

**GAUTENG DEPARTMENT OF EDUCATION
SENIOR CERTIFICATE EXAMINATION**

PHYSIOLOGY SG

POSSIBLE ANSWERS / MOONTLIKE ANTWOORDE SUPP 2007

SECTION A

QUESTION 1

1.1	B
1.2	C
1.3	D
1.4	C
1.5	B
1.6	B
1.7	A
1.8	B
1.9	D
1.10	C
1.11	B
1.12	D
1.13	A

1.14	B
1.15	D
1.16	C
1.17	D
1.18	A
1.19	C
1.20	B
1.21	D
1.22	B
1.23	A
1.24	C
1.25	C

25x2=[50]

QUESTION 2

- 2.1 Homeostasis
- 2.2 Accommodation
- 2.3 Ampulla
- 2.4 Cretinism
- 2.5 Taste bud / Papilla
- 2.6 Cells of Leydig
- 2.7 Sebaceous gland / Oil gland
- 2.8 Scrotum
- 2.9 Fallopian tube / oviducts
- 2.10 Syphilis

(10)

QUESTION 3

- | | | | |
|------|---------------------------------------|------|----------------------------|
| 3.1 | Left kidney | 3.11 | Dorsale horn / Grey matter |
| 3.2 | Ureter | 3.12 | Ventral root |
| 3.3 | Bladder | 3.13 | Comea |
| 3.4 | Urethra | 3.14 | Lens |
| 3.5 | Synapse | 3.15 | Optic nerve |
| 3.6 | Synaptic vesides | 3.16 | Yellow spot/central fovea |
| 3.7 | Synaptic cleft | 3.17 | Seminal vesicle |
| 3.8 | Neurotransmitter / acetylcholine | 3.18 | Penis |
| 3.9 | Cross-section through the spinal cord | 3.19 | Epididymis |
| 3.10 | White matter | 3.20 | Prostate |
- [20]**

QUESTION 4

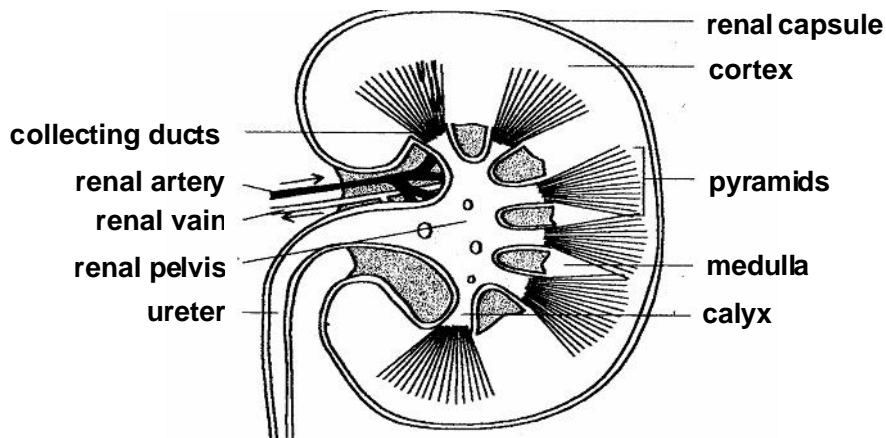
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|-----|---|------|---|
| 4.1 | F | 4.6 | D |
| 4.2 | J | 4.7 | M |
| 4.3 | K | 4.8 | G |
| 4.4 | B | 4.9 | H |
| 4.5 | C | 4.10 | I |
- 10x2=**[20]**

TOTAL FOR SECTION A: [100]

SECTION B

QUESTION 5

- 5.1.1 The saltsv in the urine will cristallizev / high calcium levels in the bloodv (2)
- 5.1.2 Kidney stones damagev the wall of the ureterv and this causes bleeding. (2)
- 5.1.3
- Ultrasound wavesv are used to break upv the stones which will then pass through the urine
 - A small tube with an optic fibrev is used to enter the kidney and the stones are then gathered through suctionv. (4)
- 5.1.4 Drink lots of water. (1)



1 x heading
1 x diagram
8 x labels

Longitudinal section through a kidney

(10)

- 5.3.1 1. afferent arterioles 3. Bowman's capsule
5. peritubular capillaries 9. duct of Bellini (4)
- 5.3.2 It creates a hydrostatic pressure in the glomerulus, forcing the filterable contents of the blood into the Bowman's capsule. (2)
- 5.3.3 3 – glomerular filtrate
4 – blood (2)
- 5.3.4 • glucose, amino acids, vitamin C, inorganic salts, water, urea, medicine, colourants and hormones Any (3)
- 5.3.5 • Pores in the glomerulus
• Bowman's capsule has a lining of podocytes
• A very thin, ultra-fine filter-basement membrane Any (2)
- 5.3.6 Blood cells (white / red) and plasma proteins (1)
- 5.3.7 loop of Henle / Number 7 (2)
- 5.3.8 ADH (Antidiuretic hormone) or vasopressin and aldosterone (2)
- 5.4 Brain and spinal cord (2)
- 5.5 - The cranium covers the brain and protects it against mechanical injuries
- The brain is enclosed by three connective tissue membranes called meninges. The pia mater carries food and oxygen to the cells of the brain.
- The dura mater lines the cranium and performs a protective function
- The arachnoid layer separates these two membranes. The subarachnoid cavity is filled with cerebrospinal fluid, which acts as a cushion to protect the CNS.
- The vertebrae protect the spinal cord against mechanical injury.
- The S-shaped curvature of the vertebral column and the cartilaginous discs between the vertebrae all give the body a spring of resilience. Any (8)
- 5.6 • Motor area for voluntary movements
• Sensory areas interpret impulses from the sense organs, such as for: hearing, tasting, smelling and sight.
• Association areas are the centres for higher mental activity. (3)

[50]

QUESTION 6

6.1.1 A ductless gland that secretes hormones directly into the blood (2)

6.1.2

	Endocrine gland	Hormone
A	Hypophysis	Somatotrophic hormone (STH)/ Thyroid stimulating hormone (TSH)/ Follicle stimulating hormone (FSH) / Lutenizing hormone (LH) / Adeno-corticotrophic hormone (ACTH) / Intestitial cell stimulating hormone (ICSH) / Prolactin / Antidiuretic hormone (ADH) / Vasopressin / Oxytocin
B	Thyroid gland	Thyroxine
C	Pancreas	Insulin, Glucagon
D	Adrenal gland	Cortisone / Aldosterone / Adrenaline

(8)

6.1.3

- Most hormones are proteins or steroids
- They are secreted by ductless glands into the blood
- Low concentrations in the blood stream
- Very short life
- Affects certain target cells
- Exchangeable between species

Any (3)

6.1.4 (a) Dv, adrenal (2)

(b)

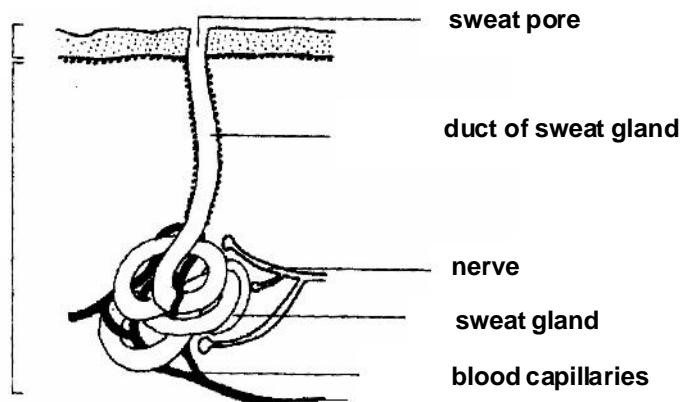
- Blood pressure is increased, enables more blood to reach the skeletal muscles ✓
- Blood sugar levels are increased ✓
- Oxygen content of the blood is raised ✓
- The heart rate is increased ✓
- Skeletal muscle-tone is increased ✓
- Dilaton of pupils ✓
- Increased sweating ✓
- Reduction of digestive system activity ✓
- Increased mental alertness

Any (5)

- 6.1.5 (a) After a meal containing cakes and sweets the blood glucose level rises√. This blood passes through the pancreas√, the insulin secreting beta cells√ from the islets of Langerhans√ detect the raised glucose levels√ and respond by secreting insulin into the blood√. The insulin is then carried to the target organs, the liver√ and muscles√. These organs have an increased absorption of glucose from the blood√. The rate at which glucose is converted into the storage√ of glycogen√ increased. The blood glucose level lowers√ and less insulin will be secreted√. Any (10)
- (b) Diabetes mellitus√ (1)
- (c) Sugar in the urine will result in a positive test√ (1)

- 6.2.1 1 – epidermis√
4 – sebaceous gland√
5 – capillary network√ (3)

6.2.2



1 x heading
1 x diagram
4 x labels
(6)

The sweat gland√

- 6.2.3 **8 - Cornified layer**√
Flattened, dead cells√ which contain the protein, √ keratin.

- 9 – Malpighian layer**√
Contains the pigment melanin. √ Cells contain a distinct nucleus. √
Any two per paragraph (4)

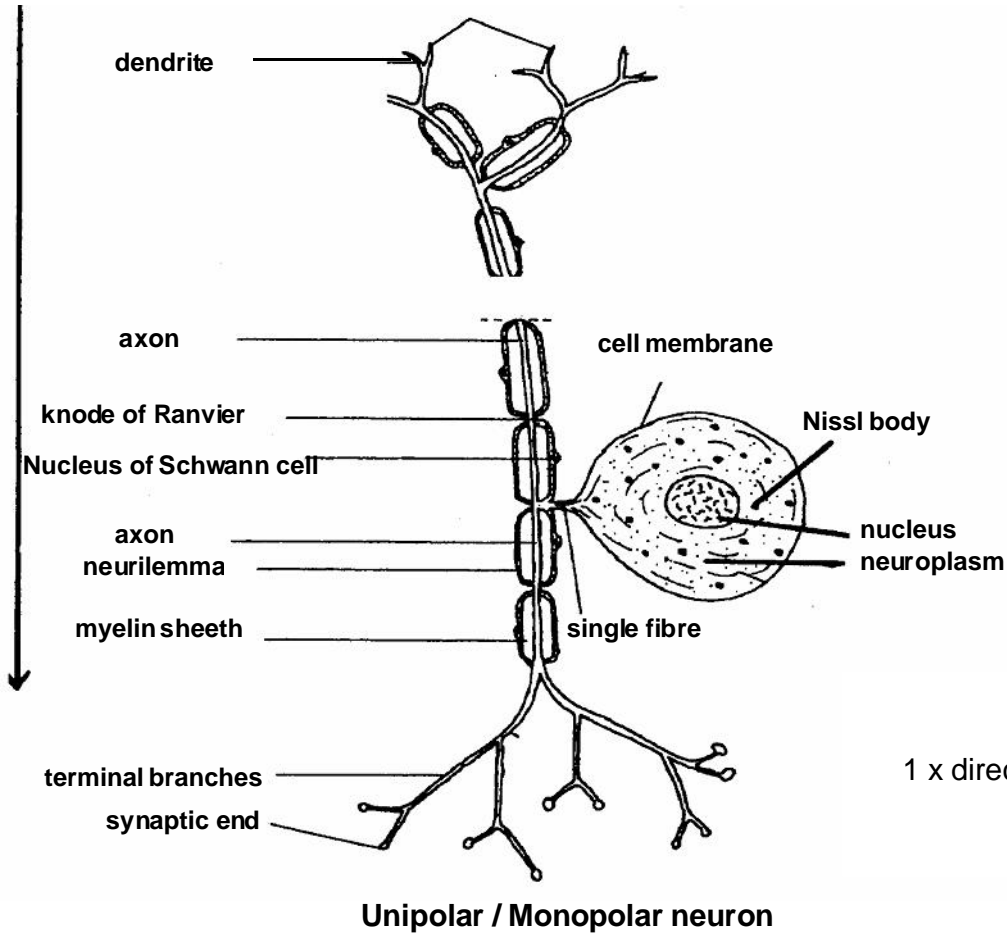
- 6.2.4 (a) Free nerve endings√
(b) Sensitive to cold√
(c) 10√
(d) End organs of Ruffini√
(e) Sensitive to pressure√ (5)

[50]

QUESTION 7

- 7.1.1 Outer ear✓
Middle ear✓
Inner ear✓ (3)
- 7.1.2 3 – Tympanic membrane
4 – Pinna
7 – Semicircular canal
9 – Auditory nerve
12 – Eustachian tube (5)
- 7.1.3 5v - middle ear v
6v - external auditory canal / meatus v (4)
- 7.1.4 Number 6✓ provides a sticky trap for foreign bodies / repels insects by its pungent smell. / Keep external ear passage moistv (2)
- 7.1.5 13 – Cochleav, is responsible for the reception of sound stimuli and generates nerve impulses✓. (2)
- 7.1.6 1 - Malleus / hammerv
2 - Incus / Anvilv
9 - Stapes / Stirrupv (3)
- 7.1.7 Sensory neurons / Unipolar neuronv (1)
- 7.1.8 Temporal lobev of the cerebrum✓ (2)

7.2



1 x heading
 1 x diagram
 1 x direction of impulse
 7 x labels
 (10)

7.3 **Myopia** (near / short-sightedness)
Causes

The lens is too convex, the cornea is too convex. The commonest cause is a too elongated eyeball. The light rays converge to form an image in front of the retina.

Symptoms

Objects close to the eye are clearly seen. But distant objects appear blurred.

Remedy

Wear glasses or contact lenses with suitable concave lenses to diverge light rays so that they have to travel further through the eyeball before focusing on the retina and not in front of it.

Radial - keratotomy - is a recent method to treat this defect. It is an operation which involves cutting the cornea to reduce its curvature.

Any (8)

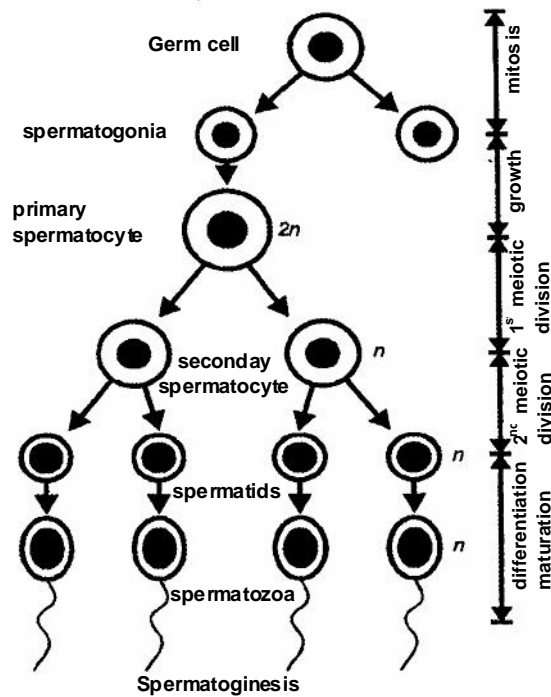
- 7.4.1 Photoreceptors vv (2)
- 7.4.2 Light v (1)
- 7.4.3 - Rodsv: Black or white / Night visionv
- Conesv: Coloured / Day vision v (4)
- 7.5 waterv, nutrientsv, oxygenv / pH / temperature / waste products Any (3)
- [50]**

QUESTION 8

- 8.1.1 1 – Placenta 5 – Amnion
2 – Umbilical cord 6 – Amniotic fluid
3 – Foetus 7 – Cervix
4 – Uterus / Myometrium 8 – Vagina (8)
- 8.1.2 2 arteries√ and 1 vein√ (2)
- 8.1.3 - Provides oxygen √ for respiration and removes carbon dioxide√
- Nutrition: glucose and amino acids√ diffuse across the placental barrier√
- Nitrogenous waste√ e.g. urea diffuses into the maternal blood and are excreted with her waste products√
- It is a microfilter√ preventing most pathogenic√ organisms from entering the foetus.
- Maternal antibodies√ can, however, pass through the placental barrier and provide a passive immunity√ for the foetus.
- The placenta secretes the hormones progesterone and oestrogen√ that maintain pregnancy√. Any 3x2=(6)
- 8.1.4 Mucus plugv - prevents the entry of pathogens that might affect the foetusv (2)
- 8.1.5 - Eat a healthy dietv
- Avoid taking **any** form of drugsv
- Don't smoke or consume alcoholv
- Avoid, in the first 4 months of pregnancy, contact with anyone suffering from German measlesv. Any (3)
- 8.1.6 Oxytocinv
- Stimulates the muscle wall of the uterus to start rhythmic contractions during birthv
- Causes the release (flow) of milk from the mammary glandsv (3)
- 8.1.7 9 monthsv / 40 weeks / 280 days (1)
- 8.2 8.2.1 The release, under the influence of LHv, of a mature ovumv from a Graafian follicle in the ovary every 28 daysv. Any (2)

8.2.2 The sequence of events during which mature haploid sperm are produced in the seminiferous tubules of the testes. v Any (2)

8.3



1 x heading
1 x diagram
8 x labels
(10)

The process of spermatogenesis

8.4.1 Reflex action v (2)

8.4.2 1 – Sensory v / Afferent neuron (2)
2 – Motor v / Efferent neuron

8.4.3 (a) He can not feel the pain in his foot but he can move it. v
(b) He can feel the pain of the hot coals, but cannot move his leg. v
(c) No movement or feeling in his leg, this can cause complete paralysis of the legs v (3)

8.5 The circular muscles of the dermal arteries contract v on a cold day which limits the flow of the blood to the capillary loops v. This is known as vasoconstriction v. It causes blood to divert to the vessels in the deeper subcutaneous layers v. In this way very little blood is carried to the surface v, so very little heat will be lost by radiation, convention or conduction v.

Any (4)
[50]

TOTAL FOR SECTION B: [200]

TOTAL: 300