

# Respiration

## Question Paper 1

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Biology
Exam Board	AQA
Topic	4.4 Bioenergetics
Sub-Topic	Respiration
Difficulty Level	Bronze Level
Booklet	Question Paper 1

**Time Allowed:** 59 minutes

**Score:** /58

**Percentage:** /100

**Grade Boundaries:**

**Q1.**Respiration can happen aerobically or anaerobically.

Respiration transfers energy from glucose.

- (a) Draw **one** line from each type of respiration in human cells to the correct information.

**Type of respiration  
in human cells**

**Information**

	Produces ethanol
Aerobic respiration	Uses oxygen
Anaerobic respiration	Uses carbon dioxide
	Produces lactic acid

(2)

- (b) The table below shows the amount of energy released by aerobic and anaerobic respiration.

	Energy in kJ transferred from 1 g of glucose
Aerobic respiration	16.1
Anaerobic respiration	1.2

Suggest why human cells might respire anaerobically, even though only a small amount of energy is transferred.

.....  
 .....

(1)

- (c) Yeast is used in the brewing and baking industries.

Why is yeast used in these industries?

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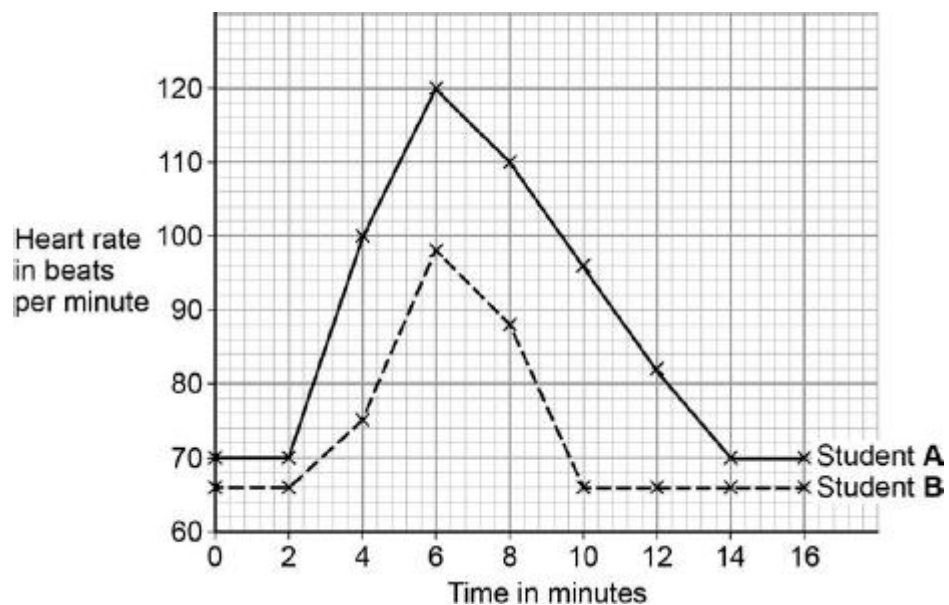
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(4)  
(Total 7 marks)

**Q2.** Some students investigated how exercise affects heart rate.

The figure below shows their results.



- (a) What was Student **B**'s resting heart rate?

Resting heart rate = ..... beats per minute

(1)

- (b) The students started running at 2 minutes.

What evidence for this is in the figure above?

.....  
.....

(1)

- (c) For how many minutes did the students run?

Tick **one** box.

2

☐

4

☐

6

☐

14

☐

(1)

- (d) Student **B** is fitter than Student **A**.

Use the figure above to give **two** pieces of evidence that support this statement.

1 .....

.....

2 .....

.....

(2)

- (e) There are other changes in the body during exercise.

Explain why these changes occur.

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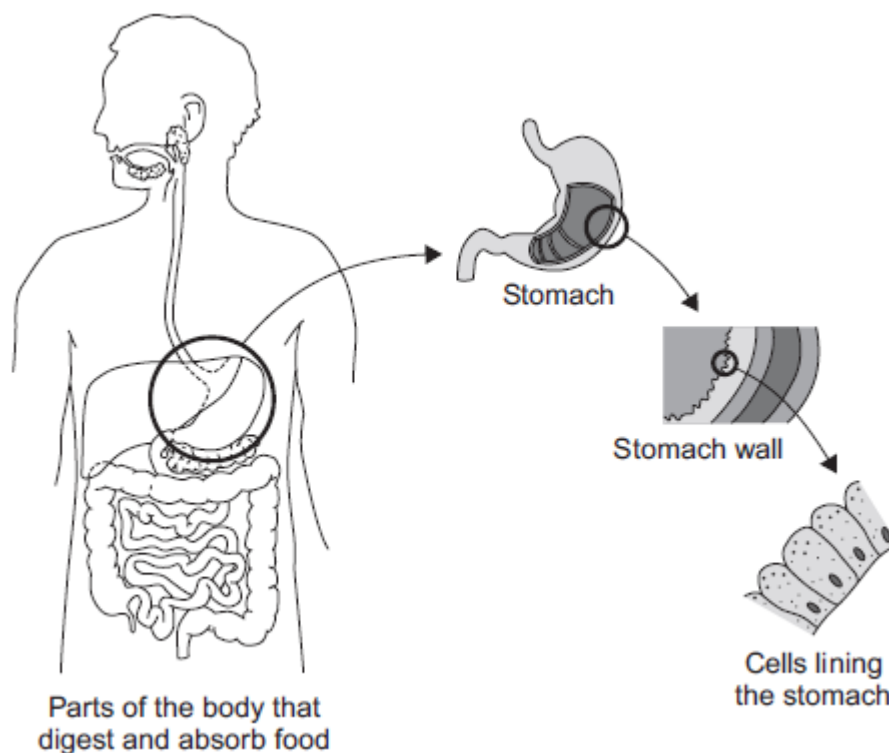
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(4)  
(Total 9 marks)

**Q3.** The diagram below shows the parts of the body that digest and absorb food.

It also shows some details about the structure of the stomach.



- (a) Complete the table to show whether each structure is an organ, an organ system or a tissue.

For each structure, tick (✓) **one** box.

Structure	Organ	Organ system	Tissue
Stomach			
Cells lining the stomach			
Mouth, oesophagus, stomach, liver, pancreas, small and large intestine			

(2)

- (b) (i) The blood going to the stomach has a high concentration of oxygen. The cells lining the stomach have a low concentration of oxygen.

Complete the following sentence.

Oxygen moves from the blood to the cells lining the stomach by

the process of .....

(1)

- (ii) What other substance must move from the blood to the cells lining the stomach so that respiration can take place?

Draw a ring around the correct answer.

**glucose**

**protein**

**starch**

(1)

- (iii) In which part of a cell does aerobic respiration take place?

Draw a ring around the correct answer.

**cell membrane**

**mitochondria**

**nucleus**

(1)

(Total 5 marks)

**Q4.** Scientists investigated how exercise affects blood flow to different organs in the body.

The scientists made measurements of blood flow to different organs of:

- a person resting in a room at 20°C
- the same person, in the same room, doing vigorous exercise at constant speed on an exercise cycle.

The table shows the scientists' results.

Organ	Blood flow in cm <sup>3</sup> per minute whilst ...	
	resting	doing vigorous exercise
Brain	750	750
Heart	250	1000
Muscles	1200	22 000
Skin	500	600
Other	3100	650

- (a) In this investigation, it was better to do the exercise indoors on an exercise cycle than to go cycling outdoors on the road.

Suggest **two** reasons why.

Do **not** include safety reasons.

1 .....

.....

.....

2 .....

.....

.....

(2)

- (b) Blood flow to **one** organ did **not** change between resting and vigorous exercise.

Which organ? .....

(1)

- (c) (i) How much more blood flowed to the muscles during vigorous exercise than when resting?

.....  
.....

Answer = ..... cm<sup>3</sup> per minute

(2)

- (ii) Name **two** substances needed in larger amounts by the muscles during vigorous exercise than when resting.

1 .....

2 .....

(2)

- (iii) Tick (✓) **one** box to complete the sentence.

The substances you named in part (c)(ii) helped the muscles to

make more lactic acid.

☐

respire aerobically.

☐

make more glycogen.

☐

(1)

- (iv) The higher rate of blood flow to the muscles during exercise removed larger amounts of waste products made by the muscles.

Which **two** substances need to be removed from the muscles in larger amounts during vigorous exercise?

Tick (✓) **two** boxes.



Amino acids	<input type="checkbox"/>
Carbon dioxide	<input type="checkbox"/>
Glycogen	<input type="checkbox"/>
Lactic acid	<input type="checkbox"/>

(2)

- (d) The total blood flow was much higher during exercise than when resting.

One way to increase the total blood flow is for the heart to pump out a larger volume of blood each beat.

Give **one** other way to increase the blood flow.

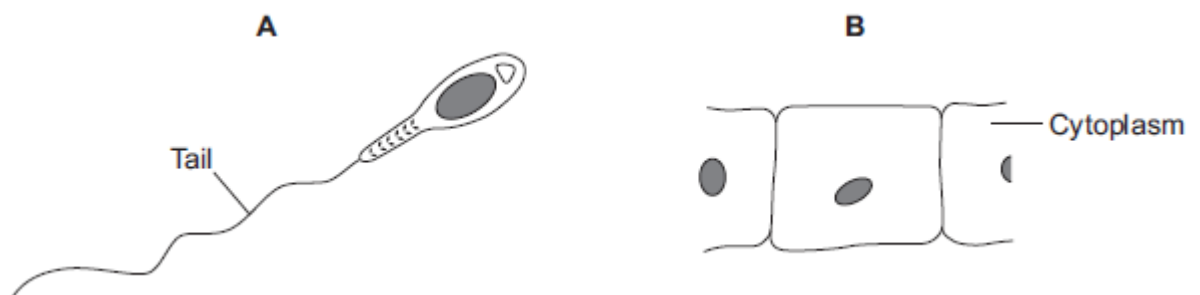
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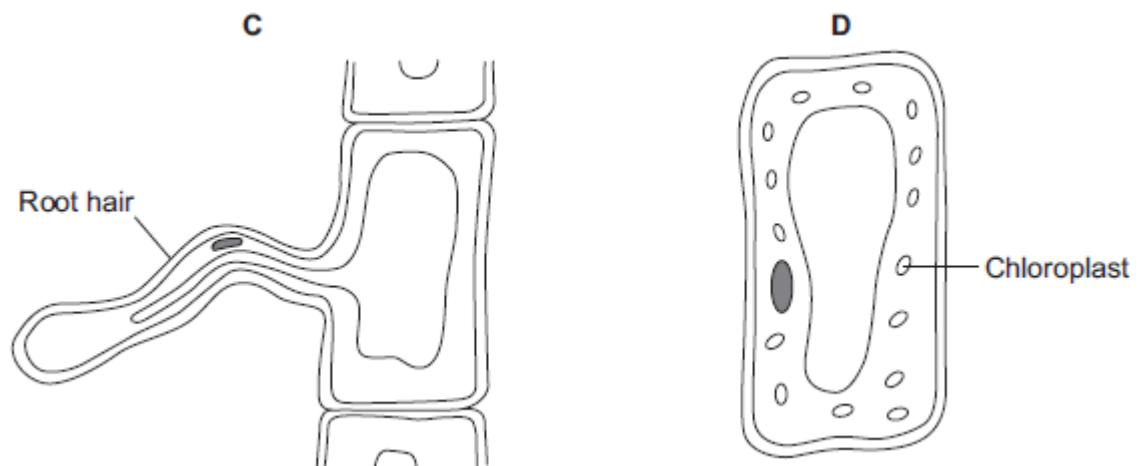
(1)

(Total 11 marks)

**Q5.** The diagrams show four types of cell, **A**, **B**, **C** and **D**.

Two of the cells are plant cells and two are animal cells.





- (a) (i) Which **two** of the cells are plant cells?

Tick (✓) **one** box.

A and B

☐

A and D

☐

C and D

☐

(1)

- (ii) Give **one** reason for your answer.

.....

.....

(1)

- (b) (i) Which cell, **A**, **B**, **C** or **D**, is adapted for swimming?

☐

(1)

- (ii) Which cell, **A**, **B**, **C** or **D**, can produce glucose by photosynthesis?

☐

(1)

(c) Cells **A**, **B**, **C** and **D** all use oxygen.

For what process do cells use oxygen?

Draw a ring around **one** answer.

osmosis

photosynthesis

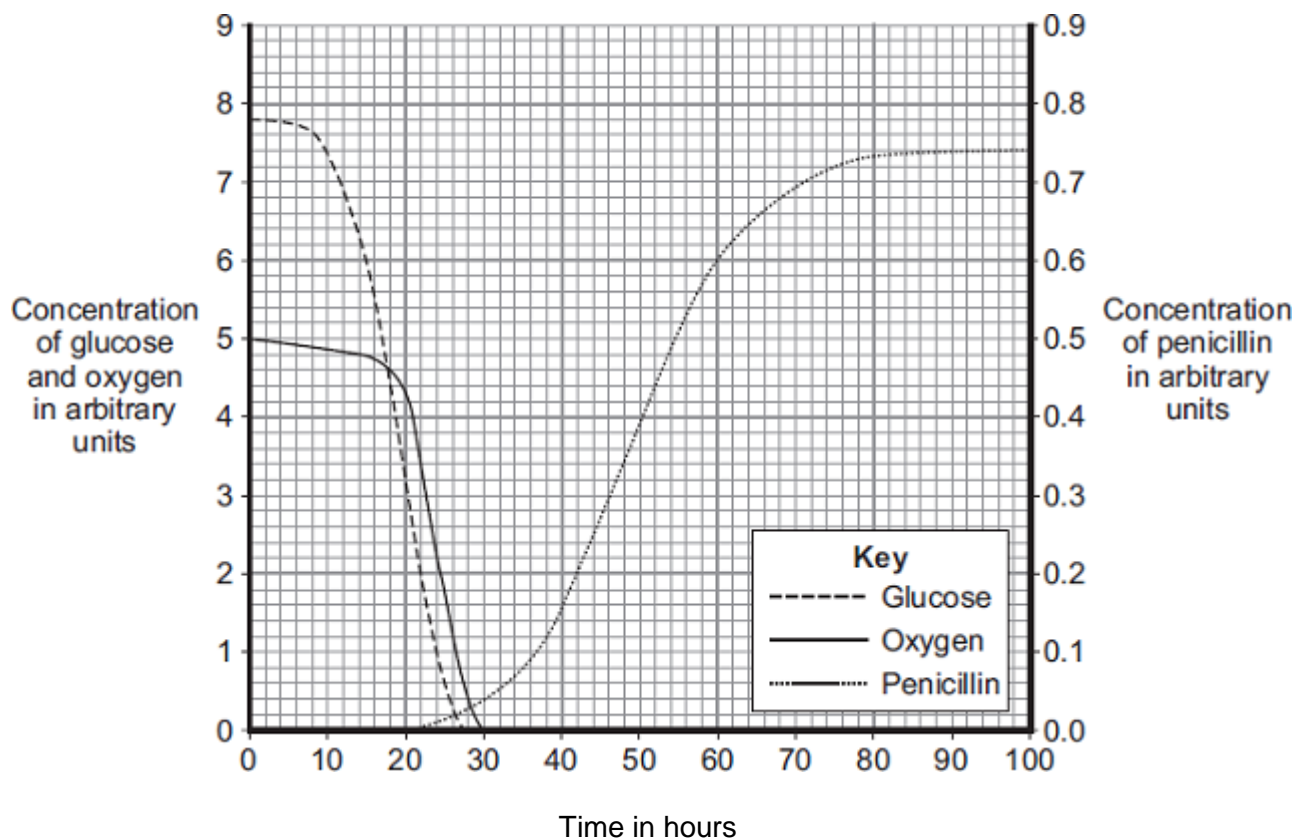
respiration

(1)

(Total 5 marks)

**Q6.** The mould *Penicillium* can be grown in a fermenter. *Penicillium* produces the antibiotic penicillin.

The graph shows changes that occurred in a fermenter during the production of penicillin.



(a) During which time period was penicillin produced most quickly?

Draw a ring around **one** answer.

**0 – 20 hours**

**40 – 60 hours**

**80 – 100 hours**

(1)

- (b) (i) Describe how the concentration of glucose in the fermenter changes between 0 and 30 hours.

.....

.....

.....

.....

(2)

- (ii) How does the change in the concentration of oxygen in the fermenter compare with the change in concentration of glucose between 0 and 30 hours?

Tick (✓) **two** boxes.

The oxygen concentration changes after the glucose concentration.

☐

The oxygen concentration changes before the glucose concentration.

☐

The oxygen concentration changes less than the glucose concentration.

☐

The oxygen concentration changes more than the glucose concentration.

☐

(2)

- (iii) What is the name of the process that uses glucose?

Draw a ring around **one** answer.

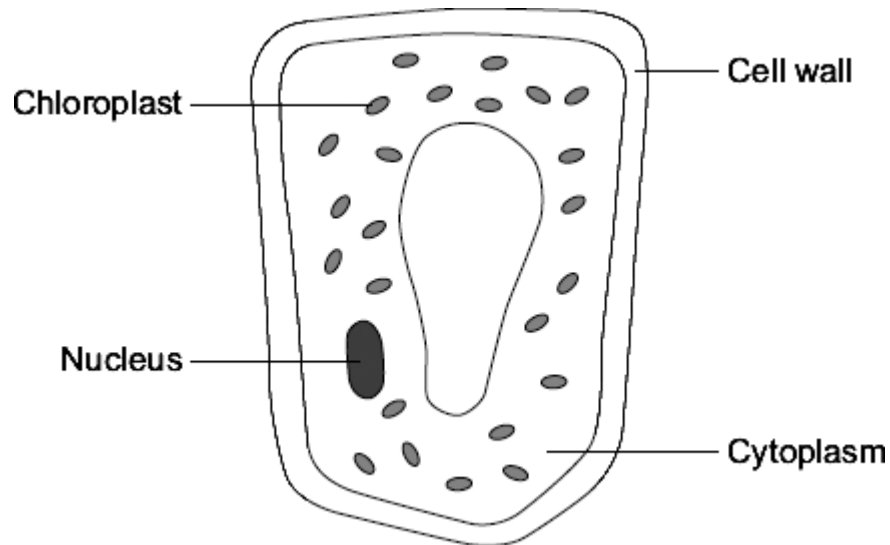
**distillation**

**filtration**

**respiration**

(1)  
(Total 6 marks)

**Q7.** The diagram shows a plant cell from a leaf.



- (a) **List A** gives the names of three parts of the cell. **List B** gives the functions of parts of the cell.

Draw a line from each part of the cell in **List A** to its function in **List B**.

**List A**  
**Parts of the cell**

Nucleus
Cytoplasm
Chloroplast

**List B**  
**Functions**

Where most of the chemical reactions take place
Absorbs light energy to make food
Strengthens the cell
Controls the activities of the cell

(3)

- (b) Respiration takes place in the cell.

Draw a ring around the correct answer to complete the sentence.

All cells use respiration to release

energy  
oxygen.  
sugar.

(1)  
(Total 4 marks)

- Q8.** Muscles need energy during exercise.

Draw a ring around the correct answer in parts (a) and (b) to complete each sentence.

- (a) (i) The substance stored in the muscles and used during exercise is

glycogen.  
lactic acid.  
protein.

(1)

- (ii) The process that releases energy in muscles is

digestion.  
respiration.  
transpiration.

(1)

- (b) The table shows how much energy is used by two men of different masses when swimming at different speeds.

Speed of swimming in metres per minute	Energy used in kJ per hour	
	34 kg man	70 kg man
25	651	1155
50	1134	2103

- (i) When the 34 kg man swims at 50 metres per minute instead of at 25 metres per minute,

the extra energy he uses each hour is

36 kJ.

483 kJ.

948 kJ.

(1)

- (ii) When swimming at 50 metres per minute, each man's heart rate is faster than when swimming at 25 metres per minute.

A faster heart rate helps to supply the muscles with more

carbon dioxide.

glycogen.

oxygen.

(1)

- (iii) During the exercise the arteries supplying the muscles would

constrict.

dilate.

pump  
harder.

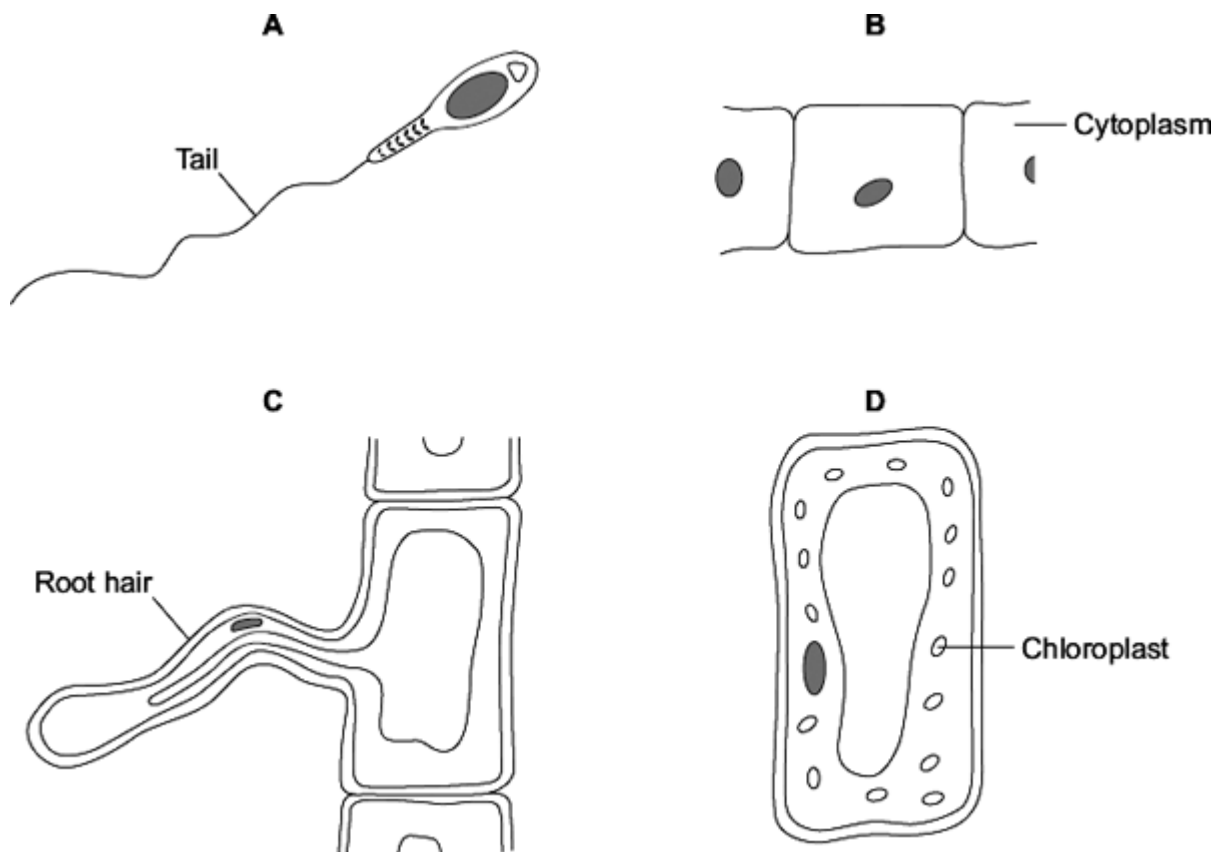
(1)

- (c) When a person starts to swim, the breathing rate increases.

Give **one** way in which this increase helps the swimmer.

(1)  
(Total 6 marks)

**Q9.** The diagrams show four types of cell, **A**, **B**, **C** and **D**.  
Two of the cells are plant cells and two are animal cells.



(a) (i) Which **two** of the cells are plant cells?

Tick (✓) **one** box.

**A and B**

☐



A and D

☐

C and D

☐

(1)

(ii) Which part is found **only** in plant cells?

Draw a ring around **one** answer.

cell membrane

cell wall

nucleus

(1)

(b) (i) Which cell, **A**, **B**, **C** or **D**, is adapted for swimming?

☐

(1)

(ii) Which cell, **A**, **B**, **C** or **D**, can produce glucose by photosynthesis?

☐

(1)

(c) Cells **A**, **B**, **C** and **D** all use oxygen.

For what process do cells use oxygen?

Draw a ring around **one** answer.

osmosis

photosynthesis

respiration

(1)  
(Total 5 marks)

