



A-Level Biology

Y13 Practical Questions

Mark Scheme

Time available: 84 minutes

Marks available: 68 marks

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Mark schemes

1.

- (a)
1. Draw line/origin on (chromatography) paper (using ruler and pencil);
 2. (Use pipette/tubing/dropper to) add chlorophyll/solution to origin/line;
 3. Add solvent/**A** below line/origin;
Accept 'so solvent is not above line' for 'solvent below line'.
 4. Remove/stop (from glassware) before solvent reaches end (of chromatography paper)

OR

Mark (position) where solvent reaches/front;

Accept all marks on a labelled diagram.

Allow filter paper for chromatography paper.

Accept remove/stop (immediately) when solvent reaches end/top.

Accept ensure solvent does not reach top/end.

Ignore Rf values.

4

- (b) For **2 marks** = two pigments have same solubility in (solvent) **A** but different solubility in (solvent) **B**

OR

For **2 marks** = one pigment is soluble in (solvent) **B** but not in (solvent) **A**

OR

For **2 marks** = pigments have different solubilities in the solvents/**A** and **B**

OR

For **2 marks** = one pigment is only soluble in (solvent) **B**

OR

For **2 marks** = one pigment is insoluble (only) in (solvent) **A**;

For **1 mark** = response as for 2 marks but refers to solution rather than solvent;

Accept 'dissolves' for solubility.

Accept correct reference to 'affinity' for solubility e.g., 'greater affinity' (to solvent) indicates more soluble.

Accept correct reference to 'polarity' for solubility' e.g. pigments have different polarities.

Accept 'Rf value' for solubility.

Ignore 'solvent stronger'.

2

[6]

2.

(a) Automarked question – Reduction of pyruvate
(Box 3)

1

- (b) 1. Oxygen/O₂ taken up/used (by seeds);
2. Carbon dioxide/CO₂ (given out) is absorbed by solution/potassium hydroxide/KOH;
3. Decrease in pressure/volume (of air inside);
Ignore 'negative pressure' but reject reference to vacuum.
Accept 'air pressure higher than inside'.

3

- (c) 1. Distance (drop/liquid moves);
Accept description of distance, e.g. 'start and end position'.
2. Diameter/radius/bore of tubing/lumen
Accept (cross-sectional) area of tubing/lumen.
- Ignore time.*

2

- (d) 1. Remove potassium hydroxide/KOH
OR
Remove solution which removes carbon dioxide.
OR
Replace potassium hydroxide/KOH with water;
Reject if seeds removed or another organism used.
2. Record distance liquid moves (without potassium hydroxide);
Reject moves to the right.
Accept 'liquid would not move'.
3. Use difference in distance liquid moves (with potassium hydroxide and without potassium hydroxide)
- OR**
- Use difference in (calculated) volumes (with potassium hydroxide and without potassium hydroxide);
Accept 'if liquid does not move (volume of) carbon dioxide produced is the same as (volume of) oxygen used'.
- Answers which add/use a syringe, reject mp2 **and** mp3.*

3

- (e) Answer in the range 3×10^{-7} to 3.33×10^{-7} ;
 Accept equivalent answers in this range which are not in standard form.
 Accept 3.0×10^{-7}
 Ignore any numbers after 3.33.

1

[10]

3.

- (a) 1. Osmosis does not occur;
 2. Chloroplast / organelle does not burst / lyse / shrivel / shrink;
 1. Accept: osmosis would occur if water potentials were not the same.
 1 and 2, Accept: correct reference to osmotic lysis for **2 marks**.
 2. Accept: chloroplast would burst / lyse / shrivel / shrink if water potentials were not the same.
 2. Reject: 'cell bursts/shrivels'
 2. Ignore: damage to chloroplasts on its own is not enough for a mark.
 3. Reject: becomes turgid / flaccid.

2

- (b) 1. To show light does not affect DCPIP;
 2. To show chloroplasts are required;
 Ignore: comparison with other tubes.

2

- (c) 1. Reduction of DCPIP by electrons;
 2. (From) chlorophyll / light dependent reaction;
 1. Accept: hydrogen / H for electrons but not protons / hydrogen ions / H* on their own.
 2. Accept: from chloroplasts / photosystems / water.

2

- (d) Provides a standard / reference point

OR

Can compare different chemicals/weed-killers

OR

Can compare different concentrations of chemicals / weed-killers;

Accept: decolourises quicker than 100% **or** saves time waiting for complete decolourisation.

Note: comparisons must be qualified.

Accept: find the most effective weed-killer **or** the most effective concentration.

Accept: answers relating to cost effectiveness.

1

- (e) 1. Less / no ATP produced;
2. Less / no reduced NADP produced;
3. Less / no GP reduced / converted to TP;
2, Accept: less / no NADPH / NADPH₂ / NADPH + H

2 max

[9]

4.

- (a) 1. Light/I band only actin;
2. H zone/band only myosin;
3. Darkest/overlapping region actin **and** myosin;
*Accept any suitable descriptions that distinguishes these regions
e.g. 'white band' for 1, 'light grey' for 2 and 'dark grey' for 3.
Ignore references to A band.*

3

- (b) 1. Use (distilled) water and creatinine solution to produce dilutions (series);
Accept description of dilutions (series).
2. Addition of (creatinine-)detecting solution (to each solution);
*The addition of a known/specific volume of (creatinine-)detecting
solution = 2 marks.*
3. Using a known/specified/constant volume of a solution (e.g. diluted creatinine
solution);
*The addition of a known/specific volume of (creatinine-)detecting
solution = 2 marks.*
4. Record absorbance/transmission of solution/s using a colorimeter;
*Reject calorimeter. Ignore details provided on 'blank'.
Accept description of absorbance or transmission.*
5. Plot dilution/concentration of (creatinine) solution against
absorbance/transmission;
*Accept absorption for 'absorbance'.
Accept description of absorbance or transmission.*

4 max

- (c) 1. Use same volumes of solutions as used in producing (calibration curve)

OR

Add (creatinine-)detecting solution (to urine);

Ignore 'add indicator' on its own.

Ignore calorimeter in this part of the question.

2. Read off (creatinine) concentration against absorbance/transmission (value) obtained;

Ignore 'line of best fit'.

Accept 'compare' for 'read off'.

2

[9]

5.

- (a) *one mark for conclusion:*

maggots move to / respond to / prefer / like / red rather than green;

(reject 'most prefer red')

maggots move to / prefer / like areas of lower light intensity (except green);
maggots respond more to colour than light intensity / do not respond to differences in light intensity;

(reject conclusion relating to single result)

one mark for:

evidence matching conclusion:

more in red than green, but light intensity the same;

more in segments with lower light intensity;

more differences in different colours, little difference in light intensity;

large difference in number of maggots on segments with 25 a.u.

light intensity;

2 max

- (b) valid statement expressed as null hypothesis, i.e. in negative form, e.g. no difference in response to different colours / light intensities;

(must relate to a possible hypothesis)

1

- (c) rotate box (so segments in different direction) / change order of coloured segments;

place magnets around box / create alternative magnetic field;

1 max

[4]

6.

- (a) Population – organisms of one species in an ecosystem / habitat / area;
Community – organisms of all species / all populations in an ecosystem / habitat / area;

2

- (b) (i) No immigration / migration (Ignore references to emigration);
 No reproduction (*Ignore references to death*);
 Idea of mixing;
 Marking does not influence behaviour / increase vulnerability to predation;
 Sample / population large enough;

max 2

- (ii) $\frac{96 \times 77}{11}$; 672;
Correct answer (however derived) scores 2 marks
Incorrect answer with evidence of correct method scores 1 mark.

2

- (c) Principle of randomly placed quadrats and method of producing random quadrats; (*Reject 'throwing'*)
 Valid method of obtaining no. dandelions in given area (mean per quadrat / total no. in many quadrats);
 Multiply to give estimate for total field area;

3

- (d) (i) Niche of A – 1;
 Niche of B – 3;
 Too small for B / too hot for A – 4;
 Too large for A / too cold for B – 2;
All four correct = 2 marks; any 2 correct = 1 mark

2

- (ii) Original population living in one area / 2 species evolved in the area;
 Idea of genetic variability;
 Concept of reproductive isolation;
 Possible mechanism;
 Gene pools become increasingly different;
 Until interbreeding does not produce fertile offspring;

max 4

[15]

7.

- (a) (i) 1. Sex;
 2. Lifestyle;
Stress, smoking, diet etc are examples of lifestyle.
 3. Body mass;
3. Allow weight for mark point 3.
 4. Health;
Reject: height.
 5. Ethnicity;
 6. Genetic factors / family history;

2 max

- (ii) 1. Large sample / number / 410 000;
Reject: random
2. Long time period / 8.5 / many years;
3. Different countries / more than one country;
- 2
- (b) Correct answer of 209 / $209.1 = 2$ marks;
Answer of 210 = one mark
- Incorrect answer but multiplies by 8.5 = 1 mark;
- 2
- (c) Age affects risk of cancer;
Must relate to cancer not just to illness
- 1
- (d) 1. Correlation does not mean causal relationship;
1. Reject casual for point 1.
Reference to 'due to other factors' on its own is not enough for a mark
2. Tea / coffee contains other substances / different amounts of caffeine / estimated intake (of tea / coffee);
3. No control group;
4. Only one type of cancer studied / further studies required / only one investigation / study / group;
- 4
- (e) (i) 1. Treated the same;
2. Accept decaffeinated
2. No caffeine;
2. Reject placebo.
- 2
- (ii) 1. Absorb different amounts;
Reject: Different body masses
2. Broken down by enzymes / digested;
3. Different blood volumes;
4. Differences in metabolism;
5. Caffeine from a different source;
- 1 max

- (iii) 1. Less oxygen / glucose to (cancer) cells;
'Reduces cell division' on its own should not be credited.
2. Less carcinogens;
3. Reduces spread of cancer (cells);

1 max

[15]