

GRADE 11 PRACTICAL: THE KIDNEY

MARKS: 50

TIME: 2 PERIODS

PART 1: KIDNEY DISSECTION

- 1.1. For this practical you will need
- a sheep or pig kidney
 - A scalpel
 - A piece of newspaper and dissection board
 - 1 pin of each colour: red, yellow, green, blue, black

METHOD

1. Remove any excess fat and other loose tissues around the kidney carefully.
2. Don't cut away the tubes that are located on the concave side of the kidney.

(a) Identify the colour of the fat tissue. _____ (1)

(b) Give the number of tubes that are attached to the concave side of the kidney. _____ (1)

3. Dissect the sheep or pig kidney by making a neat **longitudinal section** through the middle of the kidney.
4. If you cut skew, try to cut the kidney tissue away so that you can clearly see the calyces and pyramids. Pull away a part of the "skin" that covers the kidney.

(c) Name the "skin". _____ (1)

(d) Describe the appearance of the "skin." _____ (2)

5. Now use the coloured pins to indicate each of the following on your dissected kidney. (Call your teacher once you are done to evaluate your dissection when you are done):
 - o Red – a renal pyramid
 - o Yellow – the renal pelvis
 - o Green – a renal calyx
 - o Blue – the cortex
 - o Black – the ureter

Your teacher will evaluate the accuracy of your dissection and identifying the labels.
Rubric:

Neat longitudinal section	Red – renal pyramid	Yellow – Renal pelvis	Green – renal calyx	Blue - Cortex	Black - Ureter

6. Describe the appearance of the cortex against the medulla of the kidney.

(2)

- 1.2. Your teacher will show you your mistakes with the pins (if any). Now make a neat biological sketch of one half of the dissected kidney. Make sure your drawing accurately reflects the dissected kidney.



(6)

- 1.3. Clean your dissection apparatus well.
- Throw the kidney and the newspaper away in the correct containers (not the dustbin).
 - Wash your scalpel and dissection board with warm, soapy water and dry off with a alcohol cloth.

(1)

TOTAL PART A: [20]

PART 2 – THEORY

1.4. Study the table below and answer the questions that follow:

Substance	% in plasma	% in filtrate	% in urine
Water	90 – 93	99 - 100	97,5
Proteins	7,00	0	0
Glucose	0,10	0,10	0
Salts	0,35	0,35	0,50
Urea	0,03	0,03	2,00

1.4.1. Which substance(s), present in the plasma, does not filter into Bowman's capsule?
Give a reason for your answer. (1 + 1)

1.4.2. Provide an explanation for each of the following:

(a) No glucose in the urine. (2)

(b) A higher concentration of salt in the urine compared to the filtrate. (2)

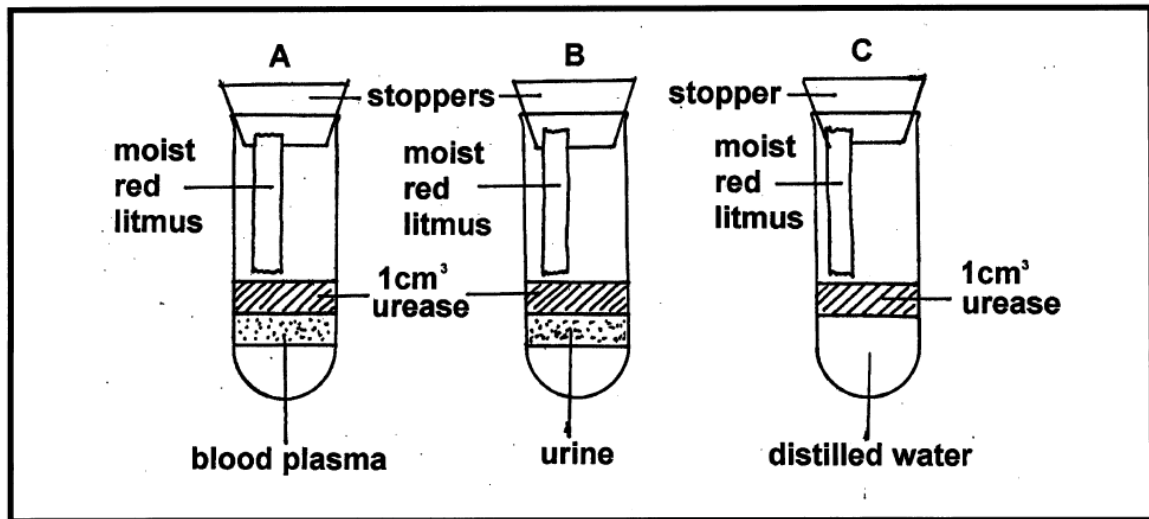
1.4.3. Give one medical reason why the urine can sometimes contain glucose.

(1)

1.4.4. Can the composition of this urine (shown in the table) be that of a dehydrated person? Explain your answer thoroughly. (4)

(11)

- 1.5. In an investigation three test tubes were set up as illustrated in the diagram below. The test tubes were incubated at 37°C for one hour. Thereafter the changes in the colour of the litmus paper were recorded while the contents of each tube were tested with Fehling A and B or Benedict's solution and the Biuret or Millon's test respectively. The results are recorded in the table below.



NOTE: The enzyme urease breaks down urea to ammonia. The presence of ammonia can be detected by its effect on moist litmus paper (it turns blue).

TEST TUBE	A	B	C
Litmus paper	Turns blue	Turns blue	No change
Benedict's/Fehling's A & B Solutions	Turns orange	No change	No change
Biuret/Millon's tests	Violet/Brick red	No change	No change

- 1.5.1. Which substance is present in both the plasma and urine? (2)

- 1.5.2. Why were the test tubes incubated at 37°C? (2)

1.5.3. What is the purpose of test tube C in the investigation? (1)

1.5.4. Compare the results of test tube A and B and make **TWO** conclusions. (4)

(9)

1.6. An investigation was carried out to determine the influence of alcohol on the volume of urine produced. 12 healthy, 23-year-old males of similar height and mass participated in the investigation. The investigation was conducted as follows:

- The men were divided into two groups of six each, Group **A** and Group **B**.
- The two groups ate the same food and did the same exercise for the 24-hour-period before testing.
- Each group was given the following to drink after the 24-hour-period:
 - Group **A**: 1 litre of alcohol-free beer (beer that does not contain alcohol)
 - Group **B**: 1 litre of alcoholic beer
- Urine was collected from each man every hour.

Assume that the volume of urine collected is equal to the volume of urine produced. The results of the investigation are shown in the table below.

TIME OF COLLECTION	AVERAGE VOLUME OF URINE COLLECTED (mℓ)	
	GROUP A	GROUP B
After 1 hour	599	643
After 2 hours	413	504
After 3 hours	112	132

1.6.1. State the dependent variable in this investigation. (1)

1.6.2. State **TWO** planning steps the investigators had to take before the investigation could start. (2)

1.6.3. State **TWO** factors that need to remain constant, other than the ones already mentioned. (2)

1.6.4. State **ONE** step that the investigators took to ensure the reliability of the investigation. (1)

1.6.5. Based on the results, explain how the intake of alcohol influences the secretion of ADH and consequently the volume of urine that is produced by the kidneys. (4)

(10)

TOTAL PART 2: [30]
SUM TOTAL: [50]