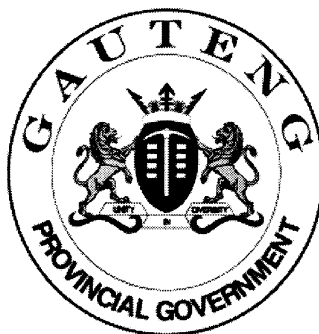


SENIOR CERTIFICATE EXAMINATION



FEBRUARY / MARCH

2007

PHYSIOLOGY

SG

PHYSIOLOGY SG

307-2/0 E



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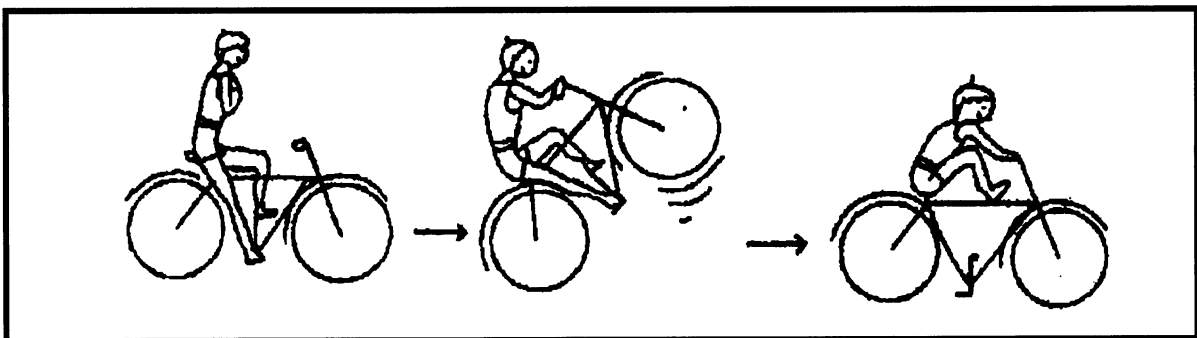
SG

19 pages

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- 1.2 Reabsorption mainly occurs _____.
- A. in the Malpighian body
 - B. in the loop of Henle
 - C. from the proximal convoluted tubule
 - D. from the peritubular capillaries surrounding the nephron
- 1.3 A very thin lining of squamous cells in Bowman's capsule which are in close contact with the glomerulus.
- A. Endothelial cells
 - B. Columnar epithelial cells
 - C. Cuboidal epithelial cells
 - D. Podocytes
- 1.4 Which one of the following is NOT a function of the skin?
- A. Synthesis of vitamin D
 - B. Secretion of sebum
 - C. Synthesis of vitamin A
 - D. Excretion of sweat
- 1.5 Which neuron carries the impulse from the receptor to the spinal cord?
- A. Motor neuron
 - B. Sensory neuron
 - C. Connector neuron
 - D. Bipolar neuron
- 1.6 Which of the following will maintain the balance of the cyclist in the diagram?



- 1. Macula in vestibulum
- 2. Crista in ampulla
- 3. Cochlea
- 4. Cerebrum
- 5. Ultriculus and sacculus

- A. 1 and 3
- B. 1 and 2
- C. 2 and 4
- D. 3 and 5

1.7 Which of the following is NOT associated with the cerebrum?

- A. Arbor vitae
- B. Fissure of Rolando
- C. Corpus callosum
- D. Hypophysis

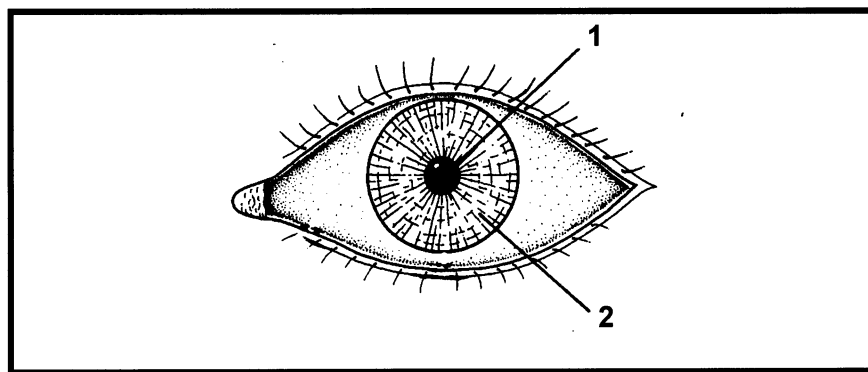
1.8 During a marathon energy is released to the athlete when _____.

- A. insulin is secreted to increase blood glucose levels
- B. glucagon is secreted to convert glycogen to glucose
- C. glucagon is secreted to decrease blood glucose levels
- D. glucagon is secreted to convert glucose to glycogen

1.9 The parathormone is secreted by the parathyroid gland and _____.

- A. promotes skeletal growth
- B. deposits calcium in bone
- C. brings about closure of the epiphyseal growth points of the bones
- D. removes calcium from the bones

Questions 1.10 and 1.11 refer to the following diagram of the eye.

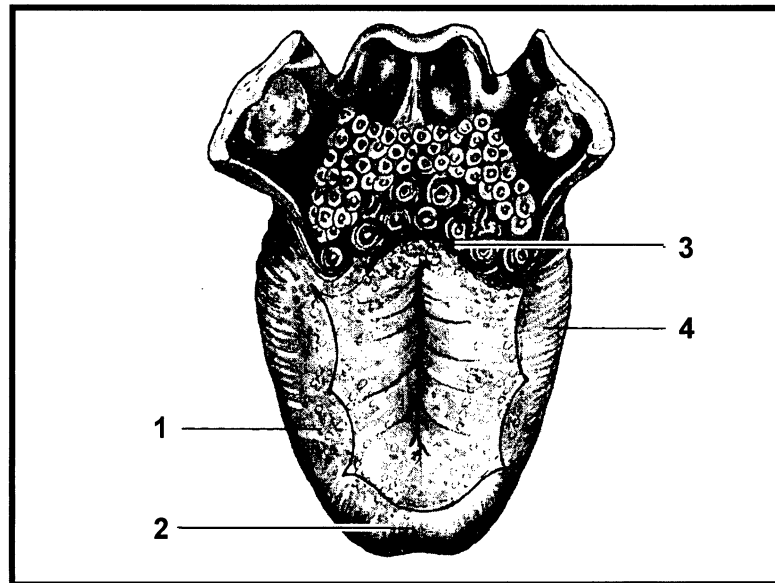


1.10 Numbers 1 and 2 refer to _____.

- A. 1, the iris and 2, the pupil
- B. 1, the pupil and 2, the sclera
- C. 1, the pupil and 2, the iris
- D. 1, the cornea and 2, the sclera

- 1.11 Numbers 1 and 2 control the following in the eye.
- A. Accommodation
 - B. Pupillary mechanism
 - C. Absorption of excessive light rays
 - D. Converging refraction of light rays
- 1.12 What type of neuron will carry impulses from your spinal cord to your left foot?
- A. Bipolar neuron
 - B. Interneuron
 - C. Sensory neuron
 - D. Multipolar neuron
- 1.13 The following hormones are secreted by the neurohypophysis:
- A. Antidiuretic hormone (ADH) and oxytocin.
 - B. Adrenalin and aldosterone
 - C. Testosterone and oestrogen
 - D. Somatotrophic hormone (STH) and thyroid stimulating hormone (TSH)
- 1.14 The control system of thermoregulation is situated in the _____.
- A. corpus callosum
 - B. hypothalamus
 - C. medulla oblongata
 - D. cerebellum
- 1.15 Which one of the following parts of the cerebrum interprets the impulse from the retina in the eye?
- A. Frontal lobe
 - B. Parietal lobe
 - C. Temporal lobe
 - D. Occipital lobe

- 1.16 In the diagram of the human tongue below, sour and bitter are respectively presented by _____ and _____.



- A. 2 and 3
B. 2 and 4
C. 4 and 3
D. 1 and 4
- 1.17 TSH is secreted by the hypophysis to stimulate the thyroid gland cells to secrete _____.
- A. adrenalin
B. growth hormone
C. cortisone
D. thyroxine
- 1.18 The structural unit of the nervous system is the _____.
- A. neuron
B. nephron
C. cell body
D. axon
- 1.19 A reflex action is an action that is _____.
- A. initiated by hormones
B. controlled by the brain
C. an autonomic response to an external stimulus
D. voluntary
- 1.20 Which of the following is NOT an effector organ?
- A. Skeletal muscles
B. Meissner's corpuscles
C. Salivary gland
D. Iris of the eye

- 1.21 Which one of the following will happen when you read a book and then look up to a mountain in the distance?
- A. The pupil dilates.
 - B. The muscles of the iris contract.
 - C. The lens becomes more convex.
 - D. The lens becomes less convex.
- 1.22 The olfactory cells in the nasal cavity are unique because they are _____.
- A. unipolar neurons
 - B. bipolar neurons
 - C. multipolar neurons
 - D. connector neurons
- 1.23 The hormone gastrin stimulates the _____.
- A. stomach to release gastric juice
 - B. duodenum to release intestinal juice
 - C. salivary glands to release saliva
 - D. testis to release sperm
- 1.24 The decidua and the chorionic villi form the _____.
- A. umbilical cord
 - B. cervix
 - C. placenta
 - D. endometrium
- 1.25 The ovum contains _____.
- A. 22 chromosomes and one Y chromosome
 - B. 44 chromosomes and XX chromosomes
 - C. 22 chromosomes and one X chromosome
 - D. 46 chromosomes

25x2=[50]

QUESTION 2

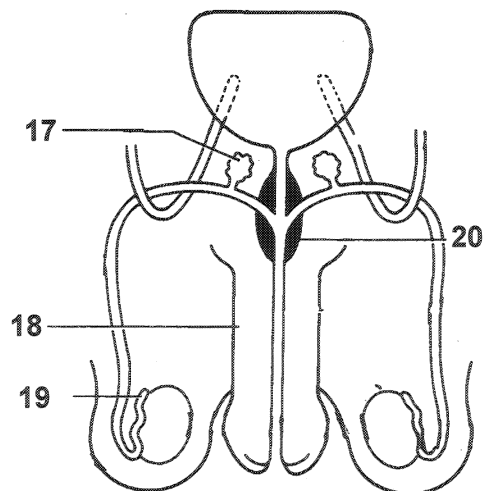
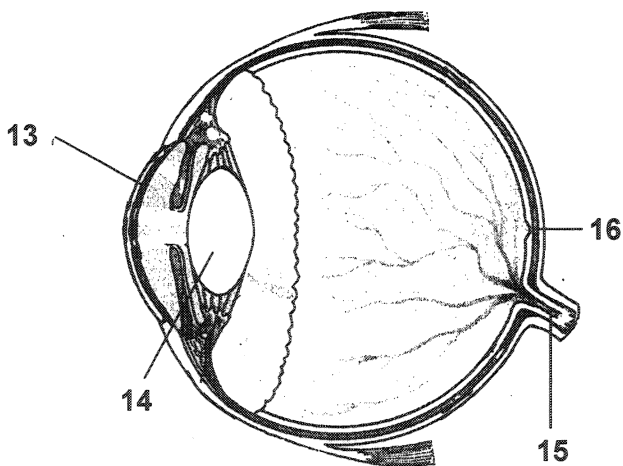
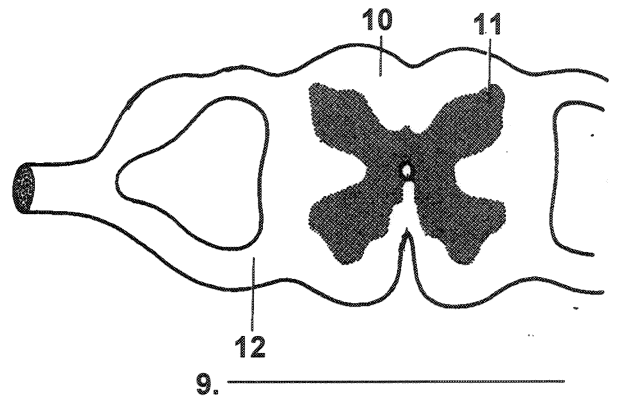
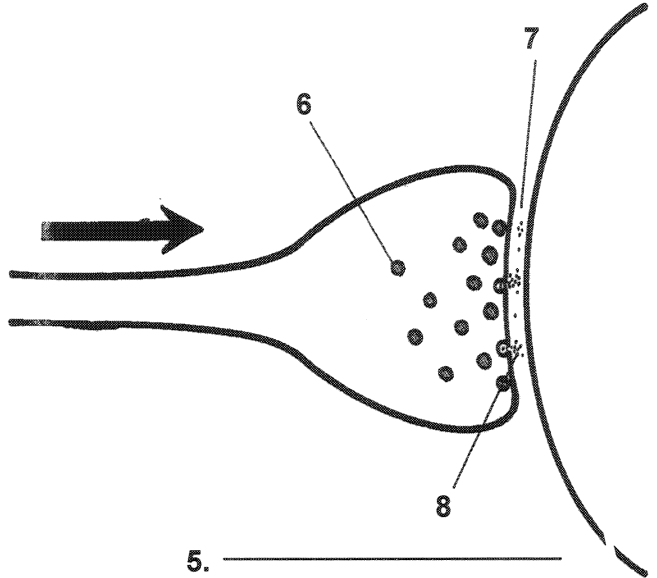
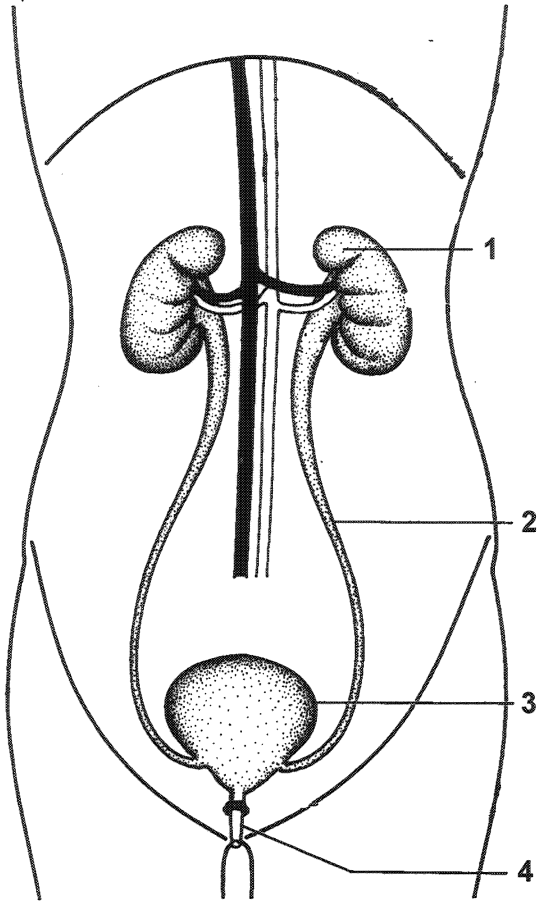
Give the **physiological term** for each of the following descriptions. Write each answer on a new line.

- 2.1 The maintenance of a constant internal environment for normal cell functioning
- 2.2 The ability of the lens of the eye to focus light rays from objects at a distance of less than 6 metres to a point on the retina
- 2.3 The structure in the semicircular canals of the human ear that contains the cupula
- 2.4 The deficiency disease caused by the hyposecretion of thyroxine in children
- 2.5 The receptors for taste on the tongue
- 2.6 The cells between the seminiferous tubules that secrete the hormone testosterone
- 2.7 The glands on the nose that secrete a fatty substance, which prevents the skin from drying out
- 2.8 The sac of skin which encloses the testis and acts as a temperature regulator for the formation of sperm
- 2.9 The tube which receives ova from the ovaries and carries them to the uterus
- 2.10 The sexually transmitted diseases which, if not treated, can cause blindness, insanity, nerve problems and death

[10]

QUESTION 3

Give the correct headings and labels of the following diagrams. Write down the numbers 1 to 20 one below the other and the correct answer next to each number.



[20]

P.T.O.

QUESTION 4

Match the **term** in **Column B** with the **description** in **Column A**. Write only the letter of the term you have selected next to the appropriate number in your answer book.

COLUMN A DESCRIPTION	COLUMN B TERM
4.1 Filled with cerebrospinal fluid	A. Rod cells
4.2 Protects the foetus against shock and temperature changes	B. Denature
4.3 Responsible for colour vision	C. Evaporation
4.4 The destruction of enzymes at high temperatures	D. Urine
4.5 The change of a liquid (e.g. sweat) to a vapour (gas)	E. Vermis
4.6 A solution of urea and salts excreted by the kidneys	F. Central canal
4.7 Joins the two cerebral hemispheres	G. Gray matter
4.8 Found in the outer region of the cerebrum	H. Cushing's syndrome
4.9 A deficiency disease caused by a cortisone over secretion	I. Menstruation
4.10 Takes place 14 days after ovulation	J. Amniotic fluid
	K. Cone cells
	L. Convection
	M. Corpus callosum
	N. Fertilisation
	O. Addison's disease

10x2=[20]

TOTAL FOR SECTION A: [100]

**SECTION B
COMPULSORY****QUESTION 5**

Answer ALL the questions in this section.

5.1 Read the following passage, then answer the questions that follow.

Kidney stones and blood in the urine

Tumi woke up one night crying. She had severe pain in her back and when she went to the toilet, there was blood in her urine. Her husband rushed her to hospital. The doctor examined her and explained that she had kidney stones. This is what he told her:

“Tumi, the salt in your urine has crystallised in the pelvis of your kidney and has formed one, maybe more, kidney stones. As the kidney stones pass through your pelvis and down your ureter to your bladder, they are tearing the walls, causing bleeding. That’s why you have such terrible pain in your back and blood in your urine. Sometimes these kidney stones are pushed by peristalsis down to the bladder but it seems your kidney stones are stuck in your left ureter. This could become dangerous because the urine can’t pass down and your left kidney will become infected.”

The doctor then explained to Tumi two possible ways of getting rid of these stones. Ultrasound waves could be used to shatter the stones into fragments which would then move down in the urine. Another way would be to push a small tube containing optical fibres into the kidney. The surgeon could then look for the stones and suck them out.

Tumi had ultrasound treatment and was soon relieved of her pain.

From: Buckley L, e.a. 2001: *Verken Biologie*

- 5.1.1 Explain how and why a kidney stone is formed. (2)
- 5.1.2 Why was there blood in Tumi’s urine? (2)
- 5.1.3 Briefly discuss the TWO methods, from the paragraph, to get rid of kidney stones. (4)
- 5.1.4 What advice will you give Tumi to prevent kidney stones from forming? (1)
- 5.2 Draw a neat labelled diagram of a longitudinal section through a kidney to show the internal macroscopic structure. (10)

5.3 Study the following diagram and answer the questions that follow.

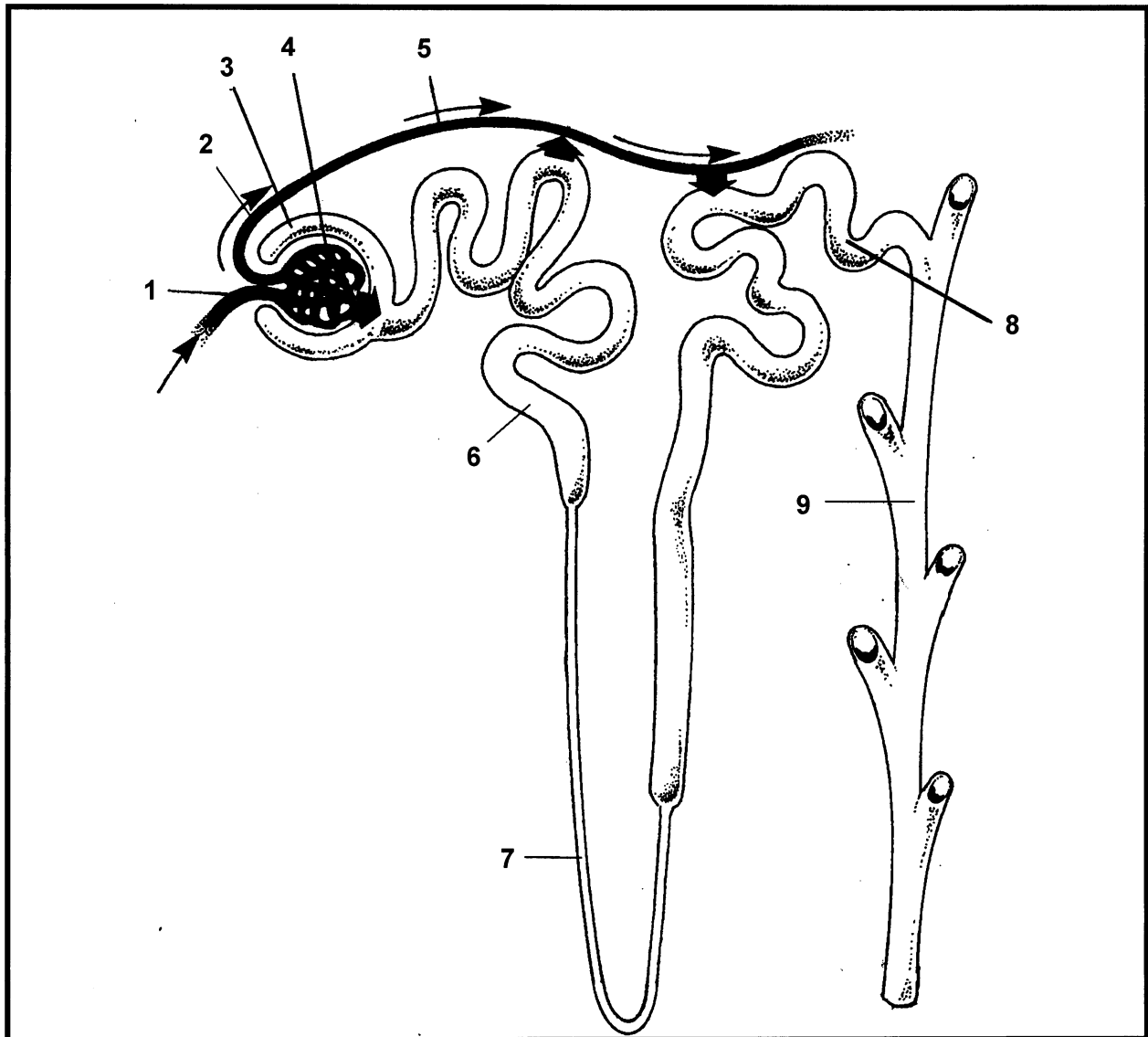


Figure 5.3: The nephron

- 5.3.1 Identify numbers 1, 3, 5 and 9. (4)
- 5.3.2 Why is the structure numbered 2 narrower than the structure numbered 1? (2)
- 5.3.3 What are the liquids found in the structures numbered 3 and 4 respectively known as? (2)
- 5.3.4 Name THREE substances that can possibly be found in the cavity of structure number 3. (3)
- 5.3.5 Name TWO other adaptations of the nephron NOT shown on the diagram, that cause successful glomerular filtration. (2)

- 5.3.6 Give an example of a substance that can be found in structure number 5, but will not be found in structure number 6. (1)
- 5.3.7 Give the name AND number of the structure that is responsible for osmoregulation. (2)
- 5.3.8 Which TWO hormones control osmoregulation in the nephron? (2)
- 5.4 Name the TWO structures that make up the central nervous system. (2)
- 5.5 Briefly describe how the central nervous system is protected. (8)
- 5.6 Discuss THREE functions of the cerebrum. (3)
- [50]**

QUESTION 6

- 6.1 The diagram below shows the most important endocrine glands in the body. Carefully study the diagram, then answer the questions that follow.

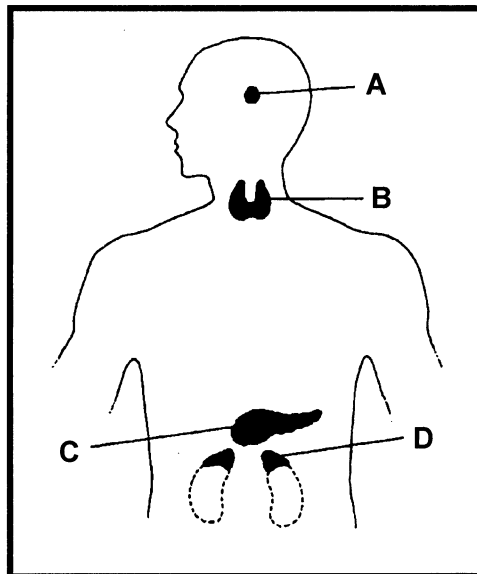


Figure 6.1: The endocrine glands

- 6.1.1 Define an **endocrine gland**. (2)

6.1.2 Redraw the following table in your answer book and complete the table by naming the endocrine glands labelled **A** to **D**. Also give an example of **ONE** hormone secreted by each gland.

Table 6.1.2: Endocrine glands and secretions.

	Endocrine gland	Example of a hormone secreted
A		
B		
C		
D		

(8)

6.1.3 Name **THREE** properties of hormones.

(3)

6.1.4 (a) Which letter, (endocrine gland) according to Table 6.1.2, secretes the “flight or fright” hormone? Give the correct scientific name for this hormone.

(2)

(b) Briefly discuss **FIVE** functions of the hormone identified in (a) in an emergency situation.

(5)

6.1.5 (a) Discuss the homeostatic control of the hormone secreted by gland C according to Table 6.1.2, when a person eats lots of cake and sweets during a party.

(10)

(b) What disease will occur if the homeostatic control identified in Question 6.1.5 (a) is unsuccessful?

(1)

(c) What will a positive test be for the disease identified in Question 6.1.5 (b)?

(1)

6.2 Study the following diagram of the human skin and answer the questions that follow.

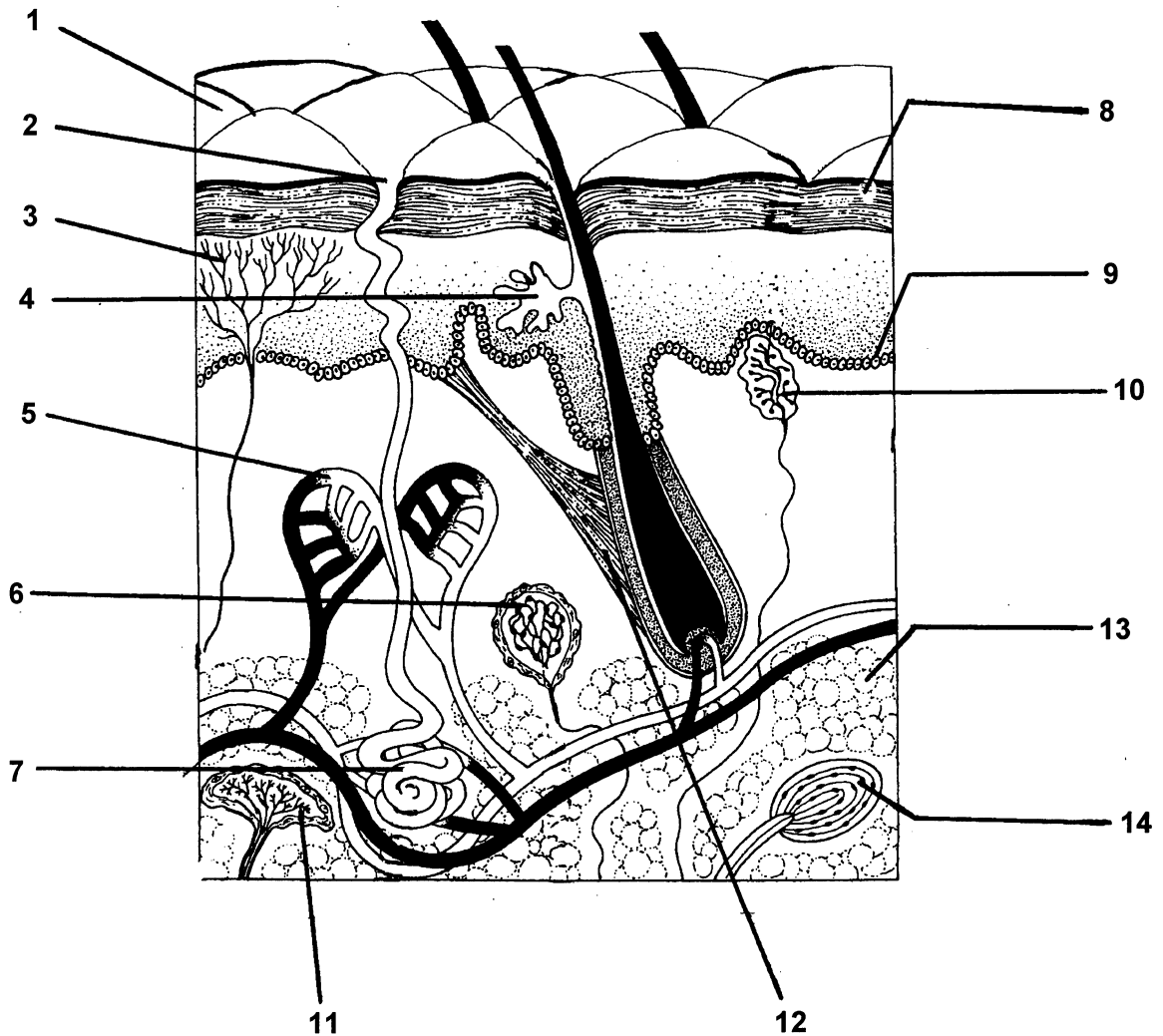


Figure 6.2: Cross-section through the human skin

- 6.2.1 Identify numbers 1, 4 and 5. (3)
- 6.2.2 Draw a neat, labelled diagram of structure numbered 7 in Figure 6.2. (6)
- 6.2.3 Identify AND briefly discuss the most important characteristics of the structures numbered 8 and 9. (4)

6.2.4 The table below refers to the diagram. Complete the table by filling in the missing numbers, receptors or stimuli. Write only the letter and the correct answer in your answer book.

Table 6.2.4: Receptors and various stimuli.

NO.	RECEPTOR	STIMULUS
3	(a)	Sensitive to pain
6	End bulb of Krause	(b)
(c)	Meissner's corpuscle	Sensitive to touch
11	(d)	Sensitive to heat
14	Pacinian corpuscle	(e)

(5)
[50]

QUESTION 7

7.1 Study the diagram below that shows a section through the human ear, then answer the questions that follow.

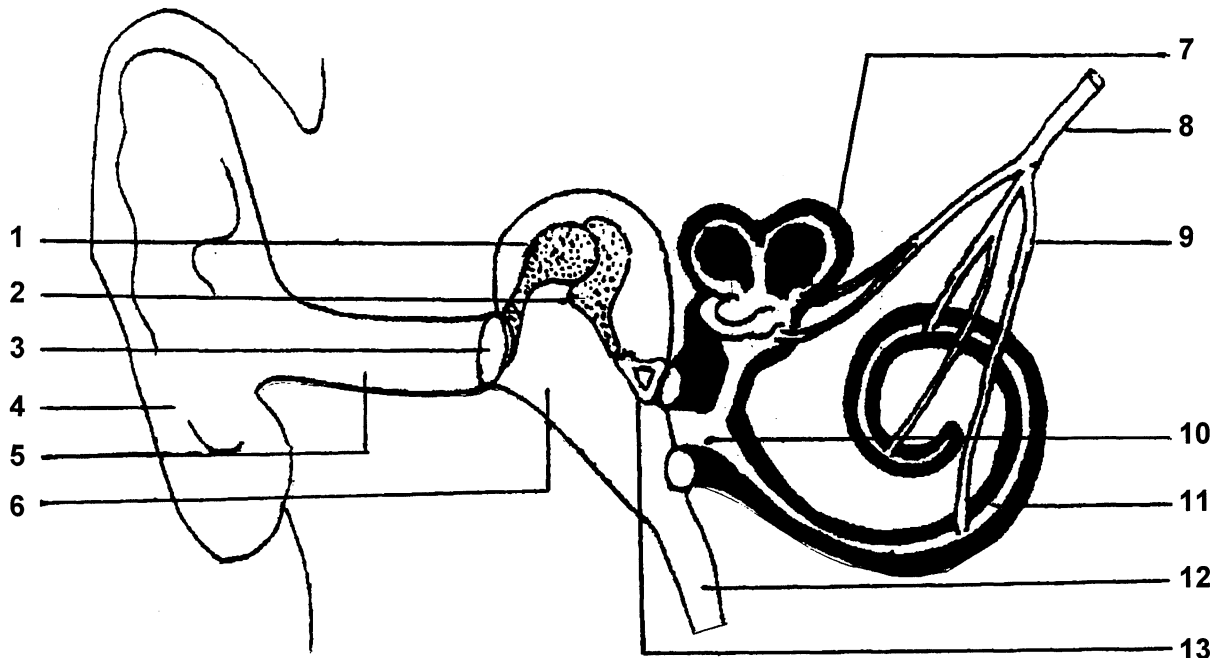


Figure 7.1: The ear

7.1.1 Name the THREE main regions found in the human ear. (3)

7.1.2 Identify numbers 3, 4, 8, 9 and 12. (5)

- 7.1.3 Give the numbers AND names of the TWO structures on the diagram that are filled with air. (4)
- 7.1.4 In which number will you find cerumen and what is its function? (2)
- 7.1.5 Give the name AND function of the structure numbered 11. (2)
- 7.1.6 Name the auditory ossicles represented by numbers 1, 2 and 13. (3)
- 7.1.7 What neuron type is structure numbered 9? (1)
- 7.1.8 To where will the impulses from structure number 9 be carried? (2)
- 7.2 Draw a neat, labelled diagram of a unipolar / monopolar neuron. (10)
- 7.3 Briefly discuss the eye defect **myopia** (short-sightedness) under the following headings:
- Causes
 - Symptoms
 - Remedy
- (8)
- 7.4 Answer the following questions regarding the receptors found in the human eye.
- 7.4.1 What type of receptors are found in the eye? (2)
- 7.4.2 What type of stimulus are they sensitive to? (1)
- 7.4.3 Name the TWO types of receptor cells that occur in the above mentioned receptor AND name their respective functions. (4)
- 7.5 Name THREE factors that need to remain constant in tissue fluid, in order for homeostasis to be maintained. (3)

[50]

QUESTION 8

8.1 Study the diagram below of the female reproductive system, then answer the questions that follow.

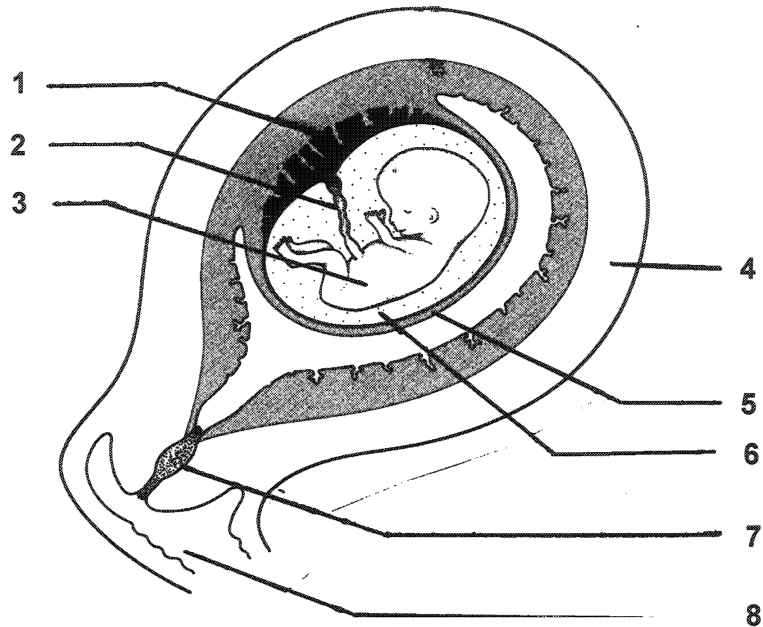


Figure 8.1: Pregnancy

- 8.1.1 Identify numbers 1 to 8. (8)
- 8.1.2 Name the blood vessels found in the structure numbered 2. (2)
- 8.1.3 Briefly discuss any THREE functions of the placenta. (6)
- 8.1.4 Identify the structure found inside the region numbered 7 and name its function. (2)

Antenatal care ("before birth" care) is extremely important to the developing foetus.

- 8.1.5 Give THREE important factors that a woman needs to attend to during her pregnancy. (3)
- 8.1.6 Name ONE hormone that will be present in a woman's blood during the birth of her child. State TWO functions of this hormone. (3)
- 8.1.7 How long is pregnancy? (1)

8.2 Explain the following terms:

- 8.2.1 Ovulation (2)
- 8.2.2 Spermatogenesis (2)

8.3 Draw a neat, labelled schematic diagram to explain spermatogenesis. (10)

8.4 Study the diagram below, then answer the questions that follow.

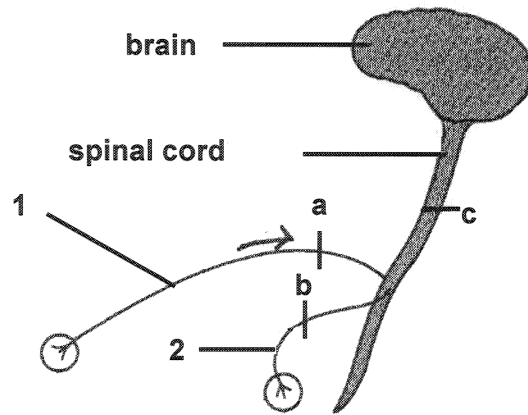


Figure 8.4
The central nervous system

- 8.4.1 What process is illustrated by the diagram? (2)
- 8.4.2 Identify neurons numbered 1 and 2 according to their functions. (2)
- 8.4.3 State the sensations a person will feel in each of the following situations:
- (a) If the nerve is damaged at a.
 - (b) If the impulse is blocked at b.
 - (c) If severe damage is done to the spinal cord at c. (3)

8.5 What will happen to the dermal blood vessels of a person during an excursion to the North Pole? (4)
[50]

TOTAL FOR SECTION B: [200]

TOTAL: 300