1 The lungs and the kidneys are excretory organs of the human body.

(a) **(i)** Define the term *excretion*.

→ removal of poisonous toxins, harmful substances from body

eg: waste product of metabolism (respiration)

→ substances in excess

.....[3]

(ii) State an excretory product that is passed out through the lungs.

CO_2 / H_2O vapours

.....[1]

(iii) Outline the role of the liver in excretion.

→ Deamination of A. Acids

→ Removal of N part of A. Acids - produces Urea

→ Breakdown of hormones/ toxins/drugs/ excess vitamins

→ Breakdown of worn out RBCs

→ excretory products put in bile

.....[3]

(b) Fig. 4.1 is a vertical section of the kidney.

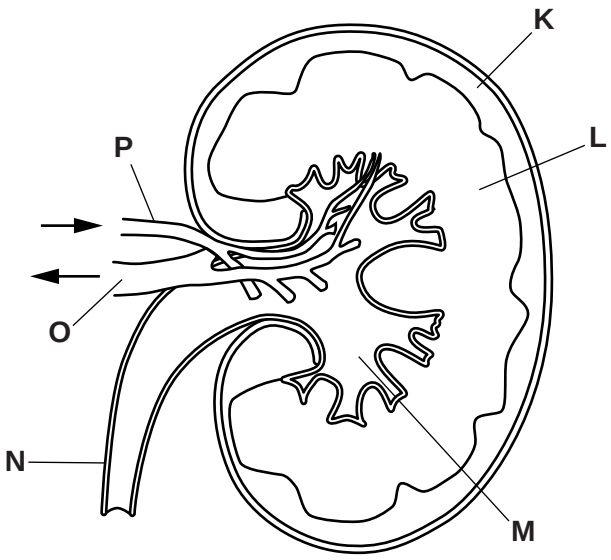

Fig. 4.1

Table 4.1 shows the functions of parts of the kidney.

Complete the table by:

- naming the part of the kidney that carries out each function
- using letters from Fig. 4.1 to identify the part of the kidney named.

One row has been completed for you.

Table 4.1

function	name of part	letter from Fig. 4.1
blood is filtered		
concentration of urine is determined	medulla	**L**
urine flows to the bladder		
blood is carried into the kidney		
blood flows out of the kidney		

[4]

(c) People with kidney disease are often treated in renal dialysis clinics. Their blood passes through tubes lined with a special membrane for about three hours.

(i) State **two** waste substances that are removed from the blood by dialysis.

1 .....

2 .....

[2]

(ii) Kidney patients may be given a kidney transplant. State **one** advantage and **one** disadvantage of kidney transplants compared with dialysis.

advantage .....

.....

disadvantage .....

.....

.....

[2]

[Total: 15]

2 Fig. 5.1 shows a cross-section of a kidney.

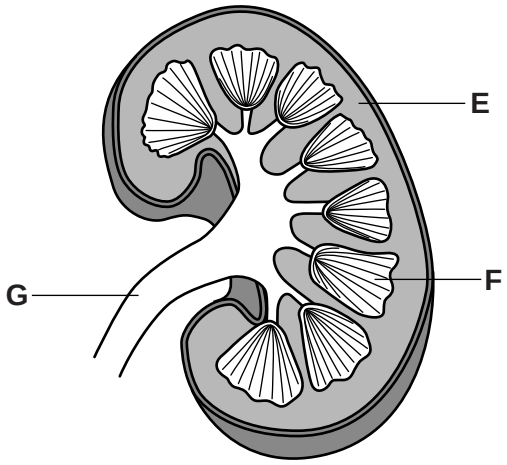

Fig. 5.1

(a) Name the structures labelled, **E**, **F** and **G** as shown in Fig. 5.1.

E cortex

F medulla

G ureter

[3]

(b) Explain the function of the renal capsule in the kidney.

→ Ultrafiltration

→ High blood pressure assists filtrate to pass th

glomerulus cap & into capillaries

→ protein / blood cells too big to move out of cap

→ filtrate small enough to move through

[3]

→ filtrate consists of water, dissolved salts / ions, glucose, urea

(c) Glucose is reabsorbed, back into the blood, by active transport.

Define *active transport*.

Movement of ions/large molecules through cell membrane against conc gradient
- using energy from respiration
- use of protein/carrier in membrane [2]

(d) Give **one** example, other than glucose, of a substance that is reabsorbed into the blood from the renal tubule.

water/salts/ions/minerals [1]

(e) Dialysis is a treatment for kidney disease.

Fig. 5.2 shows a dialysis machine.

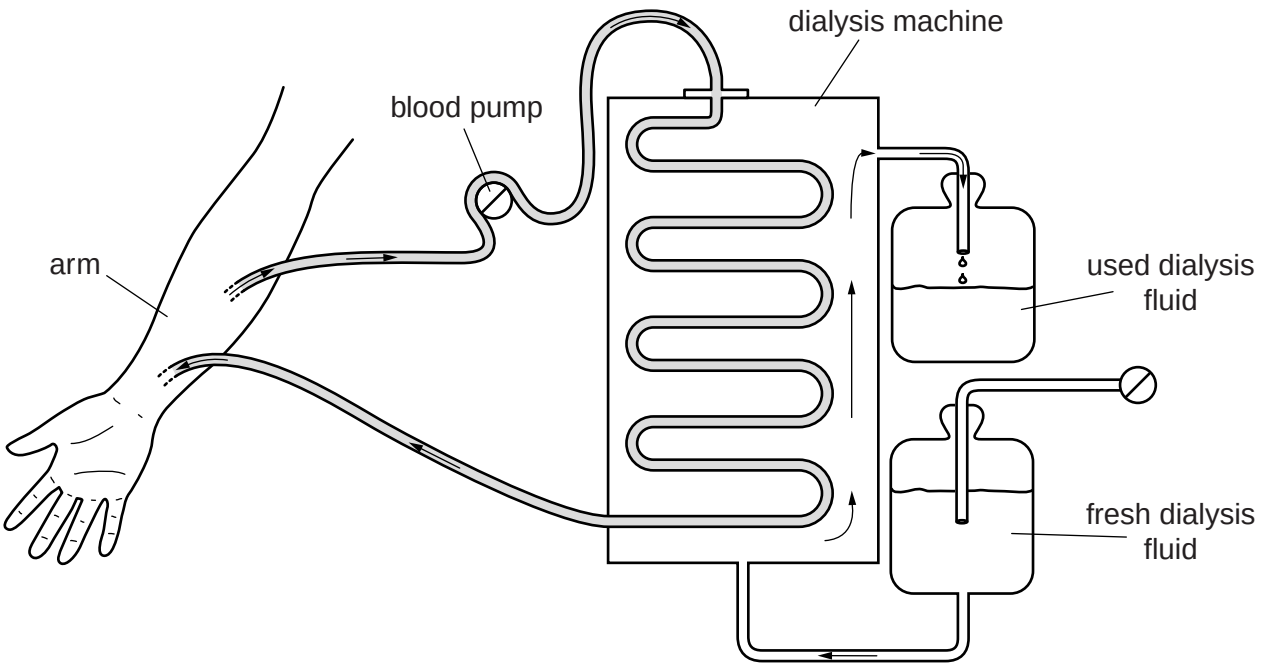

Fig. 5.2

(i) The composition of the dialysis fluid changes as it passes through the dialysis machine.

Complete Table 5.1 using the words 'low', 'high', 'same' or 'none' to show how the concentration of each substance changes in the dialysis fluid.

The last one has been done for you.

Table 5.1

	concentration of substance in:		
substance	blood before dialysis	**used** dialysis fluid	**fresh** dialysis fluid
glucose	normal	—	same
salts	high	high	low
urea	high	high	none
toxins	high	high	low

[3]

(ii) Explain how a dialysis machine filters blood.

Dialysis membrane is partially permeable
Minerals/salts/ions/urea move by diffusion
from high conc to low conc - down conc gradie
H2O move by osmosis
protein/blood cells - too large to move across
membrane
glucose is not removed by dialysis as
fresh dialysate maintains a conc gra

[4]

(f) Kidney transplants are the most common organ transplants.

Describe the **advantages** of a kidney transplant compared with dialysis.

Severe diet/fluid restrictions
No need for regular visits to hospital
less unwell/tired/nausea/headache/less pain
No needless/fistula permanently in arm

[3]

(g) Before a kidney is transplanted, it is important to match the tissue type of the donor with the tissue type of the recipient.

State why this is necessary.

Avoid rejection

stop immune system attacking new kidney

.....[1]

[Total: 20]

3 **(a)** Define the term *excretion*.

.....

.....

.....

.....

.....

.....[3]

Fig. 2.1 is a diagram of a kidney tubule and its blood supply.

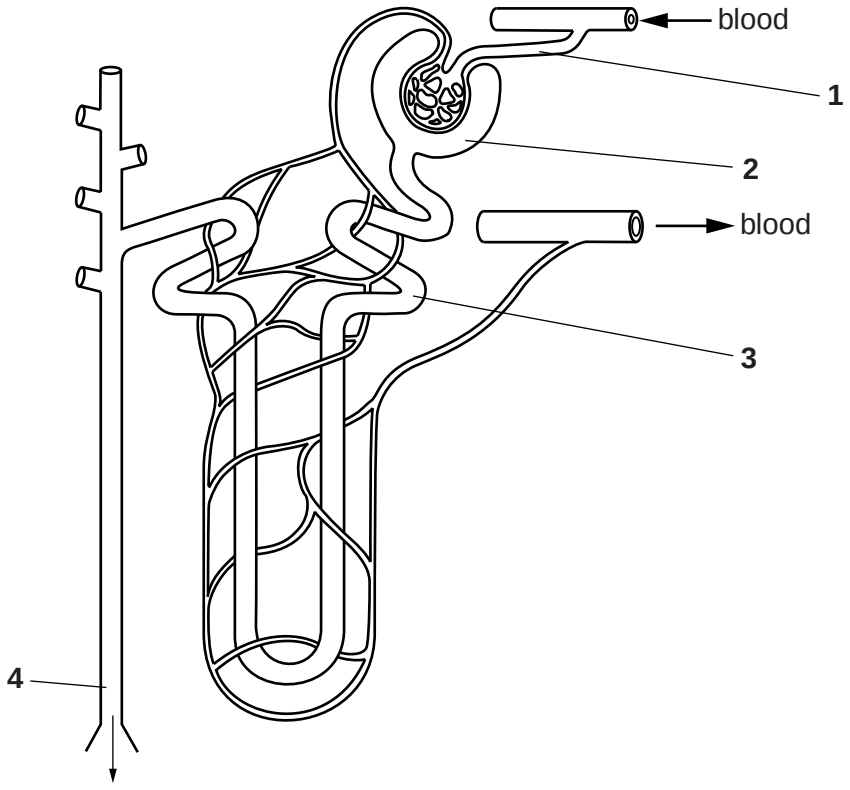

Fig. 2.1

(b) The concentrations of solutes in the fluids at regions **1**, **2**, **3** and **4** were determined. The results are shown in Table 2.1.

Table 2.1

substance	concentration / g dm^{-3}			
	region **1**	region **2**	region **3**	region **4**
glucose	0.9	0.9	0.2	0.0
protein	82.0	0.0	0.0	0.0
salts	8.0	8.0	9.6	16.5
urea	0.2	0.2	0.2	20.0

State the substance or substances in Table 2.1 which:

(i) has molecules which are too large to be filtered;

protein [1]

(ii) has molecules which are small enough to be filtered but is completely reabsorbed from the fluid in the kidney tubule;

glucose [1]

(iii) increases in concentration as fluid moves along the kidney tubule.

1 urea

2 salts [1]

(c) State **three** structures through which the fluid from region **4** passes as it leaves the body.

1 pelvis

2 ureter urethra

3 bladder [3]

(d) One role of the kidney is to maintain the concentration of the blood plasma.

Name the process of maintaining constant conditions within the body.

homeostasis [1]

[Total: 10]