

**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 B
- 1.24 A
- 1.25 A

25x2=[50]

QUESTION 2

- 2.1 Accommodation
- 2.2 Semicircular canals
- 2.3 Podocytes
- 2.4 Proprioceptors
- 2.5 Homeostasis
- 2.6 Cretinism
- 2.7 Endometrium
- 2.8 Vasoconstriction
- 2.9 Medulla oblongata
- 2.10 Renin

10x2=[20]

QUESTION 3

- 3.1 L
- 3.2 A
- 3.3 H
- 3.4 C
- 3.5 D
- 3.6 G
- 3.7 I
- 3.8 J
- 3.9 O
- 3.10 B

10x2=[20]

QUESTION 4

- 4.1 Axon
- 4.2 Mitochondrion
- 4.3 Synaptic cleft / neurotransmitter e.g. acetylcholin / adrenalien / epinephrine
norepinephrine / noradrenalin
- 4.4 Semicircular canals
- 4.5 Round window
- 4.6 Cochlear nerve / vestibulo-cochlear nerve / vestibular nerve.
- 4.7 Ureter
- 4.8 Bladder
- 4.9 Urethra
- 4.10 Penis

TOTAL FOR SECTION A: [100]**SECTION B****QUESTION 5**

- 5.1
 - 5.1.1 Cold✓ – End bulbs of Krause✓
Heat✓ – End organ of Ruffini✓
Pressure✓ – Pacinian corpuscles✓
Touch✓ – Meissner's touch corpuscles✓
Pain✓ – Free nerve endings✓ (10)
 - 5.1.2 Sebaceous gland✓ – secretes sebum✓, makes skin waterproof✓ / protects
skin from drying out✓, keeps it pliable✓
(1+any 2 functions) (3)
(Any 3)
 - 5.1.3 Malpighian layer✓ – Divide by mitosis✓ – form new cells daily✓
– Melanocytes contain melanine✓ – which protects
skin against UV rays✓ / sunburn (Any 5) (5)
(1.+4 functions)

- 5.1.4 On a cold day the end bulbs of Krause[✓] will be stimulated.
 The heat regulating centre[✓] in the hypothalamus[✓] senses the drop in blood temperature. [✓]
 Sends an impulse to the vaso-motor centre[✓] in the medulla oblongata[✓].
 The smooth muscles[✓] in the peripheral arterioles[✓] / skin will constrict[✓].
 Less blood flow to the skin[✓].
 Less sweat is produced[✓],
 Less heat loss by evaporation[✓], convection[✓], conduction[✓], radiation [✓]
 Erector muscle will be stimulated[✓], hair stands erect[✓] / goose bumps
 Air trapped between hair[✓], isolation[✓] layer, less heat loss by conduction,
 radiation, convection (Any 10) (10)
- 5.2
- 5.2.1 (a) Is the time when an immature individual becomes capable of reproducing^{✓✓} (2)
- (b) Males: ICSH (3)
 Females: FSH and LH
- 5.2.2 - Growth in height
 - External genitalia increase in size
 - Hair grows in pubic area, axillae, upper lip and chin
 - Larynx increase in size, vocal cords thicken and voice deepens.
 - Skeletal muscles develop
 - Skin thickens
 - Red blood cells are produced in greater numbers (7)
- 5.2.3 Oxygen concentration[✓]: Oxygen needed for cell respiration[✓] / to provide energy
 Carbon dioxide[✓]: Waste product of cell respiration, if accumulates in cell it lowers pH[✓] of tissue fluid[✓]
 Water content[✓]: It affects the water and osmotic and water potential of fluids, needed for all biochemical reactions
 pH level[✓]: pH must be 7.0 to 7.4 for functioning of enzymes. If pH changes enzymes denature[✓].
 Temperature[✓]: High temperature denatures enzymes / at low temperatures enzymes are inactive[✓].
 Glucose concentration: Needed for cell respiration to release energy. / Affects water potential of fluids.
 Ion concentration[✓] : Needed for proper cell functioning / e.g. [✓]
 Hormone concentration[✓]: Needed in certain concentrations hypo- / hyper secretion can cause deficiency diseases[✓]
 Nitrogenous waste[✓]: Becomes toxic if accumulates in cell / derives from protein metabolism[✓]
 (Any five) 5x2=(10)
 [50]

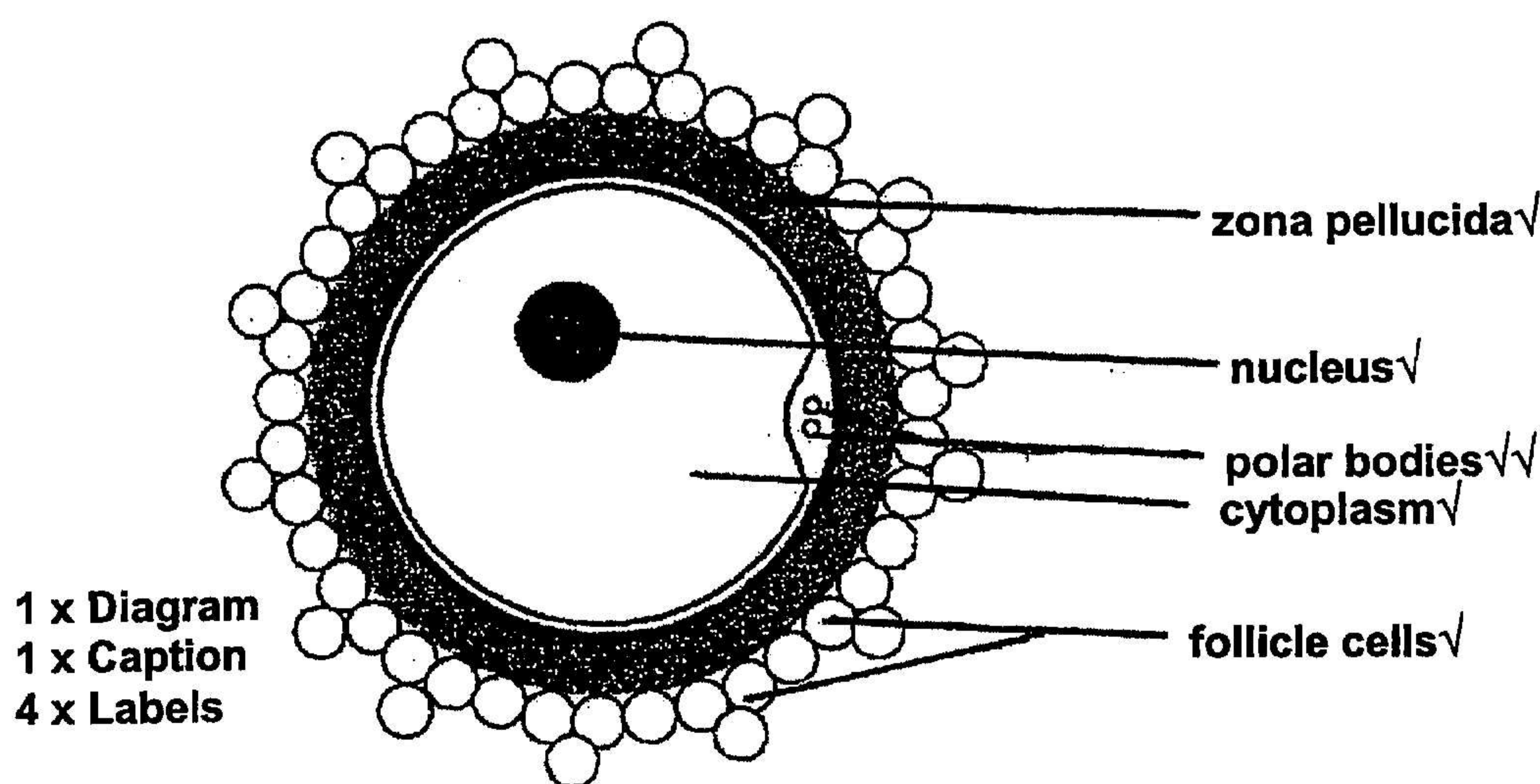
QUESTION 6

- 6.1 6.1.1 Multipolar neuron / motor neuron✓✓ (2)
- 6.1.2
1. Dendrite / afferent outgrowth
 2. Cell body / cell membrane / centron
 3. Node of Ranvier
 4. Neurilemma
 5. Axon / efferent outgrowth
 6. Myelin sheet
 7. Terminal branches
- (7)
- 6.1.3 Muscles✓ or glands✓ (2)
- 6.2 6.2.1
1. Cerebrum
 2. Medulla oblongata
 3. Cerebellum
 4. Spinal cord
- (4)
- 6.2.2
5. longitudinal fissure
 6. fissure of Rolando
 7. fissure of Sylvius
- (3)
- 6.2.3 Frontal lobe✓ Voluntary movements and speech✓ / seat of intelligence, / higher mental activities / emotions
- Parietal lobe✓ Sensations from skin✓
- Temporal lobe✓: Hearing/ tasting/ smelling✓
- Occipital lobe✓: Sight✓ (8)
- 6.2.4 The spinal cord is protected by the following:
- The vertebrae✓ that surround it
 - The 3 meninges✓, Dura mater✓, arachnoid mater✓, pia mater✓
 - The subarachnoid cavity✓ is filled with cerebro-spinal fluid✓
Acts as cushion✓ and shock absorber✓, maintains uniform pressure✓, prevents it from drying out✓ (Any 5) (5)
- 6.2.5 White matter: Myelinated fibres (axons) of the neurons✓✓ (4)
- Gray matter : Cell bodies with granular cytoplasm of neurons✓✓ (4)
- 6.2.6 Hypothalamus: Controls automatic nervous system
- Heart rate / visceral activities / blood pressure / urinary bladder
 - Controls hypophysis
 - Maintains homeostasis:
Regulates body temperature
Sleeping patterns
Thirst
Appetite
Centre for behavioural drives
Emotions (Any 2) (4)

- 6.2.7 (a) A reflex action: Automatic response✓ of a muscle or gland✓ to a stimulus received✓ by a receptor organ (3)
- (b) Unconditioned reflex: we are born with these reflexes to protect the body
 Conditioned reflex: acquired by learning✓ / an adaptive change in behaviour due to experience✓ (4)
- (c) Unconditioned reflexes: Pupillary mechanism, blinking of eyes, sneezing, coughing, salivation
 Conditioned reflexes: reading, tying shoelaces, driving, playing piano, regulating external bladder sphincter (Any 2 of each) (4)
- [50]

QUESTION 7

- 7.1 7.1.1 1. Fallopian tube
 2. Infundibulum / Fimbriae
 3. Ovary
 4. Zygote / Morula
 5. Umbilical cord
 6. Cervix (6)
- 7.1.2 Non-identical twins✓
 - Each develops from a different ova✓
 - Gender is different or the same✓
 - Each has its own placenta✓ (4)
- 7.1.3 Oestrogen and progesterone✓ prepare mammary glands to produce milk✓
 Prolactin✓ stimulates milk glands to produce milk✓
 Oxytocin✓ causes the release (flow) of milk✓ (4)
- 7.1.4 Oxytocin✓ (2)
- 7.1.5 Ovum ready for fertilization (6)



(6)

7.1.6 **Semen:**

Spermatozoa✓ and seminal fluid✓
 Seminal fluid consists of the following secretions:
 section of seminal vesicles✓ which contain yellow mucus alkaline✓
 substance providing transport medium✓ / which enables spermatozoa
 to move
 globulin✓ and fructose✓ as a source of nourishment✓ and energy✓
 alkaline fluid neutralises acid in the vagina and urethra of penis✓

Secretion of the prostate gland✓
 Rich in citric✓ acid prostaglandins✓ and enzymes✓
 to activate the sperms✓ and increase its viability✓

Secretion of the Cowper's gland✓
 Alkaline substance✓ neutralising the acid in urethra✓
 Contains mucus which lubricates✓ the end of penis during intercourse✓
 (Any 10) (10)

7.2

	GLAND	HORMONE	FUNCTION
1	Adenohypophysis	TSH	Stimulate the thyroid to secrete thyroxin
2	Neurohypophysis	ADH / Vasopressin	Increases the permeability of the cells in the nephron
3	Thyroid	Thyroxin	Regulates metabolic tempo / enhances the function of the heart / nerves
4	Adrenal gland	Aldosterone	Stimulates the reabsorption of sodium
5	Ovary	Estrogen	Responsible for secondary female sex characteristics
6	Testis	Testosterone	Responsible for secondary sex characteristics of male

(18)
[50]**QUESTION 8**

- 8.1 8.1.1 Tears / Lachrymal fluid✓
 - Washes away dust particles
 - Destroys germs as it is salty
 - Prevents eyes from desiccation
 - Lubricates the movement of the eyelids
 - Distributes warmth across the eye surface (1+5 functions) (6)
- 8.1.2 No. 4 Lachrymal duct✓
 - Drain✓ excess fluid / tears to the nose✓ (1+2) (3)

- 8.1.3 1 Sclera
2 Iris
3 Pupil (3)
- 8.1.4 If a person looks at the sun – sharp light✓
- radial muscles in the iris relax✓
- circular muscles constrict✓
- pupil contracts and becomes smaller✓
- parasympathetic stimulation✓ (5)
- 8.1.5 Yellow spot - In the centre of retina✓
- contains more cones✓
- region with highest visual acuity✓
- small indentation in the middle called fovea centralis (only contains cones) ✓
Blind spot - No cones or rods✓
- Not sensitive to light stimulus✓
- Blood vessels enter and leave eye here✓
- Optical nerve leaves eye here✓ (8)
- 8.2 8.2.1 1: Renal artery✓ – oxygenated bloods, rich in impurities (metabolic waste) ✓
2: Renal vein✓ – Deoxygenated blood, without metabolic waste✓ (4)
- 8.2.2 Kidneys are protected by:
- Fibrous renal capsule against physical injuries✓
- Adipose tissue against physical injury✓
- Outer fibrous connective tissue anchors kidney and prevents displacement✓
- Protected by the last pair of ribs✓
Strong muscles of the back form a protective layer✓ (5)
- 8.2.3 3. Ureter
4. Pelvis
5. Renal capsule
6. Cortex
7. Medulla / Pyramid
8. Collective duct / duct of Bellini (6)
- 8.2.4 (a) Hydrostatic pressure
(b) Loop of Henlé
(c) Aldosterone
(d) Proximal convoluted tubule
(e) Bladder
(f) Urethra
(g) ADH
(h) Bowman's capsule
(i) Glomerulus
(j) Proximal convoluted tubule (10)

[50]

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 B
- 1.24 A
- 1.25 A

25x2=[50]

VRAAG 2

- 2.1 Akkommodasie
- 2.2 Semisirkulêre kanale / halvesirkelvormige kanale
- 2.3 Podosiete
- 2.4 Proprioseptore
- 2.5 Homeostase
- 2.6 Kretinisme
- 2.7 Endometrium
- 2.8 Vasokonstriksie
- 2.9 Medulla oblongata
- 2.10 Renien

10x2=[20]

VRAAG 3

- 3.1 L
- 3.2 A
- 3.3 H
- 3.4 C
- 3.5 D
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10x2=[20]

VRAAG 4

- 4.1 Akson
- 4.2 Mitochondrium
- 4.3 Sinapsspleet/neuro-oordragstof/bv. asetielcholien / adrenalien / noradrenalien / epinefrien / norepinefrien
- 4.4 Halfsirkelvormige kanale / Semisirkulêre kanale
- 4.5 Ronde venster
- 4.6 Kogleasenuwee / vestibulokogleêre senuwee / ewewigsenuwee
- 4.7 Ureter
- 4.8 Blaas
- 4.9 Uretra
- 4.10 Penis

TOTAAL VIR AFDELING A: [100]**AFDELING B****VRAAG 5**

- 5.1
 - 5.1.1 Koue√ – Tasliggaampie van Krause√
 Hitte√ – Tasliggaampie van Ruffini√
 Druk√ – Tasliggaampie van Paccini√
 Tas√ – Tasliggaampie van Meissner√
 Pyn√ – Naakte senuwee-eindpunt√ (10)
 - 5.1.2 Sebumklier√ – skei sebum/olie√ af wat die vel waterdig maak√ / beskerm teen uitdroging√ en hou dit elasties√
 (1+enige 2 funksies)
 (Enige 3) (3)
 - 5.1.3 Laag van Malpighi√ – Verdeel deur mitose√ – vorm daaglik nuwe selle√
 – Melanosiete√ bevat pigment melaniën√ wat vel teen UV strale van son beskerm√ / teen sonbrand beskerm√
 (Enige 5) (5)
 (1+4 funksies)

- 5.1.4 Op 'n koue dag sal tasliggaampies van Krause√ gestimuleer word.
 Die hitte reguleringsentrum√ in die hipotalamus√ neem 'n verandering in
 bloedtemperatuur√ waar.
 Impulse word na die vasomotoriese sentrum√ in die medulla oblongata√
 gestuur.
 Gladde spiere√ in die periferêre arteriole√ vernou. √ Minder bloed na die vel
 vervoer. √
 Minder hitte verlore deur uitstraling, √ geleiding, √ en stroming. √
 Minder sweet word gevorm, √ minder hitteverlies deur verdamping√
 Erektorspier√ word gestimuleer om saam te trek√
 Vervang lug vas tussen hare, √ isolasielaag, √ minder hitte verlore deur
 geleiding, stroming en uitstraling. (Enige 10) (10)
- 5.2
- 5.2.1 (a) Wanneer 'n onvolwassene sekere veranderinge ondergaan op pad na
 volwassenheid wat hulle in staat stel om te kan voortplant. √√ (2)
- (b) Seuns: ISSH√
 Dogters: FSH√ en LH√ (3)
- 5.2.2
- Toename in lengte
 - Vergroting van die uitwendige geslagsorgane.
 - Hare groei op die pubiese dele, onder die arms, op die bolip en ken.
 - Larinks / stemkas vergroot en stembande verdik en die stem is dieper.
 - Skeletspiere veral in die bors en dye begin vergroot.
 - Vel verdik.
 - Rooibloedselle vermeerder (7)
- 5.2.3 Suurstofkonsentrasie√: Nodig vir selrespirasie√ om energie beskikbaar te stel
 Koolstofdiksied√: Afvalproduk van selrespirasie, as dit ophoop verlaag
 pH van weefselvloeistof√
 Water√: Beïnvloed die osmotiese en waterpotensiaal√ van
 oplossings / benodig vir alle biochemiese reaksies
 pH-vlak√: pH moet tussen 7.0 en 7.4 wees sodat ensieme
 kan werk. Indien pH verander, denatureer ensieme. √
 Temperatuur√: Ensieme is temperatuursensitief. √ / Lae
 temperature is ensieme onaktief/. By hoë
 temperature denatureer ensieme.
 Glukose√: Benodig vir selrespirasie om energie aan sel te
 verskaf/ beïnvloed die waterpotensiaal van vloeistof
 loonkonsentrasie√: Word benodig vir normale self funksionering√ / bv.
 Hormoonkonsentrasie√: Benodig in sekere konsentrasies vir normale
 self funksionering / voorbeeld√ / hiper-of hiposekresie
 veroorsaak gebreksiektes
 Stikstofafvalstowwe√: Raak toksies as ophoop in liggaam√ / produk van
 proteïenmetabolisme (Enige vyf) 5x2=(10)
 [50]

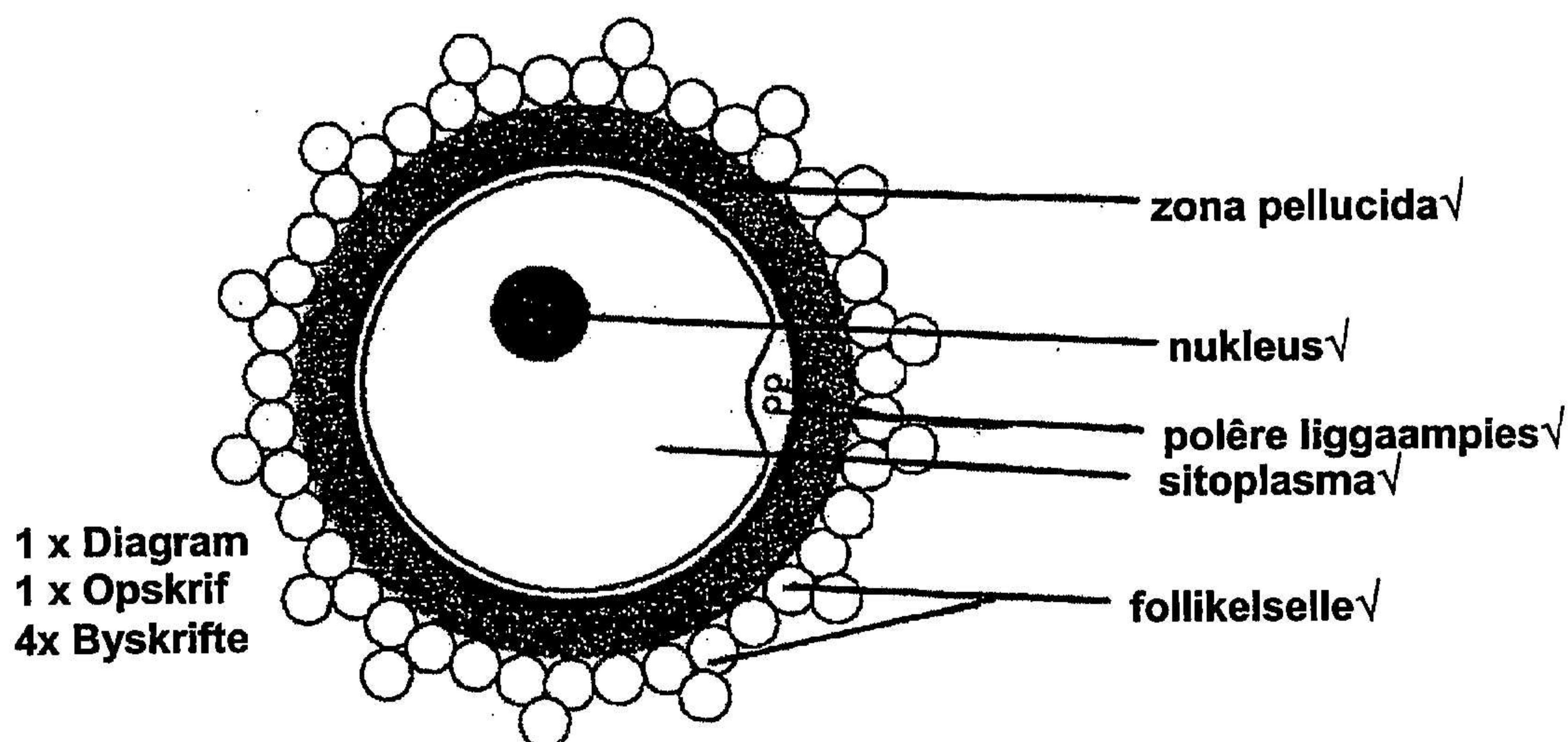
VRAAG 6

- 6.1 6.1.1 Multipolêre neuron / motoriese neuron√√ (2)
- 6.1.2 1. Dendriet / afferente uitloper
2. Selliggaam / Sentron / selmembraan
3. Knoop van Ranvier
4. Neurilemma
5. Akson / efferente uitloper
6. Mieliënskede
7. Terminale eindvertakkings (7)
- 6.1.3 Kliere of spiere (2)
- 6.2 6.2.1 1. Serebrum
2. Medulla oblongata
3. Serebellum
4. Rugmurg (4)
- 6.2.2 5. Longitudinale groef
6. groef van Rolando
7. groef van Sylvius (3)
- 6.2.3 Frontale lob√: Willekeurige spierbewegings en spraak / setel van intelligensie / hoër kognitiewe aktiwiteite / emosies√
Parietale lob√: Sensasies van die vel√
Temporale lob√: gehoor/reuk/smaak
Oksipitale lob√: sig√ (8)
- 6.2.4 Die werwelkolom word beskerm deur die:
- werwels wat dit omring√
- 3 meninges√ nl. Duramater√, arachnoied√ mater√, pia mater√
- subarachnoiedale ruimte√ word met serobraspinale vloeistof√ gevul. Dit absorbeer skokke√, hou drukking konstant√, verhoed uitdroging√ (Enige 5) (5)
- 6.2.5 Witstof: Gemiëlieneerde vesels (aksone) van neurone√√
Grysstof: Selliggame met korrelagtige sitoplasma van neurone√√ (4)
- 6.2.6 Hipotalamus: Beheer outonome senuweestelsel
- Hartritme / spysvertering / bloeddruk / blaas
- Kontroleer die hipofise
- Beheer homeostase deur:
Temperatuurregulering van liggaam
Slaappatrone
Dors
Honger/ptyt/eetlus
Gedragspatrone
Emosies (Enige 2) (4)

- 6.2.7 (a) Refleksaksie: onwillekeurige beweging√ van 'n klier of spier√ op 'n stimulus wat 'n reseptororgaan ontvang het√ (3)
- (b) Ongekondisioneerde refleks: Aangebore reflekse√ ter beskerming van liggaam√
Gekondisioneerde reflekse: Aangeleer√ deur aanpassing op verandering in gedrag deur ondervinding√ (4)
- (c) Ongekondisioneerde reflekse: pupilmeganisme, oogknip, nies, hoës, speekselafskeiding
Ongekondisioneerde refleks: veters vasmaak, motorbestuur, speel van klavier, eksterne sfinkter van blaas (4)
(Enige 2 van elk)
- [50]

VRAAG 7

- 7.1 7.1.1 1. Fallopiese buis
2. Infundibulum / Fimbria
3. Ovarium
4. Sigoot/Morula
5. Naelstring / umbilikus
6. Cerviks/Serviks (6)
- 7.1.2 Nie-identiese tweeling√
- Ontwikkel uit twee verskillende ova√
- Geslagte kan verskil of dieselfde wees√
- Elkeen het sy eie plasenta√ (4)
- 7.1.3 Estrogeen√ en progesteron√ berei melkkliere voor om melk te vervaardig.√
Prolaktien√ stimuleer melkkliere om melk af te skei√
Oksitosien√ veroorsaak die vloei van melk√ (4)
- 7.1.4 Oksitosien (2)
- 7.1.5 Ovum wat gereed is vir bevrugting (6)



(6)

7.1.6 **Semen:**

Spermatozoa✓ en seminale vloeistof✓

Seminale vloeistof bevat sekresies van die volgende kliere:

Sekresie van die seminale vesikels

Taaie geel alkaliese✓ vloeistof wat as transportmedium dien en stel sperms in staat om te beweeg✓

Globulien en fruktose dien as voedingstowwe✓ en verskaf energie✓

Alkaliese vloeistof neutraliseer suur in die vagina en uretra✓ van die penis

Sekresie van die prostaatklier✓

Ryk aan sitroensuur✓, prostaglandiene en ensieme✓

Aktiveer sperms✓ en verhoog hulle lewensvatbaarheid✓

Sekresie van die Cowper se klier✓

Alkaliese vloeistof✓ wat die sure in die uretra neutraliseer✓

Bevat smeermiddel✓ wat punt van penis smeer tydens gemeenskap✓

(Enige 10)

(10)

7.2

	KLIER	HORMOON	FUNKSIE
1	Adenohipofise	TSH	Stimuleer tiroïed om tiroksien af te skei
2	Neurohipofise	ADH / Vasopressien	Verhoog deurlaatbaarheid van selle van nefron
3	Tiroïed	Tiroksien	Beheer metaboliese tempo/ bevorder funksionering van hart/senuwees
4	Adrenaalklier (Bynier)	Aldosteroon	Verhoog natrium-herabsorpsie
5	Ovarium	Estrogeen	Verantwoordelik vir vroulike sekondêre geslagseienskappe
6	Testis	Testosteroon	Verantwoordelik vir die sekondêre geslagseienskappe vir die man

(18)
[50]**VRAAG 8**

- 8.1 8.1.1 Trane / Lakrimale vloeistof✓
- was stofdeeltjies uit oë
 - vernietig kieme vanweë soutgehalte
 - verhoed uitdroging van oë
 - smeer oogbal vir die beweging van ooglede
 - versprei hitte oor oogbal se oppervlak (1+5 funksies) (6)
- 8.1.2 No. 4 Lakrimaalbuisie✓
- Dreineer✓ oortollige trane uit oog na neus✓ (1+2) (3)

- 8.1.3 1 Sklera / oogrok
2 Iris / Reënboogvlies
3 Pupil (3)
- 8.1.4 As na die son – skerp lig√ kyk
- laat pupil saamtrek en kleiner word√
- die radiale spiere in die iris verslap√
- die kringspiere trek saam√
- parasimpatiese stimulerings√ (5)
- 8.1.5 Geelvlek - Naby die middel van die retina
- Besit meer keëltjies
- Streek met die hoogste gesigskerpte (beste sig)
- Duikie in middel bekend as fovea centralis (bevat net keëltjies)
Blindevlek - Geen stafie en keëltjies nie
- Nie sensitief vir ligstimulus nie
- Bloedvate verlaat en kom oog hier binne
- Senuwee verlaat oog hier (8)
- 8.2 8.2.1 1: Nierslagaar√ – suurstofryke / geoksigineerde bloed met
(Renale arterie) hoë konsentrasie metaboliese afvalstowwe√
2: Nieraar√ – Suurstofarm / gedeoksigineerde bloed
(Renale vene) sonder metaboliese afvalstowwe√ (4)
- 8.2.2 Niere word beskerm deur die
- Veselagtige nierkapsel teen fisiese besering√
- Vet / Adipose weefsel teen fisiese besering√
- Buitenste veselagtige bindweefsel anker die nier en verhoed verplasing√
- Niere word deur die swewende ribbes beskerm√
Sterk spiere van die rug vorm beskermende laag√ (5)
- 8.2.3 3. Ureter
4. Pelvis / bekken
5. Nierkapsel
6. Kors/korteks
7. Medulla / Murg / Piramiede
8. Versamelbuis / buisie van Bellini (6)
- 8.2.4 (a) Hidrostatiese druk
(b) boog van Henlé
(c) Aldosteroon
(d) Proksimale kronkelbuis
(e) Blaas
(f) Uretra
(g) ADH
(h) Kapsel van Bowman
(i) Glomerulus
(j) Proksimale kronkelbuis (10)

[50]

TOTAAL: 300