Circulation

Question Paper 1

Level	A Level
Subject	Biology
Exam Board	Edexcel
Topic	Exchange and Transport
Sub Topic	Circulation
Booklet	Question Paper 1

Time Allowed: **56 minutes**

Score: **/46**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1 Blood clots can form if the lining of an artery becomes damaged and affected by atherosclerosis.

One cause of a myocardial infarction (heart attack) is a blood clot in a coronary artery that supplies the muscle of the heart with blood.

(a) Read through the following passage about the blood clotting process then write on the dotted lines the most appropriate words to complete the passage.

(3)

The cell fragments called ..... stick to the site of damaged tissue.

This causes thromboplastin to be released, resulting in .....

being converted into an enzyme. This enzyme catalyses the conversion of a

soluble plasma protein into long, insoluble strands of ..... .

This insoluble protein traps red blood cells to form a clot.

(b) Explain how a blood clot can cause a heart attack.

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(c) One risk factor for cardiovascular disease (CVD) is a high concentration of blood cholesterol.

(i) The table below shows the death rate due to CVD and the ratio of fatty acids in the diet for four countries.

Country	Death rate from CVD / deaths per 100 000	Ratio of unsaturated to saturated fatty acids in diet
Finland	503	0.175
USA	408	0.275
Italy	235	0.350
Japan	115	1.000

Using the information in the table, describe the relationship between the ratio of fatty acids in the diet and the death rate from CVD.

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(ii) The table below shows information about four fatty acids found in some foods.

Fatty acid	Number of carbon double bonds	Effect on blood cholesterol concentration	Percentage of fatty acid in each food (%)			
			Beef	Butter	Olive oil	Corn oil
Palmitic	0	raises	25	30	9	13
Stearic	0	raises	29	11	3	3
Oleic	1	no effect	34	19	77	31
Linoleic	2	lowers	2	2	11	53

Using information from both tables, explain what changes a person could make to their diet to reduce their risk of developing CVD.

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(d) Studies of CVD patterns between different countries suggest that there is a link between CVD and diet.

Suggest why such studies may **not** prove the link between CVD and diet.

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(Total for Question 1 = 14 marks)

2 Human hearts contain muscle that is myogenic. Exercise and other activities can affect heart rate.

(a) Explain what is meant by the term **myogenic**.

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(b) Explain how an electrocardiogram (ECG) can be used to calculate a person's heart rate.

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*(c) Workers in the brewing industry may be at risk due to the carbon dioxide released by yeast fermentation.

Atmospheric air contains between 0.03% and 0.04% carbon dioxide.

A concentration of 5% carbon dioxide in the air causes a change in the heart rate of people exposed to this concentration.

Explain why a carbon dioxide concentration of 5% causes a change in heart rate.

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(Total for Question 2 = 10 marks)

3 Over 20% of the population of the UK is classified as obese. Obesity is a significant risk factor in the development of cardiovascular disease (CVD).

(a) One way of estimating if a person is obese is to find their Body Mass Index (BMI). Body Mass Index is calculated using the formula below.

$$\text{BMI} = \frac{\text{Mass in kilograms}}{(\text{height in metres})^2}$$

The table below provides the range of BMI values for different categories of people.

Category	BMI range
Very severely underweight	less than 15.0
Severely underweight	from 15.0 to 15.9
Underweight	from 16.0 to 18.4
Normal (healthy weight)	from 18.5 to 24.9
Overweight	from 25.0 to 29.9
Obese Class I (moderately obese)	from 30.0 to 34.9
Obese Class II (severely obese)	from 35.0 to 39.9
Obese Class III (very severely obese)	over 40.0

(i) Calculate the BMI of a person who has a mass of 95 kg and a height of 1.75 metres.

(1)

Answer .....

(ii) Use your calculated value and the information in the table to find the category of this person.

(1)

Category .....

*(iii) People in this category are more likely to develop high blood pressure than people with a healthy weight.

Explain why someone who has a high blood pressure is at a significantly higher risk of developing CVD.

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(b) Suggest **one** piece of medical advice that could be given to someone who does not have high blood pressure but who is obese.

Explain why this will help to reduce their risk of developing CVD.

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Medical advice: .....

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Why this will reduce the risk of developing CVD: .....

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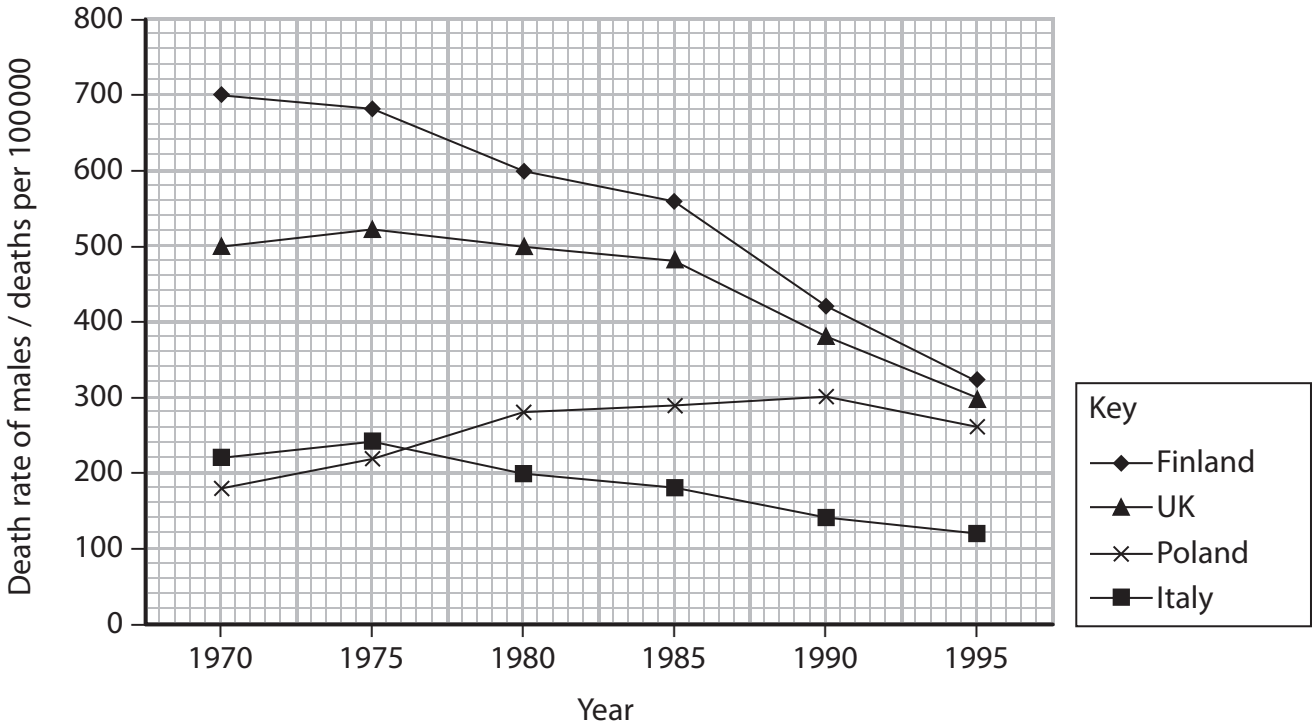
(c) The graph below shows the death rates from CVD for men from four different European countries.



Using the information in the graph, discuss the statement that death rates from CVD are falling.

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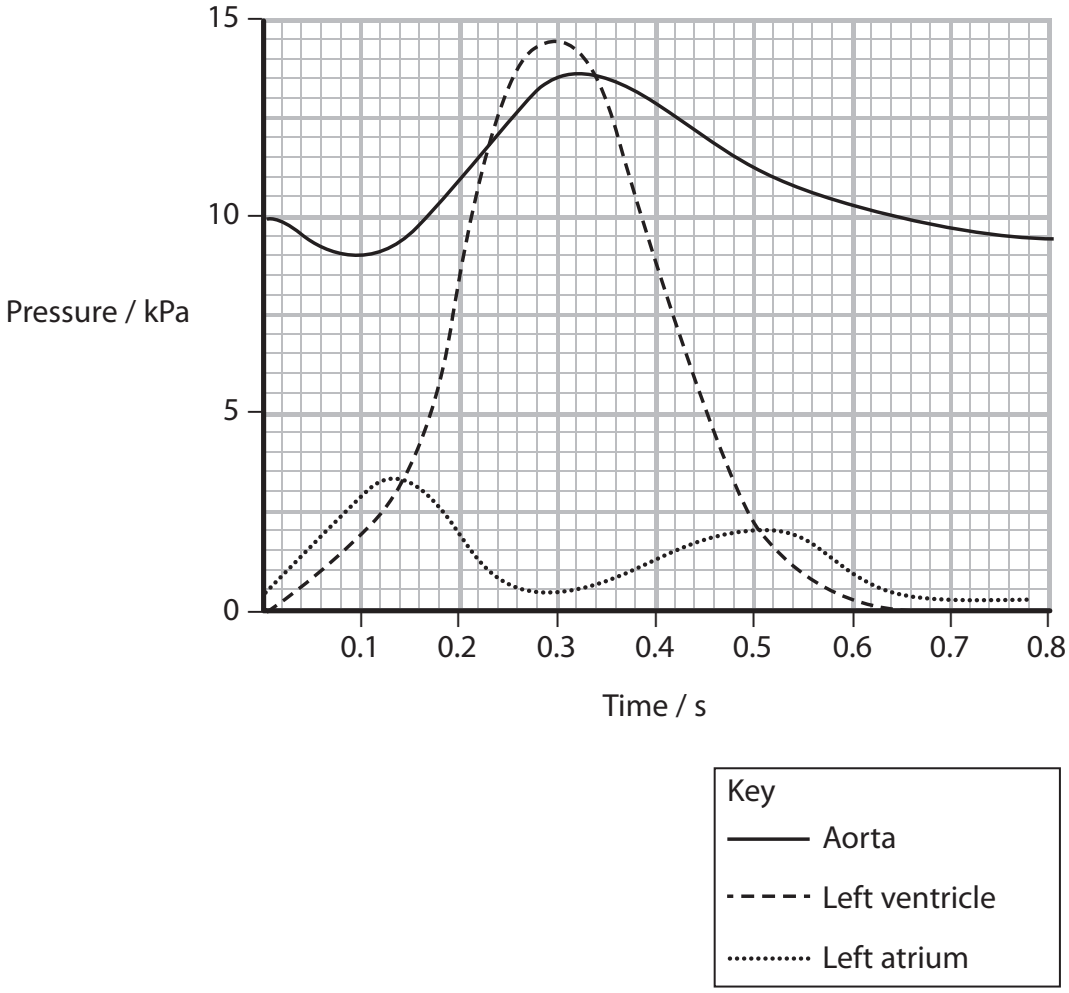
(Total for Question 3 = 12 marks)

4 During the cardiac cycle, muscles in the walls of the atria and ventricles contract and relax.

The graph below shows the changes in pressure that occur in the left side of the mammalian heart during one cardiac cycle.



(a) Use the graph to identify the following.

(i) The time at which the bicuspid (left atrioventricular) valve closes.

(1)

..... seconds

(ii) The pressure in the aorta when the semilunar (aortic) valve closes.

(1)

..... kPa

(b) Using the information in the graph, describe the pressure changes that take place in the left ventricle during each stage of this cardiac cycle.

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*(c) During this cardiac cycle, the changes in pressure that occur in the left atrium and in the left ventricle are different.

Using the information in the graph and your own knowledge, explain these differences.

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(Total for Question 4 = 10 marks)