Mark schemes

Q1.

(a) 1. Tip produces IAA;

Accept source/release for produces but ignore contains/stores IAA.

2. IAA diffuses (into shoot);

Accept auxin for IAA.

Accept IAA diffuses down.

3. (More) elongation of cells on one side (than other);

Accept (more) elongation of cells on left side.

Reject any reference to shaded/dark side or away from light.

3

(b) 1. Size of shoot/tip;

2. Number of shoot tips;

3. Size/type of agar (block);

Accept 'amount of agar'.

4. (Shoots) at same stage of growth/development;

Accept (Shoots/plants) are same age.

5. Time (period) tips kept on agar

OR

Time (period) agar/block kept on (cut shoot)

OR

Time (period shoots) kept in dark;

6. Temperature;

Mark points 1 to 6 = max 3.

Ignore pH, species, carbon dioxide, humidity, nutrients, water and light.

7. (Repeat several times and) calculate a mean;

8. Compare/read degree of curvature (on calibration curve) to determine (IAA) concentration

OR

Higher the degree of curvature the higher the IAA concentration;

5 max

(c) 1. (IAA) is not broken down by light

OR

(IAA) is produced in the dark **OR**

Light/dark does not affect (IAA) production;

2. (IAA) moves away from light

OR

(IAA) moves to shaded side;

IAA accumulates on shaded side is not enough on its own, idea of movement is required.

2

[10]

Q2.

(a) Behaviour

1. (Positive photo) taxis;

Reject negative (photo) taxis

Advantage

2. Accept any suitable suggestion, eg to avoid competition, to find a mate, increase dispersal, to avoid predators;

Neutral – to move into the open or to move out of the tree bark

2

(b) 1. No stats test, so do not know if change (in movement away from light) is significant;

2. Between 35 °C and 36.5 °C more than half of beetles are still found on the light side;

3. (At higher temperatures/above 35 °C) beetles might be flying (not walking)

OR

(Y-axis) states speed of movement, might not just be walking speed;

4. Slowing of movement happens before 35 °C;

5. Slowing of movement could be due to beetles preparing to fly (and not temperature);

6. Speed (of movement) not recorded above 35 °C/ between 35 and 37.5 °C/between 35 and 40 °C;

OR

Speed (of movement) not recorded at 37.5 °C

7. (Mean speed could mean) some might walk very quickly **and** others stay still/not move;

3 max

[5]

Q3.

(a)

Mark in pairs *1 and 2 or 3 and 4.*

1. Tip produces IAA;
   Accept auxin for IAA.
   Accept affects amount of IAA.
   Ignore contains/stores IAA.

2. Affects concentration of IAA
   OR
   Affects (shoot) length/growth/elongation;
   Accept affects independent variable.
   Accept auxin for IAA.
   Ignore affects results.

3. Mitosis/division occurs in shoot tips;

4. Affects (shoot) length/growth/elongation;
   Ignore affects results.

2 max

(b) 1. For respiration;
   Ignore photosynthesis.
   Ignore aerobic/anaerobic (respiration).
   Reject glucose used in photosynthesis.

2. Provide ATP/energy (for growth);
   Reject produce energy.
   *Do **not** credit photosynthesis provides ATP.*

2

(c) 1. To prevent/reduce evaporation;
   Accept evaporation of (IAA/glucose) 'solution'.
   Ignore contamination.

2. (Which) alters concentration of (IAA) solution
   OR
   (Which) alters water potential;
   Accept auxin for IAA.

2

(d) 1. Increase in IAA <u>concentration</u> the higher/greater the <u>mean</u> (change in) length;

Accept auxin for IAA.

2. (High) IAA stimulates cell elongation;
   Accept auxin for IAA.

3. In roots, growth/elongation less/inhibited;
   Accept auxin for IAA.
   Accept decrease in (mean) change in length but reject 'decreases length' on its own.
   Accept 'opposite results or 'negative correlation'.

3

(e) 0.4 **and** 39.6;
Both numbers required and must be in order shown.

1

[10]

Q4.

(a) Only 3 neurones / nerve cells (in reflex arc)

1

(b) 1. Rapid;

2. Protect against damage to body tissues;

3. Do not have to be learnt;

4. Help escape from predators;

5. Enable homeostatic control.

2 max

Q5.

(a) Accept suitable null hypothesis that **includes type of light and behaviour**, eg

The type of light has no effect on the behaviour/movement of COTS
OR
There is no difference in behaviour/movement with constant/flashing light;
Ignore general null hypotheses, or example 'there is no difference between observed and expected'

1

(b) Accept any **two** factors for **one** mark from the list below;

Salinity / salt concentration of the water

Temperature (of the water)

Amount / distribution of food

pH (of the water)

Oxygen/carbon dioxide concentration

Intensity/wavelength of (constant and flashing) light

List rule applies
Ignore humidity
Ignore type of coral
Ignore depth of water

1 max

(c) Yes (no mark)

1. Movement is away from either type/both types of light
OR
Negative (photo) taxis to both types/either types of light;

2. Significant movement away from constant light **as** p = 0.02 / < 0.05 / = 2% / < 5%
OR
Movement away from constant light is not due to chance **as** p = 0.02 / 0.05 / = 2% / < 5%;

*Ignore '**results**' in the context of significance or chance*

No (no mark)

3. Movement away from flashing light is not significant **as** p = 0.69 / > 0.05 / = 69% / > 5%
OR
Movement away from flashing light is due to chance **as** p = 0.69 / > 0.05 / = 69%/> 5%;

*Ignore '**results**' in the context of significance or chance*

3

(d) Correct answer of 3 hours = 2 marks;;

Allow 1 mark for distance of 48 000 mm in working

1 max for answer of 185 minutes/3 hours and 5 minutes/3.09 hours

1 max for answer of 1 hour (ie answers that use 564 in their calculation);

2 max

[7]