Mark schemes

Q1.

(a)   controlling water output in urine

1

   keeping cool on a hot day

1

(b)   pituitary

1

(c)   (8.4 – 5.2 =) 3.2 (mmol/dm^3)

1

(d)   diabetes

ignore type of diabetes

1

(e)   the pancreas is not releasing insulin

1

(f)   change diet

allow description of suitable diet change e.g. use sweetener in hot chocolate, eat less sugary / starchy food or stop eating sugar-coated cereal

1

   take more exercise

allow description e.g. go to gym instead of reading and TV, walk / cycle to work

allow change to an active job

*if no other marks awarded allow 1 mark for lose weight.*

1

[8]

Q2.

(a)

Primary consumer	Algae
Producer	Crab 1
	Shark 1
Tertiary consumer	Loggerhead turtle 1
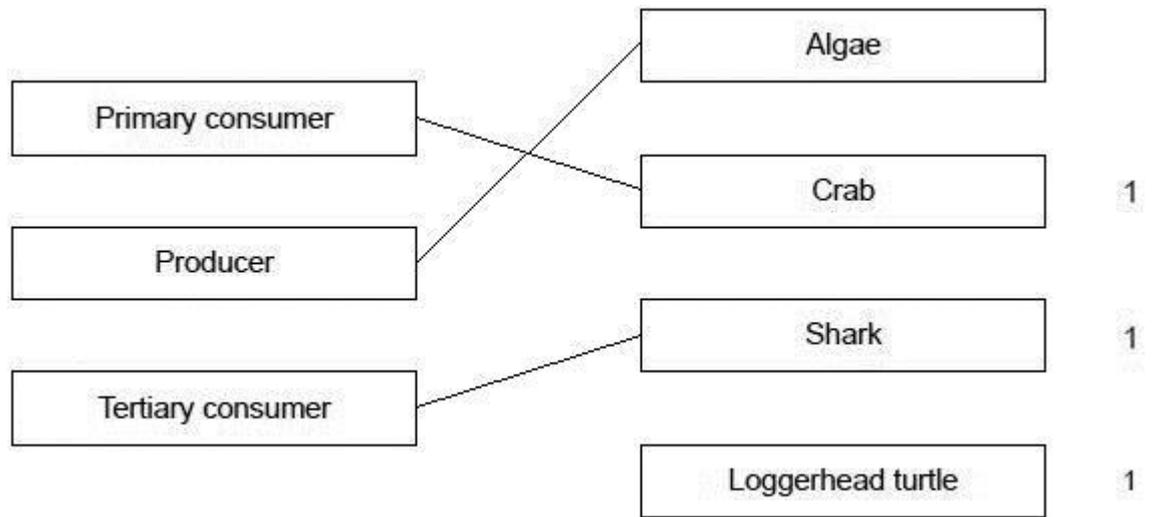
additional lines from a box on the left negates the
mark for that box 1

(b) population

1

(c) the number of (loggerhead) turtles will decrease
    ignore (loggerhead) turtles die

1

  because there will be less crab to eat
    allow less food

1

(d) biotic

1

(e) (as) length of the turtle increases, the number of eggs laid increases
    allow the number of eggs increases as the length
    of the turtle increases
    allow size for length
    allow positive correlation

1

(f) (as sea levels rise) the numbers will decrease
    allow extinction

1

  as there will be fewer beach(es) to nest on
    allow the beach they normally return to may be
    underwater / flooded
    allow fewer egg laying sites available
    allow eggs may be washed away

1

(g) 2.6

1

(h) burning wood on a fire

1

travelling by aeroplane

1

[13]

Q3.

(a) any **two** from:
- (same) number of scoops / sweeps each time

  allow any idea of controlling sweeps e.g. for same time

- scoop / sweep (at same) distance from the edge of pond

  allow scoop / sweep at the same place

- scoop (at same) depth

- (same) size of net

- (same) gauge / mesh size of net

2

(b) 64

1

(c) 19 to 122

allow 122 to 19
or
103

1

(d) water fleas were not evenly spread (around the edge of the pond)

allow any description of this such as more water fleas near the vegetation

1

(e) more water fleas live near the edge of the pond

allow more water fleas live where there is vegetation

allow converse if student's calculated answer to part (b) was less than 12

1

(f) 35

1

(g) 37.5 (%)

allow 38 (%)

1

(h) there was a high(er) level of pollution (in the pond in 2016)

1

because there are no / fewer mayfly nymphs
or

because there are fewer freshwater shrimps

data must be comparative

1

allow converse for 2014

(i) any **two** from:
  • famine / food insecurity
  • water shortage
  • landfill sites filling up
  • acid rain
  • deforestation / habitat destruction
  • extinction of species
    or
    reducing biodiversity
  • natural resources running out

ignore global warming and any water pollution references such as sewage or eutrophication

2

[12]

Q4.

(a)

Factor	Biotic	Abiotic
Diseases	✓	
Herbivores	✓	
Temp		✓
Water		✓

allow 1 mark for 2 or 3 correct

2

(b) (leaves block light near tree so) more light (as you move outwards)

allow low light intensity under tree
ignore Sun

1

for photosynthesis

allow less photosynthesis under the tree

1

(which) produces (more) glucose / proteins (for growth)

ignore growth
ignore food

allow molecules, cell components or other correct substances instead of proteins

if no other mark awarded allow less water / ions / minerals / nutrients under the tree

1

(c) quadrat

correct spelling only

1

light meter

allow lux meter
allow light intensity meter
allow light data logger

1

in this order

(d)   1.5(0) (m²)

allow 15 000 cm²

1

(e)   to keep light (intensity) as similar as possible

allow the light (intensity) might change

ignore references to temperature
ignore weather
ignore Sun

1

(f)   any **one** from:
   •   repeat (investigation) around the tree

allow repeat in different directions

   •   repeat (investigation) for other trees / areas
   •   sample every one metre
   •   count the number of each species present (rather than percentage cover)

ignore repeats unqualified
ignore repeat at different times / days / seasons
ignore different size quadrat
ignore random sampling

1

(g)   daisy

1

(h)   as light (intensity) increased so did the percentage / cover of plants

ignore directly proportional
ignore positive correlation unqualified

1

up to 100% / maximum at 175 (arbitrary units)

ignore distance

1

(i)   any pair from:
   •   (lack of) water / rain (1)

because the leaves are stopping the rain
or
because the roots of the tree are absorbing it (1)

allow soil moisture

- (lack of) minerals / ions (1)

  allow magnesium / nitrate / nutrients

  because the tree (roots) have absorbed them (1)

- temperature (1)

  allow too cold / cooler

  because less thermal energy from the sun is reaching under the tree canopy (1)

  allow 'heat' for thermal energy
  allow pH / acidity (1)
  because (some) fallen leaves are acidic (1)

  2

  ignore carbon dioxide
  *do **not** accept oxygen*

  [15]

Q5.

(a) homeostasis

1

(b) by hormones

1

by nerve impulses

1

(c) any **one** from:

ignore water
- temperature
- (blood) glucose / sugar (concentration)

  allow pH / ions / salts
  allow oxygen or carbon dioxide

1

(d)

*an answer of 600 (cm³) scores **2** marks*

2000 − 1400

allow 800 − 200

1

600 (cm³)

1

*if no mark awarded allow (600 + 1000 + 400 =) 2000 for **1** mark*

(e) more sweat (on hot day)

1

cools the body

1

(f) $\dfrac{750}{3000} \times 100$

1

25 (%)

1

*an answer of 25 (%) scores **2** marks*

[10]

Q6.

Level 3: Relevant adaptations are identified, given in detail and logically linked to form a clear account.	5-6
Level 2: Relevant adaptations are identified, and there are attempts at logical linking. The resulting account is not fully clear	3-4
Level 1: Adaptations are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1-2
No relevant content	0
Indicative content •a small SA:V ratio •means less thermal energy transferred to surroundings •thick fur **or** hollow hair shafts •traps a layer of air which acts as an insulating layer stopping transfer of thermal energy •a layer of fat or blubber under the skin •acts as an insulating layer **or** as a food store for respiration when food is in short supply •small ears •reduces surface area for thermal energy transfer •white colour •camouflage in the snow so prey do not see them coming and they get more to eat **or** so predators do not see them and they can escape •large feet •to spread weight over snow so they can run faster	

•hibernate in winter •to conserve energy stores allow 'heat loss' for transfer of thermal energy	

6

[6]

Q7.

    (a)   (i)   correct parental genotypes (man BB and woman bb)

1

all offspring Bb

Woman

	b	b
B	**Bb**	**Bb**
B	**Bb**	**Bb**

Man
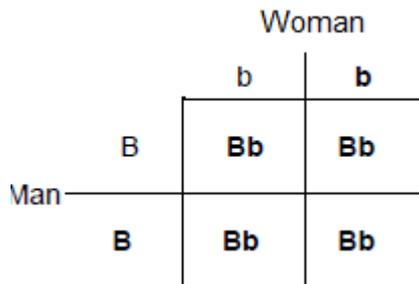
ignore 'brown' or 'brown eyes' on diagram

1

        (ii)   they have one B / dominant allele / heterozygous

or

B / brown allele / dominant allele is expressed even if only on one chromosome

1

    (b)   correct parental genotypes (both Bb)
                can be shown in a diagram
                can be shown as gametes

1

correct derivation of offspring genotypes from gametes
                allow correct derivation from wrong gametes

1

bb identified as blue-eyed

1

[6]