AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



MARK SCHEME

4.7.1 ADAPTATIONS, INTERDEPENDENCE AND COMPETITION (PACK 3)

SCORE	PERCENTAGE
/185	%

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Q1.

(a) any **two** from: eg

- same volume of solution
  *do **not** allow same size of container*
- left for same length of time
- same temperature
- same oxygen
- same pH
- same number of invertebrates / animals
  *do **not** allow same number of species*
- same age / stage of invertebrates / animals

2

(b) line of best fit / curve / point to point drawn going through 240-260 and 25

1

correct interpolation to X axis
if no work on graph allow 250

1

(c) (i) (C)

50% killed at lowest / low copper concentration
ignore least survivors

1

(ii) any **two** from:

- involves counting
  *easy to count gains **2** marks*
- easy to do
- invertebrates more sensitive
- needs less / no apparatus
  ignore more reliable / accurate

2

[7]

Q2.

(a) stays cool
ignore shade

1

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less sweat

1

(b) any **two** from:

- breathing rate less
- less water lost via breath
  less can be implied
- less water <u>from</u> respiration

2

[4]

Q3.

(a) (i) conserves water owtte

1

(ii) prevents overheating / keeps cool
allow cooler at night
allow safety from predators

1

(iii) increases heat loss / cooling
allow prevents sinking into sand

1

(b) animal could overheat owtte

1

[4]

Q4.

(a) **1** mark for each adaptation and **1** mark for its correct linked advantage

- long / thick hair / fur (1)
  for insulation (1)
  allow keeps warm
- small ears (1)
  for reduced heat loss (1)
- small feet (1)
  for reduced heat loss (1)
  ignore wide feet
  ignore prevent sinking
- white fur / coat (1)
  for camouflage / poor emitter (1)
- small SA/V ratio (1)
  reduces heat loss (1)
- thick layer of fat (1)
  insulates / keeps warm (1)

max 4

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(b) **1** mark for each adaptation and **1** mark for its correct linked advantage

- horns (1)
  for defence (1)
- long legs (1)
  for speed / escape / vision (1)
- light colour (1)
  for camouflage (1)
  allow pattern
- eyes on side of head (1)
  for wider field of vision (1)
- hooves (1)
  for speed / escape (1)
- large ears (1)
  to hear predators better (1)

max 4

[8]

Q5.

(a) any **two** from:

- streamlined / shape reduces friction / long and thin / smooth surface OWTTE
- fins / flippers / tail / paddle
  *do **not** accept 'arms' or 'legs'*
- structures that push against water

2

(b) (i) any **two** from:

fossil has hind limb / legs / feet
it = minke
accept any valid comparison

fossil has more ribs / bones

fossil has teeth

fossil has curved spine

2

(ii) billion

1

give evidence for

1

[6]

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Q6.

(a) wing pattern similar to *Amauris*

1

birds assume it will have foul taste

1

(b) mutation / variation produced wing pattern similar to *Amauris*

*do **not** accept breeds with Amauris*

*do **not** accept idea of intentional adaptation*

1

these butterflies survived

1

breed / genes passed to next generation

1

[5]

Q7.

(a) (i) any **two** from:

list principle

- light

  ignore oxygen / food / sun
- water
- space
- nutrients / ions / minerals / named
- carbon dioxide / CO_2

2

(ii) less competition for water

ignore space / light / food

or

more water / nutrients / minerals available

1

(b) camouflage / same shape as leaf / looks like a leaf

allow 'blends in'

ignore colour

1

[4]

Q8.

(a) any **two** from:

control variables from information given

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- area of bed sampled
- sampling time
- size of net
- kicking action
- net position

2

(b) any **two** from:

must be ideas related to a sample

- some animals not dislodged
  ignore reliability etc
- some animals missed / through / escaped net
- invertebrates difficult to identify
- invertebrates from outside area

2

(c) 10 to 99 **or** 10 – 99 **or** 99 to 10 **or** 99 – 10

1

(d) any **two** from:

- increased / goes up
  allow increase implied from all data described
- 0 at sample 4
- to (more than) 100

2

(e) mayfly

1

because not found downstream of point where sewage enters stream **or** only in the unpolluted water

1

[9]

Q9.

adaptation and linked advantage eg

*max **2** for 3 adaptations*

2

- roots widespread / long (1)

  to collect water from large area (1)

  ignore large roots
  accept to collect more water

- some roots deep / long (1)

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to collect water from deep down (1)

ignore large roots
accept to collect more water

- absence of leaves(1)

  reduces water loss (1)

- swollen stem (1)

  to store water (1)

- roots near surface (1)

  to absorb rainwater (1)

- roots widespread (1)

  support in sandy soil (1)

2

[4]

Q10.

(a) points plotted accurately

$+\frac{1}{2}$ *square*

deduct 1 mark per error
ignore the line

2

(b) 30 **or** correct from candidate's graph

accept 30 000 lynx
*do **not** accept 30 000*

1

(c) (i) fall

mark (i) and (ii) separately

1

(ii) fewer hares **or** lack of food

*do **not** accept <u>no</u> hares or food*

1

(d) kills / preys / preys on / hunts / catches
<u>and</u> eats / for food (other) animals

*must have the eat **and** kill for the point*

1

[6]

Q11.

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The answer to this question requires good English in a sensible order with correct use of scientific terms. Quality of written communication should be considered in crediting points in the mark scheme.

*maximum of **4** marks if ideas not well expressed*

Polar bear has

white fur - camouflage **or** not seen by prey

accept converse points re sun bear

1

thick(er) fur - insulation **or** keeps heat in

<u>number must be comparative</u>
numbers given must be explained
*do **not** accept keeps warm / keeps out the cold*

1

thicker fat - insulation **or** keeps heat in

1

energy reserve **or** can release heat

1

lower S.A - slower / less heat loss
(re body size)

1

[5]

Q12.

(a) (i) increases

1

(ii) decreases

1

(b) any **two** from:

- competition for water
- competition for ions / minerals / salts / nutrients

accept correct named example
*do **not** accept food*
*do **not** accept <u>all</u>*

- competition for light

2

(c) kills / harms other / named organisms

1

[5]

Q13.

any **three** from adaptation **and** effect:

ignore references to ions throughout ignore animals eating plant

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few leaves / no leaves / little growth above ground / low surface area above ground so less water loss

*do **not** accept zero water loss*

deep roots

so can reach water **or** because surface soil is likely to dry out

accept 'moisture' for water

roots near surface so can obtain water when it does rain

widespread roots or many roots so can obtain water from a large area

swollen stem so can store water

[3]

Q14.

(a) (i) 144

1

(ii) 1955 **or** 1979

1

(b) (i) 144-12 = 132

allow 130, 134
allow a transfer error from part (a)

1

(ii) disease **or** predators **or** sterility **or** starvation **or** migration **or** climatic **or** weather change

*award **one** mark for an awareness that any of the following factors could reduce the rabbit population*

accept words to the effect of e.g vegetation decreased = starvation
e.g. humans named as predators

*do **not** accept gender bias of offspring **or** 'too crowded' unless qualified*

1

(c) there's only enough food **or** water **or** space for about 140

*do **not** accept statements equating births and deaths or increase or decrease in predators*

1

[5]

Q15.

(a) (i) traps air

note 'keeps warm' is stem

1

(increases) insulation effect **or** retains body heat or prevents heat loss

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accept air is a poor (thermal) conductor

*do **not** credit acts as a barrier unless qualified by a prevention of heat loss*

1

(ii) **increases** insulation

*do **not** accept keep warm*

1

retains body heat or prevents heat loss

accept:
*stored fat can be broken down **or** respired **or** burned (1 mark)*
credit 'used for energy'

to release (thermal) energy (1 mark)
*do **not** credit create energy*

1

(iii) less **or** smaller surface area (per unit mass or volume)

*accept uses more glucose **or** respires more*

*do **not** credit small surface area*

1

and

less heat loss (for its mass) or explanation of this idea

generates more heat

1

(b) (coloured) to match or blend in with environment

*accept this idea in candidate's own words e.g disguised **or** specific example*

1

any **one** from:
prevents predation
aids hunting

accept this idea in own words

1

(c)

*note: marks are awarded for an indication of enhanced qualities **or** adaptations of xerophytes*

*do **not** credit an unqualified **effect***
*e.g. small surface area **or** they can store water **or** spikes **or** prickly leaves related to protection*

any **two** from:

widespread roots
long roots
spiky leaves or needles
hidden **or** sunken stomata

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fleshy leaves **or** stems **or** roots for
water storage
leaves arranged to **funnel** dew to roots
hairy **or** rolled leaves
light colour

*accept no **or** fewer stomata*

accept no leaves

accept crassulacean acid metabolism
*accept ephemeral (flowering **or***
*leaf loss **or** production)*

accept reverse diurnal pattern of stomatal opening (stomata open at night)

2

[10]

Q16.

(a) it has a long/thin beak;
which enables it to reach down the long flower tube/OWTTE;

(allow qualified answers in terms of wings)

(allow two adaptations)

2

(b) it has a sharp beak;
which enables it to peck through the base of the flower tube/OWTTE

(allow qualified answers in terms of feet)

(allow two adaptations)

each for 1 mark

2

[4]

Q17.

(i) 8

gains 1 mark

1

(ii) winter

gains 1 mark

1

(iii) e.g. colder/shorter days

gains 1 mark

1

(iv) e.g. obtains light needed for food production;

before oak leaves emerge

each for 1 mark

2

(v) April

gains 1 mark

1

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(vi) e.g. more available food

gains 1 mark

1

[7]

Q18.

(a) (i) squirrels eat nuts;

each for 1 mark

owls eat squirrels

(2 marks for energy flow)

2

(ii) hazel tree

gains 1 mark

1

(iii) 1 squirrel population would decrease;
because fewer nuts available as food

each for 1 mark

2

2 owl population would decrease;
because fewer squirrels available as food

each for 1 mark

2

(b) (i) digested/broken down;

(ii) by microbes/reference to worm action;

each for 1 mark

2

(iii) March
warmer/increased activity of worms/microbes;

each for 1 mark

2

[11]

Q19.

(a) 4 of:
intensification due to need to improve efficiency of energy transfer;
has led to developing fast growing crop varieties;
native plants cannot compete with these;
for e.g. light/water/minerals;
effect of herbicides;
pesticides killing pollinating insects

each for 1 mark

4

(b) recommend a variety of measures; (can be implied)
because rotational will allow these species to continue;
permanent will allow others;
leading to conservation of a wide range of species

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each for 1 mark

4

[8]

Q20.

(a) e.g.:
competition for light because potamogeton plants taller
competition for nutrients taller plants may have longer roots

each for 1 mark

4

(b) descriptions of:
measuring tape or similar quadrat
method of estimating cover (inside quadrat)

each for 1 mark

3

[7]

Q21.

Cogently argued based on biological principles, for **and**
against introduction of caterpillar
maximum of 4 pros e.g.
fewer chemicals used therefore less expense
less chemical damage to other plants
consequent benefits to food chains
fewer farm animals poisoned therefore more economic
countryside more varied therefore more attractive to tourists
tourists bring economic advantages
greater variety of habitats therefore greater variety of species

any 4 for 1 mark each

4

cons e.g.
danger to livelihoods if crops destroyed by caterpillar
relatively low chance of success since only one third of schemes effective world-wide
unlikely to be natural predators therefore ecological balance affected

any 2 for 1 mark each

2

cogently argued case **gains up to 2 marks**

2

[8]

Q22.

(a) 2 of e.g.
competition for food competition for space disease

2

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(b) e.g.
greys eat greater range of food
greys larger – more effective competitors

2

[4]

Q23.

(1) A
(2) C
(3) B
(4) D

for 1 mark each

[4]

Q24.

(a) from 20.00 to 4.00

for 1 mark

1

(b) line correct length

for 1 mark

1

(c) e.g. it is dark so fewer predators can see it,

for 1 mark each

2

[4]

Q25.

(a) 1 mark for each correct set of plots

for 1 mark each

2

(b) (i) number of voles/amount of food

for 1 mark

1

(ii) e.g. increased number of owls
new disease

for 1 mark each

2

[5]

Q26.

(a) light and/or temperature too low in winter,
increasing light in spring leads to increase in photosynthesis
increasing temperature in spring leads to increasing metabolism/ growth/reproduction

for 1 mark each

3

(b) they run out of minerals

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for 1 mark

1

[4]

Q27.

(a) long / pointed horns ***and*** for defence
long legs ***and*** to run away *reject strong / powerful legs*
long legs ***and*** to kick predator
tall ***and*** can see predators a long distance away but accept
eyes on side of head ***and*** to see predator approaching
large ears ***and*** to hear predators approaching
pattern ***and*** for camouflage any

two for 1 mark each

2

(b) (i) fall in morning / day and rise at night or any reasonable

for 1 mark
description of whole pattern for one mark

1

(ii) loss due to evaporation or transpiration <u>in day</u> / absorbed from air
<u>at night / when cool</u>

for 1 mark

1

(c) (i) 19.30 – 20.30 **and** 07.30 – 08:30

for 1 mark

1

(ii) highest moisture content in grass
needs water in desert conditions / response to shortage of drinking water
sensible reference to less chance of predation

any two for 1 mark each

2

[7]

Q28.

<u>pros e.g.:</u>

gum trees survive therefore less soil erosion
therefore food webs not disrupted
if no culling, whole Koala population may die
easier to cull because Koalas are difficult to catch

<u>cons e.g.:</u>

Koala's 'right to life' / ethical issue
better to transfer to reserves on mainland than kill
could use tranquillisers to catch without killing
could allow population to stabilise naturally

max 4 of the above; max 3 pros or cons.

[4]

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Q29.

(i) 0.25 × 100 / 25

gains 1 mark

but
1%

gains 2 marks

2

(ii) muscle contraction / limb movement / moving around / chewing
heartbeat / breathing / internal muscle activity
maintaining body temperature / keeps body warm
active uptake synthesising substances (*reject* growth)

any three for 1 mark each

3

[5]

Q30.

camouflage (when hunting)

*accept the idea that the white coat prevents the prey **or** predator 'seeing' the Arctic fox*

1

insulation (from cold)

*accept an idea that the thick coat retains body heat **or** traps air **or** that air in the fur is a poor conductor **or** keeps it warm*

NEUTRAL RESPONSES –
protection, waterproof

1

[2]

Q31.

(a) **Quality of Written Communication**
The answer to this question requires ideas in good English, in a sensible order with correct use of scientific terms. Quality of written communication should be considered in crediting points in the mark scheme.

max 2 if ideas not well expressed

in summer more greenfly

accept increase in population

1

in winter less greenfly

accept decrease in population

1

over the three years greenfly numbers decrease

*accept fall **or** drop for decrease*

1

(b) any **one** from

(number of) greenfly

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severe **or** cold winters
toxic chemicals
destruction of habitats
disease
predators
weather
temperature

do not accept food

1

[4]

Q32.

any **two** from

swollen stem stores water (for dry periods)

reduced leaves / spines lose less water /less transpiration / less evaporation

idea of long roots absorb water from deeper / more spread out in soil

[2]

Q33.

(a) any **one** from

big, flat feet

long eyelashes

long hair around openings to its ears

1

(b) (the came) does not need insulation

accept can keep warm without the fat

1

(c) any two from:

- (the camel) can drink large amounts of water in one go
- loses little water by urine and/or sweating
- (the camel) can use fat from its hump to produce water

any order for the reasons

2

[4]

Q34.

(a) (long) roots

1

(b) prevents water from evaporating

accept to reduce/stop water loss

1

[2]

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Q35.

(a) any **three** from:

space

accept land, room

water

accept rain

nutrients

accept fertilisers, nitrates, minerals
*do **not** accept food*
*do **not** accept just sun*

light

carbon dioxide

3

(b) herbicides

1

[4]

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