

Write your name here

Surname

Other names

Centre Number

Candidate Number

**Edexcel GCSE**

**Biology / Science**

**Unit B1: Influences on Life**

**Higher Tier**

**Sample Assessment Material**

**Time: 1 hour**

Paper Reference

**5BI1H/01**

**You do not need any other materials.**

Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*

### Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (\*) are ones where the quality of your written communication will be assessed  
– *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

### Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

S39982A

©2011 Edexcel Limited.



Turn over ►

**edexcel**  
advancing learning, changing lives

## Answer ALL questions

Some questions must be answered with a cross .  
If you change your mind about an answer, put a line through the box  and then mark your new answer with a cross .

### Hydrothermal vents

- 1 Colonies of organisms called tubeworms live in the deep ocean. They live in mineralised water released from hydrothermal vents.

This is a food chain found near a hydrothermal vent.



2007 Woods Hole Oceanographic Institution,  
Fred McConnaughey/Science Photo Library,  
Peter Batson/DeepSeaPhotography.com,  
Visions '05 Expedition/U. of Washington/NSF/W. M. Keck Foundation

- (a) Complete the sentences by putting a cross () in the box next to your answer.

- (i) The conditions very close to hydrothermal vents are

(1)

- A** cold with low pressure
- B** cold with high pressure
- C** hot with low pressure
- D** hot with high pressure

- (ii) Bacteria are part of the prokaryote kingdom.

Which main organelle do bacteria **not** have inside their cells?

(1)

- A** DNA strands
- B** cell membrane
- C** cytoplasm
- D** nucleus

- (iii) Tubeworms rely on bacteria to gain the correct amount of nutrition.  
The bacteria also rely on the tubeworms to survive.

What is the name given to this type of relationship?

(1)

- (iv) The food chain shown has four trophic levels.  
What limits the length of a food chain?

(1)

- (b) The discovery of organisms in hydrothermal vents occurred in 1977.

Explain how the scientific community might have validated this new discovery.

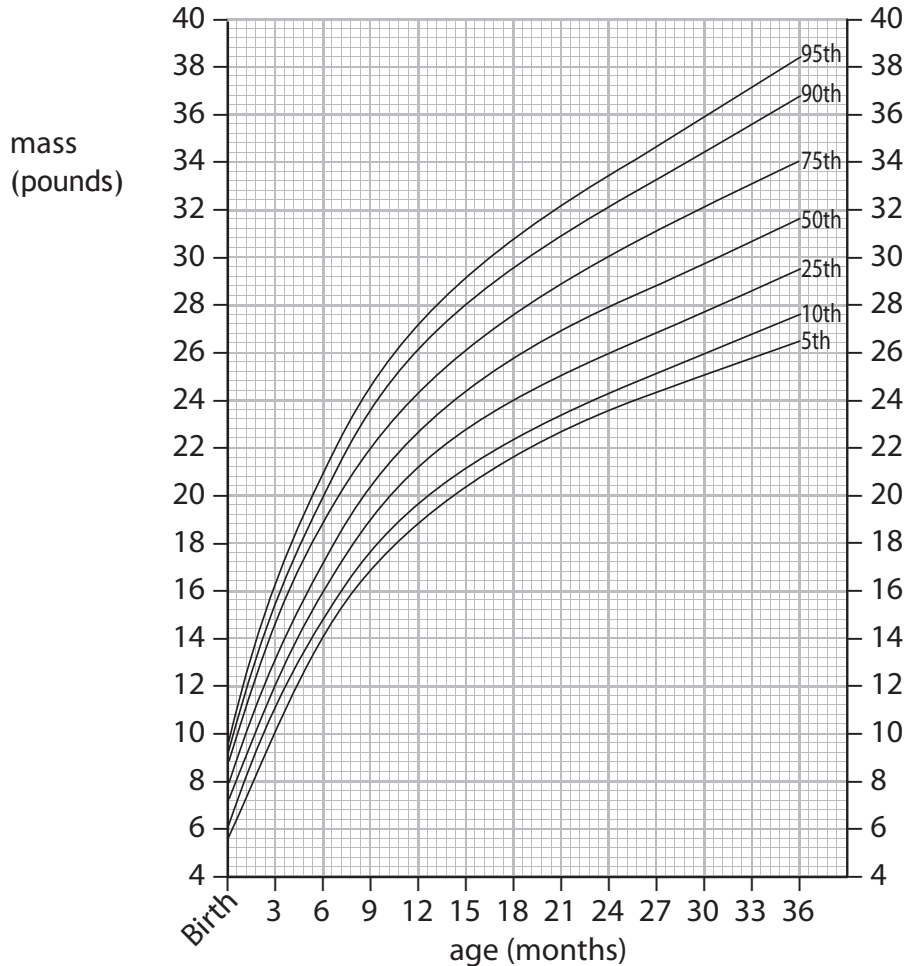
(3)

**(Total for Question 1 = 7 marks)**

## Smoking and health

- 2 Government campaigns try to persuade pregnant women to stop smoking. Smoking can affect the birth mass of babies.

The graph below shows a percentile growth curve for boys aged 0–36 months.



- (a) (i) The average baby will follow the 50th percentile line. What is the mass of the average newborn boy?

(1)

mass = ..... pounds

- (ii) Babies born to mothers who smoke often have a smaller birth mass than babies born to mothers who do not smoke. Calculate the difference in birth mass between a baby born on the 50th percentile and a baby born on the 5th percentile.

(1)

difference in mass = ..... pounds

(iii) Describe how the difference in birth mass has changed by the time the child is 36 months old.

(1)

.....

.....

(b) (i) Carbon monoxide from cigarette smoke can enter the bloodstream of a pregnant woman who smokes.

Explain how carbon monoxide could reduce the birth mass of her baby.

(2)

.....

.....

.....

.....

(ii) Explain how nicotine in cigarette smoke can lead to lung cancer.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

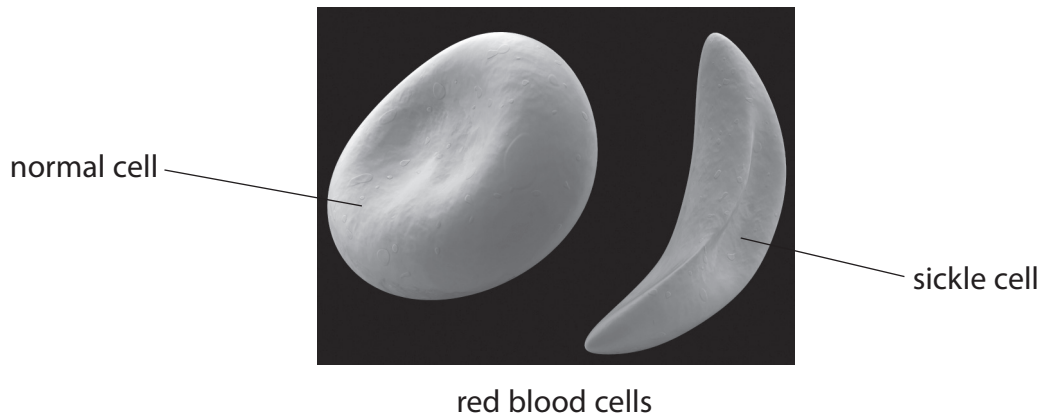
.....

.....

**(Total for Question 2 = 8 marks)**

### Sickle cell disease

- 3 Sickle cell disease is a genetic condition that causes the red blood cells to change into a sickle shape. This reduces the ability of the red blood cells to carry oxygen.



- (a) (i) State **two** of the main symptoms of sickle cell disease.

(2)

1 .....

.....

2 .....

.....

- (ii) What is the genotype of people who have the genetic condition sickle cell disease?

(1)

Put a cross (☒) in the box next to your answer.

A BB

B Bb

C bB

D bb

- (iii) People who are heterozygous for sickle cell disease are likely to have a resistance to malaria.  
Malaria is a life-threatening disease.

Explain why this may cause sickle cell disease to be more prevalent in countries with a high incidence of malaria.

(2)

.....

.....

.....

.....

.....

- (b) (i) State where most genes are located in a human cell.

(1)

.....

.....

- (ii) Two parents are heterozygous for sickle cell disease.

Calculate the probability and percentage likelihood of their offspring having the genetic condition sickle cell disease.

Show your working, including a genetic diagram.

(4)

probability of offspring inheriting sickle cell disease .....

percentage likelihood of offspring inheriting sickle cell disease .....

**(Total for Question 3 = 10 marks)**

## Maintaining temperature

4 Lizards are poikilothermic.

This means that they rely on the environment to keep them warm or cool.

Humans use energy to maintain their internal body temperature.

(a) (i) Suggest **one** advantage of being poikilothermic.

(1)

(ii) As well as their body temperature, humans maintain other internal conditions.

What is the name given to the ability to maintain a constant internal environment?

(1)

Put a cross (☒)

- A** homeostasis
- B** interdependence
- C** mutualism
- D** homozygous

(b) (i) Explain how vasodilation helps to maintain body temperature.

(2)



(ii) Vasodilation is an involuntary response controlled by a reflex arc.

Describe the path taken by a nerve impulse in a reflex arc.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(c) Blood glucose concentrations is an example of a negative feedback mechanism.

Explain how the model of a negative feedback mechanism can be applied to the changes in the body following the eating of a chocolate bar.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

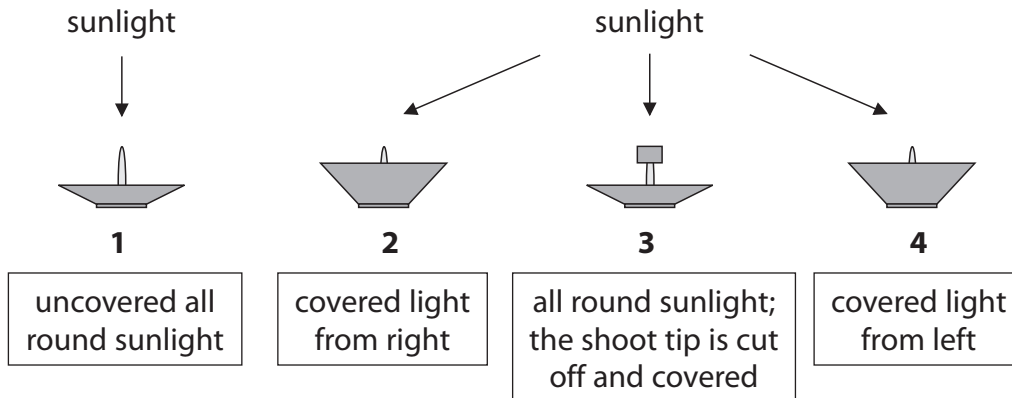
.....

.....

**(Total for Question 4 = 11 marks)**

## Plant hormones

- 5 Gareth carried out an investigation to see the effect of sunlight on grass shoots. He set up four grass shoots.



### Results of the experiment after 48 hours:

- grass shoot 1 grew straight upwards
- grass shoot 2 grew and curved towards the right
- grass shoot 3 did not grow
- grass shoot 4 grew and curved towards the left

- (a) (i) Which grass shoot was the control in this experiment?

(1)

Put a cross (☒) in the box next to your answer.

- A grass shoot 1
- B grass shoot 2
- C grass shoot 3
- D grass shoot 4

- (ii) The growth of the grass shoots towards the direction of the light is called phototropism.

Give the name of the hormone that causes this reaction in grass shoot tips.

(1)

- (iii) Explain how this experiment provides evidence that the hormone causing phototropism is found in the shoot tip.

(2)

(b) Give **two** ways that plant hormones are used by commercial plant growers.

(2)

1 .....

.....

2 .....

.....

\*(c) Explain how phototropism **and** geotropism affect the development of plants so they can grow more successfully.

(6)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

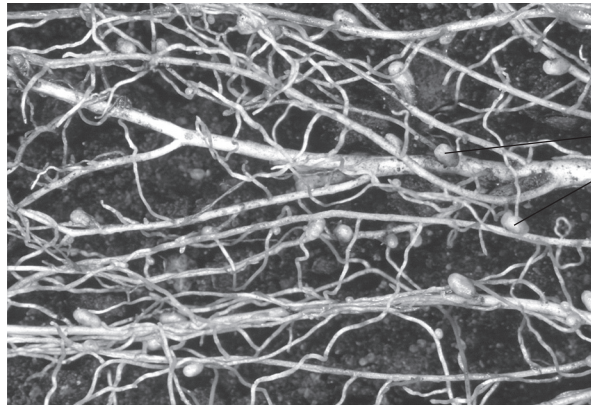
.....

.....

**(Total for Question 5 = 12 marks)**

## The nitrogen cycle

6 The photograph shows the root nodules on a clover plant.



root nodules

In the root nodules there are colonies of bacteria.

(a) Put a cross (☒) in the box next to your answer.

(i) What is the name of the type of bacteria that live in the root nodules in the clover plant?

(1)

- A decomposer bacteria
- B denitrifying bacteria
- C nitrifying bacteria
- D nitrogen-fixing bacteria

(ii) The bacterial colonies and the clover plant work together for survival.

Describe how this relationship is an example of mutualism.

(2)

.....

.....

.....

.....

.....

(b) The nitrate content of soil can be increased without using bacteria.

State **one** way in which this can be done.

(1)

.....

(c) Explain why nitrates are important for plants.

(2)

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

\*(d) Rather than use fertilisers, farmers could encourage bacteria to grow in the soil to provide their crops with the minerals they require.

Explain how bacteria in the soil can cycle essential plant nutrients.

(6)

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

---

**(Total for Question 6 = 12 marks)**

---

**TOTAL FOR PAPER = 60 MARKS**



# Sample Mark Scheme

## Unit B1: Influences on Life (Higher Tier)

Question number	Answer	Mark
1(a)(i)	D	(1)

Question number	Answer	Mark
1(a)(ii)	D	(1)

Question number	Answer	Acceptable answers	Mark
1(a)(iii)	mutualism/symbiosis	interdependence	(1)

Question number	Answer	Acceptable answers	Mark
1(a)(iv)	energy is converted into less useful forms of energy at each trophic level	energy is lost at each trophic level	(1)

Question number	Answer	Acceptable answers	Mark
1(b)	<p>an explanation including the following points:</p> <p>collected primary evidence on feeding methods/trophic levels/interdependence (1)</p> <p>published their findings in scientific journals (1)</p> <p>peer review/other scientists investigated the same environment (1)</p>	<p>adaptations that are specifically related to the conditions in a hydrothermal vent</p> <p>ignore references to organisms not in the food chain</p>	(3)

**TOTAL: 7 MARKS**

Question number	Answer	Acceptable answers	Mark
2(a)(i)	8 (lbs)	$\pm 0.4$ lbs	(1)

Question number	Answer	Mark
2(a)(ii)	Answers within the range of 2.0-2.4(lb)	(1)

Question number	Answer	Acceptable answers	Mark
2(a)(iii)	The difference in mass has increased as the child gets older	Accept: the difference in mass is now 5.0-5.5 lbs	(1)

Question number	Answer	Acceptable answers	Mark
2(b)(i)	an explanation linking the following:  foetus has less oxygen from the mother's blood for respiration (1)  (so) foetus has less energy for growth (1)	may use embryo or baby instead of foetus	(2)

Question number	Answer	Mark
2(b)(ii)	an explanation linking the following:  nicotine is addictive (as) it acts on (receptor sites in) the brain (1)  (which) causes you to smoke more tobacco to get the same effect (1)  smoking more means an increased exposure to tar, which is a carcinogen (1)	(3)

**TOTAL: 8 MARKS**



Question number	Answer	Acceptable answers	Mark
3(a)(i)	Any <b>two</b> of the following:  tiredness/lack of energy  painful joints and muscles  dizziness and fainting	more likely for blood clots to form	(2)

Question number	Answer	Mark
3(a)(ii)	D	(1)

Question number	Answer	Acceptable answers	Mark
3(a)(iii)	an explanation linking the following:  in countries with a high incidence of malaria, individuals heterozygous for sickle cell disease are more likely to live long enough to reproduce (1)  and pass the sickle cell allele on to their offspring so it becomes more prevalent in the gene pool(1)	May use genes instead of alleles	(2)

Question number	Answer	Acceptable answers	Mark
3(b)(i)	in the nucleus of the cell (1)	genes are found on chromosomes (1)	(1)

Question number	Answer	Acceptable answers	Mark									
3(b)(ii)	correct genotypes of gametes (1)  correct genotypes of offspring (1)  25% chance (1)  probability 1 in 4 (1)  <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>A</td> <td>a</td> </tr> <tr> <td>A</td> <td>AA</td> <td>Aa</td> </tr> <tr> <td>a</td> <td>Aa</td> <td>aa</td> </tr> </table>		A	a	A	AA	Aa	a	Aa	aa	allow a maximum of 2 marks only for a correctly drawn genetic diagram	(4)
	A	a										
A	AA	Aa										
a	Aa	aa										

**TOTAL: 10 MARKS**

Question number	Answer	Acceptable answers	Mark
4(a)(i)	less energy is used keeping warm/ need to consume less food	reasonable responses regarding less energy	(1)

Question number	Answer	Mark
4(a)(ii)	A	(1)

Question number	Answer	Acceptable answers	Mark
4(b)(i)	an explanation linking the following:  increased volume of blood flow near the surface of the skin/dilation of capillaries near the surface of the skin (1)  (so) more heat is radiated from the skin to the environment (1)	reject blood vessels move closer to the skin  accept reference to the shunt valve in the correct context	(2)

Question number	Answer	Mark
4(b)(ii)	a description including the following points in a logical order:  starting with sensory neurone from receptors (1) to relay neurone in CNS/spinal cord (across synapse)(1) to motor neurone (across synapse) linking to effectors (1)	(3)

Question number	Answer	Mark
4(c)	an explanation linking the following in a logical order:  glucose concentrations rise in the blood/glucose absorbed into blood (1)  this stimulates the release of insulin from the pancreas/endocrine gland (1)  insulin stimulates conversion of glucose to glycogen/insulin acts to lower blood glucose back to normal level (1)  the lowering of glucose levels inhibits the production of insulin in a negative feedback loop (1)	(4)

**TOTAL: 11 MARKS**

Question number	Answer	Mark
5(a)(i)	A	(1)

Question number	Answer	Mark
5(a)(ii)	auxin	(1)

Question number	Answer	Acceptable answers	Mark
5(a)(iii)	an explanation linking the following:  grass shoot 3 has the top covered and does not show any phototropism (1)  (so) the hormone must be in the tip of the shoot (1)		(2)

Question number	Answer	Mark
5(b)	any two from: <ul style="list-style-type: none"> <li>• weedkillers</li> <li>• rooting powder</li> <li>• seedless fruit</li> <li>• fruit ripening</li> </ul>	(2)

Question number	Indicative content	Mark
*5(c) QWC	<p>Phototropism:</p> <ul style="list-style-type: none"> <li>causes elongation of the tip of the plant</li> <li>on the side of the shoot furthest from the light</li> <li>tip is bent towards the light/the plant grows in the direction of the light</li> <li>gives maximum light for photosynthesis</li> <li>light energy converted to chemical energy</li> <li>carbohydrate/sugar/starch produced</li> <li>provides energy for growth and metabolism</li> <li>converted into other compounds</li> <li>out compete other plants.</li> </ul> <p>Geotropism:</p> <ul style="list-style-type: none"> <li>causes roots to grow downwards/towards gravity</li> <li>into the soil</li> <li>the plant is well anchored to the ground</li> <li>maximises water uptake</li> <li>maximises mineral uptake</li> <li>both minerals and water are essential for photosynthesis.</li> </ul>	(6)
Level	0	no rewardable material
1	1-2	<ul style="list-style-type: none"> <li>a limited explanation of the steps involving either phototropism or geotropism</li> <li>many of the steps of phototropism or geotropism are missing or in an incorrect order</li> <li>communicates ideas using simple language and some scientific terminology. Spelling, punctuation and grammar are used with limited accuracy</li> </ul>
2	3-4	<ul style="list-style-type: none"> <li>an incomplete explanation of both phototropism and geotropism</li> <li>some of the steps may be missing but there is a correct order to the events</li> <li>an attempt to explain how the two processes lead to the successful development of a plant</li> <li>communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately. Spelling, punctuation and grammar are used with some accuracy</li> </ul>
3	5-6	<ul style="list-style-type: none"> <li>a clear explanation of the key processes of both phototropism and geotropism</li> <li>the key steps of these two processes are in the correct order</li> <li>a clear explanation linking the two processes to the successful development of the plant in terms of anchorage/absorption of water and nutrients from the roots, so the plant is able to carry out photosynthesis</li> <li>communicates ideas clearly and uses a range of scientific terminology appropriately. Spelling, punctuation and grammar are used with few errors</li> </ul>

**TOTAL: 12 MARKS**

Question number	Answer	Mark
6(a)(i)	D	(1)

Question number	Answer	Acceptable answers	Mark
6(a)(ii)	a description including the following:  bacteria convert gaseous nitrogen into nitrates for plant growth (1)  the plant provides food/glucose for the bacteria for respiration (1)		(2)

Question number	Answer	Acceptable answers	Mark
6(b)	any <b>one</b> from: <ul style="list-style-type: none"> <li>• chemical fertilisers</li> <li>• organic fertilisers</li> <li>• lightning</li> </ul>	fertiliser/nitrate fertilisers/specific named chemical fertilisers/blood and bone/specific named organic fertilisers/green manure	(1)

Question number	Answer	Acceptable answers	Mark
6(c)	an explanation linking the following:  for growth (1)  (because they are) used to make proteins (protein synthesis) (1)	names of specific proteins/ chlorophyll  to make amino acids	(2)

Question number		Indicative content	Mark
*6(d) QWC		an explanation of the process referring to: <ul style="list-style-type: none"> <li>• named mineral nitrates/phosphates/potassium/magnesium ions</li> <li>• a description to include the uses of these minerals in plant growth</li> <li>• magnesium for chlorophyll production</li> <li>• phosphates for root and shoot growth.</li> <li>• how decomposers break down dead animals and plants and excretory products</li> <li>• how nitrifying (soil) bacteria convert ammonia to nitrates</li> <li>• how denitrifying bacteria convert nitrates to nitrogen gas</li> <li>• the importance of lightning/fertilisers.</li> </ul>	(6)
Level	0	no rewardable material	
1	1-2	<ul style="list-style-type: none"> <li>• limited explanation of the steps involved in the recycling of nitrogen</li> <li>• many of the steps will be missing or in an incorrect order</li> <li>• limited understanding evident of how the nitrogen cycle is a complete cycle of events</li> <li>• reference to soil bacteria/decomposers will be minimal or omitted</li> <li>• communicates ideas using simple language and some scientific terminology. Spelling, punctuation and grammar are used with limited accuracy</li> </ul>	
2	3-4	<ul style="list-style-type: none"> <li>• some explanation of the steps involved in the recycling of nitrogen</li> <li>• some of the steps will be missing or in an incorrect order</li> <li>• some understanding of how the nitrogen cycle is a complete cycle of events</li> <li>• some appropriate reference to soil bacteria/decomposers</li> <li>• communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately. Spelling, punctuation and grammar are used with some accuracy</li> </ul>	
3	5-6	<ul style="list-style-type: none"> <li>• developed explanation of the key steps involved in the recycling of nitrogen</li> <li>• most of the steps will be explained and in sequence</li> <li>• good understanding of how the nitrogen cycle is a complete cycle of events</li> <li>• soil bacteria/decomposers are referred to appropriately</li> <li>• communicates ideas clearly and uses a range of scientific terminology appropriately. Spelling, punctuation and grammar are used with few errors</li> </ul>	

**TOTAL: 12 MARKS**