1   Table 5.1 shows the energy reserves for skeletal muscles in an athlete.

Table 5.1

| energy reserve | mass/g | energy/kJ | time the reserve would last/min | |
			walking	marathon running
blood glucose	3	48	4	1
liver glycogen	100	1660	86	20
muscle glycogen	350	5800	280	71
fat in skin	9000	337 500	15 500	4018

(a) (Compare the effect of walking and marathon running on energy reserves.

....

.... [2]

   (ii) Suggest which two energy reserves would be most readily available to muscles during exercise.

   1. ....

   2. .... [1]

   (iii) Underline the **two** food groups to which the energy reserves in Table 5.1 belong.

      protein   mineral   fibre   fat   carbohydrate   [1]

   (iv) Calculate the energy per gram of glycogen.

      Show your working.

                                      energy = ... kJ   [2]

(b) Suggest why athletes eat foods high in

  (i) proteins, during training;

  ....

  .... [1]

  (ii) carbohydrates, for three days before a marathon race.

  ....

  ....

  .... [2]

(c) During a fast race (a 100 metre sprint), 95% of the energy comes from anaerobic respiration.

  During a marathon, only 2% of the energy comes from anaerobic respiration.

  (i) State the equation, in symbols, for anaerobic respiration in muscles.

  .... [2]

  (ii) Suggest and explain why a sprinter can use mainly anaerobic respiration during the race, while a marathon runner needs to use aerobic respiration.

  ....

  ....

  ....

  ....

  .... [4]

  (iii) Explain how, during a marathon race, the blood glucose concentration stays fairly constant, but the mass of glycogen in the liver decreases.

  ....

  ....

  .... [2]

[Total: 17]

2   To stay healthy we need a balanced diet.

(a) Define the term *balanced diet*.

....

....

.... [2]

Protein is one nutrient present in a balanced diet. The body cannot store protein, so any excess amino acids are broken down in the process of deamination, as shown in Fig. 5.1.

excess
amino acid

non-nitrogen
compound

nitrogen
compound

X

urea

respiration

$6CO_2 + 6H_2O + energy$
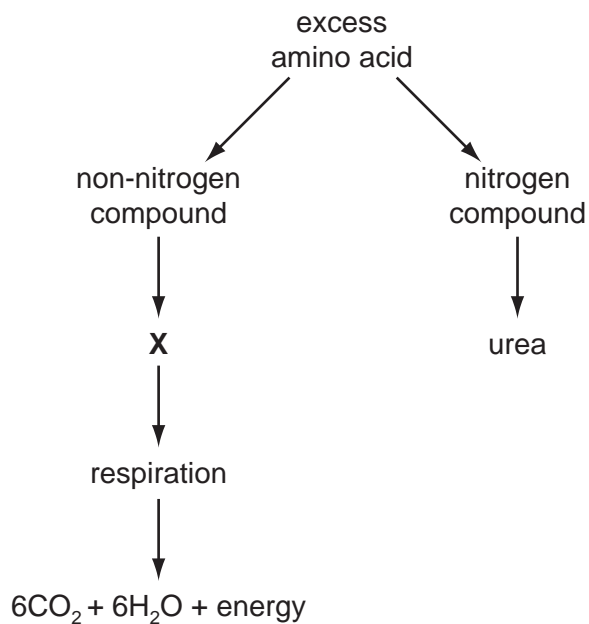
Fig. 5.1

(b)   Name the organ where deamination takes place.

.... [1]

(ii) Compound **X** is used as an energy source in respiration.

Suggest the name of compound **X**.

.... [1]

(iii) State the type of respiration shown in Fig. 5.1.

Explain your answer.

type of respiration ....

explanation ....

.... [2]

(c) The urea produced is transported to the kidney, where it is excreted.

Describe how urea is transported in the blood to the kidney.

....

.... [2]

Fig. 5.2 shows a kidney tubule (nephron) and its associated blood vessels.
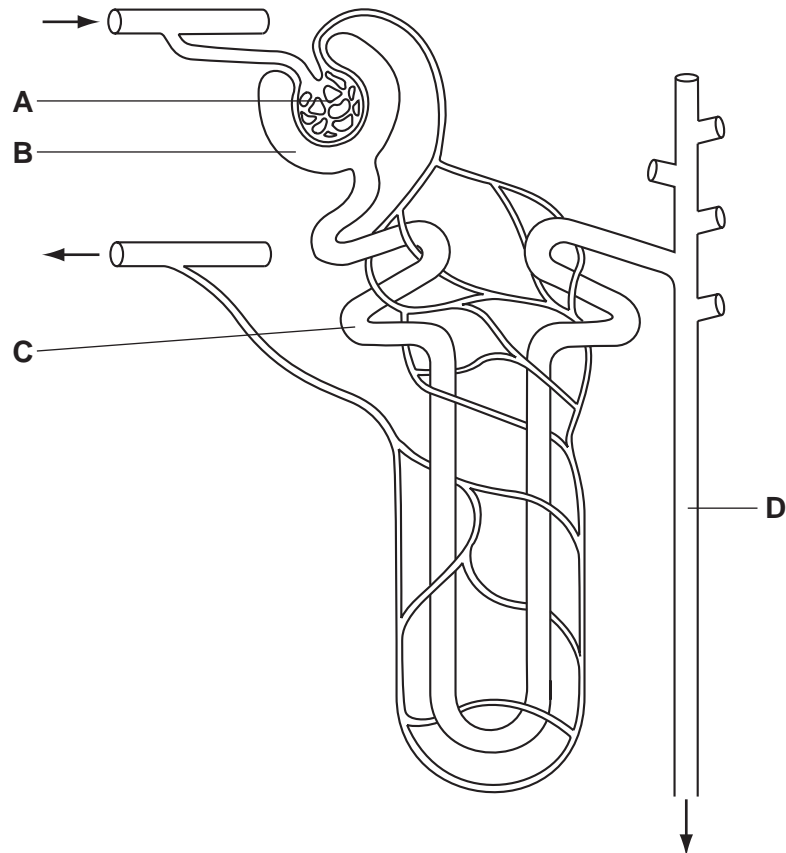

A

B

C

D

Fig. 5.2

(d) Complete the table by naming the parts labelled **A** to **D** and stating **one** function for each.

	name of part	function
A	....	....
B	....	....
C	....	....
D	....	....

[8]

(e) The volume of blood filtered by the kidneys is 1.18 dm^3 min^{-1}.

  (i) Calculate the total volume of blood filtered in 24 hours.

  Show your working.

  volume = ... [2]

  (ii) If the total volume of urine produced in 24 hours is 1.7 dm^3, calculate the percentage volume of the filtered blood excreted as urine in 24 hours.

  Show your working.

  % volume = ... [2]

[Total: 20]