

**GAUTENG DEPARTMENT OF EDUCATION
SENIOR CERTIFICATE EXAMINATION**

PHYSIOLOGY SG

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

25x2=[50]

QUESTION 2

- 2.1 Homeostasis
- 2.2 Cells of Leydig / interstitial cells
- 2.3 Menstruation
- 2.4 Acromegaly
- 2.5 Circumvallate papillae
- 2.6 Hypothalamus
- 2.7 Choroid
- 2.8 Nephron
- 2.9 Urea
- 2.10 Central nervous system

(10)

QUESTION 3

- 3.1 I
- 3.2 L
- 3.3 B
- 3.4 N
- 3.5 O
- 3.6 G
- 3.7 J
- 3.8 P
- 3.9 A
- 3.10 Q
- 3.11 E
- 3.12 R
- 3.13 K
- 3.14 F
- 3.15 M

(15)

QUESTION 4

- 1. Cornified layer
- 2. Granular layer
- 3. Malpighian layer
- 4. Epidermis
- 5. Dermis
- 6. Adipose tissue / Fat layer
- 7. Free nerve endings
- 8. Hair shaft / Hair
- 9. Sweat Pore
- 10. Sweat duct
- 11. Erector muscle / Arrector pili ✓
- 12. Hair follicle
- 13. Sweat gland
- 14. Oil gland / Sebaceous gland
- 15. Capillary / Blood vessels ✓

(15)

QUESTION 5

- 5.1 Insulin
- 5.2 Hyposecretion
- 5.3 Thyroxin
- 5.4 Hypersecretion
- 5.5 Cortisone
- 5.6 Hypersecretion
- 5.7 ADH
- 5.8 Hyposecretion
- 5.9 Parathormone
- 5.10 Hypersecretion

(10)

TOTAL FOR SECTION A: [100]

SECTION B**QUESTION 6**

6.1

- 6.1.1 (a) A. Tissue fluid / interstitial fluid. (2)
 (b) B. Cytoplasm

- 6.1.2 C. blood plasma (1)

6.1.3

- Water ✓ –medium for metabolic reactions ✓ / influence water / osmotic potential of cells.
- Glucose ✓ – needed for cell respiration / provision of energy ✓
- Oxygen ✓ needed for cell respiration ✓
- pH ✓ – if pH changes enzymes will denaturate ✓
- Temperature ✓ – if temperature increases enzymes will denaturate / low temperature enzymes will be inactive ✓
- Hormones ✓ – needed in certain concentrations, hyper- / hyposecretions cause deficiency diseases. ✓
- Ions ✓ – needed for normal cell functioning ✓
- Carbon dioxide ✓ – causes pH to drop, ✓ which influences enzyme operation
- Metabolic waste / nitrogen waste ✓ – becomes toxic if accumulates. ✓
 Any 5x2= (10)

- 6.1.4 (a) It is anti-inflammatory and anti-allergic (2)
 It increases the body's ability to resist stress

- (b) Adrenal cortex ✓ (1)

- (c) Water: It causes the increased retention of water / oedema.
 Glucose: It causes a rise in blood sugar concentration because it stimulates the break down of excess proteins into glucose / deamination. (4)

6.2

- 6.2.1 1. Ovum
 2. Umbilical cord
 3. Fallopian tube
 4. Ovary
 5. Uterus
 6. Cervix / uterus
 7. Vagina / birth canal (7)

- 6.2.2 A. Ovulation ✓✓ (2)

- 6.2.3 (a) Zygote
 (b) Embryo
 (c) Foetus (3)

6.2.4 Identical twins ✓✓ (2)

6.2.5 (a) Oestrogen
 (b) Oxytocin
 (c) Prolactin
 (d) Oxytocin
 (e) FSH (5)

6.2.6 (a) mucous plug in the servix ✓
 (b) placenta ✓ (2)

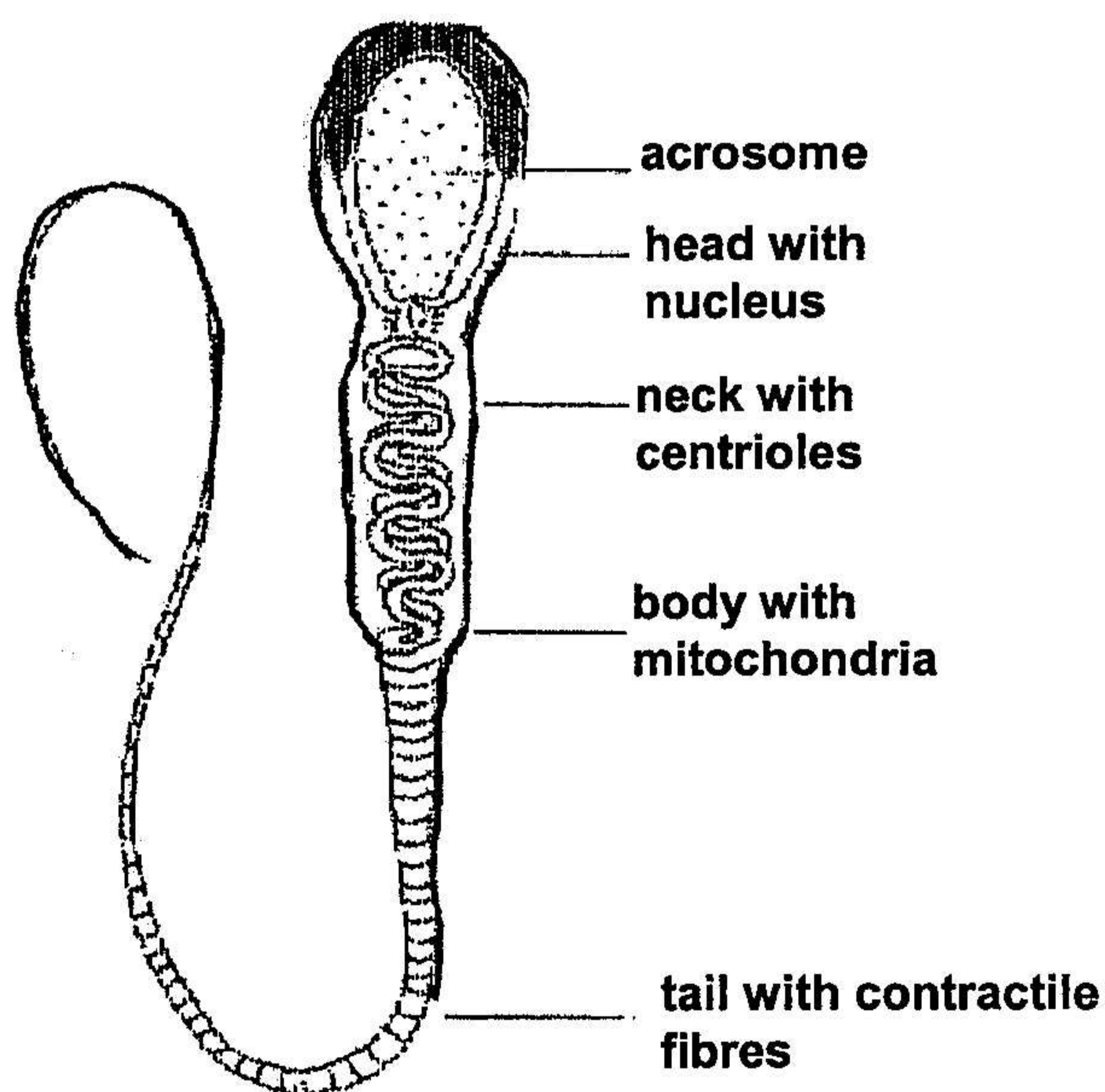
6.2.7 Functions of the amniotic fluid

Protects the embryo against: mechanical shock ✓

- changes in temperature ✓
- dehydration ✓
- adhering (sticking) to the uterine wall ✓ and
- malformations of the foetus due to gravity ✓

Any (4)

6.2.8 Sperm



3x Labels
 1 x Diagram
 1 x Subscript

(5)
 [50]

QUESTION 7

- | | | |
|--------------------------|--|------|
| 7.1 | 7.1.2 End organs of Ruffini | |
| 7.1.1 Cold | 7.1.4 Free nerve endings | |
| 7.1.3 Dermis of the skin | 7.1.6 Taste buds / papillae | |
| 7.1.5 Epidermis | 7.1.8 Bright light / Colour / Detail ✓ | |
| 7.1.7 Tongue | 7.1.10 Retina of the eye | (10) |
| 7.1.9 Rods | | |

7.2

- 7.2.1
2. Cerebrum / Frontal lobe
 3. Pons of Varolii
 4. Medulla Oblongata
 5. Cerebellum
 6. Spinal cord
- (5)

- 7.2.2
- Frontal lobe ✓ – Intelligence ✓ / memory
- Parietal lobe ✓ – Interpreting sensations from the skin ✓
- Occipital lobe ✓ – Sight ✓
- Temporal lobe ✓ – Hearing tasting and smelling ✓
- (8)

- 7.2.3
- Fissure of Rolando ✓
- Fissure of Sylvius ✓
- (2)

- 7.2.4
- Corpus callosum, ✓ fibres connect the left and right hemispheres ✓ and causes information to be conducted over the whole cortex area. ✓
- (2)

7.2.5 Cerebellum

- It is made up of two hemispheres ✓
 - joined by a vermis ✓
 - The surface folds (convolutions) are shallow, ✓ parallel ✓ and are called folia ✓
 - The white matter is found internally, ✓ tree-like shaped and called the arbor vitae ✓
 - Grey matter is found on the outside ✓ and forms the cerebellar cortex ✓
 - Cerebellar peduncles ✓ are three bundles of nerves which connect the cerebellum to the other parts of the brain ✓
 - *Functions:* Coordinate the actions of the voluntary muscles so that we are able to perform complicated physical actions in a smooth, controlled way ✓
 - Coordinate the contractions of the voluntary muscles, ✓ maintaining our balance and equilibrium. ✓
 - Control the muscle tone ✓ which helps the posture.
- (Any 10)

7.3 Reflex action

- Stimulus ✓ generates an impulse ✓ in sensory nerve endings called the free nerve endings of pain ✓
- These impulses are conducted along sensory neurons ✓ and by way of the dorsal root of the spinal nerve ✓ to the dorsal horn ✓ of the gray matter. ✓

- Here the impulses synapse ✓ with connector neurons ✓ (interneurons) which serve as reflex centres. ✓
- From the connector neurons impulses make synaptic ✓ contact with motor neurons / multipolar ✓ in the grey matter of the ventral horn. ✓
- These impulses travel out of the ventral root ✓ of the spinal nerve along the motor efferent neurons to the effector organs. ✓
- Muscle contracts very quickly ✓ / pull hand back.

(any 13)
[50]

QUESTION 8

8.1

8.1.1 A. Inner ear

B. Middle ear

C. Outer ear

(3)

8.1.2 External auditory canal directs sound waves ✓ → tympanic membrane vibrates ✓ → malleus ✓ → incus ✓ → stapes ✓ → transmit the vibrations of the tympanic membrane to the oval window ✓ → which causes waves in the perilymph ✓ in the Scala tympani ✓.

(any 7)

8.1.3 (a) 10 ✓✓

(b) 1 ✓✓

(c) 3 ✓✓

(d) 6 ✓✓

(8)

8.2.1 1. Conjunctiva

2. Iris

3. Cornea

4. Pupil

5. Lens

6. Suspensory ligament

7. Ciliary body

(7)

8.2.2 Lachrymal fluid

- Washes away dust particles ✓
- Destroy germs as it has a hydrolytic enzyme, lysozyme ✓
- Prevents the eye from desiccation (drying out) ✓
- Lubricates the eyelids ✓
- Distributes warmth across the surface ✓
- Glucose feeds the eye ✓

(5)

- 8.2.3 (a) 13
 (b) 2
 (c) 2
 (d) 9 / 14
 (e) 10
 (f) 4
 (g) 1/3
 (h) 8 (8)

8.3 Chemicals in food dissolve in saliva√
 Bitter taste sensations√ stimulate the hair-like projections√ of the sensory cells of the circumvallate. √ This triggers a series of impulses which are conducted via sensory neurons / taste nerve√ to the temporal lobe√ of the cerebral cortex where the sensation of taste arises. (any 6)

8.4 Filiform- papillae√√
 Circumvallate- papillae. √√
 Fungiform papillae√√ (6)
 [50]

QUESTION 9

9.1.1 37°C√ (1)

9.1.2 (a) Less evaporation: Vasoconstriction√ causes less blood to flow to the sweat glands, √ decreasing the secretion of sweat.√ (3)

(b) Radiation: Little heat will be lost by radiation√ because less blood flows to the skin√ as result of vasoconstriction. √ Less radiation occurs. (3)

(c) Insulation: Erector muscles contract. √ The hair follicles are pulled upright√ and trap a thicker layer of air√ which acts as an insulator to reduce heat loss. √ Fat is a poor conductor of heat, so this layer serves to insulate the body against heat loss. √ (4)

9.2.1 Increases the basal metabolic rate√
 Promotes normal functioning of the heart√
 Promotes normal functioning of the nervous system√ (any 2)

9.2.2 (a) Cretinism√ (2)
 (b) Myxoedema√

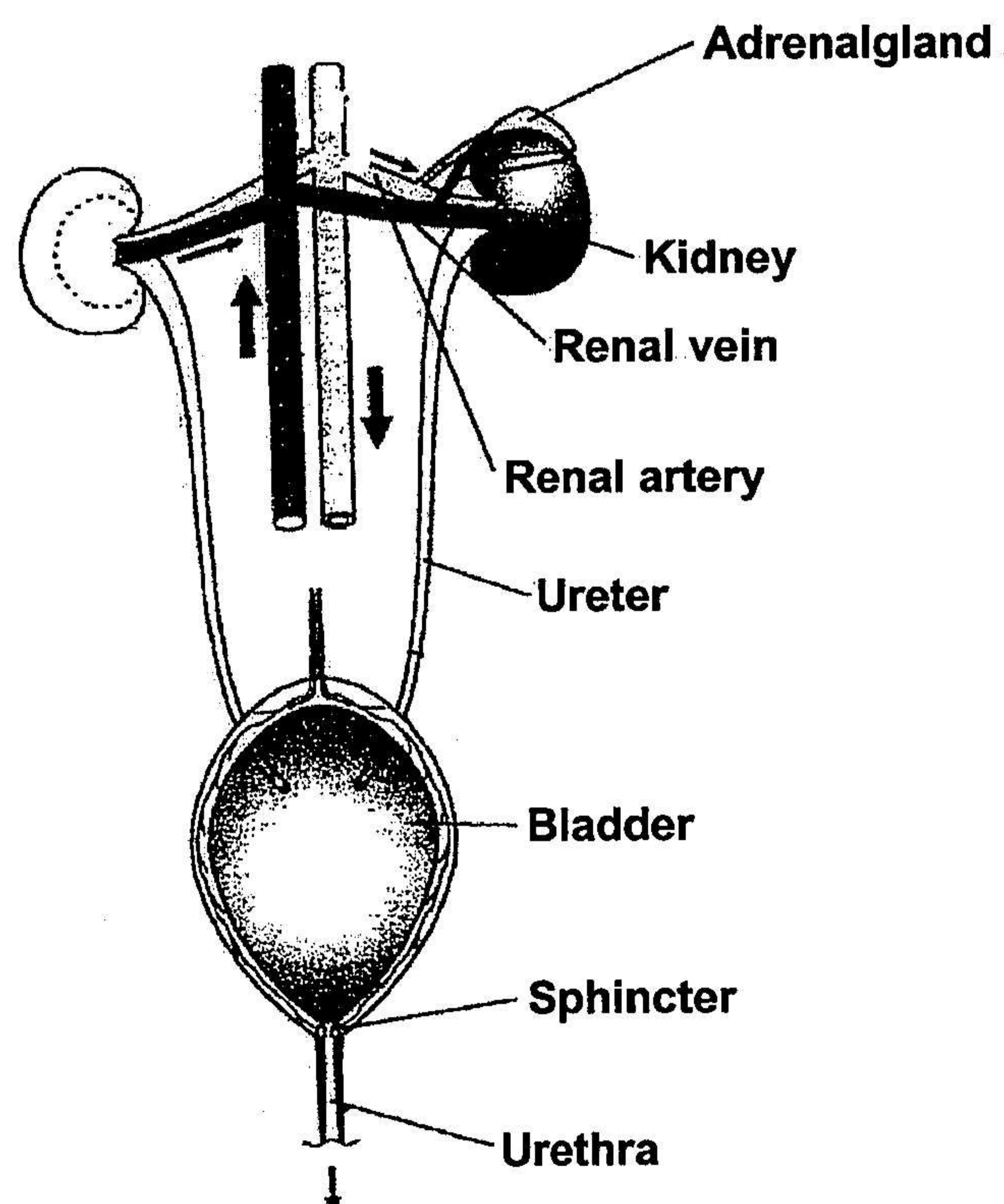
9.2.3 Iodine√√ (2)

9.3 Adrenaline

- Blood pressure is increased✓ because vasoconstriction takes place✓
- Blood sugar levels are increased✓ because liver glycogen is converted to glucose. ✓
- Oxygen content of the blood is raised✓ because the breathing rate and depth are increased✓
- Heart rate is increased, ✓ more blood with higher levels of glucose and oxygen goes to the muscles✓
- Skeletal muscle-tone is increased✓ enabling the muscles to respond more quickly✓
- Dilation of pupils✓
- Increased sweating✓
- Reduction of digestive system activity✓
- Increased mental alertness✓

(any 8)

9.4

URINARY SYSTEM

1 x Subscript
1 x Diagram
6 x Labels

(8)

- 9.5.1 1. Bowman's capsule
 2. Glomerulus
 3. Malpighian body
 4. Afferent arteriole
 5. Proximal convoluted tubule
 6. Loop of Henlé
 7. Distal convoluted tubule (7)

- 9.5.2 (a) 3 / 2
 (b) 5
 (c) 6
 (d) 2
 (e) 5 (5)

- 9.5.3 Water✓
 Salts✓
 Urea✓
 Uric acid✓
 Creatinine✓
 Colourants✓
 Drugs✓
 Medicines✓
 Preservatives✓
 Ammonium ions✓ (any 5)
 [50]

TOTAL FOR SECTION B: [100]

TOTAL: 300

GAUTENGSE DEPARTEMENT VAN ONDERWYS
SENIORSERTIFIKAAT-EKSAMEN

FISIOLOGIE SG

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

25x2=[50]

VRAAG 2

- 2.1 Homeostase
- 2.2 Selle van Leydig/interstisiële selle
- 2.3 Menstruasie
- 2.4 Akromegalie
- 2.5 Omwalde papille (Circumvallate)
- 2.6 Hipotalamus
- 2.7 Choroïed
- 2.8 Nefron
- 2.9 Ureum
- 2.10 Sentrale sensuweestelsel

(10)

VRAAG 3

- 3.1 I
- 3.2 L
- 3.3 B
- 3.4 N
- 3.5 O
- 3.6 G
- 3.7 J
- 3.8 P
- 3.9 A
- 3.10 Q
- 3.11 E
- 3.12 R
- 3.13 K
- 3.14 F
- 3.15 M

(15)

VRAAG 4

- 1. Horinglaag
- 2. Granulêre laag
- 3. Malpighiese laag
- 4. Epidermis
- 5. Dermis
- 6. Vetweefsel / adipose weefsel
- 7. Naakte senuwee eindpunte
- 8. Haarskag/Haar
- 9. Sweetporie
- 10. Sweetbuisie
- 11. Erektorspier / Arrector pili
- 12. Haarfollikel
- 13. Sweetklier
- 14. Olieklier/Sebumklier
- 15. Kapillêre vat / Bloedhaarvaatjie

(15)

VRAAG 5

- 5.1 Insulien
- 5.2 Onderafskeiding/hiposekresie
- 5.3 Tiroksien
- 5.4 Oorafskeiding/hipersekresie
- 5.5 Kortisoan
- 5.6 Oorafskeiding/hipersekresie
- 5.7 ADH
- 5.8 Onderafskeiding/hiposekresie
- 5.9 Parathormoon
- 5.10 Oorafskeiding/hipersekresie

(10)

TOTAAL VIR AFDELING A: [100]

AFDELING B**VRAAG 6**

- 6.1
- 6.1.1 (a) A. Weefselvloeistof / interstitiële vloeistof (2)
 (b) B. Sitoplasma (2)
- 6.1.2 C. bloedplasma (1)
- 6.1.3
- Water √ –medium vir metaboliese reaksies / beïnvloed water- / osmotiese potensiaal van selle. √
 - Glukose √ nodig vir selrespirasie / energieverkaffing
 - Suurstof √ nodig vir selrespirasie √
 - pH √ ensieme denatureer as pH verander √
 - Temperatuur √ – by hoë temperature denatureer ensieme / by lae temperature is ensieme onaktief √
 - Hormone √ nodig in sekere konsentrasies. Oor/onderafskedings veroorsaak gebreksiektes √
 - Koolstofdiksied. √ Indien dit ophoop, verlaag pH wat ensiemwerking beïnvloed √
 - Ioonkonsentrasies √-lone nodig vir die funksionering van selle √
 - Metaboliese afvalstowwe / stikstofbevattende afval √ raak toksies as ophoop. √ Enige 5x2= (10)
- 6.1.4 (a) Dit is anti-inflammatories√ en anti-allergies√
 Verhoog die liggaam se vermoë om alle stress teen te staan. Enige 2 (2)
- (b) Adrenale korteks / Bynierkorteks√ (1)
- (c) Water: Verhoog die retensie √ (terughouding) van water / edeem word veroorsaak.
 Glukose: Word verhoog omdat dit die afbreek van oortollige proteïene na glukose stimuleer / deaminasie van proteïene. √ (4)
- 6.2
- 6.2.1 1. Ovum / eiersel
 2. Naelstring
 3. Fallopiese buis
 4. Ovarium / eierstok
 5. Uterus / baarmoeder
 6. Serviks
 7. Vagina / geboortekanaal (7)
- 6.2.2 A. Ovulasie√√ (2)
- 6.2.3 (a) Sigoot
 (b) Embrio
 (c) Fetus (3)

6.2.4 'n Identiese tweeling ✓✓ (2)

6.2.5 (a) Estrogeen
 (b) Oksitosien
 (c) Prolaktien
 (d) Oksitosien
 (e) FSH (5)

6.2.6 (a) slymprop in serviks
 (b) plasenta (2)

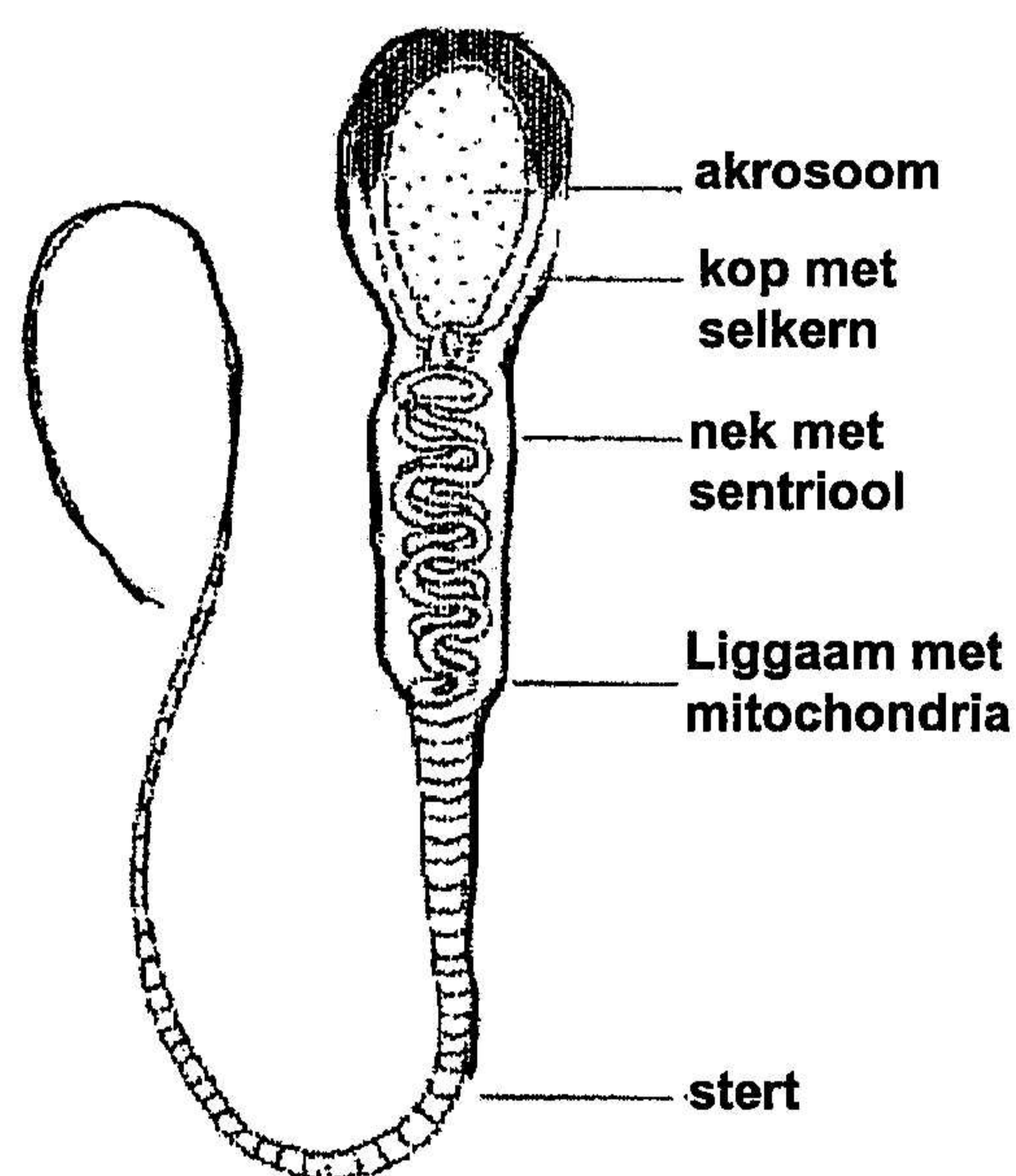
6.2.7 Funksies van die amnionvloeistof

Beskerm die embryo teen: meganiese skokke ✓

- Veranderinge in temperatuur ✓
- Dehidrasie ✓
- Vasklewing teen die wand van die uterus ✓
- Vervorming van die fetus as gevolg van gravitasie ✓

Enige (4)

6.2.8 Sperm



1 x Diagram
 1 x Opskrif
 3 x Byskrifte

(5)
 [50]

VRAAG 7

7.1

7.1.1 Koue

7.1.2 Tasliggaampies van Ruffini

7.1.3 Dermis van die vel

7.1.4 Vrye / Naakte senuwee-eindpunte

7.1.5 Epidermis

7.1.6 Smaakpapille / smaakbekers

7.1.7 Tong

7.1.8 Helder lig / Kleur / Detail

7.1.9 Stafies

7.1.10 Retina van die oog

(10)

7.2

- 7.2.1
2. Serebrum / Frontale lob
 3. Pons van Varolii
 4. Medulla Oblongata
 5. Serebellum / Kleinbrein
 6. Rugmurg
- (5)

- 7.2.2
- Frontale lob ✓ – Intelligensie ✓ / geheue
- Pariëtale lob ✓ – Velsensasies ✓
- Oksipitale lob ✓ – Sig ✓
- Temporale lob ✓ – Gehoor, smaak en reuk ✓
- (8)

- 7.2.3
- Groef van Rolando ✓
- Groef van Sylvius ✓
- (2)

- 7.2.4
- Corpus callosum ✓
- Verbind die twee breinhelftes / serebrale himisfere
 - of
 - veroorsaak dat inligting oor die hele brein versprei.
- (2)

7.2.5 Serebellum

- Bestaan uit twee hemisfere ✓
 - Vasgeheg deur 'n vermis ✓
 - Vlak, ✓ parallele ✓ groefies nl. lamellae ✓
 - Witstof lê aan die binnekant en lyk soos boomtakke, die arbor vitae ✓
 - Grysstof lê aan die buitekant en vorm die serebellêre korteks ✓
 - Serebellêre pedunkels is drie senubundels wat die serebellum met die res van die brein verbind ✓
 - *Funksies:* Koördineer reaksies van willekeurige spiere om ingewikkelde fisiese handeling op 'n gekontroleerde wyse uit te voer ✓
 - Koördineer sametrekking van willekeurige spiere ✓ en handhaaf so balans en ewewig ✓
 - Beheer spiertonus ✓ vir die korrekte liggaamshouding
- (Enige 10)

7.3 Refleksaksie

- Stimulus ✓ van die duimspyker word omgesit in 'n impuls ✓ deur die vry senu-eindpunte van pyn ✓
- Word vervoer met sensoriese of afferente neurone ✓ deur die dorsale wortel ✓ van die rugmurgsenuwee ✓ na die grysstof ✓ van die rugmurg in die dorsale horing. ✓

- Die impulse word sinapties na die verbindingsneurone (interneurone) wat as refleksentrum dien, ✓ oorgedra.
- Lg. maak sinaptiese kontak ✓ met die motoriese neurone ✓ / multipolêre neurone in die grysstof en verlaat die grysstof by die ventrale horing. ✓
- Die impuls beweeg uit die ventrale wortel ✓ van die rugmurgsenuwee met die motoriese efferent senuwee na die effektororgane. ✓
- Spiere trek baie vinnig saam ✓ / hand word weggeruk.

(enige 13)
[50]

VRAAG 8

8.1

8.1.1 A. Binne-oor

B. Middelloor

C. Buite-oor

(3)

8.1.2 Uitwendige gehoorgang ✓ gelei klankgolwe ✓ → Trommelvlies (timpanum) wat vibreer ✓ → malleus ✓ → inkus ✓ → stapes ✓ → vibreer op die ovaalvenster ✓ → vibrasie in perilimf ✓ in die scala tympani ✓ → waar reseptore ✓ is.

(enige 7)

- 8.1.3 (a) 10 ✓✓
(b) 1 ✓✓
(c) 3 ✓✓
(d) 6 ✓✓

(8)

8.2

8.2.1 1. Konjunktiva

2. Iris

3. Kornea

4. Pupil

5. Lens

6. Suspensoriese ligament

7. Siliêre spier

(7)

8.2.2 Traanvloeistof

- Was stofdeeltjies weg ✓
- Vernietig kieme met lisosieme / hidrolitiese ensiem ✓
- Voorkom desikkasie ✓ / uitdroging van oog
- Smeer ooglede ✓
- Versprei hitte ✓ eweredig oor die oppervlak van oog
- Glukose voed die oog ✓

(5)

- 8.2.3 (a) 13
 (b) 2
 (c) 2
 (d) 9 / 14
 (e) 10
 (f) 4
 (g) 1/3
 (h) 8 (8)
- 8.3 Chemikalieë in voedsel los op in die speeksel. ✓
 Haarselle van die omwalde papille word geprikkel deur die bitter smaak. ✓
 Dit veroorsaak 'n reeks senu-impulse ✓ / wat via die sensoriese neurone /
 smaaksenuwee ✓ na die temporale lob ✓ van die serebrale korteks vervoer
 word waar die sensasie van smaak ontstaan. ✓ (enige 6)
- 8.4 Villivormige / draadvormige ✓✓ papille / filivorme.
 omwalde / omkringde ✓✓ papille / circumvallate (6)
 Fungivormige / knopvormige ✓✓ papille [50]

VRAAG 9

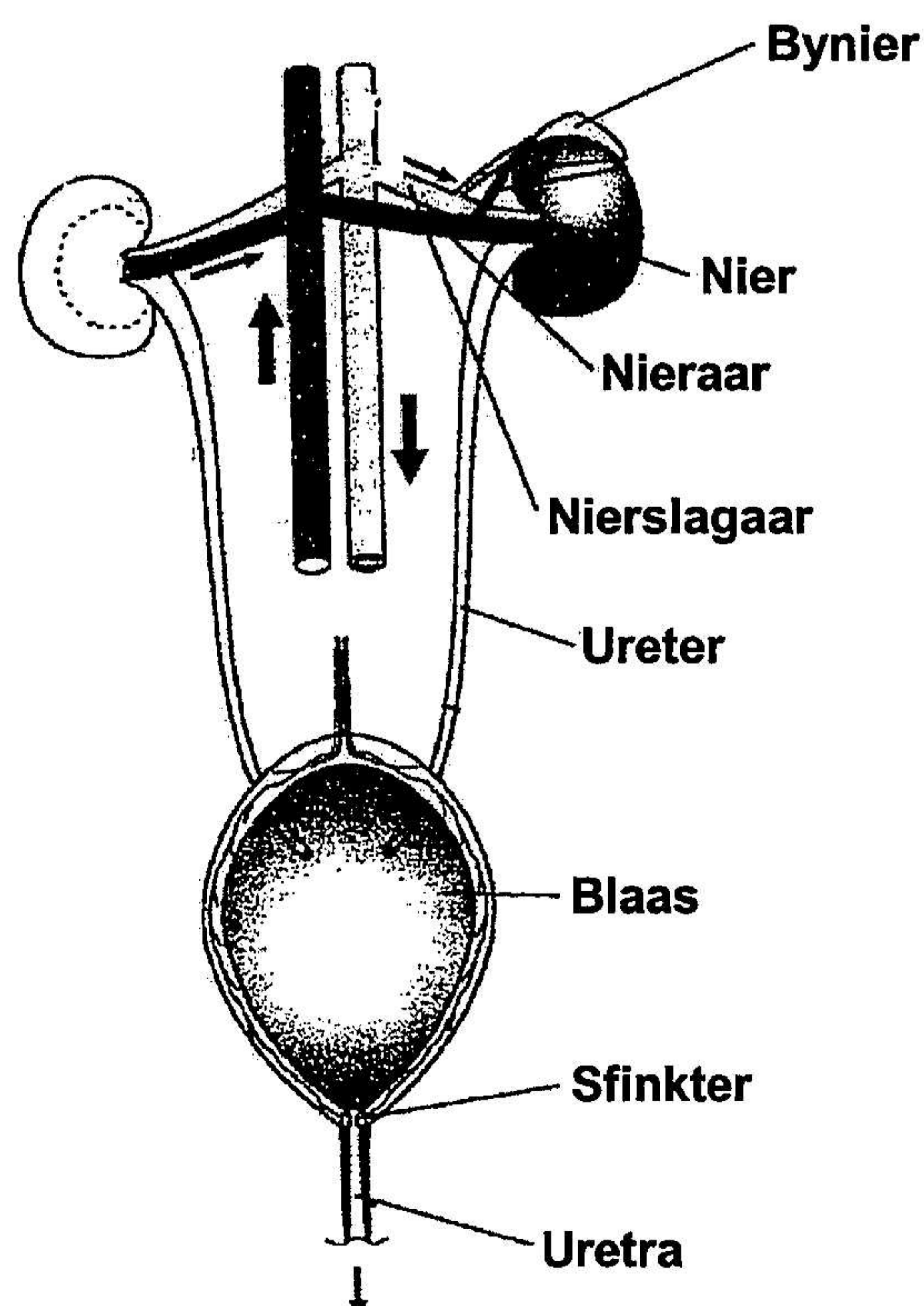
- 9.1.1 37°C ✓ (1)
- 9.1.2 (a) Minder verdamping: Bloedvate wat bloed na die vel vervoer, vernou, ✓
 minder bloed word na die sweetkliere vervoer. ✓ Minder sweet word
 vrygestel. ✓ (3)
- (b) Minder uitstraling: Minder bloed na die vel ✓ as gevolg van die vernouing ✓
 van die kapillêre bloedvate wat na die vel bloed vervoer. Minder
 uitstraling vind plaas. ✓ (3)
- (c) Isolasië: erektorspiere trek saam. ✓ Die haarfollikels word regop
 getrek ✓ en vang 'n dikker laag lug vas ✓ wat as 'n isolasielaag ✓ dien.
 Minder uitstraling. ✓ Vet ✓ is ook 'n isolasielaag wat dien om die
 liggaam teen hitteverlies te beskerm. ✓ (4)
- 9.2.1 Verhoog die basale metabolismiese tempo ✓
 Bevorder normale hartfunksionering ✓
 Bevorder normale funksionering van die senuweestelsel ✓ (enige 2)
- 9.2.2 (a) Kretinisme ✓ (2)
 (b) Miksedeem ✓
- 9.2.3 Jodium ✓✓ (2)

9.3 Adrenaliën

- Bloeddruk word verhoog ✓ a.g.v. vaatvernouing. ✓
- Bloedsuikervlak word verhoog ✓ omdat die lewer glikogeen omsit in glukose. ✓
- Suurstofinhoud van die bloed verhoog ✓ want asemhalingstempo en -diepte word verhoog. ✓
- Hartklop word verhoog, ✓ meer glukose en suurstof word na die spiere vervoer. ✓
- Spiertonus van die skeletspiere verhoog, wat hulle in staat stel om vinniger te beweeg ✓
- Vergroting van die pupille ✓
- Toename in die sweetafskeiding ✓
- Afname in die aktiwiteit van die SVK ✓
- Verhoogde verstandelike gewaarwording ✓

(enige 8)

9.4

UITSKEIDINGSTELSEL

1 x Opskrif
1 x Diagram
6 x Byskrifte

(8)

- 9.5.1 1. Bowman Kapsel
 2. Glomerulus
 3. Liggaampie van Malpighi
 4. Afferente arteriool
 5. Proksimale kronkelbuis
 6. Boog van Henlé
 7. Distale kronkelbuis (7)

- 9.5.2 (a) 3 / 2
 (b) 5
 (c) 6
 (d) 2
 (e) 5 (5)

- 9.5.3 Water ✓
 Soute ✓
 Ureum ✓
 Uriensuur ✓
 Kreatinien ✓
 Kleurstowwe ✓
 Dwelms ✓
 Medisyne ✓
 Perserveermiddels ✓
 Ammoniumione ✓ (enige 5)
 [50]

TOTAAL VIR AFDELING B: [100]

TOTAAL: 300