HL Paper 3

Outline a mechanism used to transport products of digestion from the lumen of the ileum into the blood.

Antibiotics are sometimes given orally to poultry to prevent disease that may lead to reduced growth. Antibiotic resistance of bacteria from turkeys and chickens bred for meat and from egg laying hens was measured.

Excrement was collected and *Escherichia coli* bacteria were isolated. These bacteria were tested for resistance to a range of antibiotics and the results are shown below.

Number of antibiotics to which *E. coli* are resistant	Turkeys $n = 43$	Chickens $n = 45$	Egg laying hens $n = 20$
0	7	9	13
1	8	5	3
2	7	7	0
3	2	7	3
4	5	7	1
≥5	14	10	0

[Antibiotic resistance of faecal _Escherichia coli_ in poultry, poultry farmers and poultry slaughterers. A. E. van den Bogaard, N. London, C. Driessen, E. E. Stobberingh. _Journal of Antimicrobial Chemotherapy_, 47, June 1, 763--771. 2001, Oxford University Press.]

a. Calculate the percentage risk of bacteria becoming resistant to more than five kinds of antibiotics in turkeys and egg laying hens. [1]

Turkeys:

Egg laying hens:

b. Compare the incidence of drug resistance in bacteria from chickens and egg laying hens. [2]

c. Discuss the hypothesis that giving antibiotics increases antibiotic resistance in poultry bacteria. [2]

d. Suggest how antibiotic-resistant bacteria are passed from animals to humans. [1]

e. Outline the mechanism of the action of antibiotics. [2]

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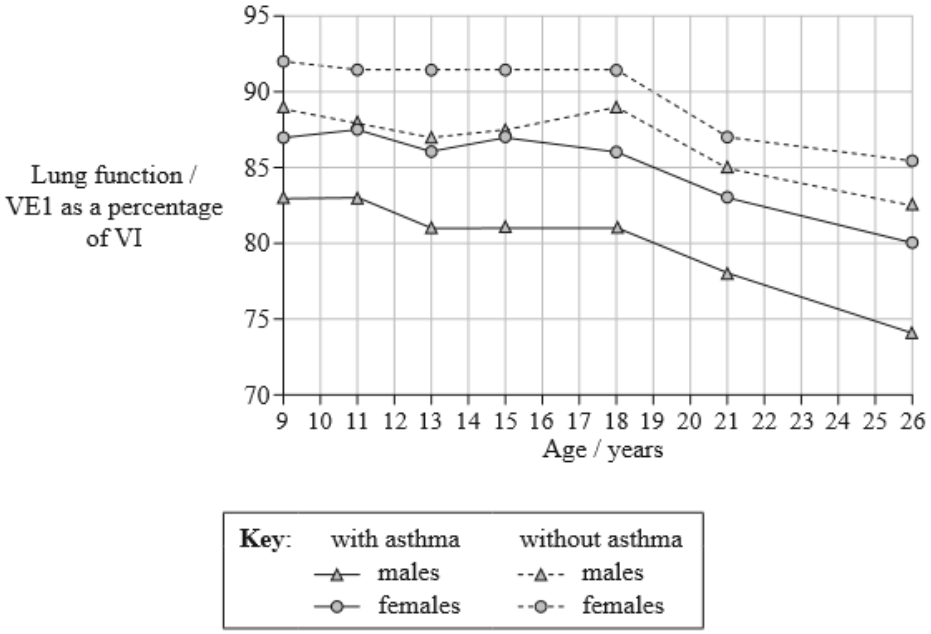
In a long-term study carried out in New Zealand, 9-year-old children were tested for asthma by checking if they had difficulty in breathing (wheezing). The children were then re-tested periodically until they were 26 years old. In addition, a measure was made of how well the lungs functioned by calculating the maximum volume of air exhaled in one second (VE1) as a percentage of the maximum volume of air inhaled (VI). The graph shows the lung function for males and females with or without asthma.



[Source: From *The New England Journal of Medicine*, Malcolm R. Sears, Justina M. Greene, Andrew R. Willan, et al., *A Longitudinal, Population-Based, Cohort Study of Childhood Asthma Followed to Adulthood*, 349, pages 1414–1422. Copyright © (2003) Massachusetts Medical Society. Reprinted with permission from Massachusetts Medical Society.]

a. State the relationship between asthma and lung function. [1]

b. Calculate the change in lung function of females with asthma between the ages of 11 and 26. [1]

c. Compare the data for 26-year-old males and females. [2]

d. Explain how the units used to measure lung function are useful in showing if a person suffers from asthma. [2]

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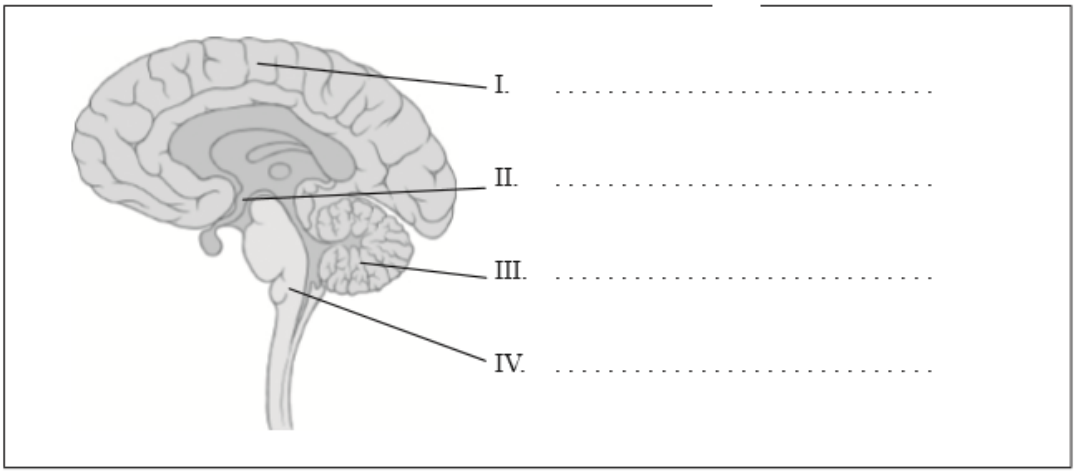
a. Identify the parts of the brain indicated on the diagram below. [2]



Patrick J. Lynch, medical illustrator; C. Carl Jaffe, MD, cardiologist

b. Outline the unconscious control of the heart rate. [3]

c. Describe different aspects of the processing of visual stimuli. [3]