BOTSWANA
EXAMINATIONS
COUNCIL

Botswana General Certificate of Secondary Education
October/November 2025

Confidential Mark Scheme
SPECIMEN

1428/01 BIOLOGY

Maximum Mark: **70**

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Mark scheme notes

A1 answer marks that generally follow **compensation mark** or a **method mark**. The answer mark is awarded only when the answer is obtained from the correct working or method.

B1 an independent mark that is awarded whenever the answer given is correct.

C1 compensation mark for writing the correct preceding formula or condition. The mark may not be given when the formula required has not been given.

M1 method mark that must be seen before awarding the answer mark

( ) the word, phrase or unit in brackets is not required but is in the mark scheme for clarification

accept the response is not necessarily the perfect answer but may be credited

reject do not accept some answers that candidates may write and they appear to be correct

and both responses are necessary for the mark to be given

c.a.o correct answer only

e.c.f. error carried forward; marks are awarded if a candidate has carried an incorrect value forward from earlier working, provided the subsequent working is correct.

ignore this response is to be disregarded and does not negate an otherwise correct response

/ or alternative responses for the same marking point

AW alternative wording. This is applicable where there are several ways of writing the correct response **underline** mark is not allowed unless the underlined word or idea is used by candidate

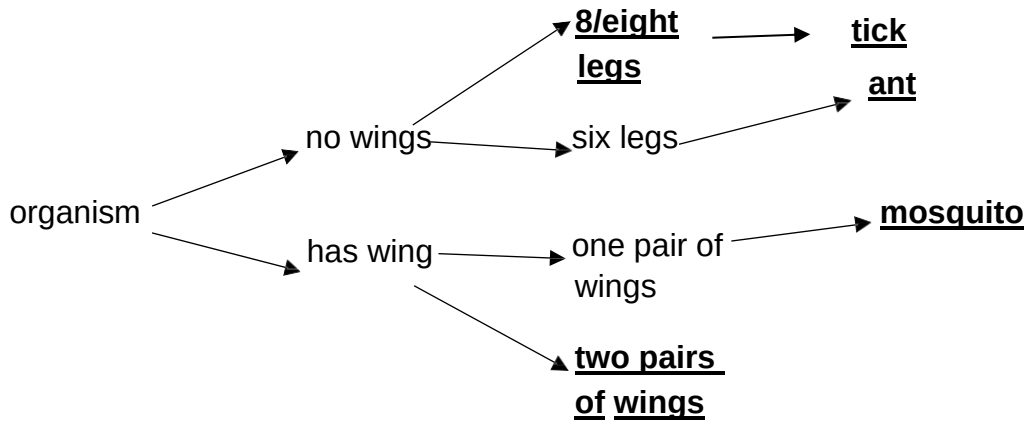
unit penalty the unit that follows the answer is required. There must a maximum of **one** unit penalty per question unless otherwise indicated and not more than **four** in the whole question paper.

in any form indicates that the formula can be presented in any other form that may include changing the subject of the formula or using numbers to represent the formula

BOD benefit of the doubt given when an examiner is not very certain about a response

spelling be generous about spelling but ensure the science is not distorted. Single answer words should not have any other meaning while those used in phrases and sentences should be interpreted from the sentence.

decimal places unless specified ignore the number of decimal places for an answer.

Number	Answer	Mark	Additional Guidance
1 (a)		4	6 correct = 4 marks 4-5 correct = 3 marks 2-3 correct = 2 marks 1 correct = 1 mark
(b)	- accessible to non-experts; - breaks the process down / binary choices / either or choices; - quick and easy to create;	1	Max 1
2 (a)	- transfer of pollen grains from the anther to the stigma; - within the same flower or different flowers within the same plant;	2	
(b)	- germination of the pollen grain; - growth of the pollen tube down the style; - movement of pollen nuclei towards ovule / AW; - enters the ovule;	3	Max 3
3 (a)	- genotype is genetic characteristics of an organism / alleles that an organism contains / AW;	1	

(b)	Parental Genotype: Bb + bb; Gametes: B b b b; Offspring Genotype: Bb Bb bb bb; Offspring phenotype: 2 white and 2 black; Phenotypic ratio: 1:1;	5	Max 5 ECF
4 (a) (i)	- phloem; - ref. to translocation; - diffusion / energy used (by companion cells)/ active transport; - from source to sink;	3	Max 3
4 (a) (ii)	- amino acids; - proteins; - water; - mineral ions / or named; - plant hormones;	1	Max 1 **ignore** glucose / sucrose
(b)	- decreases; - stomata less open; - less water vapour lost by transpiration;	2	**accept** decreased transpiration Max 2
5 (a) (i)	- adrenal (gland). - adrenaline;	2	**accept** pancreas glucagon
(ii)	- increased breathing rate; - increased breathing depth; - enhanced oxygen/glucose delivery; - increased respiration;	1	Max 1 ECF
(b)	- ref to concentrated blood / AW; - detection by the hypothalamus;	4	Max 4

	- secretion of ADH; - more water is reabsorbed; - by the kidney tubules; - concentrated urine / less urine ;		
6 (a) (i)	- **A**: epithelium / epithelial cell; - **B**: lacteal;	2	
(ii)	- substance: fatty acids / glycerol / fat soluble vitamins; - process: diffusion / active transport;	2	ECF **accept** active transport
(b)	- thinner/thin/one cell thick + to reduce distance / decreases time for diffusion / AW; - lots of mitochondria + release more energy for active uptake / AW; - capillary network + promotes rapid transport or increases surface area / AW; - presence of microvilli + increases surface area / AW;	2	Max 2
7 (a)	- bacteria;	1	**accept** correctly named bacteria
(b)	- fermentation / anaerobic respiration; - lactose / milk sugar; - specific pH read from graph; - lactic acid / ref. to acid / low pH; - sours / coagulates milk protein / casein curdles;	4	Max 4
8 (a)	- acute vision / AW; - forward facing eyes / AW: - talons / long hooked nails / AW; - feathers adapted for quiet flight/ AW;	3	Max 3 fast flight / speed face disc transfers sounds to the ears
(b) (i)	- population increases; - increases in genetic diversity; - increased competition / less resources available; - potential over population; - potential increase in disease;	4	Max 4
(ii)	- population decreases; - reduces genetic diversity; - less competition / more resources available; - populations of other species may change;	3	Max 3

(iii)	- competition increases as the population increases; - individuals require same resources; - such as food/space/reproductive mates; - limitation of resources; - death/less reproduction; - reduced population size;	5	Max 5
9 (a)	- identification of functional gene; - extraction of gene; - using restriction enzyme; - introduced into vector/virus (genome) / AW; - joined using ligase (enzyme); - recombinant DNA formed / recombinant vector formed; - vector/virus introduced into patient; - vector/virus introduced into specific target organ; - vector/virus injects (functional) gene into host cells; - condition corrected in host cells;	7	**accept** reference to recombinant DNA/RNA/transgenic; Max 7
(b)	- change in overall biodiversity; - improve crop/animal species by adding resistant genes; - reduce disease in species; - elimination of non-native/invasive/alien/harmful/pest species / create new invasive species / AW; - engineered species may out-compete native species; - restore extinct species;	2	Max 2
(c)	- waste oil degradation; - bacteria; - breaks down oil to carbon dioxide and water; - waste water management; - bacteria; - removal of phosphates / nitrates / any named ion; - break down organic matter; - composting/breaking down of organic matter / decomposition; - bacteria/fungi; - formation of humus; - anaerobic respiration; - produces a flammable gas / methane / biogas / renewable energy;	6	Max 6