

**GAUTENG DEPARTMENT OF EDUCATION
SENIOR CERTIFICATE EXAMINATION**

PHYSIOLOGY HG

**SECTION A
QUESTION 1**

- | | |
|------|---|
| 1.1 | B |
| 1.2 | B |
| 1.3 | B |
| 1.4 | B |
| 1.5 | D |
| 1.6 | D |
| 1.7 | A |
| 1.8 | D |
| 1.9 | C |
| 1.10 | C |
| 1.11 | B |
| 1.12 | C |
| 1.13 | B |
| 1.14 | B |
| 1.15 | B |
| 1.16 | A |
| 1.17 | B |
| 1.18 | C |
| 1.19 | D |
| 1.20 | B |
| 1.21 | B |
| 1.22 | C |
| 1.23 | D |
| 1.24 | A |
| 1.25 | A |

25 x 2 = [50]

QUESTION 2

- | | |
|-----|---|
| 1. | H |
| 2. | A |
| 3. | L |
| 4. | K |
| 5. | F |
| 6. | B |
| 7. | J |
| 8. | C |
| 9. | I |
| 10. | G |

10 x 2 = [20]

QUESTION 3

- 3.1 Parturition
- 3.2 Cells of Leydig/interstitial cells
- 3.3 Menstruation
- 3.4 Glucagon
- 3.5 Filiform papillae
- 3.6 Cauda equina
- 3.7 Acromatosis
- 3.8 Renin
- 3.9 Uric acid
- 3.10 Double innervation

10 x 2 = [20]

TOTAL FOR SECTION A: [90]

SECTION B
QUESTION 4

- 4.1.1 Hydrostatic pressure ✓✓ (2)
- 4.1.2 Blood cells / e.g. ✓ and blood proteins ✓
They are too large to pass through the glomerular membrane ✓ (3)
- 4.1.3 B – extracellular / interstitial / tissue fluid. (2)
C – intracellular fluid / sitosol / cytoplasm.
- 4.1.4 Deamination
 - The excess amino acids are taken to the liver ✓ where they are broken down.
 - The nitrogenous part, the amino group (-NH₂) ✓ is removed from the amino acid by deamination ✓ and
 - combines with H⁺ to
 - form toxic ammonia (NH₃) ✓
 - which then reacts with CO₂ ✓ to form
 - less toxic urea. ✓
 - The urea travels through the blood from the liver to the kidneys where it is excreted in urine. ✓
 - The non-nitrogenous ✓ part of the amino acid can be processed in three ways
 - It may be oxidised ✓ during cellular respiration to release energy ✓
 - or it may be converted into glucose and stored as glycogen ✓ (a carbohydrate) in the liver and muscles.
 - It may also be converted into fat ✓ which is stored subcutaneously. (any 8)
- 4.1.5 CO₂ – cell respiration
Uric acid – break down of nucleic acids
Creatinine – break down of phosphocreatine
Ammonium – deamination of glutamine
Hippuric acid – break down of benzoic acid (4)
- 4.2.1 A. Ovulation
B. Fertilization
C. Implantation (3)

- 4.2.2 1 Graafian follicle
 3. Fallopian tube
 4. Blastocyst
 5. Endometrium
 6. Corpus luteum/ovary (5)
- 4.2.3 The secondary oocyte ✓ / ovum ✓ (2)
- 4.2.4 Fertilization
 • Semen fluid ✓ serves as a transport medium ✓.
 • Sperm moves ✓ by spiral movements ✓ of the tail.
 • Fructose ✓ provides energy ✓ for the sperm to move.
 • Mitochondria ✓ in the neck releases energy by cell respiration ✓.
 • Alkaline mucus ✓ neutralises ✓ the acidic condition in the vagina. Any 4x2=(8)
- 4.2.5 Trophoblast ✓, cells forming the wall, surrounding a hollow, fluid-filled ball ✓ with a inner cell mass ✓. (3)
 [40]

QUESTION 5

- 5.1.1 (a) Meissner's touch corpuscles
 (b) Organ of Corti
 (c) Cochlea
 (d) Epidermis
 (e) Cones
 (f) Retina
 (g) Thermoreceptors
 (h) Proprioceptors
 (i) Joints
 (j) Taste buds (10)
- 5.1.2 (a) Sensory neuron ✓
 (b) Multipolar neuron ✓ (2)
- 5.1.3 Synapse operation
 • A nerve impulse travels along the axon ✓ to the terminal branches to the synaptic knobs ✓.
 • Inside the synaptic knobs there are small vesicles (sacs) ✓ which contain a neurotransmitter ✓.
 • The nerve impulses cause the vesicles to burst through the pre-synaptic membrane ✓ and release the neurotransmitter into the synaptic cleft (gap) ✓.
 • The neurotransmitter becomes attached to the post –synaptic ✓ membrane of the dendrite ✓ and sets up electrical impulses ✓ which are relayed towards the cell body as nerve impulses.
 • In this way the impulse is conducted across the gap chemically ✓.
 • Neurotransmitter/s are only released from one side of the gap, ✓ / one-way valves, so messages can only be transmitted from this side ✓. (any 7)

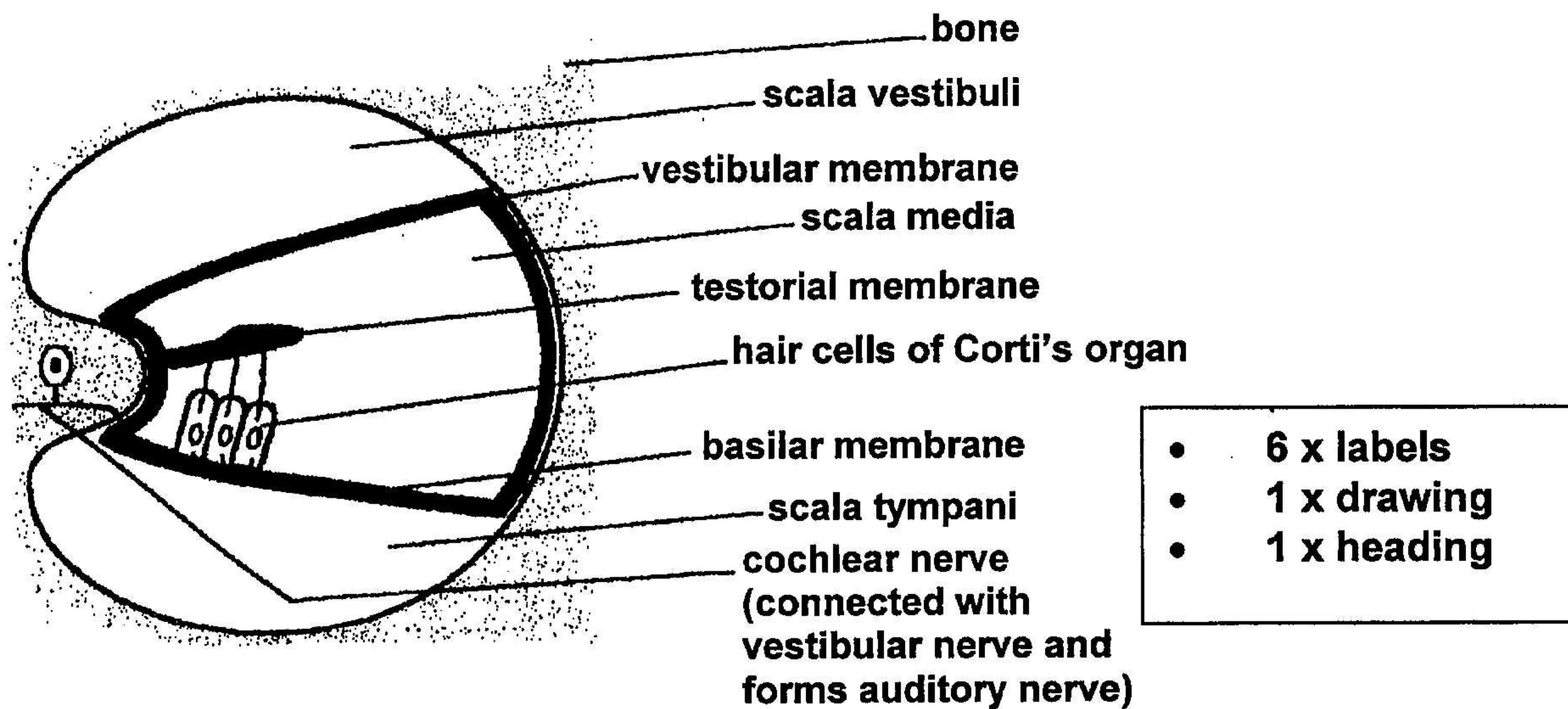
- 5.1.4 acetylcholine, norepinephrine, (noradrenalin) epinephrine, (adrenalin) (1)
- 5.2.1 1. First and second brain ventricles / lateral ventricles
 2. Third brain ventricle
 3. Duct of Sylvius
 4. Fourth brain ventricle
 5. Sub-arachnoidal cavity
 6. Central canal (6)
- 5.2.2 Cerebrospinal fluid✓ (1)
- 5.2.3 Functions
 • Acts as a shock absorbing cushion✓, protecting the delicate structures of the brain and spinal cord
 • Maintains a constant pressure around the CNS✓
 • Nourishes the cells of the CNS with food and oxygen✓
 • Removes metabolic waste from the cells✓
 • Prevents cells of the CNS from drying out✓ (5)
- 5.2.4 A. Meninges
 B. Cerebrum/Frontal lobe
 C. Cerebellum
 D. Cerebrospinal fluid (4)
- 5.2.5 a) Circular iris muscles contract, constricting pupil✓
 b) Muscles contract, causing bronchioli to constrict✓
 c) Weakens contractility and slows down heartbeat✓
 d) Contracts bladder wall✓ (4)

[40]

QUESTION 6

- 6.1.1 1. Ossicles ✓carry the vibrations of the tympanum to the oval window✓ / strengthen the vibrations.
 2. Helicotrema✓ carries low frequency sound to the scala tympanum. ✓ (4)
- 6.1.2 1. Tympanic membrane✓: Converts sound waves from the external auditory canal into vibrations and transmits them to the hammer✓
 2. Oval window membrane ✓: Passes vibrations, received from the stirrup, into the perilymph of the inner ear✓
 3. Round window membrane✓: Absorbs the waves after they have passed through the cochlea, preventing sound reflection✓
 4. Eustachian tube✓: Equalises the pressure in the middle ear cavity with the external ear pressure, enabling the tympanic membrane to vibrate freely. ✓ (8)

6.1.3 CROSS-SECTION THROUGH THE COCHLEA ✓



(8)

6.2.1 Vestibular apparatus

- Suspended in the perilymph ✓ are the two membranous sacs, the utriculus ✓ and sacculus. ✓ They are found in the cavity just inside the oval window ✓ and below the semicircular canals. ✓
- These sacs, filled with endolymph, contain ✓
- Equilibrium receptors called maculae ✓.
- The maculae are patches of hair cells covered with a jelly-like layer ✓
- In which tiny stones (calcium carbonate, crystals) called otoliths ✓ are embedded.
(At least 5 points from this section)

- The semicircular ✓ canals are also part of the vestibular apparatus. They are found in the temporal bone ✓ above the utriculus.
- They are at right angles to each other ✓.
- Running through each canal is a membranous semicircular duct which joins with the utriculus ✓.
- Each duct has an enlarged swelling at one end called an ampulla ✓
- Each ampulla contains an equilibrium receptor, a crista. ✓
- The crista is a patch of hair cells covered with a jelly-like cap, the cupula. ✓

(10)

6.2.2 Medulla oblongata ✓

(1)

- 6.3 Decrease in the cortisone level[√] of the blood stimulates the hypothalamus. [√]
 This secretes (CRF) Cortico releasing factors [√] in the blood, which are carried
 via the blood[√] to the adenohypophysis[√]
 Adenohypophysis is stimulated to secrete ACTH (Adrenocorticotrophic
 hormone[√] which is carried to the adrenal cortex. [√]
 The adrenal cortex then secretes more cortisone[√] that allows the level to
 return to normal. [√]
 The normal cortisone level in the blood inhibits further secretion of ACTH[√]
 (any 9) [40]

QUESTION 7

- 7.1.1 They obtain their heat from sources inside the body, the body temperature [√]
 remains constant [√] at 37°C. (2)
- 7.1.2 a) 37°C [√] (1)
 b) 10:00[√] and 02:00 [√] (2)
 c) 37,5°C^{√√} (2)
 d) Skin's role in thermoregulation;
- Impulse from the end bulbs of Krause,[√] and the low blood temperature[√] stimulate the heat-producing centre [√] in the hypothalamus[√].
 - Impulses are sent to the medulla oblongata [√] via the vasomotor centre[√]
 - Impulses are sent to the dermal arterioles in the skin[√], circular muscles of these vessels contract[√] which limits the flow of blood to the capillary loops[√]. This causes blood to be diverted into shunt vessels in the deeper subcutaneous layers[√], vasoconstriction[√].
 - Little warm blood is carried to the surface, so very little heat will be lost [√] by radiation [√], convection [√] or conduction[√].
 - Vasoconstriction causes less blood to flow to the sweat glands[√], decreasing the secretion of sweat[√]. Less heat is therefore lost through the evaporation of sweat. [√]
 - Erector hair muscles contract[√], the hair follicle is pulled upright[√] causing "goose bump" and reduces heat loss. Insulation layer of air (any 15)
- e) Other functions of the skin
- The cornified layer protects the body against minor mechanical injuries [√] and the entry of germs.[√]
 - It forms a waterproof layer, preventing excessive loss of water. [√]
 - Melanin in the Malpighian layer protects the underlying tissue from the harmful effects of the ultraviolet rays of the sun[√].
 - It acts as a sense organ, enabling the body to react to external changes and dangers and thus prevent injury. [√]
 - Synthesizes Vitamin D from steroids. [√]
 - It is an excretory organ, getting rid of metabolic waste in sweat[√].

- It plays a role in osmoregulation by excreting water and salts ✓
 - It secretes useful substances, e.g. sebum, wax, milk.
- (any 5)

f) Thyroxine/Adrenalin ✓, increases the basal metabolic rate/body heat production ✓ (2)

7.2.1 Iodine ✓ (1)

7.2.2 Iodine is required to form thyroxine ✓. Thyroxine is formed in a series of reactions which involve both tyrosine ✓ and thyroglobulin ✓. If iodine is lacking thyroglobulin accumulates ✓, the thyroid gland swells ✓, forming what is known as a goitre ✓. (6)

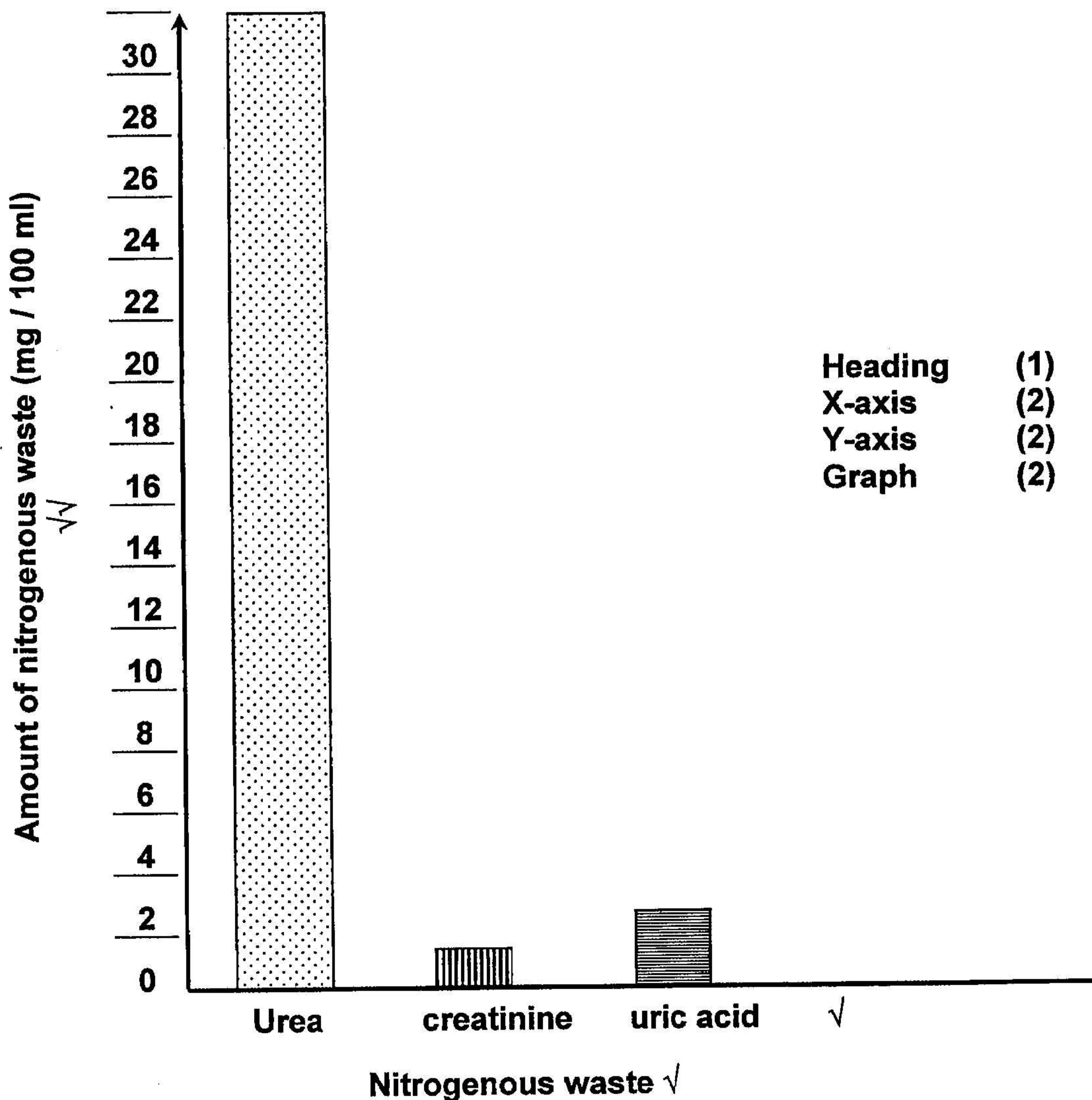
7.2.3 a) Children – Cretinism ✓ (4)
 b) Adults – Myxoedema ✓ (4)

[40]

SECTION C

QUESTION 8

8.1 Nitrogenous waste present ✓ in glomerular filtrate ✓



Heading (1)
 X-axis (2)
 Y-axis (2)
 Graph (2)

(7)

- 8.2 $2\,000\text{ mg} = 2\text{g} \checkmark$
 $\therefore 2\text{ g} \times 24\text{ h} \checkmark$
 $= 48\text{ g per day} \checkmark$ (3)
- 8.3 $\frac{2,8\ell}{14\ell} \times \frac{100}{1} \checkmark\checkmark$
 $= 20\% \checkmark$ (3)
- 8.4.1 glucose \checkmark + amino acids \checkmark (2)
- 8.4.2 Proximal convoluted tubules (1)
- Mechanism:
- These substances are actively reabsorbed \checkmark
 - Energy / ATP is needed to carry the molecules \checkmark
with the aid of a carrier molecule
 - through the cell membranes \checkmark
against the diffusion gradient. \checkmark (4)
- 8.4.3 Proximal tubule
- very long for maximum reabsorption \checkmark
 - a dense capillary network closely surrounding the renal tubule into which substances \checkmark can be reabsorbed. \checkmark
 - Cuboidal epithelial cells \checkmark make up the walls
 - Cells have a border of microvilli \checkmark at their inner surface to increase surface area \checkmark
 - fold on the outer \checkmark wall for the same reason
 - Mitochondria \checkmark in cells produce ATP \checkmark for active reabsorption (Any 5)
- 8.5.1 100 mg / 100 ml glucose in blood plasma.
 No proteins in glomerular filtrate
 no amino acids in urine
 no glucose in urine
 $0,05 \times 24 = 1,200\text{ l urine per day excreted} \checkmark$ (Any 4)
- 8.5.2 Diabetes insipidus \checkmark - hyposecretion of ADH \checkmark
 Diabetes mellitus \checkmark - hyposecretion of insulin \checkmark (4)
- 8.6 Hippuric acid, drugs, medicine (penicillin), colourants, vitamins, hormones, preservatives, urochromes, flavouring. (Any 4)
- 8.7 Renal artery \checkmark – interlobar artery \checkmark – arcuate artery \checkmark – interlobular artery \checkmark – afferent arteriole \checkmark – glomerulus \checkmark – Bowman's capsule \checkmark – proximal convoluted tubule \checkmark – peritubular capillaries \checkmark – interlobular vein \checkmark – arcuate vein \checkmark – interlobar vein \checkmark – renal vein \checkmark (13)
 [50]

QUESTION 9

9.1 **Pathways of light rays and image formation**

As light passes from the air into the eye it moves through the conjunctiva, cornea, refracts light rays, passes through aqueous humour of the anterior and posterior eye cavities, through the pupil, biconvex lens (3 x refracted), through vitreous humour of the glasslike body. In the neural layer of the retina cones and rods are stimulated on the yellow spot's fovea centralis.

(15)

Image formation

The image will be a real image, slightly smaller than the object, upside down and reversed from left to right.

(3)

Accommodation of the lens

The person is focusing further than 6 metres. Ciliary muscles relax. Tension on the ligaments increase and they contract. Pulling force on lens increases, ciliary body brought nearer to lens. Lens flattens (less convex), bending light less. Focus length lengthens. Image can now be focused clearly on the retina.

(9)

Stimulation of the photoreceptors and the pathway of the nerve impulse

Bright light reaches the cones (photoreceptors). Iodopsin is broken down by light energy. This breaking down generates an impulse in the photoreceptors. The impulses pass to the bipolar neuron and form neuron synapses with the ganglion cells. The ganglion cell axons make a right-angle turn at the inner surface of the retina. The axons form the optic nerve which leaves the eye at the blind spot. Two optic nerves cross over in the optic chiasma. Impulses are carried to the visual cortex (occipital lobe) of the cerebrum where the sensation of vision arises.

(15)

9.2 Presbyopia. √√

(2)

Symptoms: Lens loses its elasticity and/or ciliary muscles weaken. √√

(2)

Causes: The eyes lose their power to accommodate and the person can see neither distant nor near images clearly. √√

(2)

Remedy: Two pairs of glasses are needed or bifocals can be used. √√

(2)

[50]

TOTAL FOR SECTION C: [50]

TOTAL: 300

END

**GAUTENGSE DEPARTEMENT VAN ONDERWYS
SENIORSERTIFIKAAT-EKSAMEN**

FISIOLOGIE HG

**AFDELING A
VRAAG 1**

- | | |
|------|---|
| 1.1 | B |
| 1.2 | B |
| 1.3 | B |
| 1.4 | B |
| 1.5 | D |
| 1.6 | D |
| 1.7 | A |
| 1.8 | D |
| 1.9 | C |
| 1.10 | C |
| 1.11 | B |
| 1.12 | C |
| 1.13 | B |
| 1.14 | B |
| 1.15 | B |
| 1.16 | A |
| 1.17 | B |
| 1.18 | C |
| 1.19 | D |
| 1.20 | B |
| 1.21 | B |
| 1.22 | C |
| 1.23 | D |
| 1.24 | A |
| 1.25 | A |

25 x 2 = [50]

VRAAG 2

- | | |
|-----|---|
| 1. | H |
| 2. | A |
| 3. | L |
| 4. | K |
| 5. | F |
| 6. | B |
| 7. | J |
| 8. | C |
| 9. | I |
| 10. | G |

10 x 2 = [20]

VRAAG 3

- 3.1 Parturisie
- 3.2 Selle van Leydig/interstisiële selle
- 3.3 Menstruasie
- 3.4 Glukagon
- 3.5 Filiforme papillae/ draadvormige papille
- 3.6 Cauda equina
- 3.7 Akromatose
- 3.8 Renien
- 3.9 Uriensuur
- 3.10 Dubbele innervasie

10 x 2 = [20]

TOTAAL VIR AFDELING A: [90]

AFDELING B

VRAAG 4

- 4.1.1 Hidrostatiese druk ✓✓ (2)
- 4.1.2 Bloedselle / 'n voorbeeld ✓ en bloedproteïene ✓
Want die deeltjies is te groot ✓ om deur die glomerulêre membraan te gaan (3)
- 4.1.3 B – ekstrasellulêre vloeistof / weefselvloeistof / interstisiële vloeistof.
C – intrasellulêre vloeistof / sitosol / sitoplasma. (2)
- 4.1.4 Deaminasie
 - Oortollige aminosure word na die lewer ✓ vervoer waar dit afgebreek word.
 - Die stikstofgedeelte, die aminogroep (-NH₂) ✓ word van die aminosuur deur deaminasie ✓ verwyder en bind met H⁺ om giftige ammoniak (NH₃) ✓ te vorm.
 - Ammoniak reageer dan met CO₂ ✓ en vorm 'n minder giftige stof, nl. ureum ✓.
 - Ureum beweeg deur die bloed vanaf die lewer na die niere, waar dit uitgeskei word ✓ in die urien.
 - Die nie-stikstofgedeelte ✓ van die aminosuur kan op drie maniere verwerk word
 - Kan geoksideer word tydens sellulêre respirasie ✓ en energie verskaf ✓
 - Oortollige glukose kan ook gestoor word as glikogeen ('n koolhidraat) ✓ in die lewer en in die spiere.
 - Kan ook omgesit word na vet ✓ en onder die vel gestoor word. (enige 8)
- 4.1.5 CO₂ – selrespirasie
Uriensuur – afbreek van nukleïensure
Kreatinien – afbreek van fosfokreatien in die spier
Ammonium – deaminasie van glutamien
Hippuursuur – afbreek van bensoësuur (4)
- 4.2.1 A. Ovulasie
B. Bevrugting
C. Inplantering (3)

- 4.2.2 1 Graaffse follikel
 3. Fallopiusbuis
 4. Blastosist
 5. Endometrium
 6. Corpus luteum/Ovarium (5)
- 4.2.3 Sekondêre oösiet ✓ / ovum ✓ (2)
- 4.2.4 Bevrugting
 • Semenvloeistof ✓ is die vervoermedium. ✓
 • Skroefbewegings ✓ van die stertfibrille dryf die sperms aan. ✓
 • Fruktose ✓ verskaf die energie ✓ vir die sperms om te beweeg.
 • Mitochondrium ✓ in die nek stel energie vry deur selrespirasie. ✓
 • Alkaliese slym ✓ neutraliseer ✓ suur van die vagina. Enige 4x2=(8)
- 4.2.5 Trofoblast, ✓ selle vorm die wand wat 'n hol, vloeistofge vulde ruimte ✓ en 'n sentrale massa ✓ omring. (3)
 [40]

VRAAG 5

- 5.1.1 (a) Tasliggaampies van Meissner
 (b) Orgaan van Corti
 (c) Koglea
 (d) Epidermis
 (e) Keëltjies
 (f) Retina
 (g) Termoreseptore
 (h) Proprioseptore
 (i) Gewrigte
 (j) Smaakpapille (10)
- 5.1.2 (a) Sensoriese neuron ✓
 (b) Multipolêre neuron ✓ (2)
- 5.1.3 Sinapswerking
 • 'n Senu-impuls beweeg met die akson ✓ langs na die eindvertakkings van die sinaptiese knoppies ✓.
 • Binne-in die knoppies is daar blasies (sakkies) ✓ wat 'n neuro-oordragstof ✓ bevat.
 • Die senu-impuls veroorsaak dat die blasies deur die pre-sinaptiese membraan bars ✓ en die oordragstof in die sinaptiese spleet ✓ vrystel.
 • Die neurotransmitter (oordragstof) heg aan die postsinaptiese membraan ✓ van die dendriet ✓ en veroorsaak elektriese impulse ✓ wat na die selliggaam gelei word as 'n senu-impuls.
 • Die impuls word dus op 'n chemiese wyse ✓ oor die spleet gelei.
 • Neuro-oordragstof word net aan een kant van die spleet vrygestel, ✓ impulse word dus slegs in een rigting ✓ gelei/eenrigtingkleppe.

(enige 7)

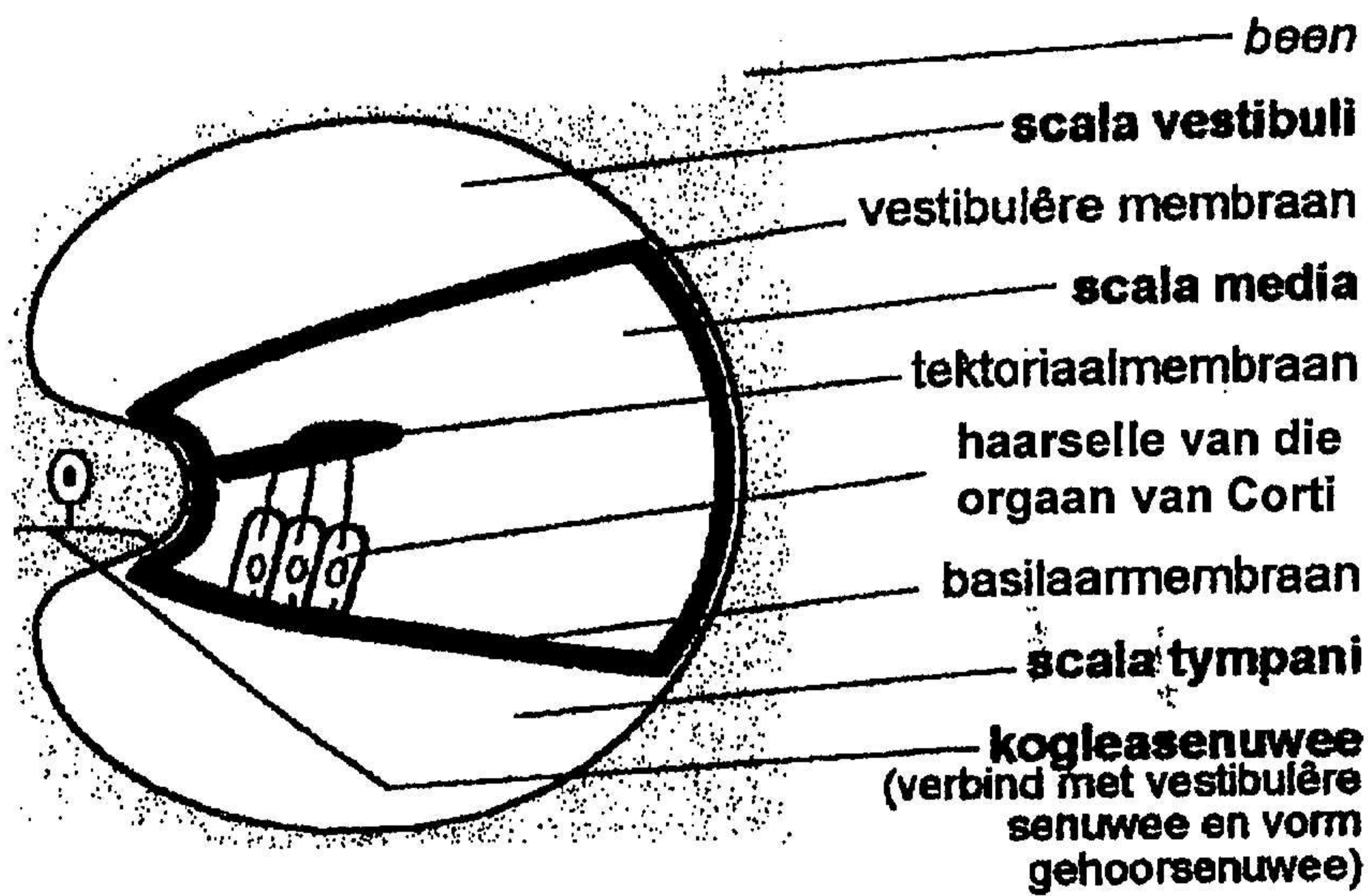
- 5.1.4 Asetielcholien / noradrenalien (norepinefrien) adrenalien (epinefrien) (Enige (1)
- 5.2.1 1. Breinventrikel een en twee / laterale ventrikels
 2. Derde breinventrikel
 3. Duktus van Sylvius
 4. Vierde breinventrikel
 5. Subarachnoïede ruimte
 6. Sentrale kanaal (6)
- 5.2.2 Serebrospinale vloeistof√ (1)
- 5.2.3 Funksies
 • Tree op as 'n skokabsorberende kussing√, en beskerm die delikate strukture van die brein en rugmurg
 • Handhaaf 'n konstante druk√ rondom die SSS
 • Voorsien selle van die SSS van voedingstowwe en suurstof√
 • Verwyder metaboliese afvalstowwe√ uit die selle
 • Verhoed dat selle van die SSS uitdroog√ (5)
- 5.2.4 A. Breinvliese / Meninges
 B. Serebrum / Frontale lob
 C. Serebellum / Kleinbrein
 D. Serebrospinale vloeistof / SSV (4)
- 5.2.5 a) Kringspiere van die iris trek saam, wat die pupil vernou√
 b) Spiere trek saam, wat veroorsaak dat die bronchioli vernou√
 c) Verswak kontraktiliteit en vertraag die hartklop√
 d) Blaaswand trek saam√ / Blaassfinkter ontspan (4)

[40]

VRAAG 6

- 6.1.1 1. Ossikels √ dra die vibrasies van die timpanum oor na die ovaalvenster√ / versterk die vibrasies.
 2. Helikotrema√ dra laefrekwensie-klanke oor na die scala timpanum. √ (4)
- 6.1.2 1. Timpanum-membraan√: dra klankgolwe van die uitwendige gehoorkanaal in die vorm van vibrasies oor na die hamer√
 2. Ovaalvenster-membraan√: dra trillings ontvang vanaf die stiebeuel na die perilimf van die inwendige (binne-) oor√
 3. Rondevenster-membraan√: absorbeer vibrasies nadat dit deur die koglea beweeg het en verhoed weerkaatsing van die klankgolwe√
 4. Buis van Eustachius√: Balanseer die druk in die middelloor-holte met die druk op die uitwendige oor, d.w.s. weerskante van die oordrom, sodat die trommelvlies vrylik kan vibreer. √ (8)

6.1.3 DEURSNIT VAN DIE KOGLEA✓



- 6 x byskrifte
- 1 x diagram
- 1 x opskrif

(8)

6.2.1 Vestibulêre apparaat

- Membraanagtige sakke✓ die utrikulus✓ en sakkulus✓ dryf in die perilimf.✓ Dit kom in die holte net aan die binnekant van die ovaalvenster✓ voor en aan die onderkant van die halfsirkelvormige kanale.
- Dié sakke, gevul met endolimf✓, bevat reseptore, nl. makulae✓, wat die ewewig monitor.
- Die makulae is haarselstroke✓ wat met 'n jellieagtige laag✓ bedek is, waarin klein kalsiumkarbonaatkristalle, nl. otoliete✓ voorkom.

(minstens 5 punte uit hierdie deel)

- Die halfsirkelvormige kanale is ook deel van die vestibulêre appaarat. Hierdie drie halfsirkelvormige kanale ✓ word in die temporale been ✓ bokant die utrikulus aangetref.
- Die drie kanale is reghoekig✓ t.o.v. mekaar gerangskik.
- 'n Halfsirkelvormige buis✓ loop deur elkeen van die kanale en sluit by die utrikulus aan.✓
- Elke buis het 'n geswolle gedeelte aan die onderkant, nl. die ampulla.✓
- Elke ampulla bevat 'n reseptor vir ewewig, nl. 'n krista. ✓
- Die krista is ook 'n strook haarselle✓ bedek met 'n jellieagtige kapsel die kupula✓. (10)

6.2.2 Medulla oblongata✓

(1)

- 6.3 Daling in die kortisoonvlak \checkmark van die bloed, stimuleer die hipotalamus \checkmark .
 Dit skei vrystellingstowwe (KVF) = kortikotrofiese vrystellings faktore \checkmark in die bloed af, wat via die bloed \checkmark na die adenohipofise \checkmark oorgedra word \checkmark .
 Adenohipofise word gestimuleer om AKTH \checkmark (adrenokortikotrofiese hormoon) af te skei \checkmark wat na die adrenale korteks \checkmark oorgedra word.
 Die adrenale korteks skei dan meer kortisoon af \checkmark , wat die vlak na normaal laat terugkeer \checkmark .
 Die normale kortisoonvlak in die bloed inhibeer verdere AKTH-afskeiding \checkmark .
 (enige 9) (9)
 [40]

VRAAG 7

- 7.1.1 Dit beteken dat mense in staat is om 'n konstante \checkmark liggaamstemperatuur te handhaaf \checkmark en hulle hitte van bronne in die liggaam verkry. (2)
- 7.1.2 a) 37°C \checkmark (1)
 b) 10:00 \checkmark en 02:00 \checkmark (2)
 c) $37,5^{\circ}\text{C}$ $\checkmark\checkmark$ (2)
 d) Die vel is betrokke by termoregulering.
- Impulse van die eindknoppe van Krause \checkmark en die lae bloedtemperatuur \checkmark stimuleer die hitte-produserende sentrum \checkmark in die hipotalamus \checkmark .
 - Impulse word deur die vasomotoriese sentrum \checkmark na die medulla oblongata \checkmark gestuur
 - Impulse word na die arterieë in die vel gestuur \checkmark , kringspiere in dié vate trek saam en verminder bloedvloei na die vel \checkmark kapillêre netwerk, die bloed vloei deur die sytakvate na dieperliggende vellae \checkmark . Dit is vaatvernouing \checkmark .
 - Min warm bloed word na die oppervlak vervoer, dus gaan minder hitte deur \checkmark uitstraling, \checkmark konveksie \checkmark /stroming of geleiding verlore \checkmark .
 - Minder bloed gaan ook na die sweetkliere \checkmark , wat die afskeiding van sweet verminder \checkmark . Minder hitte gaan dus deur verdamping van sweet verlore \checkmark .
 - Erektorspiere van die vel trek ook saam \checkmark wat veroorsaak dat die hare op die vel regop staan \checkmark , vorm "hoendervleis" en minder hitte gaan verlore.
- Isolerende luglaag (enige 15)
- e) Ander funksies van die vel
- Die horinglaag van die vel beskerm die liggaam teen geringe meganiese beserings \checkmark en indringing van kieme. \checkmark
 - Vorm 'n waterdigte laag om oormatige waterverlies te verhoed \checkmark .
 - Melanien in die laag van Malpighi beskerm vel teen die skadelike ultravioletstrale \checkmark van die son.
- Die vel is 'n sintuigorgaan wat die liggaam in staat stel om op uitwendige veranderings en gevare te reageer, en om sodoende beserings te voorkom. \checkmark
 - Vervaardig vitamien D uit steroïede. \checkmark
 - Dit is 'n uitskeidingsorgaan en dit raak ontslae van metaboliese afvalstowwe deur te sweet \checkmark .

- Speel 'n rol in osmoregulering deur water en soute uit te skei√.
- Dit skei nuttige stowwe soos sebum, was en melk af.

(enige 5)

- f) Tiroksien/Adrenaliën√ versnel die basale metaboliese tempo/ produseer liggaamshitte.√ (2)

7.2.1 Jodium√ (1)

7.2.2 Jodium is nodig vir tiroksienvorming√. Tiroksien word vervaardig uit 'n reeks reaksies wat tirosien√ en tiroglobulien√ insluit. Met 'n tekort aan jodium sal die tiroglobulien ophoop√, die tiroïed sal opswel√ en 'n goiter√ sal vorm. (6)

7.2.3 (a) Kinders – Kretinisme√ (4)

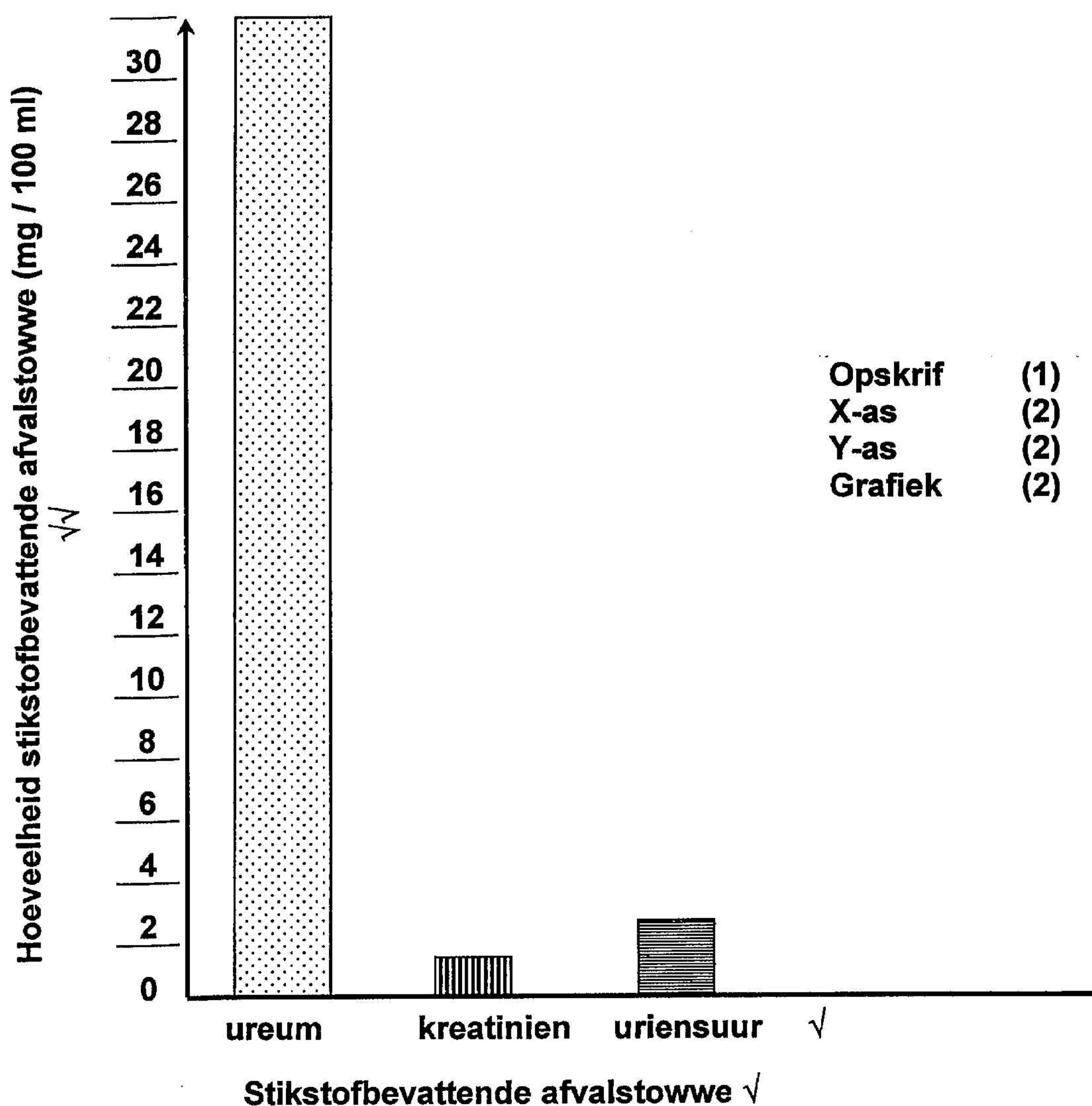
(b) Volwassenes – Miksedeem√ (4)

[40]

AFDELING C

VRAAG 8

8.1 Stikstofbevattende afvalstowwe in glomerulêre filtraat √



Opskrif (1)

X-as (2)

Y-as (2)

Grafiek (2)

(7)

8.2 $2\,000\text{ mg} = 2\text{g} \checkmark$
 $\therefore 2\text{ g} \times 24\text{ h} \checkmark$
 $= 48\text{ g per dag} \checkmark$ (3)

8.3 $\frac{2,8\ell}{14\ell} \times \frac{100}{1} \checkmark \checkmark$
 $= 20\% \checkmark$ (3)

8.4.1 glukose \checkmark en aminosure \checkmark (2)

8.4.2 In die proksimale kronkelbuis (1)

Meganisme:

- Bestanddele word aktief geherabsorbeer \checkmark
- Energie / ATP word benodig \checkmark om die stof met 'n draermolekule te verbind \checkmark
- sodat die stof teen die diffusiegradiënt \checkmark deur die selmembraan in die omringende kapillêre vate kan inbeweeg. (4)

8.4.3 Proksimale kronkelbuisie

- Kronkelbuis is baie lank \checkmark en gekronkel vir maksimale herabsorpsie.
- 'n Digte kapillêre netwerk wat nierbuisie heg omring waarin stowwe maklik geherabsorbeer kan word \checkmark
- Wande bestaan uit gespesialiseerde kubusvormige epiteelselle \checkmark
- 'n Borselvlak van mikrovilli op hulle binneste oppervlakte \checkmark en 'n membraan met baie voue aan die buitenste wandoppervlak \checkmark om die oppervlak te vergroot \checkmark
- Baie mitochondria \checkmark in selle produseer ATP \checkmark vir aktiewe herabsorpsie. (Enige 5)

8.5.1 100 mg / 100 ml glukose in bloedplasma.
 geen proteïene \checkmark in glomerulêre filtraat
 $0,05 \times 24 = 1,200\text{ l urien per dag word uitgeskei} \checkmark$
 geen aminosure \checkmark in urien nie.
 geen glukose \checkmark in die urien nie. (enige 4)

8.5.2 Diabetes insipidus \checkmark – hiposekresie van ADH \checkmark
 Diabetes mellitus \checkmark – hiposekresie van insulien \checkmark (4)

8.6 Hippuursuur, dwelmmiddels, medisyne (penisillien), kleurstowwe, vitamien, hormone, preserveermiddels, uochrome, geurmiddels. (enige 4)

8.7 Nierslagaar \checkmark – interlobêre slagaar \checkmark – boogslagaar \checkmark – interlobulêre slagaar \checkmark – afferente arteriool \checkmark – glomerulus \checkmark – kapsel van Bowman \checkmark – proksimale kronkelbuis \checkmark – peritubulêre kapillêre vate \checkmark – interlobulêre aar \checkmark – boogaar \checkmark – interlobêre aar \checkmark – nieraar \checkmark (13)
 [50]

VRAAG 9

9.1 **Pad van 'n ligstraal en beeldvorming**

Ligstraal beweeg deur die lug en in die oog in en val op die konjunktiva√, kornea√ konvergeer ligstraal,√ beweeg deur waterige vog√ van anterior en posterior oogkamers√, deur pupil√, bikonvekse lens√ (3 x gebreek)√, deur glasagtige vog√ van glasagtige liggaam√. Deur die senuweelaag√ van die retina√ en stimuleer die keëltjies√ en stafies op die fovea centralis√ van die geelvlak√. (15)

Beeldvorming

Die beeld sal 'n egte beeld wees√ effens kleiner√ as die voorwerp, onderstebo en omgedraai van links na regs√. (3)

Akkommodasie van die lens

Persoon kyk verder as 6 meter√. Siliaarspiere ontspan√. Spanning op die ligamente neem toe√ en hulle trek saam√. Trekkrag op die lens neem toe, siliêre liggaam nader aan lens. Lens word platter (minder konveks)√, Ligstrale word minder gebuig√. Fokuslengte verleng√. Beeld fokus nou duidelik op retina√. (9)

Opwekking en geleiding van 'n impuls

Helder ligstrale bereik fotoreseptore√ (keëltjies)√. Idiopsien√ word afgebreek deur ligenergie√. Hierdie afbreekproses genereer 'n impuls in die fotoreseptore√. Impulse word gelei na die bipolarneuron√. Bipolarneurone vorm 'n sinaps√ met die ganglion-selle√ aan die binnekant van die retina√. Laasgenoemde kom saam om 'n optiese senuwee te vorm√ wat die oog verlaat by die blinde vlek√. Oorkruising√ van die twee optiese senuwees vind by die optiese chiasma√ plaas en gelei impulse na die visuele korteks (oksipitale lob)√ van die serebrum√ waar die sensasie van sig ontstaan. (15)

9.2 Presbiopie. √√ (2)

Simptome: Lens verloor sy elasticiteit en/ of siliaarspiere verswak.√√ (2)

Oorsake: Die oë verloor hulle vermoë om te akkommodeer en die persoon kan dus nie naby of ver voorwerpe duidelik sien nie. √√ (2)

Behandeling: Twee brille of een bril met bifokale lense. √√ (2)

[50]

TOTAAL VIR AFDELING C: [50]

TOTAAL: 300

EINDE