Mark schemes

Q1.

(a) any **one** from:

- collect more samples each time
- collect samples more frequently

  allow suggested time interval
- use a bigger bucket / sample
- do not return tadpoles until after the fourth sample
- sample at the same time of day
- randomise collecting positions
- collect at range of depths
- standardised sweeps with a net instead of a bucket

  allow a method to avoid double counting tadpoles

1

(b) 6

if no answer on line, allow answer in the table

1

(c) correct linear scale and axis labelled weeks

scale must use at least half available space

1

all points plotted correctly

allow a tolerance of ±½ small square

*allow 4 or 5 correct plots for **1** mark*

2

curved line of best fit

ignore line drawn point to point

1

(d) correct value at 0 and 4 weeks from line on student's graph, eg 60 and 22

allow a tolerance of ±½ small square

1

correct calculation eg

$\frac{22}{60} \times 100$

1

36.7

allow 37 or 36.6...

allow correct calculation using values from the student's graph

if no line drawn on Figure allow a calculation based on values of 60 and 24 for up to full marks

if line drawn on Figure but data from table used (60 and 24) only mp2 and mp3 can be awarded 1

1

(e) any **two** from:

- disease / (named) pathogens
- being eaten **or** predators
- lack of food

allow competition for food

ignore competition unqualified

- low oxygen (concentration in water)

allow eutrophication

- change in temperature
- change in pH
- (some of the) pond dried out
- toxic chemical

allow lack of space

allow named example such as sewage / fertiliser

ignore pollution

ignore waste

2

[11]

Q2.

(a) (30 m) tape measure

1

quadrat

1

must be in this order

(b) choose locations at random

1

(c) area

1

mean

1

must be in this order

(d) multiply mean by area

allow multiply 2 by 150

allow multiply total (of five quadrats) by a fifth of the area

allow multiply 10 by 30

1

(e) count and record more samples

1

(f) any **one** from:

- water / moisture

  allow humidity

  allow rain

  allow drought

- light

  ignore sun unqualified

  allow shade (by eg building)

- temperature
- oxygen in the soil

  ignore oxygen unqualified

- wind
- minerals / ions

  allow named ions

  allow fertiliser / salts

  ignore carbon dioxide

  ignore nutrients

  ignore (soil) pH

1

[8]

Q3.

(a) any **one** from:

- sun
- light

ignore photosynthesis

1

(b)

Feeding relationship	Organism	
Secondary consumer	lynx	
Primary consumer	(snowshoe) hare	1
Producer	grass	
Herbivore	(snowshoe) hare	1
Carnivore	lynx	
Prey	(snowshoe) hare	1
Predator	lynx	

*if no other mark awarded allow **1** mark for 3 correct answers*

Up to 3

(c) camouflaged / hidden **or** not (easily) seen

allow description eg blends in with surroundings

1

from lynx / predator / carnivore

1

not killed / eaten

allow less likely to be killed / eaten

1

(d) any **two** from:

- fewer lynx (to eat them)

  *allow not many predators / lynx do **not** accept no lynx / predators*

- more food / grass (available)

  allow a lot of food / grass

- hares reproduce / breed / multiply

2

(e) (number of lynx) increases

1

(f) less food **or** fewer (snowshoe) hares (to eat) **or** fewer prey

ignore the lynx were hunted

*do **not** accept no food*

1

(g) any **two** from:

- (lost in) respiration (of snowshoe hare)

  allow as carbon dioxide
- egestion / faeces

  allow not all digested
- excretion / urea / urine
- not all eaten

  allow not all (named) parts eaten

2

*if no other mark awarded, allow **1** mark for waste*

[13]

Q4.

(a) fungi

1

(b) the pH of the milk

1

(c) put the beaker in a water bath

1

(d) fatty acid

1

(e) all the fat had been digested

1

(f) any **one** from:

allow converse if clearly describing 5 °C

- (there is) more (kinetic) energy
  allow particles move faster
  allow more collisions between particles
- enzyme activity is higher
  allow enzymes work faster
  ignore enzymes work better
- bacteria / microorganisms are dividing / reproducing faster
  allow number of bacteria / microorganisms increasing faster
  allow more bacteria / microorganisms
  ignore bacteria / microorganisms grow faster
  ignore it is warmer

1

(g) (30 °C, 2 days) 6(.0)
and
(30 °C, 3 days) 4.7

allow a tolerance of ±½ small square

1

(fall) 1.3 (pH units/day)

allow −1.3 (pH units/day)
allow correct answer using student's incorrect readings in the range of 5.95 to 6.05 and / or 4.65 to 4.75

1

(h) $\frac{1.3}{0.1}$

*allow ecf from answer in part **(g)***

1

13

*do **not** accept if a unit is given*

1

[10]

Q5.

(a) **abiotic**

any **two** from:

- water
  - *allow moisture / humidity / rain(fall)*
  - *allow dryness*
- oxygen / air (in soil)
  - *ignore carbon dioxide*
- pH (of soil)
  - *allow acidity / alkalinity (of soil)*
- minerals / ions
  - *allow salts*
  - *allow named example of an ion*
  - *ignore nutrients*
- temperature
- size of soil particles **or** texture / type of soil
  - *allow named examples of soil types*
  - *ignore space / toxins / weather*

2

biotic

any **two** from:

- food
  - *allow amount of dead / decaying matter (in soil)*
  - *ignore nutrients*
- predators / consumers / carnivores
  - *allow example − such as birds*
- disease / pathogens / bacteria / fungi
  - *allow microorganisms / microbes / parasites /*

2

*if **no** other marks awarded allow **2** marks for **four** factors in reverse categories*

(b) **Level 3:** The method would lead to the production of a valid outcome. The key steps are identified and logically sequenced.

5–6

Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the method is not fully logically sequenced.

3–4

Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.

1–2

No relevant content

0

Indicative content

- same concentration of chemical / **X** applied to the soil
- same volume / amount of chemical / **X** applied to the soil
- same size of area sampled – eg 1 m^2 or 0.25 m^2
- use of a quadrat
- same time between application and collecting worms
- same time allowed for collecting worms after application

- each sample area selected randomly
- method of achieving randomness – eg random coordinates

- (collect and) count worms in each of areas **A** and **B**

- at least 5 repeats in each of areas **A** and **B**
- calculate mean (per unit area) **or** total for each of areas **A** and **B**
- compare means / totals for areas **A** and **B**

[10]