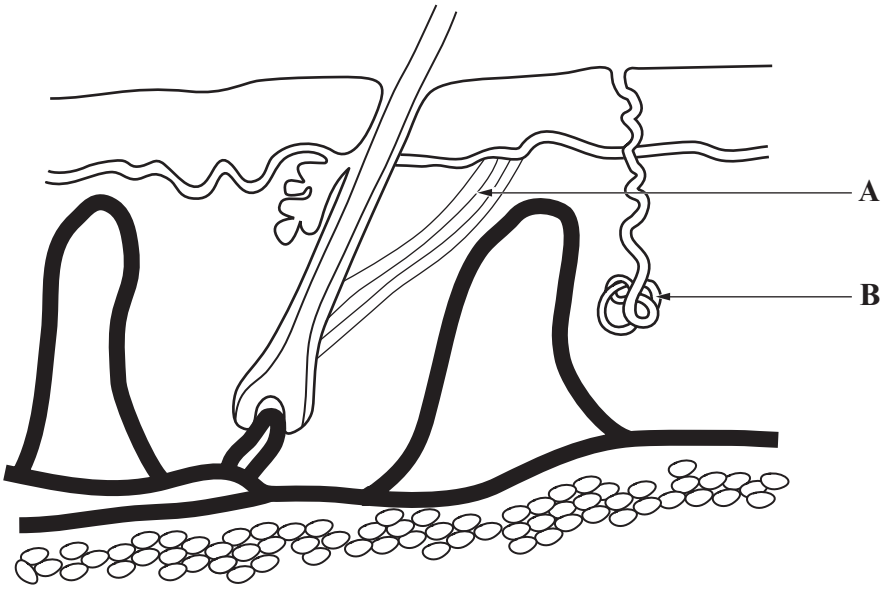
8. The diagram shows a section through the skin.



(a) Label part **A** on the diagram. [1]

(b) Explain, in detail, the role part **B** plays in lowering the body temperature in warm conditions.

[6 QWC]

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9. The table below shows the information on the packaging of two different breads, *Multi-Seeded* and *White sliced*.

	Multi-Seeded (100g)	White Sliced (100g)	Guideline Daily Amount (GDA) for an adult
Energy (kJ)	1110	992	8400
Protein (g)	10.5	9.5	45
Total carbohydrates (g)	33.5	15.7	230
Sugars (g)	4.1	4.2	90
Total fat (g)	9.9	1.3	70
Saturated fat (g)	1.5	0.1	20
Salt (g)	0.85	0.4	6

(a) Use the information in the table to calculate the mass of a *White Sliced* loaf which an adult would have to eat to reach their GDA of energy. [2]

Answer .....

(b) Which of the breads would you recommend to:

(i) a person suffering from coronary heart disease; [1]

Bread .....

Reason .....

(ii) a person suffering from high blood pressure? [1]

Bread .....

Reason .....

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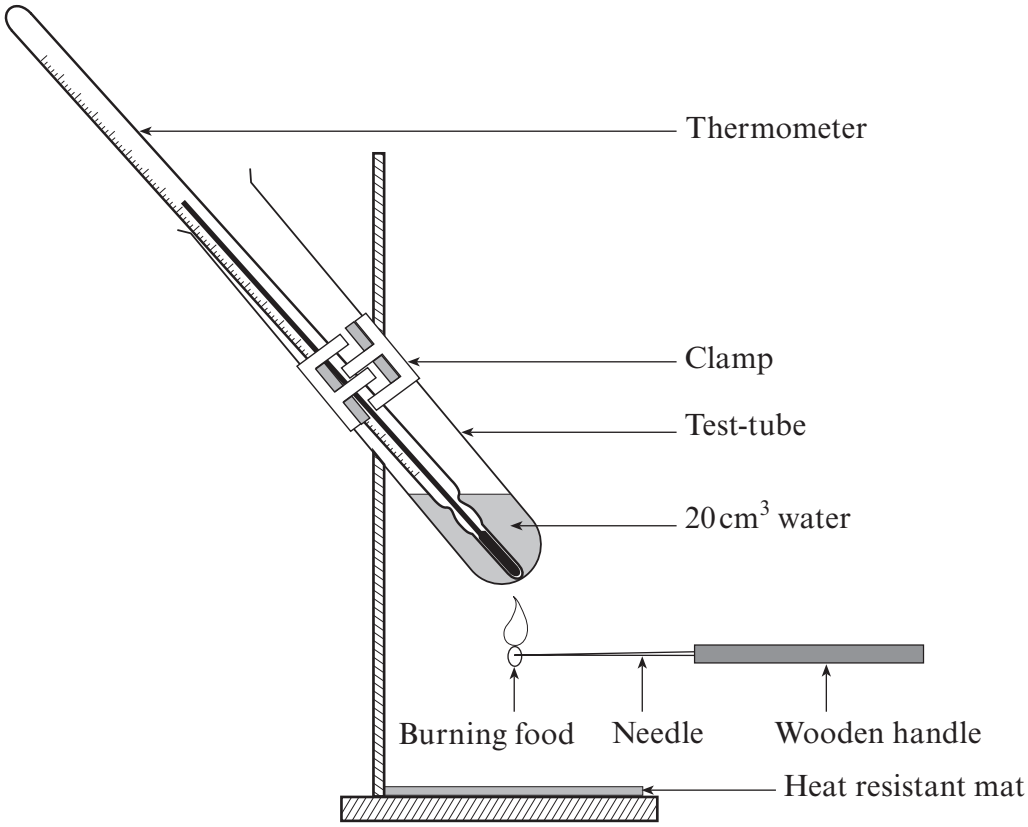
(c) Bethan wanted to check the energy content of the *Multi-Seeded* bread. She set up the apparatus shown below.



(i) Apart from the volume of water used, state **two** *other* measurements that Bethan must take in order to find the energy content of the bread. [2]

I. .....

II. .....

(ii) Why will the apparatus which Bethan uses not give an accurate reading of the energy content of the bread? [1]

.....

.....

THERE ARE NO MORE QUESTIONS IN THIS EXAMINATION.

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