GAUTENG DEPARTMENT OF EDUCATION
SENIOR CERTIFICATE EXAMINATION

PHYSIOLOGY SG

POSSIBLE ANSWERS
FEB / MAR 2006

SECTION A

QUESTION 1A
MULTIPLE-CHOICE QUESTIONS

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

1.16	C
1.17	B
1.18	D
1.19	A
1.20	B
1.21	C
1.22	A
1.23	C
1.24	D
1.25	D
1.26	B
1.27	C
1.28	B
1.29	B
1.30	B

30x2=**(60)**

QUESTION 1B

1.31 Iris
1.32 Denaturate
1.33 Hypothalamus
1.34 Vasodilatation
1.35 Myopia / near- / short-sightedness
1.36 Renal capsule
1.37 Glomerulus
1.38 Cerebellum
1.39 Neuron
1.40 Cones

10x2=**(20)**

QUESTION 1C

1.41 19,5 g ü ü 18,0 + 1,5 = 19,5 g (2)

1.42 2,0 dm^3 ü ü (2)

1.43 No sweating occurs on cold days ü but more urine is produced to get rid of waste products. ü (2)

1.44 To excrete metabolic waste products ü ü (2)

1.45 To maintain the correct levels of salts and water in the body ü ü (2)
(10)

QUESTION 1D

1.46 Bladder
1.47 Vas deferens / Sperm duct
1.48 Penis
1.49 Urethra
1.50 Ureter
1.51 Seminal vesicles / Ejaculatory duct
1.52 Ductus ejaculatoris / ejaculatory duct
1.53 Prostate gland
1.54 Epididymis
1.55 Testis **(10)**

TOTAL FOR SECTION A: [100]

SECTION B

QUESTION 2

2.1
2.1.1 Nephron ü (1)
2.1.2 1 and 2 ü ü (2)

2.1.3 3 – Malpighian body
4 – Proximal convoluted tubule
5 – Loop of Henle
6 – Distal convoluted tubule
7 – Duct of Bellini / collecting duct
(5)

2.1.4 3 – Ultrafiltration
4 – Reabsorption
6 – Reabsorption / Tubular secretion (3)

2.1.5 Blood cells ü (e.g. red blood cells and white blood cells)
Blood proteins / e.g. (2)

2.1.6
- Long and coiled ü for maximum reabsorption ü
- Surrounded by a dense capillary network ü to transport substances away ü
- Cuboidal epithelial cells have micro villi ü and folds ü to increase the surface area ü
- many mitochondria ü to produce ATP ü for active transport ü (8)

2.1.7 5 – Aldosterone ü from adrenal glands ü
6 – ADH / vasopressin ü from hipophysis ü (4)

2.1.8 The epithelial cells ü lining the distal convoluted tubules ü secrete a buffer ü ammonia / NH_3 ü.
It diffuses into the filtrate ü where it actively combines with the excess hydrogen ions/H^+ ü to form ammonium ions/NH_4^+ ü. In this way the excess H^+ are excreted and the pH is returned to normal ü. Any (5)

2.1.9

Urea	Hippuric acid
Uric acid	Hormones
Creatinine	Urochromes
Ammonium ions	Preservatives
Water	Colourants
Salts/e.g.	Drugs

Any (10)

2.2.1

A.	Conjunctiva	F.	Iris
B.	Sclera	G.	Ciliary body
C.	Anterior cavity / aqueous humor	H.	Suspensory ligaments
D.	Pupil	I.	Lens
E.	Cornea	J.	Choroid

(10)
[50]

QUESTION 3

3.1.1 Thyroxine ü (1)

3.1.2 Thyroid gland ü (1)

3.1.3
- increases the basal metabolic rate ü / (heat production) ü
- increases output and rate of the heart ü
- promotes activity of the nervous system ü
- promotes normal physical, mental and sexual growth ü

Any (3)

3.1.4
- Protruding, thick tongue ü
- Physically retarded ü
- Mentally retarded ü
- Sexually underdeveloped ü

Any (2)

3.1.5
- A decreased level of thyroxine in the blood ü is detected by the pituitary / hypophysis. ü.
- The hypophysis secretes more TSH into the blood ü.
- TSH stimulates the thyroid ü to secrete more thyroxine ü into the blood stream.
- Thyroxine level rises and returns to normal. ü
- Higher level of thyroxine inhibits ü further secretion of TSH ü.

- This is negative feedback ü and ensures that the level of thyroxine is kept at the correct level. (8)

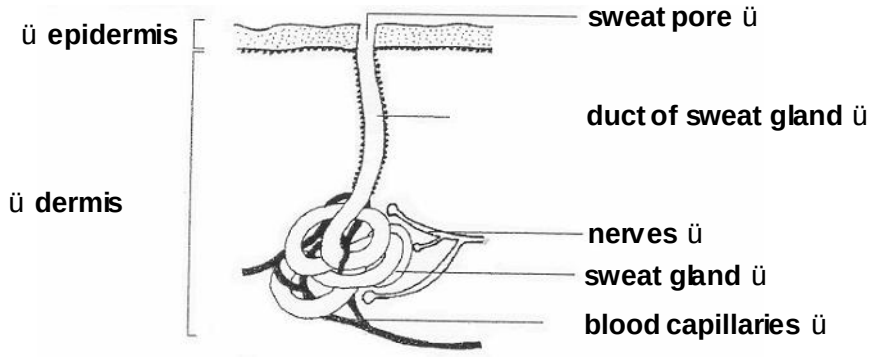
3.1.6 Calcitonin ü (1)

3.1.7 Thyroid gland is swollen ü
Eyes will protude ü
Weight loss ü
Profuse sweating ü
Hand tremor
Hyperactivity
Fast heart rate
Any (4)

3.1.8 All the rain / erosion washed the iodine from the soil. (1)

3.2 Glucagon ü
Adrenaline ü
Cortisone ü (3)

3.3 **The sweat gland**



1 x heading
1 x diagram
5 x labels (7)

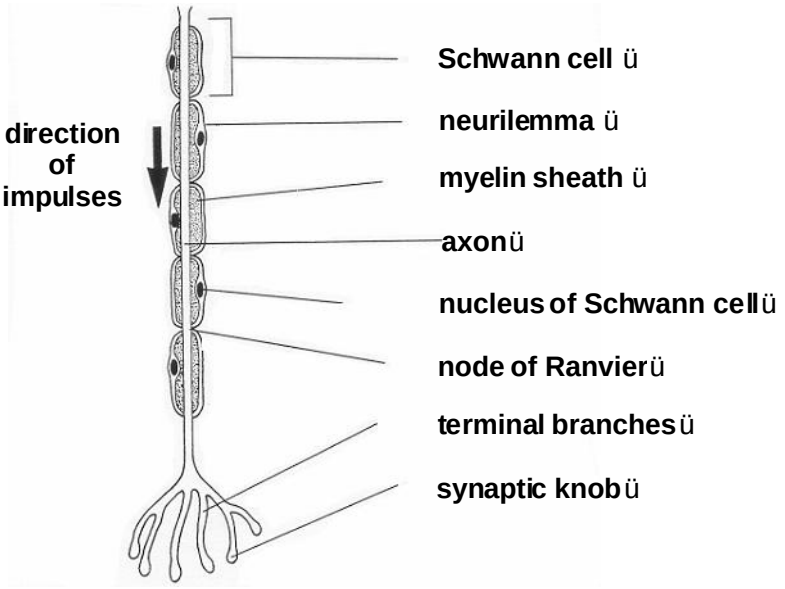
3.4.1 1 – white matter of the spinal cord ü
2 – gray matter of the spinal cord ü
5 – connector neuron / axon ü
6 – dendrite / afferent fibre / sensory neuron / unipolar neuron ü (4)

3.4.2 Number 4 (1)

3.4.3 (a) Motor neuron / Multipolar neuron ü (1)
(b) Conducts an impulse ü from the spinal cord / brain to the effector (1)
(c) Muscle / gland ü (1)

3.4.4 Person will not feel the sensory stimulus / e.g. ü and this can endanger the body ü (2)

3.5 **An Axon**



1 x direction of impulse
1 x diagram (9)
7 x labels **[50]**

QUESTION 4

4.1.1 37°C ü (1)

4.1.2 A warm day ü: (1)
- hairs lie flat ü
- sweat has been secreted ü
- heat loss by radiation at the skin surface ü (3)

4.1.3
- Impulses from the end organs of Ruffini ü and an increase in blood temperature ü stimulate the heat loss centre in the hypothalamus. ü
- Motor impulses are inhibited which allows circular muscles of the dermal arterides to relax. ü
- Large volume of blood flow ü to capillary loops ü in dermal papillae of skin / vasodilation. ü
- Heat is lost through radiation ü / conduction / convection.
- More blood flow to the sweat glands ü and large amounts of sweat are produced ü
- Evaporation of sweat will cool the body. ü Any
- Erector hair muscles are not stimulated and hairs lie flat. ü (7)

4.1.4
- Lower environmental temperature ü
- No wind ü
- High humidity of surrounding air ü (3)

4.1.5 Enzymes will denature ü, metabolic processes will stop ü coma ü, death. ü Any (2)

4.1.6 - Behavioural factors, ü taking a cold bath, ü drinking cold drinks, ü moving to cooler environments, ü swimming Any
- lower metabolismü (3)

4.2.1
A – Thalamus
B – Corpus callosum
C – cerebellum
D – spinal cord
E – cerebrum
F – hypothalamus
G – hypophysis
H – Pons Varoli
I – medulla oblongata (9)

4.2.2
(a) E
(b) A
(c) C
(d) I
(e) G (5)

4.2.3 Frontal lob, Temporal lob, Parietal lob, Occipital lob (4)

4.2.4 J ü, arbor vitae ü (2)

4.2.5 (a) white matter ü – collection of myelin sheaths of neurons ü (1)
(b) gray matter – collection of cell bodies of neurons ü (1)

4.2.6

C (Cerebellum)	E (Cerebrum)
1. Small brain ü	1. Largest part of brain ü
2. Shallow, parallel folds ü	2. Deep irregular grooves ü
3. No ventricles ü	3. Ventricles ü
4. Vermis connects hemispheres ü	4. Corpus Callosum connects hemisphere ü

(8)

[50]

QUESTION 5

5.1.1
(a) ovary
(b) fimbriae
(c) Fallopian tube
(d) Uterus
(e) Endometrium (5)

5.1.2
1 – ovulation ü
3 – fertilization ü
6 – implantation ü (3)

5.1.3 Number 5 (1)

5.1.4 Cytoplasm of zygote ü
Secretions of Fallopian tube ü
Secretions of uterus ü
trophoblast ü
placenta ü Any (4)

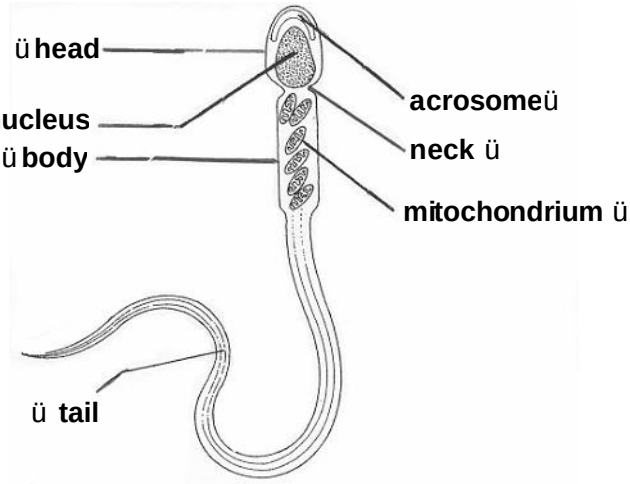
5.1.5 Protects the foetus against
- mechanical shock ü
- changes in temperature ü
- dehydration ü
- sticking to the uterine wall ü
- malformations due to gravity ü

Any (3)

5.1.6 Oestrogen and progesterone (2)

5.1.7 Sperm cells can live up to 48 hours in the female body ü and can wait for ovulation. (1)

5.1.8 **The Sperm**



1 x heading
1 x diagram
5 x labels (7)

5.2.1 Sexually transmitted diseases (1)

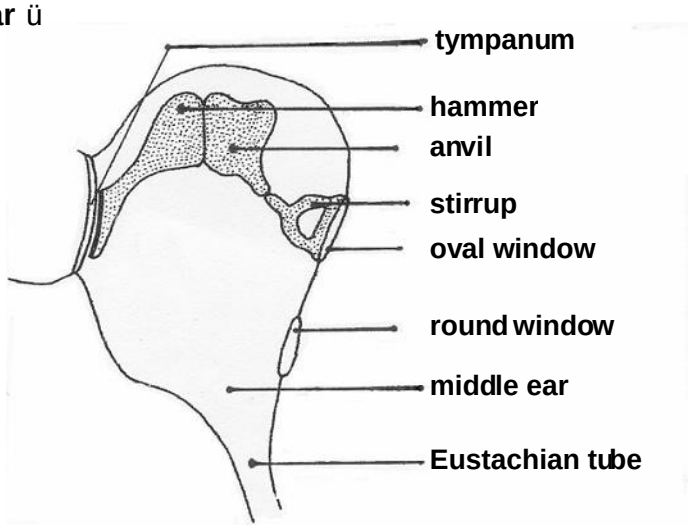
5.2.2 gonorrhoea ü
Genital herpes ü
Syphilis ü
Aids ü
Venereal warts ü

Any (2)

5.2.3 AZT, Neverapin (1)

5.3.1 **Middle ear** ü

ü



1 x heading
1 x diagram
7 x labels (9)

5.3.2
- Vibrations of the oval window ü cause waves ü in the perilymph ü of scala vestibule ü.
- Waves move along scala vestibule ü and cause Reissner's membrane to vibrate ü.
- This causes waves in the endolymph ü of the scala media ü which in turn makes the basilar membrane vibrate ü.
- Vibrations stimulate the receptor cells ü of the organ of Corti which are embedded in the tectorial membrane ü and causes impulses to be fired.

Any (11)
[50]

TOTAL FOR SECTION B: [200]

TOTAL: 300