

FORM TP 2012147



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MAY/JUNE 2012

CARIBBEAN EXAMINATIONS COUNCIL

ADVANCED PROFICIENCY EXAMINATION

BIOLOGY

UNIT 2 – Paper 02

2 hours 30 minutes

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This paper consists of SIX questions in two sections. Answer ALL questions.
2. For Section A, write your answers in the spaces provided in this booklet.
3. For Section B, write your answers in the spaces provided at the end of each question in this booklet.
4. You may use a silent, non-programmable calculator to answer items.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

SECTION A

Answer ALL questions.

Write your answers in the spaces provided in this booklet.

1. (a) Figure 1 is an incomplete diagram summarising the main steps in the Calvin cycle.

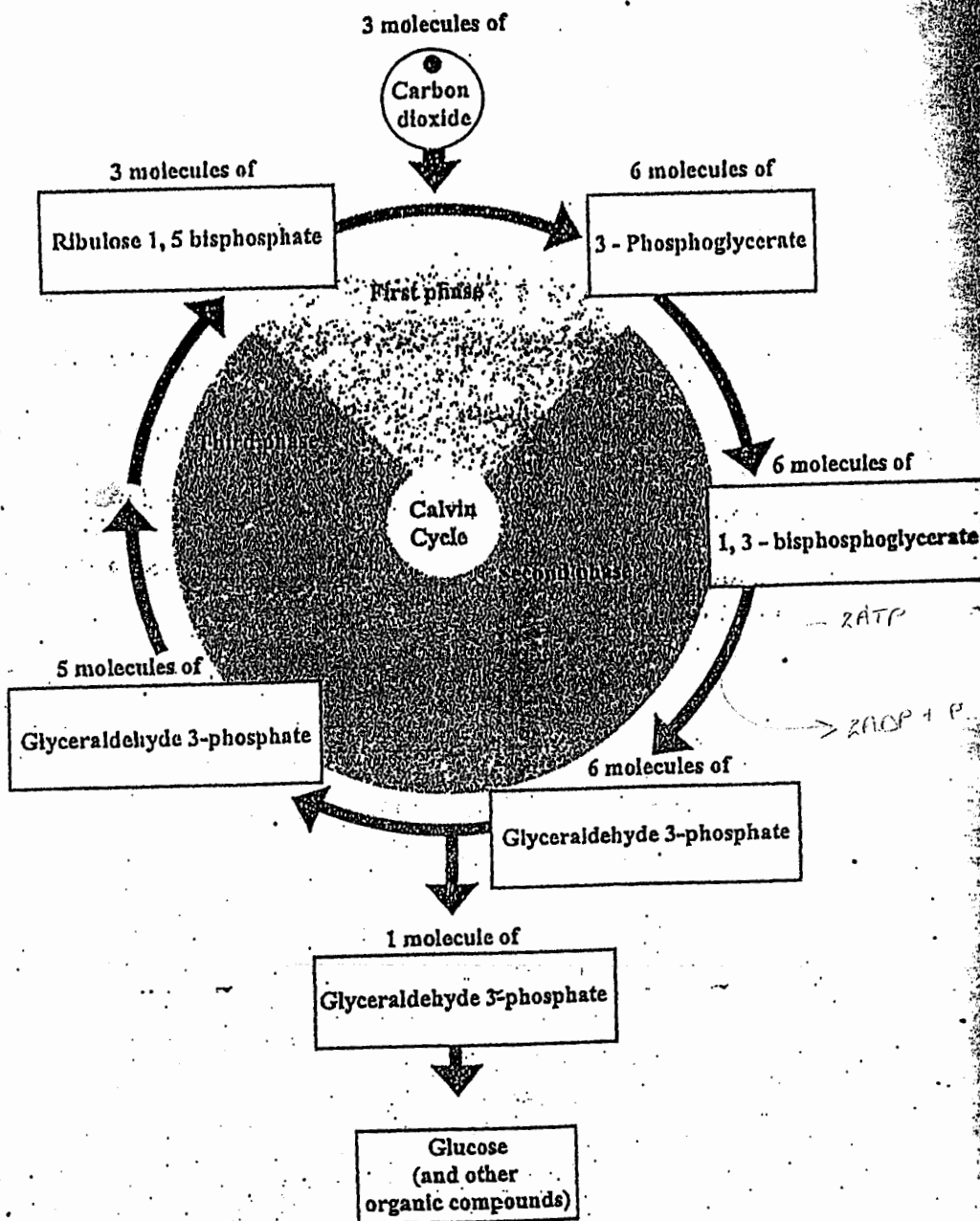


Figure 1. The Calvin cycle

(i) On Figure 1, use a labelled arrow to indicate EACH of the following:

- a) ~~The stages at which ATP is used and ADP released, including the number of molecules involved~~
- b) The stage at which NADPH is used and NADP⁺ released, including the number of molecules involved [3 marks]

(ii) The series of reactions in the Calvin cycle may be grouped into three main phases as shown by the pie sections in Figure 1. Outline the MAIN purpose of EACH phase.

First phase: _____

Second phase: _____

Third phase: _____

[3 marks]

(iii) The Calvin cycle and Krebs cycle are both metabolic pathways.

State ONE difference between these two metabolic pathways. [NOTE: Do NOT state site of pathways as a difference.]

[2 marks]

(b) Figure 2 shows the results of an experiment to investigate whether the use of pyruvate supplements enhances the aerobic performance of well-trained male cyclists. Seven well-trained male cyclists were given either placebo capsules (gelatin and glucose) or calcium pyruvate capsules for a period of seven days. Subjects cycled for a period of time until exhaustion. Whole-blood lactate and glucose concentrations were measured at 15-minute intervals during the period of aerobic exercise.

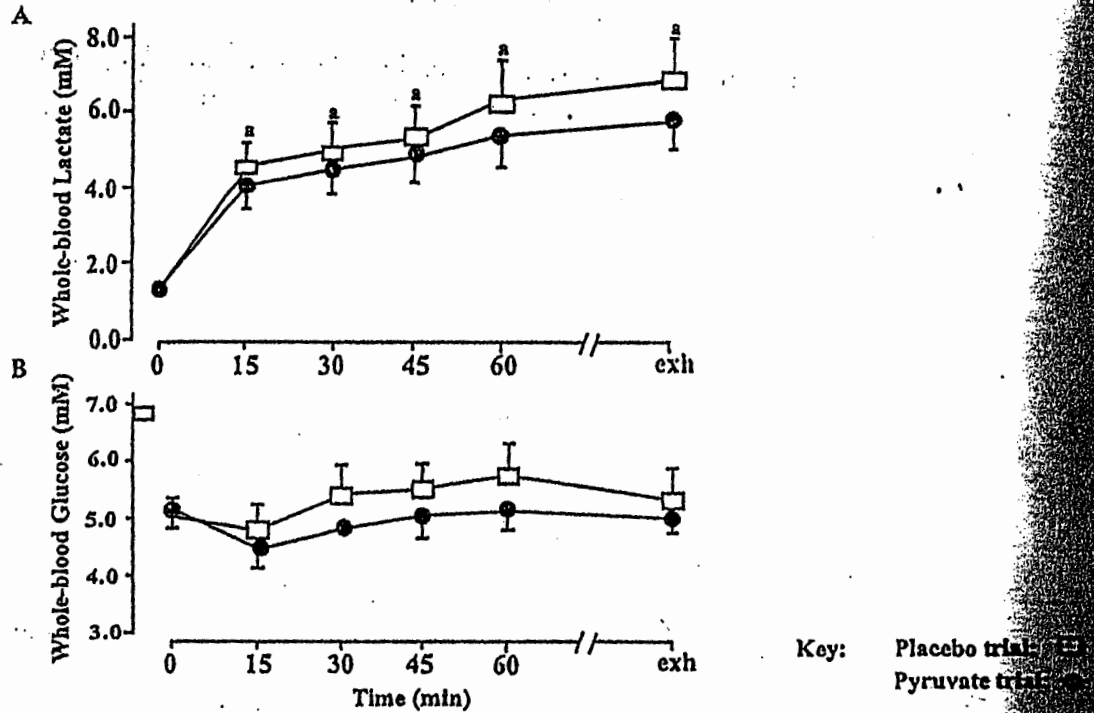


Figure 2. Whole-blood lactate (A) and glucose (B) concentrations during aerobic cycling after 7 days of consumption of placebo or calcium pyruvate.

Taken from: <http://jap.physiology.org/cgi/content-nw/full/89/2/549>

(i) Describe the changes in blood lactate and glucose levels for cyclists who took pyruvate supplements over the exercise period.

Lactate: _____

Glucose: _____

- (ii) Account for the trend observed with respect to the levels of lactate in the blood during the first 60 minutes of the cycling activity.

[2 marks]

- (iii) Based on the data shown in Figure 2, suggest what conclusion may be drawn with respect to the effect of pyruvate supplements on aerobic performance.

[1 mark]

Total 15 marks

2. (a) Figure 3 is a diagram of a longitudinal section through a mammalian heart showing the chambers and the electrical system.

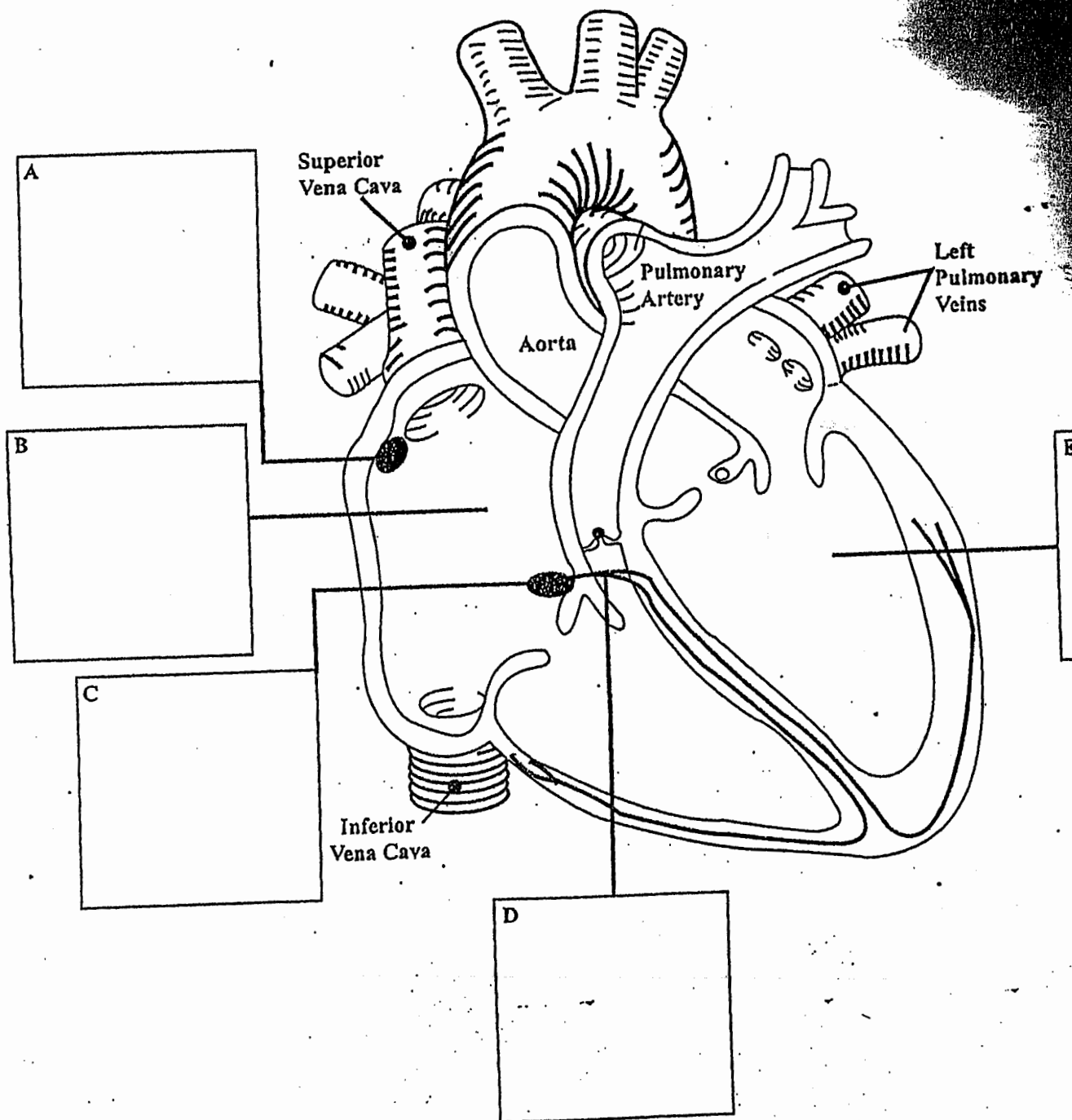


Figure 3. Longitudinal section through a mammalian heart

(i) In the boxes in Figure 3, use annotated labels to describe the structure of A, B, C, D and E. [5 marks]

(ii) State the role of EACH of the following in the functioning of the heart:

A _____

C _____

D _____

[3 marks]

(iii) State the role of the autonomic nervous system in the functioning of the heart.

[1 mark]

(b) Figure 4 is a schematic representation of the transverse section through a dicotyledonous root.

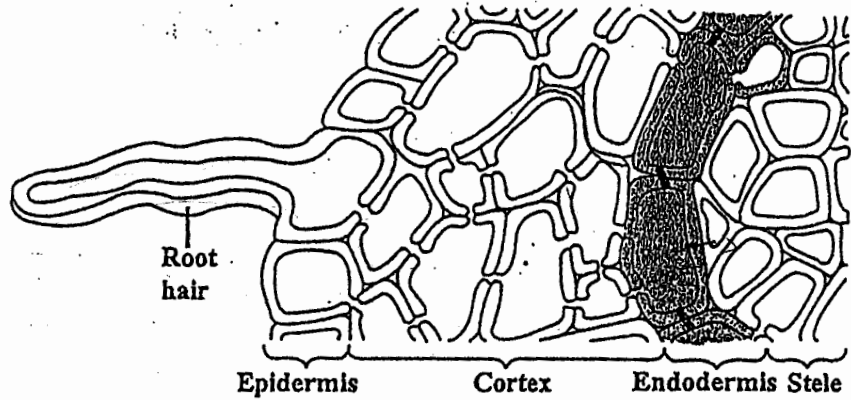


Figure 4. Schematic representation of the transverse section through a dicotyledonous root

- (i) Use arrows labelled A and B to indicate on Figure 4, TWO separate locations where the movement of ions across the root is by active transport. [2 marks]
- (ii) For EACH of the two locations identified in (b) (i) above, outline the movement of ions into and out of the cells.

A _____

B _____

[2 marks]

- (iii) Explain the relationship between the movement of ions and the movement of water across the root.

[2 marks]

Total 15 marks

3. (a) Table 1 is a summary of the leading causes of mortality in CAREC member countries for selected years over the period 1985 to 2000.

TABLE 1: LEADING CAUSES OF MORTALITY (RATES PER 100 000) BY YEAR FOR ALL CAREC MEMBER COUNTRIES

Cause of Death	1985	1990	1995	2000
Heart disease	107.2	109.5	114.0	102.5
Cancers	81.1	79.3	88.5	64.9
Diabetes	36.2	50.0	51.9	64.6
Hypertension	30.6	30.9	31.4	39.8
Accidents	25.4	22.4	26.1	39.3

- (i) On the grid provided on page 11, plot the data for Accidents and Hypertension for the years 1985, 1990, 1995 and 2000 in the form of a bar graph. [5 marks]
- (ii) Comment on the trends in mortality rates recorded for Cancers and Diabetes over the 16-year period.

Cancers: _____

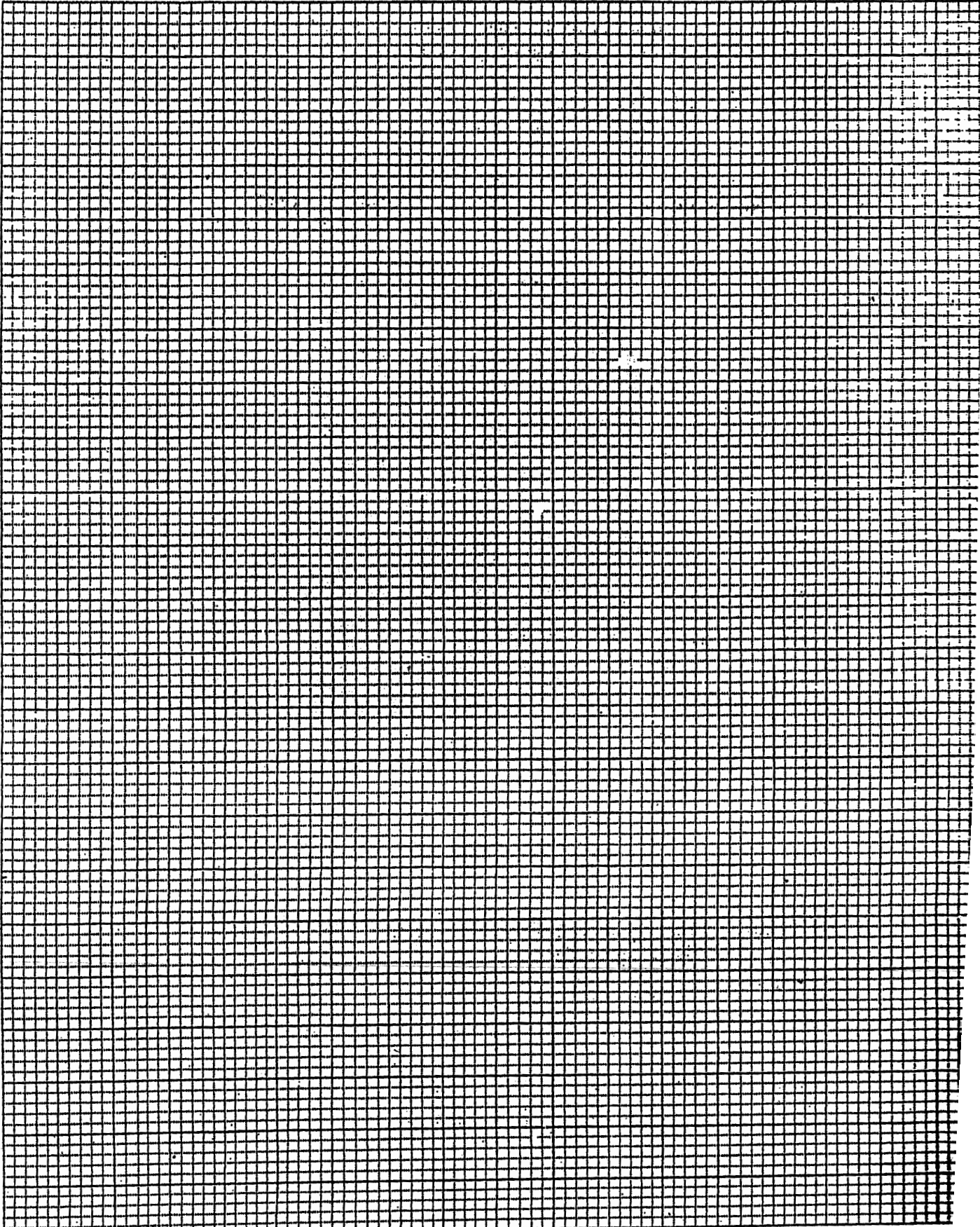
Diabetes: _____

[2 marks]

- (iii) Based on the data shown in Table 1, deduce the leading cause of death in CAREC member countries.

[1 mark]

Grid for Question 3(a) (i)



- (b) Figure 5 is a diagrammatic representation of the daily recommended food portions for a healthy balanced diet.

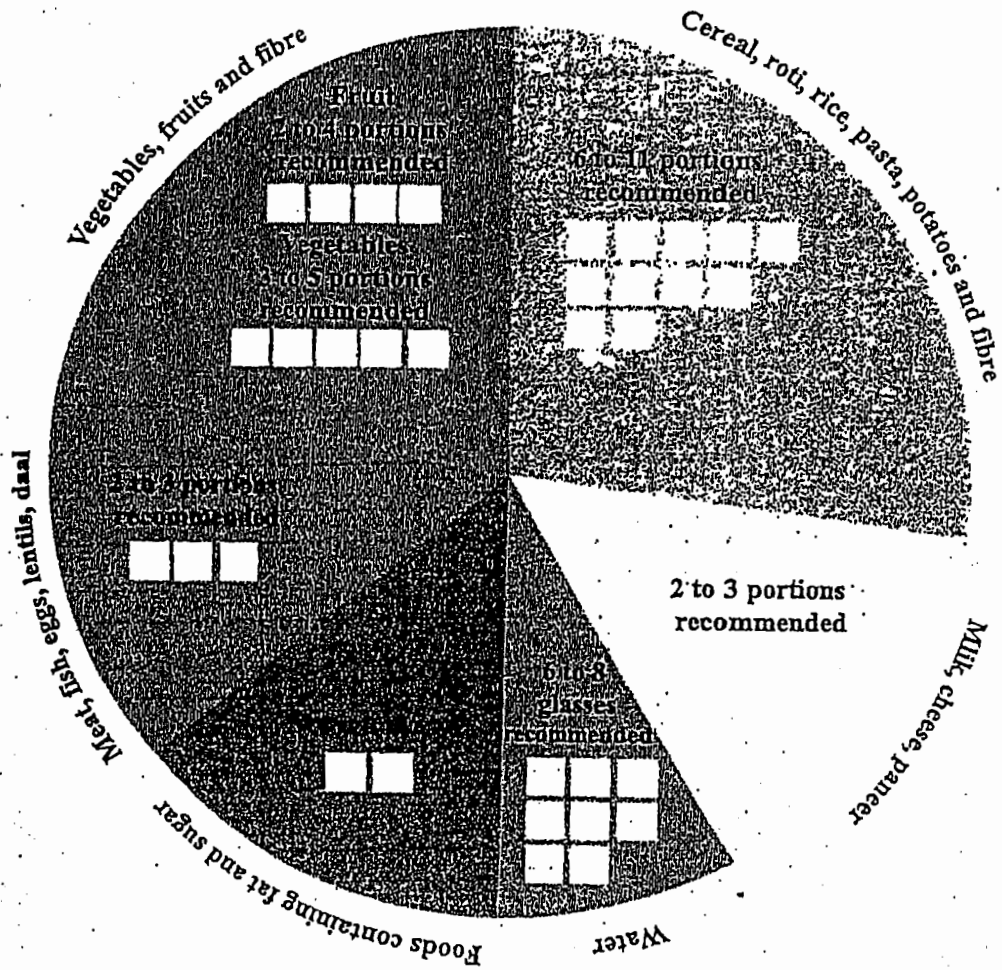


Figure 5. Daily recommended food portions for a healthy balanced diet

- (i) Explain what is meant by the term 'balanced diet'.

[2 mark]

(ii) With reference to the information presented in Figure 5, state

a) TWO MAJOR categories of food in a balanced diet

[2 marks]

b) ONE food group which should be consumed in moderation.

[1 mark]

(iii) Comment on ONE possible health consequence of regularly consuming fats in excess of the daily requirement.

[2 marks]

Total 15 marks

