KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

CURRICULUM GRADE 10-12 DIRECTORATE

NCS (CAPS)

TEACHER SUPPORT DOCUMENT

WINTER CLASSES

GRADE 12

LIFE SCIENCES

STEP AHEAD PROGRAMME

2023

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Topic: Genetics

Activity 1

Give the correct **biological term** for each of the following descriptions.

No.	Description	Biological Term
1.1	The position of a gene on a chromosome	**Locus**
1.2	Undifferentiated cells that may be stimulated to develop into any type of body cell	**Stem cells**
1.3	Mendel's principle which states that an organism possesses two factors which separate so that each gamete contains only one of these factors	**Mendel's law of segregation**
1.4	The biotechnological production of genetically identical offspring.	**Cloning**
1.5	The genetic crossing of two organisms in which two pairs of contrasting characteristics are studied.	**Dihybrid**
1.6	Individual having two alleles that influence a characteristic in different ways	**Heterozygous**
1.7	The physical and/or functional expression of a gene	**Phenotype**
1.8	An allele that expresses itself only when in the homozygous condition	**Recessive**
1.9	A sex linked disorder that affects the photoreceptors in the eye	**Colour-blindness**
1.10	The insertion of a gene from one organism into the genetic material of another organism	**Genetic engineering**
1.11	The number , shape and arrangement of all the chromosomes in the nucleus of a somatic cell	**Karyotype**
1.12	A genetic disorder resulting in the non-production of the clotting factor in blood	**Haemophilia**
1.13	A sudden change in the structure of a gene or chromosome	**Mutation**
1.14	Disorder caused by the presence of an extra copy of chromosome 21	**Down syndrome**
1.15	Characteristics controlled by alleles that are located on the gonosomes	**Sex linked disorder**

Activity 2

2.1 Spotted back ✓ (1)

2.2 Spotted frogs produced offspring without spots✓✓

OR

The spotted offspring were three times more than offspring without spots✓✓ / ratio spotted offspring to offspring without spots is 3:1 (2)

P_1	Phenotype	Spotted	x	No spots✓
	Genotype	Dd	x	dd✓

Meiosis

G/gametes D , d x d , d ✓

Fertilisation

F_1 Genotype Dd ; Dd : dd ; dd✓*

Phenotype (2) spotted : (2) without spots✓*

P_1 and F_1✓

Meiosis and fertilisation✓ **2 Compulsory** + Any 4 others

OR

P_1	Phenotype	Spotted	x	No spots✓
	Genotype	Dd	x	dd✓

Meiosis

Fertilisation

Gametes	D	d
d	Dd	dd
d	Dd	dd

1 mark for correct gametes
1 mark for correct genotypes*

F_1 Phenotype (2) spotted : (2) without spots✓*

P_1 and F_1✓

Meiosis and fertilisation✓ **2 Compulsory** + Any 4 others (6)

(9)

Activity 2

2.1 Spotted back ✓ (1)

2.2 Spotted frogs produced offspring without spots✓✓

OR

The spotted offspring were three times more than offspring without spots✓✓ / ratio spotted offspring to offspring without spots is 3:1 (2)

P_1 Phenotype Spotted x No spots✓
Genotype Dd x dd✓

Meiosis

G/gametes D , d x d , d ✓

Fertilisation

F_1 Genotype Dd ; Dd : dd ; dd✓*

Phenotype (2) spotted : (2) without spots✓*

P_1 and F_1✓

Meiosis and fertilisation✓ **2 Compulsory** + Any 4 others

OR

P_1 Phenotype Spotted x No spots✓
Genotype Dd x dd✓

Meiosis

Fertilisation

Gametes	D	d
d	Dd	dd
d	Dd	dd

1 mark for correct gametes
1 mark for correct genotypes*

F_1 Phenotype (2) spotted : (2) without spots✓*

P_1 and F_1✓

Meiosis and fertilisation✓ **2 Compulsory** + Any 4 others (6)

(9)

Activity 3

3

3.1 Incomplete dominant✓ (1)

3.2 - The pink flower is an intermediate phenotype✓ / a blend of red and white (1)
- indicating that neither of the alleles is dominant✓

3.3 (2)

P_1 /P_2 Phenotype Pink x Pink✓
Genotype RW x RW✓

Meiosis

G/gametes R, W x R, W✓

Fertilisation

F_1 /F_2 Genotype RR; RW; RW; WW✓

Phenotype 1 Red: 2 Pink: 1 White✓*

P_1 & F_1✓/
P_2 & F_2
Meiosis and fertilisation✓

OR

P_1 /P_2 Phenotype Pink x Pink✓
Genotype RW x RW✓

Meiosis

Fertilisation

Gametes	R	W
R	RR	RW
W	RW	WW

1 mark for correct gametes
1 mark for correct genotypes

F_1 /F_2 Phenotype 1 Red: 2 Pink: 1 White✓*
P_1 & F_1✓/
P_2 & F_2
Meiosis and fertilisation✓

1* compulsory + Any 5

(15)

Activity 4

4

4.1 954 000✓ (1)

4.2 1800 000✓ – (954 000 + 180 000 + 54 000) ✓
= 612 000✓ people

OR

1 800 000 ✓– 1 188 000✓
= 612 000✓ people

OR

$\frac{34}{100}$ ✓x 1 800 000 ✓= 612 000✓

(3)

4.3 - The allele for blood group A / I^A is inherited from one parent and (3)
- the allele for blood group B / I^B is inherited from the other parent therefore
- the child has blood group AB / genotype I^AI

(7)

Activity 5

5

5.1 One✓ /1 (1)

5.2 Mrs Thomas✓ (1)

5.3 -The child has the genotype ii✓ / is homozygous recessive and
- if both parents are heterozygous ✓ / have the genotypes I^Ai or I^Bi
- she inherits one recessive allele from each parent✓ (3)

5.4 Three ✓ / 3 (1)

(6)

Activity 6

6

6.1 **P_1**/parent phenotype: tortoise-shell female x orange male✓ (2)

genotype: X^BX^O x X^OY ✓

Meiosis

G/gametes X^B , X^O x X^O, Y ✓

Fertilisation

F_1/offspring genotype X^BX^O, X^BY, X^OX^O, X^O Y ✓

phenotype 1 tortoise-shell female, 1 black male, 1 orange female and 1 orange male✓

(*1 mark for gender and fur colour with correct proportion)

P_1 and F_1✓

Meiosis and fertilisation✓ *Compulsory 1 + any 6 (7)

OR

P1/parent phenotype tortoise-shell female x orange male✓

genotype X^BX^O x X^OY ✓

Meiosis

Fertilisation

gametes	X^B	X^O
X^O	X^BX^O	X^OX^O
Y	X^BY	X^O Y

1 mark for correct gametes
1 mark for correct genotypes

F1/offspring phenotype: 1 tortoise-shell female, 1 black male, 1 orange female and 1 orange male✓
(*1 mark for gender and fur colour with correct proportion)
P_1 and F_1✓
Meiosis and fertilisation✓ Compulsory 1 + any 6 (7)

6.2 The allele for the fur colour is carried on the X-chromosome✓
Male have only one X-chromosome✓
Tortoise shell is only expressed in the heterozygous condition/X^BX^O✓

OR

- If the male is X^BY it is black✓
- if the male is X^OY it is orange✓
- and therefore can never be tortoise shell as males have one X chromosome only.✓ (3)

(10)

Activity 7

7

7.1 Dihybrid (1)
7.2 TTrr (2)
7.3 TR, Tr, tR, tr (4)
7.4 **(7)**

Activity 8

8

8.1 Round shape , red flower (2)
8.2 DE , De, dE, de

8.3

P_1 Phenotype long, purple flower X round, red flower ✓
Genotype DdEe X ddee ✓

Meiosis

Fertilisation

F_1 Genotype

Gametes	DE	De	dE	de
de	DdEe	Ddee	ddEe	ddee
de	DdEe	Ddee	ddEe	ddee
de	DdEe	Ddee	ddEe	ddee
de	DdEe	Ddee	ddEe	ddee

1 mark for correct gametes
1 mark for correct genotype

Phenotype 4 long, purple flower ; 4 long, red flower
4 round, purple flower ; 4 round, red flower ✓

Phenotype proportion: 1:1:1:1 (* 1 compulsory mark)

P_1 and F_1 ✓
Meiosis and Fertilisation ✓

(10)

Activity 9

9

9.1 (a) RRLL✓ (1)
(b) Red fruit✓ and spiny leaves✓ (2)

9.2 $\left\{\frac{3}{16}\right\}$ ✓ x 128✓ = 24✓ (3)

9.3 -rrLL✓✓ (2)

OR

- One parent is rrLL and the other parent is rrLl✓✓

(8)

Activity 10

10

10.1 High yield ✓ Short stem ✓ (2)
10.2 hT ✓ (1)
10.3 HHtt ✓, Hhtt ✓ (2)
10.4 The plant breeder must cross plants of variety A (HHtt)✓ with plants of variety A✓ (HHtt) (2)

(7)

Activity 11

11

11.1 - Embryo✓
- Umbilical cord✓
- Bone marrow✓
(Mark first THREE only) (3)

11.2 - Stem cells are undifferentiated ✓
- and have the potential to develop into any type of cell✓
- to replace affected / defective cells causing a disorder ✓ Any (2)

11.3 - Heart disease✓
- Spinal injuries✓

(Mark first ONE only) Any (1)
(6)

Activity 12

12

12.1 -The manipulation of genetic material✓ (2)
-to produce a genetically different✓ / identical organism / repair tissues and organs

OR

- The manipulation of genetic material ✓
- to produce something of benefit to humans ✓/ society

12.2 - A plasmid / circular DNA is removed from the bacteria cell✓ (4)
- it is cut✓ using enzymes
- The insulin gene is removed from a human cell✓ and
- inserted into the plasmid ✓to form the recombinant DNA

12.3 - Bacteria reproduce very rapidly✓ (2)
- forming many copies of the gene✓ in a short period of time

OR

- Bacteria reproduce asexually✓ / by mitosis,
- forming identical copies of itself✓

OR

- The bacteria DNA is in the form of a plasmid✓
- for easy insertion of genes✓

OR

- Bacteria exist everywhere✓,
- So they can be obtained with no difficulty✓ / expense

OR

- Bacteria are simple organisms ✓,
- so their use is unlikely to raise ethical issues✓ (Any 1x 2)

12.4 - Expensive ✓/ research money could be used for other needs (3)
- Interfering with nature ✓/ immoral
- Potential health impacts✓
-Unsure of long-term effects ✓ (Any 3)
(Mark first THREE only)

(11)

Activity 13

13

13.1 Males✓ (2)

13.2 (a) 3 / Three✓

(b) 3 / Three✓

13.3 (a) T✓

U✓ (2)

(b) X^HX^h ✓✓ (2)

(7)

Activity 14

14

14.1 3 /Three✓ (1)

14.2 (a) H✓ (1)

(b) Rr✓ (1)

(c) C ✓and F✓ (2)

(5)

Activity 15

15

15.1 Incomplete dominance✓ (1)

15.2 (a) RR✓✓ (2)

(b) RW✓✓ (2)

(c) WW✓✓ (2)

(7)

Activity 16

16

16.1 - Decide on the sample size✓

- Decide on the sample selection✓
- Get permission from the school✓ to conduct the investigation
- Decide on the appropriate time / day / venue to conduct the investigation✓
- Decide on how to record the results of the investigation✓
- Ask permission from participants✓

(Mark the first THREE only) (3)

16.2 -Same person counted✓

- Equal number of boys and girls✓ (2)

16.3 To ensure / increase the reliability✓ of the investigation (1)

16.4 (4)

	Boys	**Girls**
Tongue rollers	260	220
Non tongue rollers	15	55

Marking Criteria

Columns heading **(C)**	1
Rows heading **(R)**	1
Data correct in the table **(T)**	1: 1-3 correct 2: All correct

(10)

Activity 17

17.1
- Glyphosate resistance increased✓
- from 2009 to 2015✓
- and remained constant in 2016 ✓

(3)

17.2

$\frac{45}{20}$ ✓ x 100 ✓

=225 ✓

(3)

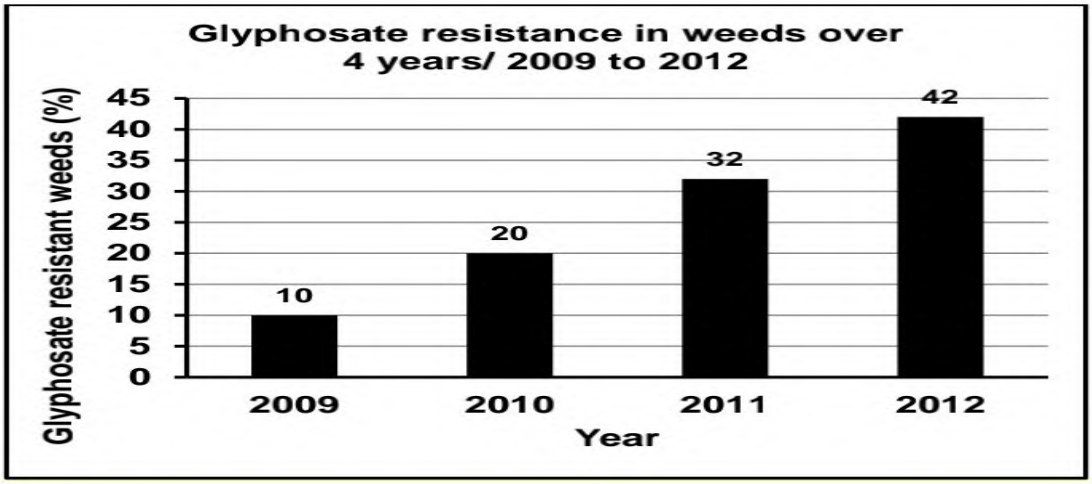
17.3
- The glyphosate will not kill the maize✓
- A greater yield✓ of maize
- Means greater profit✓

OR

- Application of the glyphosate does not have to be selective✓
- this will save on labour✓ / time / costs which
- means greater profit✓

(3)

17.4



Guideline for assessing the graph

CRITERIA	ELABORATION	MARK
Correct type of graph (T)	Bar graph drawn	1
Caption of graph (C)	Both variables included	1
Axes labels (L)	X- and Y-axis correctly labelled with units	1
Scale for X- and Y-axis (S)	- Equal space and width of bars for X-axis and - Correct scale for Y-axis	1
Plotting of co-ordinates (P)	- 1 to 3 co-ordinates plotted correctly - The 4 required co-ordinates plotted correctly	1 2

(6)

(10)

Topic: Nervous System

Activity 1

No.	Description	Biological Term
1.1	The functional gap at which a nerve impulse passes from neuron to another	**Synapse**
1.2	A disease characterised by the degeneration of brain cells and memory loss	**Alzheimer**
1.3	Type of neurons that joins sensory and motor neurons	**Interneuron /connector neuron**
1.4	Part of a neuron which contains the nucleus	**Cell body**
1.5	Fluid around the brain and spinal cord that aids in protection	**Cerebro-spinal fluid**
1.6	The part of the skull that protects the brain	**Meninges**
	(1 x 6)	**(6)**

Activity 2

2.1 Reflex arc ✓ (1)

2.2 (a) B Motor neuron /efferent neuron✓ (1)

(b) C Interneuron /connector neuron✓ (1)

(c) E Sensory neuron /efferent neuron✓ (1)

2.3 (a) F ✓ (1)

(b) A ✓ (1)

2.4 (a) D✓ Synapse✓ (2)

(b) G ✓ Myelin sheath✓ (2)

(10)

Activity 3

3

3.1 The pathway along which nerve impulses are carried from a receptor to an effector to bring about a reflex action.✓✓ (2)

3.2 A person would be able to feel the sensation✓ but is unable to react✓ to the stimuli. (1)

3.3 Multiple sclerosis✓ (2)

(5)

Activity 4

4

4.1 Smooth muscles ✓
Heart ✓muscle
Glands ✓
(Mark first TWO only) (2)

4.2 - Every organ/gland are controlled by two sets of nerves ✓
- that act antagonistically ✓
Autonomic nervous system is divided into
- Sympathetic nerves ✓ and

- Parasympathetic nerves ✓
- Sympathetic nerves stimulate ✓
- fight of flight function ✓ in emergency situations
- Parasympathetic inhibits ✓ a response and
- restores the body to normal ✓ (5)

(7)

Activity 5

5

5.1 (a) Myelin sheath ✓ (2)
(b) Axon ✓

5.2 (a) A ✓ (2)
(b) C✓

5.3 D✓ Synapse✓ (2)

(6)

Activity 6

6 brain

6.1 Corpus callosum✓ (1)

6.2 - It controls vital processes✓/heartbeat/breathing (2)
- which will stop✓ when it is damaged

6.3 (a) Spinal cord✓ (1)

(b) - The impulses from the cerebrum✓ (2)
- are not transmitted✓ to the skeletal muscles

(6)

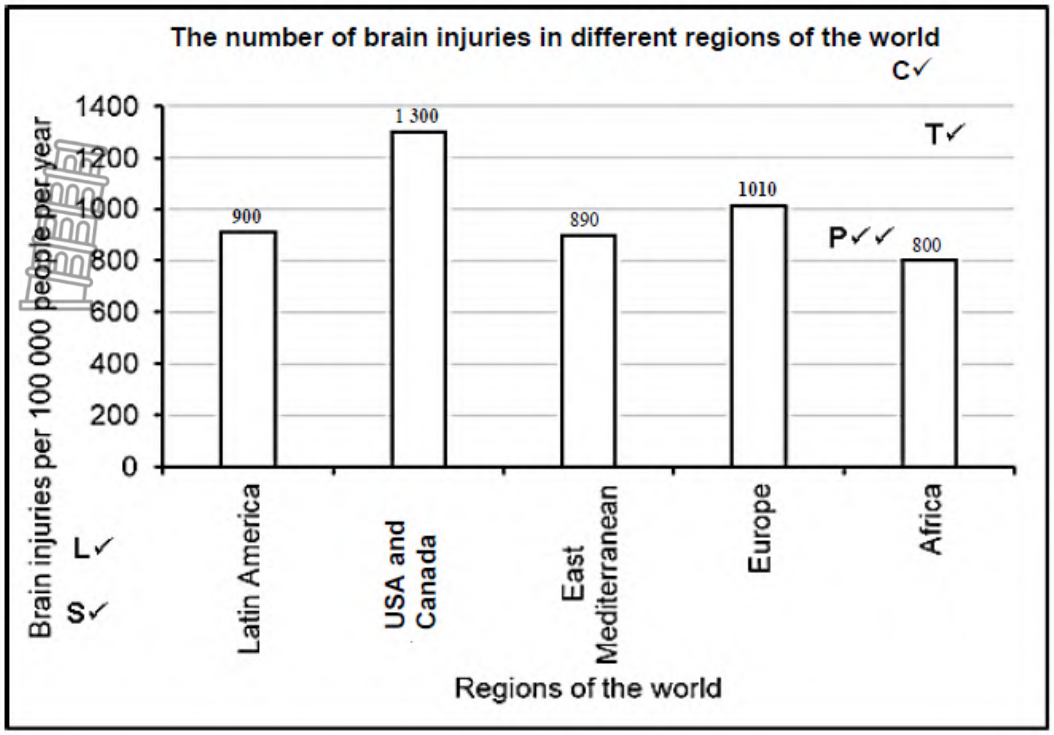
Activity 7

7

7.1 Africa (1)

7.2 - Not all brain injuries are recorded✓ (2)
- due to poor health facilities✓

7.3



Criteria for marking graph:

Criteria	Mark allocation
Bar graph is drawn (T)	1
Caption of the graph includes both variables (C)	1
Correct labels on X-axis and Y-axis (L)	1
Correct scale for Y-axis Equal spaces between bars and equal width of bars for X-axis (S)	1
Plotting: (P) 1-4 co-ordinates plotted correctly All 5 co-ordinates plotted correctly	 1 2

(9)

Activity 8

8

8.1 - From the dendrite ✓
- to the axon ✓ (2)

8.2 0 to 1 ✓ µm ✓ / 0 to 0.9 µm (2)

8.3 As the axon diameter increases the speed of impulse increases ✓✓
OR (2)
As the axon diameter decreases the speed of impulses decreases ✓✓

8.4 - The speed of the impulse will decrease ✓
- resulting in taking longer for impulses to reach the effectors ✓
- and the person will react more slowly ✓ (3)

(9)

Topic: Eye

Activity 1

No.	Description	Biological Term
1.1	The type of vision where both eyes are used to focus on an object	**Binocular Vision**
1.2	The visual defect characterised by a cloudy lens	**Cataracts**
1.3	The nerve that transmits impulses from the eye to the brain	**Optic nerve**
1.4	The protective membrane covering the cornea of the eye	**Conjunctiva**
1.5	A visual defect caused by the uneven curvature of the cornea	**Astigmatism**
1.6	The area of the retina that contains the highest concentration of cones	**Yellow spot/Fovea**
	(1 x 6)	**(6)**

Activity 2

2

2.1 B – Sclera ✓ (1)
G – Iris ✓ (1)
I – Cornea ✓ (1)

2.2 (a) H ✓ – Pupil ✓ (2)
(b) F✓ – Optic nerve ✓ (2)
(c) A ✓ – Eyelid ✓ (2)

2.3 (a) It contracts ✓ (1)
(b) It slackens ✓/loosens (1)
(c) Becomes more convex ✓/more rounded (1)

2.4 (a) Concave lenses ✓/ Concave Glasses/(Laser) surgery (1)
(b) Surgery ✓/synthetic lens (1)

(14)

Activity 3

3

3.1 (a) Different light conditions✓ (1)
(b) Diameter of the pupil✓ (1)

3.2 Only one person ✓ participated in the experiment/small sample size The experiment was not repeated ✓/only done once (2)

3.3 $\left[\frac{8-5}{8}\right]$ ✓ $\times \frac{100}{1}$ ✓

= 37,5 ✓% (3)

3.4 Iris✓ (1)

3.5 Pupil mechanism✓ (1)

3.6 Circular muscles of the iris relax✓
Radial muscles of the iris contract✓
Pupil diameter increases✓ (3)

3.7 (a) 5✓mm (1)
(b) 3✓ (1)

(14)

Topic: EAR

Activity 1

No.	Description	Biological Term
1.1	A structure in the ear that absorbs excess pressure waves from inner ear	**Round window**
1.2	Part of the ear that equalises pressure on the either side of the tympanic membrane	**Eustachian tube**
1.3	A structure in the ear that absorbs excess pressure waves from the inner ear	**Round window**
1.4	Receptors in the semi-circular canals that are sensitive speed and direction	**cristae**
1.5	Structure inserted to the tympanic membrane to allow air to pass into the middle ear	**Grommets**
1.6	The structure within the cochlea responsible for picking up the stimulus of sound	**Organ of Corti**
	(1 x 6)	**(6)**

Activity 2

2

2.1 Cochlea ✓ (1)

2.2 (a) Absorbs excess pressure waves✓/releases pressure from the inner ear/ prevents an echo (1)

(b) It converts stimuli/pressure waves into impulses✓ (1)

2.3 Part A ✓/tympanic membrane will not be able to vibrate✓/vibrate freely (2)

2.4
- Middle ear infections cause fluid build-up in the middle ear✓
- which can block the Eustachian tube✓
- The grommet will release the pressure✓ that will build up in the middle ear/ drain the fluid from the middle ear
- The pressure on either side of the tympanic membrane is equalised✓
- preventing the tympanic membrane from rupturing✓ and
- allowing the ossicles to vibrate freely✓

Any (4)

2.5
- The cristae are stimulated✓ and
- convert the stimuli into impulses✓
- The impulses are sent via the auditory nerve✓
- to the cerebellum✓
- which interprets the information✓ and
- sends impulses to the skeletal muscles✓ to restore balance

Any (4)

(13)

Activity 3

3

3.1 (a) Semi-circular canals✓ (1)

(b) Auditory canal ✓ (1)

3.2 (a) E✓ - Oval window✓ (2)

(b) D✓ - Round window✓ (2)

3.3 (a) Cerebellum✓ (1)

(b) Hair cells/Organ of Corti✓ (1)

3.4 -The pinna of the ear traps sound waves✓
-The auditory canal directs the sound waves to the tympanic membrane✓
-causing the tympanic membrane to vibrate✓
-which causes the ossicles to vibrate✓and
-pass the vibrations to the oval window✓/ amplify the vibrations
-(Pressure) waves are set up in the inner ear✓ / perilymph/endolymph
-The organ of Corti is stimulated✓
-and converts the stimuli into impulses✓
-which are transmitted by the auditory nerve✓
-to the cerebrum✓ for interpretation Any (7)

(15)

Topic: Homeostasis and Endocrine Systems

Activity 1

No.	Description	Biological Term
1.1	Joint linking and working together of systems and activities within the body to bring about a harmonious response.	**Coordination**
1.2	A system responsible for chemical co-ordination and regulation of various activities in the body	**Endocrine system**
1.3	Organic chemical messengers secreted directly into the blood by an endocrine gland.	**Hormones**
1.4	Organs which respond to specific hormones received through the bloodstream	**Target organs**
1.5	It is the process of maintaining a constant internal environment Within narrow limits, despite changes that take place internally and externally.	**Homeostasis**
1.6	When there is an increase from normal, a corrective mechanism causes a decrease and vice versa to maintain a balanced system.	**Negative feedback mechanism**
1.7	Regulation of water balance in the internal environment	**Osmoregulation**
1.8	To work in opposite ways; if one hormone causes an increase of a substance, the other hormone will cause a decrease of that substance.	**Antagonistically**
	(1 x 8)	**(8)**

Activity 2

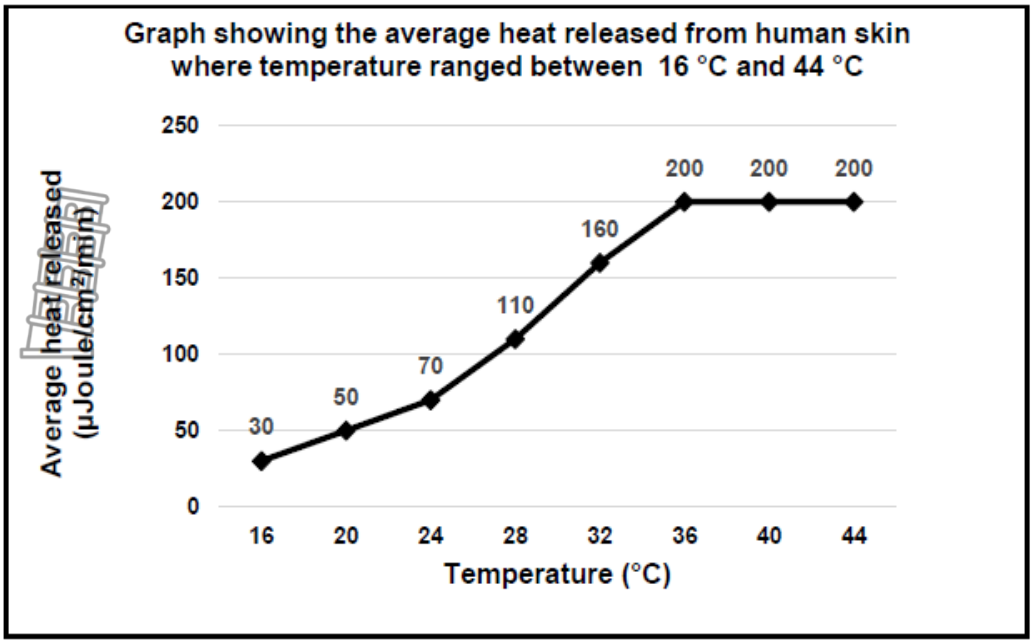
2

2.1 Thermoregulation ✓ (2)

2.2
- As the environmental temperature increases
- the hypothalamus is stimulated ✓
- and sends impulses to the blood vessels ✓ of the skin
- Blood vessels dilate/blood vessels become wider/vasodilation occurs
- More blood flows to the surface of the skin ✓
- More heat radiates from the skin ✓
- (So average heat released/lost increases) (Any 3) (3)

2.3
- As the environmental temperature increases above/beyond body temperature ✓
- the average heat released/lost through radiation reaches its maximum ✓ /levels out/no gradient for radiation of heat
- therefore, increased sweating will occur ✓/sweat glands become more active
- As the sweat is evaporated ✓
- it allows the body temperature to decrease ✓/more cooling of the skin will occur (Any 4) (4)

2.4



(6)

Criteria for assessment of the graph

CRITERIA	ELABORATION	SYMBOL	MARKS
Correct type of graph	Line graph drawn	**(T)**	1
Caption of graph	Both variables included (Heat released AND temperature)	**(C)**	1
Axes labels	Correct label and unit for X- and Y-axes	**(L)**	1
Scale of X- and Y-axes	Equal spacing and correct scaling on X-axis and Y-axis	**(S)**	1
Plotting of points	1 to 7 points plotted correctly All 8 points plotted correctly	**(P)**	1 2

(14)

Activity 3

3

3.1 Thyroxin ✓ (1)

3.2 Regulates the rate of:
- Respiration ✓/energy production
- Energy consumption ✓/metabolism
- Heat production ✓
- Heart rate ✓

Mark first TWO only (2)

3.3 - Fat ✓
- (Muscle) protein ✓

Mark first ONE only (1)

3.4 Glycogen✓ (1)

3.5 - Blood glucose level decreased below normal ✓
- The pancreas/islets of Langerhans will be stimulated ✓

− Glucagon is secreted ✓
− which is transported via blood ✓
− to the liver ✓
− and muscle cells ✓
− which converts glycogen ✓ into glucose
− increasing blood glucose levels ✓to normal (Any) (6)

(11)

Activity 4

4

4.1 Negative feedback✓mechanism (1)
4.2 (a) Thyroid✓ (1)
(b) TSH✓/thyroid stimulating hormone (1)
(c) Thyroxin✓ (1)
4.3 Goitre✓ (1)
4.4 Hormone A✓ (1)

(6)

Activity 5

5

5.1 Insulin✓ (1)
5.2 (a) Pancreas✓ (1)
(b) Islets of langerhans✓ (1)
5.3 Negative feedback reaction✓ (6)
- The glucose concentration in the blood drops below normal ✓
- The alpha cells/islets of Langerhans/pancreas detect the drop and secretes glucagon ✓
- in the blood ✓
- which is transported to the liver ✓/muscle cells
- Glucagon stimulates the conversion of glycogen to glucose ✓
- The glucose concentration in the blood returns to normal✓

(9)

Activity 6

6

6.1 (a) Wearing of a facemask ✓ (1)
(b) Carbon dioxide levels in blood ✓ (1)
6.2 -Age ✓
-Healthy ✓ individuals (Mark first TWO only) (2)
6.3 150 volunteers were used ✓ (Mark first ONE only) (1)
6.4 - To allow the carbon dioxide levels in the blood to go back to normal ✓
- so that each phase will have the same carbon dioxide level as a starting point ✓ (2)
6.5 - To act as a control ✓/baseline
- To see if it is the facemask that affects the carbon dioxide levels and not the physical activity ✓ Any (1)
6.6 - Receptors in the carotid artery are stimulated ✓ and
- impulses are sent to the medulla oblongata✓

- The medulla oblongata stimulates the heart ✓
- to beat faster ✓ causing
- more carbon dioxide to be taken to the lungs ✓
- The breathing muscles ✓/intercostal muscles and diaphragm
- contract more actively ✓ and
- the rate/ depth of breathing increases ✓
- More carbon dioxide is exhaled ✓
- The carbon dioxide level in the blood decreases ✓ /returns to normal Any (7)

(15)

Activity 7

7

7.1 71.53 – 34.72✓ = 36.81✓ml/h (2)

7.2
- The high level of ADH✓ at night
- Increases the permeability of the renal tubules✓/collecting duct/distal convoluted tubules in the kidney
- More water is re-absorbed✓/less water is excreted
- Less urine is produced✓ (4)

7.3
- Less urine produced✓/more water is retained (2)
- A person will not need to urinate often✓/ will not be thirsty/sleep will not be interrupted

7.4
- Water will not be reabsorbed from the renal tubules✓
- The volume of water in the blood will be low✓
- The pituitary gland will be stimulated✓
- to release more ADH✓ all the time Any 3 (3)

(11)