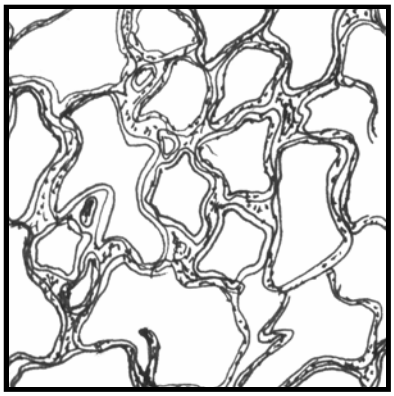
# DISEASES

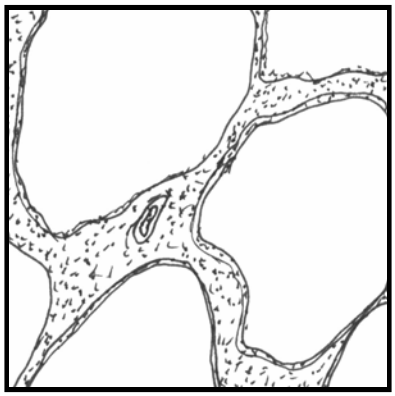
QUESTIONSHEET 1



The diagrams show lung tissue from a healthy person and lung tissue from a person suffering from emphysema.



healthy lung tissue



lung tissue from a person with emphysema

(a) (i) Describe two changes that can be seen between the lung tissue of a healthy person and the lung tissue of a person suffering from emphysema.

1: .....

2: .....

[2]

(ii) Explain how changes in the lung tissue might affect breathing and gas exchange.

.....

.....

.....

[3]

(b) Explain why a person suffering from emphysema may find it difficult to walk quickly.

.....

.....

[2]

(c) Give two ways in which the risk of developing emphysema may be increased.

1: .....

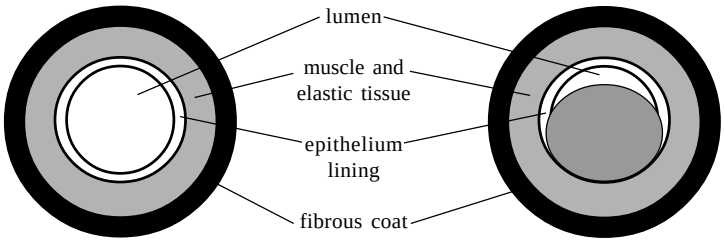
2: .....

[2]

TOTAL / 9

QUESTIONSHEET 2

The diagram shows a healthy artery and an artery from a person suffering from atheroma (arteriosclerosis).




healthy artery artery with an atheroma

(a) (i) Describe how atheroma has affected the structure of the artery wall.

.....

.....

[2]

(ii) Describe and explain the effect of atheroma on blood pressure.

.....

.....

[2]

(b) Suggest how smoking may increase the risk of atheroma.

.....

.....

[2]

(c) Explain why changing from eating animal fats to eating plant fats may decrease the risk of developing atheroma.

.....

.....

[2]

(d) The coronary artery supplies blood to the tissues of the heart. Explain why the formation of an atheroma in the coronary artery may lead to heart failure.

.....

.....

.....

[3]

(e) Some people may be given a heart transplant to replace a damaged heart. Explain why a transplanted heart may be rejected.

.....

.....

.....

[3]

TOTAL / 14

*Do not write in margin*

The Quetelet index is one way of measuring obesity.

$$\text{Quetelet index} = \frac{\text{body mass in kg}}{\text{height}^2 \text{ in m}}$$

The normal range for the Quetelet index is 20 to 25. A person with a value of more than 27 is obese. A person with a value of less than 18 is underweight.

(a) A woman is 160cm tall and has a mass of 82kg.

(i) Calculate the Quetelet index for this woman.

.....

.....

[2]

(ii) The following advice was given to this woman:

- do exercise which increases your heart rate every day for half an hour.
- eat less food, especially those rich in sugar or fats.

Explain the reasons for this advice.

.....

.....

.....

.....

.....

[4]

(b) Explain the possible dangers of a diet with too little food intake.

.....

.....

.....

.....

[2]

TOTAL / 8

# DISEASES

QUESTIONSHEET 4



(a) Tuberculosis is caused by a bacterium which lives in the lungs and causes destruction of tissue. Tuberculosis bacteria exposed to the air can form resistant spores. Overcrowded living conditions encourage the spread of tuberculosis.

(i) Describe how tuberculosis may spread from person to person.

.....

.....

[2]

(ii) Explain why tuberculosis spreads more easily in overcrowded living conditions.

.....

[1]

(iii) During the 1950s and 60s when tuberculosis was very common in the United Kingdom, buses and railway carriages often had a notice saying “no spitting”. Explain why.

.....

.....

[2]

(b) The destruction of lung tissue by tuberculosis often leaves scars. Suggest why:

(i) X-rays are often used to detect tuberculosis.

.....

[1]

(ii) mass screening by x-rays was successful in reducing the incidence of tuberculosis during the 1950s in the United Kingdom.

.....

.....

[2]

(c) Vaccination is used to control the spread of tuberculosis. Give two reasons why children should be vaccinated, even though tuberculosis is now quite rare in the United Kingdom.

1. .....

2. .....

[2]

(d) People who develop tubercolosis are treated with antibiotics. Explain why.

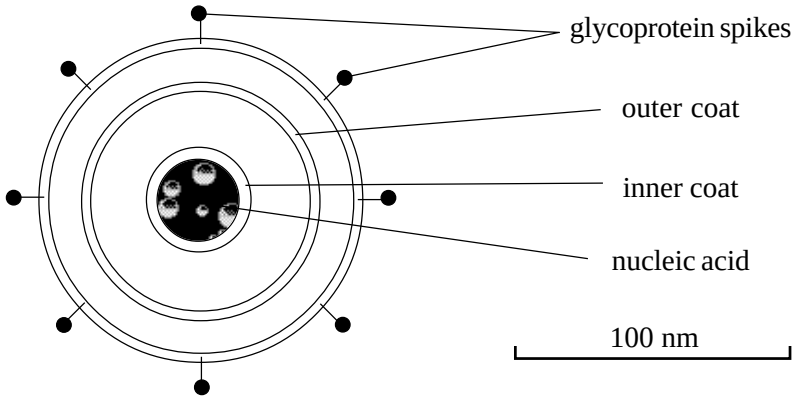
.....

[1]

TOTAL / 11

*Do not write in margin*

The diagram shows the structure of HIV magnified 10,000 times.




(a) Calculate the diameter of HIV in nanometers. Include the glycoprotein spikes in your measurement. Show your working.

Answer: ..... [3]

(b) HIV is a retrovirus.

(i) Name the nucleic acid present in HIV.

..... [1]

(ii) One of the genes of HIV codes for the production of reverse transcriptase. What is the role of reverse transcriptase?

..... [1]

(c) (i) Name the cells which are infected by HIV.

..... [1]

(ii) Describe how HIV replicates in these cells.

.....

.....

.....

.....

[4]

(d) Explain why an HIV infected person may not show any effects for several years.

.....

.....

[1]

(e) Explain two different ways in which the spread of HIV can be prevented.

1: .....

2: .....

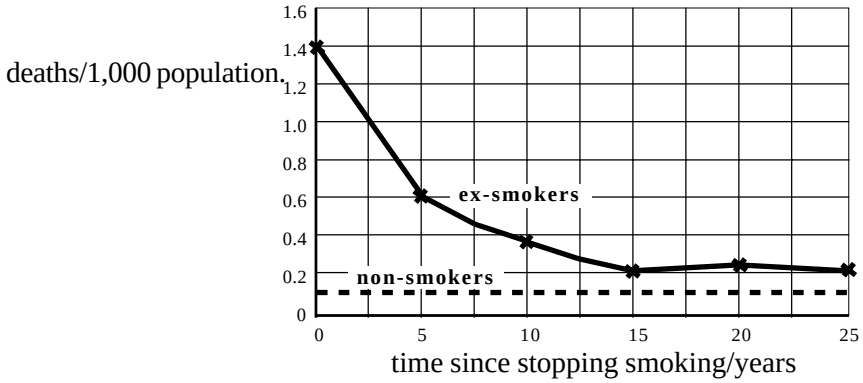
[2]

TOTAL / 13

*Do not write in margin*

QUESTIONSHEET 6

The graph shows the death rate per thousand of the population from lung cancer of non-smokers and ex- smokers.




(a) (i) Describe the pattern of the curve for ex-smokers.

.....

.....

.....

[3]

(ii) Suggest two reasons why it takes so many years for the number of deaths to decrease to the lowest point.

1: .....

2: .....

[2]

There are approximately 5.9 million new cancer cases in the world each year and 1 in 10 deaths is caused by cancer. The table shows some differences between developed countries and developing countries.

| | Developed countries | Developing countries |
|---|---|---|
| Number of new cancers per year | 2.9 million | 3.0 million |
| Number of deaths due to cancer per year | 1 in 5 | 1 in 16 |
| Life expectancy | 70+ years | 50-60 years |
| Age range with greatest incidence of cancer | 60+ years | 30-40 years |

(b) Suggest an explanation for the difference between industrialised and developing countries in:

(i) the age range with the greatest incidence of cancer.

.....

.....

[2]

(ii) the deaths per year due to cancer.

.....

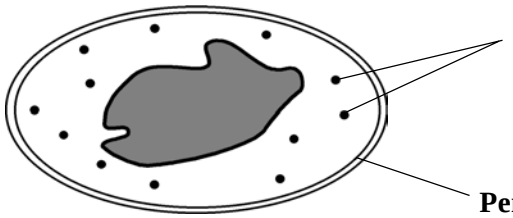
.....

[2]

TOTAL / 9

QUESTIONSHEET 7

The diagram shows the cell of a bacterium. The site of action of two antibiotics is labelled on the diagram.



**Chloramphenicol**
inhibits protein synthesis in ribosomes

**Penicillin**
inhibits synthesis of bacteria cell wall

(a) Explain why,

(i) penicillin is safe to use in the human body to treat diseases caused by bacteria.

.....

[1]

(ii) chloramphenicol may have side effects affecting bone marrow.

.....

.....

[2]

(b) Another antibiotic, actinomycin D prevents the replication of DNA. This antibiotic is considered to be too toxic to humans to use against bacterial infections, but may be used in chemotherapy to treat cancer.

(i) Suggest why actinomycin D may be an effective anti-cancer drug.

.....

.....

[2]

(ii) Explain how monoclonal antibodies can be used to target anti-cancer drugs more precisely at cancer cells.

.....

.....

.....

[3]

(c) Give one reason why antibiotics cannot be used to treat viral diseases.

.....

.....

[1]

TOTAL / 9

*Do not write in margin*

QUESTIONSHEET 8

Dietary Reference Values (DRVs) are used as guides to the amount of energy and nutrient required by people of different ages. The table shows the mean daily energy requirements, the mean daily protein requirements and the mean mass for males and females of different ages.

| Age/years | mass/kg | | energy/Kj | | protein/g | |
|---|---|---|---|---|---|---|
| | female | male | female | male | female | male |
| 0-1 | 8 | 8 | 3850 | 3850 | 20 | 20 |
| 2-3 | 13 | 13 | 5420 | 5420 | 34 | 34 |
| 4-6 | 19 | 19 | 6695 | 6695 | 42 | 42 |
| 7-9 | 25 | 25 | 8775 | 8775 | 53 | 53 |
| 10-12 | 34 | 34 | 9220 | 10060 | 56 | 61 |
| 13-15 | 48 | 46 | 10480 | 12570 | 63 | 76 |
| 16-18 | 54 | 62 | 9640 | 14290 | 59 | 86 |
| 25 | 59 | 71 | 8760 | 12150 | 59 | 71 |
| 45 | 59 | 71 | 7925 | 10800 | 59 | 71 |
| 65 | 59 | 71 | 6665 | 9120 | 59 | 71 |

(a) (i) Describe and explain the relationship between body mass and protein requirements.

.....

.....

.....

.....

[3]

(ii) Suggest two reasons why the protein requirement of males over the age of 9 is greater than that of females.

1: .....

2: .....

[2]

(b) (i) Calculate the energy intake per unit body mass (in Kj $kg^{-1}$) for males and females at 0-1 years and age 7-9 years.

Answers: 0-1 years ..... 7-9 years ..... [4]

(ii) Explain why the energy requirements per unit of body mass are different at age 0-1 from those at age 7-9.

.....

.....

[2]

*(Continued...)*

*Do not write in margin*

(iii) Suggest why the peak energy requirements for males and females occur at different ages.

.....

.....

[1]

(c) Describe how the DRV's for energy and protein would differ from the mean in a 30 year old man who works as a builder. Explain your answer.

.....

.....

.....

[2]

TOTAL / 14

*Do not write in margin*

QUESTIONSHEET 9

The table shows the effect of blood alcohol on the chances of having an accident while driving a car.

| Alcohol/mg per 100cm$^3$ blood | Increased chance of an accident | |
|---|---|---|
| | women | men |
| 0 | x1.0 | x1.0 |
| 20 | x1.2 | x1.0 |
| 40 | x1.8 | x1.2 |
| 60 | x2.8 | x1.8 |
| 80 (legal limit) | x4.0 | x2.6 |
| 100 | x6.0 | x5.6 |
| 120 | x8.8 | x5.0 |
| 140 | x13.0 | x6.0 |
| 160 | >x20.0 | x9.0 |
| 180 | >x20.0 | x12.0 |

(a) (i) A glass of wine contains 12g of alcohol. Every 8 g of alcohol raises blood alcohol level by 15 mg per 100cm$^3$ blood. How many glasses of wine could a woman drink without exceeding the legal limit? Show your working.

Answer: ..... [3]

(ii) At the legal limit alcohol increases the risk of accident while driving a car by four times in women. Explain why.

.....

.....

.....

[3]

(b) Describe and explain the difference in the effects of alcohol on the chance of an accident in men and women.

.....

.....

.....

[3]

*(Continued...)*

QUESTIONSHEET 9 CONTINUED

(c) (i) Symptoms of jaundice include yellowing of the skin and cornea due to the break-down products of haemoglobin circulating in the blood. Explain why alcoholics may develop jaundice.

.....

.....

.....

[3]

(ii) Describe the effects on the brain of alcoholism (long term drinking of too much alcohol).

.....

.....

.....

.....

[4]

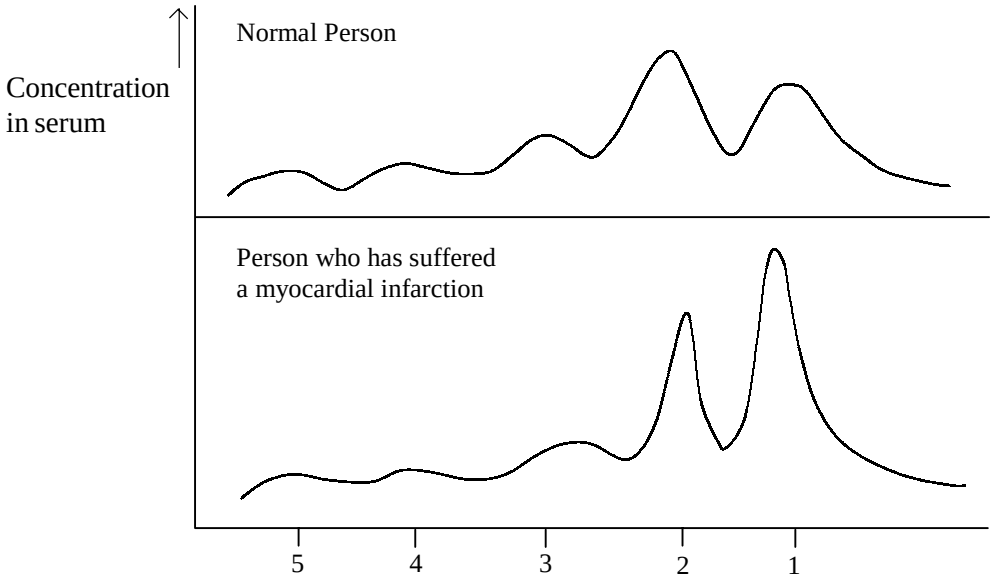
TOTAL / 16

# DISEASES

QUESTIONSHEET 10



The enzyme lactate dehydrogenase LDH exists in 5 forms. The relative concentration of the 5 forms in blood serum can be used as a diagnostic test to determine whether an individual has suffered a myocardial infarction (heart attack). The figure below shows the relative concentration of each of the 5 types of LDH in the serum of a normal person and in the serum of a person who has suffered a myocardial infarction.




(a) (i) Explain how LDH can be used as a diagnostic test for myocardial infarction.

.....

.....

[2]

(ii) All forms of LDH catalyse the same reaction. What does this suggest about the structure of the five forms?

.....

[1]

(b) (i) What is the function of lactic dehydrogenase?

.....

.....

[2]

(ii) Suggest why the concentrations of $LDH_1$ and $LDH_2$ are raised in myocardial infarction.

.....

.....

.....

[3]

TOTAL / 8

# DISEASES

QUESTIONSHEET 11



The virulence of pathogenic microorganisms depends upon two properties, their invasiveness and their toxigenicity. Bacteria may produce either exotoxins or endotoxins.

(a) Define the term 'virulence'.

.....

[1]

(b) Distinguish between 'invasiveness' and 'toxigenicity'.

.....

.....

.....

.....

[4]

(c) Distinguish between 'exotoxin' and 'endotoxin'.

.....

.....

.....

.....

[4]

(d) Name one bacterium that produces an exotoxin and one that produces an endotoxin.

Exotoxin: ..... Endotoxin: ..... [2]

TOTAL / 11

# DISEASES

QUESTIONSHEET 12

*Do not write in margin*

(a) Pair the organisms in list 1 with the diseases in list 2.

| List 1: | | | List 2: | |
|---|---|---|---|---|
| | A | Pythium | (i) | Thrush |
| | B | Staphylococcus | (ii) | Malaria |
| | C | Mycobacterium | (iii) | Damping off of seedlings |
| | D | Plasmodium | (iv) | Tuberculosis |
| | E | Candida | (v) | Food poisoning |

Answers: A: ..... B: ..... C: .....

D: ..... E: ..... [5]

(b) Pair the organisms in list 1 with the methods of disease transmission in list 2.

| List 1: | | | List 2: | |
|---|---|---|---|---|
| | A | Plasmodium | (i) | Contact |
| | B | Candida | (ii) | Contaminated water |
| | C | Influenza virus | (iii) | Contaminated blood products |
| | D | Cholera vibrio | (iv) | Droplet infection |
| | E | HIV | (v) | Anopheline mosquito |

Answers: A: ..... B: ..... C: .....

D: ..... E: ..... [5]

(c) Pair the vitamins in list 1 with the dificiency diseases in list 2.

| List 1: | | | List 2: | |
|---|---|---|---|---|
| | A | Ascorbic acid | (i) | Rickets |
| | B | Retinol | (ii) | Pellagra |
| | C | Nicotinic acid | (iii) | Scurvy |
| | D | Folic acid | (iv) | Anaemia |
| | E | Calciferol | (v) | Night blindness |
| | F | Thiamine | (vi) | Beri-beri |

Answers: A: ..... B: ..... C: .....

D: ..... E: ..... F: .....

[6]

TOTAL / 16