

Past-paper walk-through

Features of organisms ■ 1.3

eXercise

Questions in this set

- 0610/41 N25 Q4 ■ 18 marks
- 0610/42 N25 Q2 ■ 16 marks
- 0610/62 N25 Q3 ■ 20 marks
- 0610/63 N25 Q3 ■ 15 marks
- 0610/21 J25 Q2 ■ 1 mark
- 0610/22 J25 Q3 ■ 1 mark
- 0610/43 J25 Q4 ■ 17 marks
- 0610/22 M25 Q2 ■ 1 mark

Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 4

0610/41 N25 ■ Q4 ■ 18 marks

- 4 Fig. 4.1 is a photograph of a bee on a flower. One of the bee's legs is covered with pollen.



Question 4



Fig. 4.1

- (a) (i) State **three** features of flowers that attract pollinating insects such as bees.

Question 4

[3]

- (ii) State **one** way that pollen grains are adapted for pollination by bees.

Question 4

- (b) Describe **two** ways the structure of a monocotyledonous plant differs from the structure of a dicotyledonous plant.

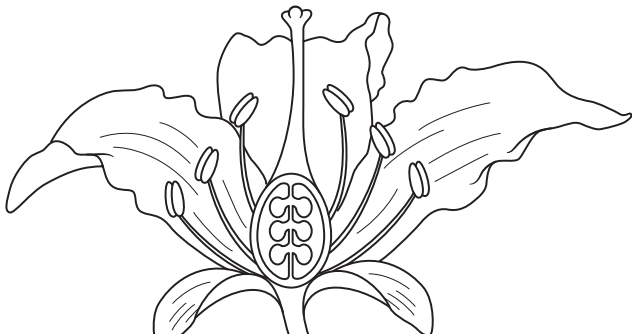
Question 4

Question 4

Question 4

[2]

(c) Fig. 4.2 is a diagram of a cross-section of an insect-pollinated flower.



Question 4

✓ \ \ ~

Question 4



Fig. 4.2

On Fig. 4.2, name and draw label lines to:

- the structure that supports an anther
- a structure that protects the flower bud
- an ovule.

[3]

(d) Describe sexual reproduction in a flower, from the release of pollen to the formation of a zygote.

Question 4

151 -

- (e) Sexual reproduction also occurs in humans.
 - (i) State the name of the male gamete in a human.

Question 4

- (ii) State where gametes are formed in the human male reproductive system.

Question 4

(iii) Human male gametes are haploid.

State the name of the process that produces haploid male gametes.

Question 4

- (iv) Describe the function of the prostate gland in the male reproductive system.

Question 4

[Total: 18]

Solution 4

(a)(i) Mark scheme

- any three from:
- scent ;
- nectar ;
- large / colourful, petals ;
- pollen (as a source of food) ;
- AVP ;
- 3
- e.g. honey guides / ref. to landing

Solution 4

- platforms / ref. to mimicking insects

Solution 4

(a)(ii)

Mark scheme

- any one from:
- large ;
- sticky / spiky / AW ;
- 1

Solution 4

(b) Mark scheme

- any two from:
- (monocots have)
- narrow / strap / long/AW, leaves ;
- parallel (leaf) veins ;
- scattered vascular, tissue / bundles, (in the stem) ;
- hollow stems ;
- petals in multiples of three ;
- fibrous roots ;

Solution 4

- one cotyledon ;
- pollen grains have one pore or furrow ;
- AVP ;;
- 2

Solution 4

(c) Mark scheme

- filament labelled ;
- sepal labelled ;
- an ovule labelled ;
- 3
- 0610/41
- October/November 2025
- Guidance

Solution 4

(d) Mark scheme

- any five from:
- 1
- pollen (released) from the anther ;
- 2
- pollen transferred to stigma ;
- 3
- pollen tube, grows ;
- 4

Solution 4

- (pollen tube goes) down / through, the style ;
- 5
- ref. to ovule / ovary ;
- 6
- pollen / male, nucleus travels down the (pollen) tube / style ;
- 7
- pollen / male, and, ovule / female, nuclei fuse ;
- 8
- fertilisation ;
- 9

Solution 4

- AVP ;
- 5
- e.g. ref. to haploid nuclei or diploid zygote ;

Solution 4

(e)(i)

Mark scheme

- sperm (cell) ;
- 1

(e)(ii)

Mark scheme

- testis / testes ;
- 1

Solution 4

(e)(iii)

Mark scheme

- meiosis ;
- 1 A reduction division

Solution 4

(e)(iv)

Mark scheme

- make fluid / semen, for the sperm / male gametes, to swim / AW ;
- 1 A ref. to providing nutrients
- Guidance

Question 2

0610/42 N25 ■ Q2 ■ 16 marks

- 2 (a)** Dicotyledons and monocotyledons belong to the plant kingdom.
- (i)** State **two** main features of plants.

Question 2

Question 2

[2]

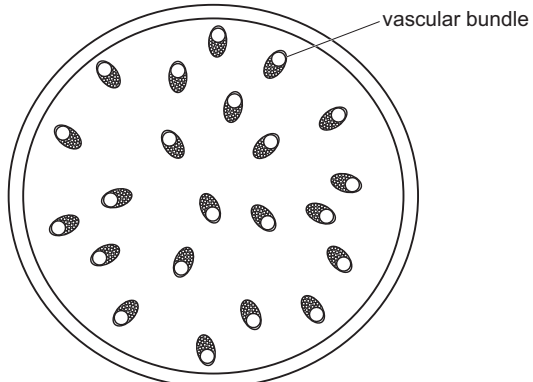
- (ii) State the names of **two** other kingdoms.

Question 2

Question 2

[2]

(b) Fig. 2.1 is a diagram of a cross-section of a monocotyledonous stem.



Question 2



Fig. 2.1

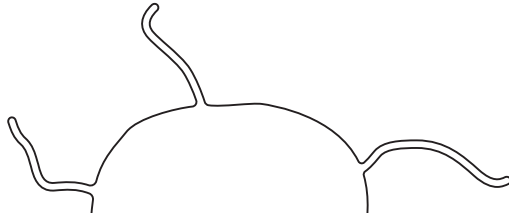
Describe how the distribution of vascular bundles in a dicotyledonous stem would differ from the monocotyledonous stem shown in Fig. 2.1.

Question 2

(c) Fig. 2.2 is an incomplete drawing of a cross-section of a dicotyledonous root.

Complete Fig. 2.2 by:

- sketching the distribution of phloem and xylem
- labelling the phloem, xylem and a root hair.



Question 2

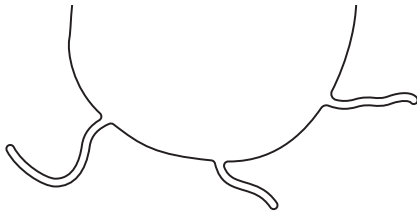


Fig. 2.2

[3]

(d) State **two** functions of xylem.

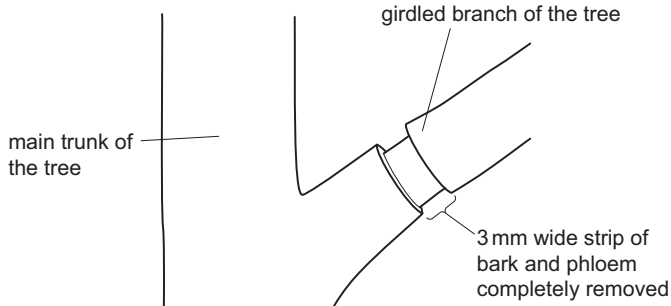
Question 2

Question 2

[2]

- (e) A farmer investigated the effect of girdling on the mass of apple fruit produced by apple trees.

The farmer removed a 3 mm strip of bark and phloem tissue from the branches that produce the fruit, as shown in Fig. 2.3.



Question 2

| / from the base of the

Question 2



Fig. 2.3

The farmer girdled nine apple trees and left nine apple trees ungirdled.

The mass of ten fruits from the girdled trees and the mass of ten fruits from the ungirdled trees were compared.

Table 2.1 shows the results.

Table 2.1

treatment of trees	mass of ten fruits /g
girdled	1500
ungirdled	1800

Question 2

| girdled

|

1796

|

Question 2

ungirdled	958
-----------	-----

Describe the results shown in Table 2.1 **and** suggest an explanation for them.

Question 2

(f) Apples are used to make apple juice.

State **one** enzyme used in fruit juice production.

Question 2

[Total: 16]

Solution 2

(a)(i) Mark scheme

- any two from:
- multicellular / AW ;
- producer / ref. to photosynthesis / (presence of) chloroplasts or chlorophyll ;
- cellulose cell wall ;
- non-motile ;
- reproduces asexually, and / or, sexually ;
- AVP ;
- 2

Solution 2

- 0610/42
- October/November 2025
- Guidance

Solution 2

(a)(ii)

Mark scheme

- any two from:
- animal ;
- fungi ;
- protist ;
- prokaryote ;
- 2

Solution 2

(b)

Mark scheme

- (vascular bundles) would be in a ring / AW ;
- 1

Solution 2

(c)

Mark scheme

- root hair labelled ;
- xylem correctly drawn and labelled ;
- phloem correctly drawn and labelled ;
- 3

Solution 2

(d)

Mark scheme

- any two from:
- transport / AW, of water ;
- transport / AW, of (mineral) ions / minerals ;
- support / AW ;
- 2

Solution 2

(e) Mark scheme

- any five from:
- 1
- girdled trees produced a greater mass of fruit / ora ;
- 2
- comparative data manipulation ;
- 3
- phloem transports, sucrose / amino acids ;
- 4

Solution 2

- leaves, photosynthesise / produce (named), carbohydrates / sugars ;
- 5
- sugars / sucrose / amino acids, used for growth of fruit ;
- 6
- idea that (in girdled tree) sucrose / sugar / amino acids, stays in the
- branch / cannot be transported downwards ;
- 7
- ref. to translocation ;
- 8
- leaves are the source ;

Solution 2

- 9
- (growing) fruit is the sink ;
- 5

Solution 2

(f)

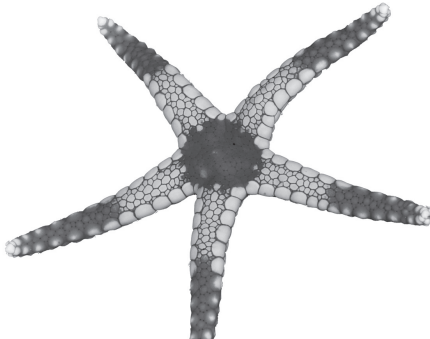
Mark scheme

- pectinase ;
- 1 A amylase / cellulase
- Guidance

Question 3

0610/62 N25 ■ Q3 ■ 20 marks

- 3 (a) Fig. 3.1 is a photograph of a necklace starfish, *Fromia monilis*.



Question 3



Fig. 3.1

- (i) Draw a large diagram of the necklace starfish shown in Fig. 3.1.

Question 3

Question 3

- (ii) Line **PQ** in Fig. 3.1 represents the diameter of the necklace starfish.

Measure the length of line **PQ** in Fig. 3.1.

Question 3

Calculate the actual diameter of the necklace starfish using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line PQ in Fig. 3.1}}{\text{actual diameter of the necklace starfish}}$$

Give your answer to **two** significant figures.

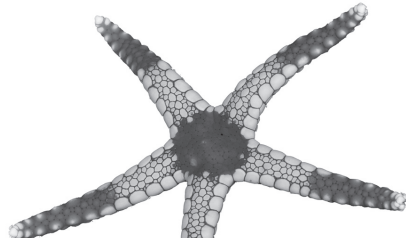
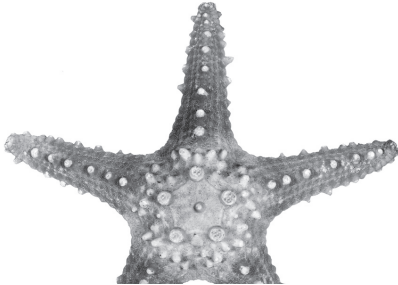
Space for working.

Question 3

[3]

- (iii) Fig. 3.2 is a photograph of a spiny starfish, *Marthasterias glacialis*. Fig. 3.3 is a photograph of a necklace starfish.

The magnifications of the photographs are **not** the same.



Question 3



Question 3



spiny starfish

Fig. 3.2



necklace starfish

Fig. 3.3

State **two** ways the spiny starfish in Fig. 3.2 differs from the necklace starfish in Fig. 3.3, and **one** way it is similar.

Do **not** include references to size in your answer.

Question 3

Question 3

Question 3

Question 3

Question 3

Question 3

[3]

(b) Seven-armed starfish live in the sea.

Scientists investigated the distribution of seven-armed starfish, *Luidia ciliaris*, in one region.

- Photographs of 20 m^2 areas of seabed were taken at different depths.
- The depth of the water in each area was measured when the water was at its highest level (high tide).
- The numbers of seven-armed starfish in each photograph were counted.
- All photographs were taken on the same day in July.

(i) State **two** ways that the method used by the scientists ensured that the numbers of seven-armed starfish counted at different depths could be compared.

Question 3

Question 3

Question 3

Question 3

[2]

The results of the investigation are shown in Table 3.1.

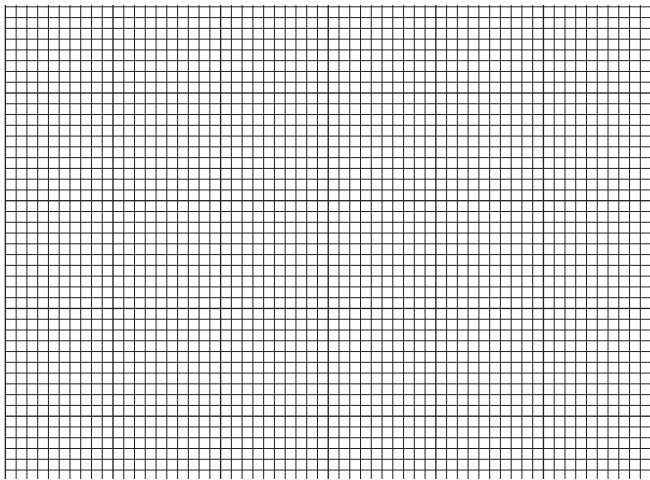
Table 3.1

depth/m	number of seven-armed starfish counted
0.0–9.9	337
10.0–19.9	1486
20.0–29.9	1243
30.0–39.9	241
40.0–49.9	121

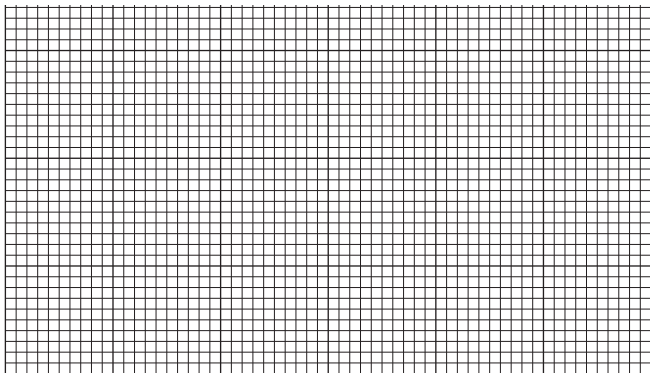
- (ii) Plot a histogram on the grid of the data in Table 3.1.



Question 3



Question 3



Question 3

[4] _

- (iii) State the depth range in Table 3.1 at which most seven-armed starfish were found.

Question 3

- (iv) Using the information in Table 3.1, calculate the total number of seven-armed starfish that were photographed at all depths, and use this value to calculate the percentage of starfish that were photographed in the 0.0–9.9 m range.

Express the percentage as a whole number.

Space for working.

Question 3

[3]

[Total: 20]

Solution 3

(a)(i)

Mark scheme

- single clear outline with no shading ;
- width of drawing greater than 93 mm ;
- detail 1: 5 arms and enclosed shape in middle that doesn't touch the
- edges ;
- detail 2: indication of where colour changes on all limbs
- 4

Solution 3

(a)(ii) Mark scheme

- length of line PQ: 93 ± 1 (mm) ;
- 290 ;;
- 3 MP1 correct measurement of line PQ
- MP2 correct calculation i.e. $PQ \div 0.32$
- MP3 correct rounding to two significant figures
- ecf from previous step
- 0610/62
- October/November 2025

Solution 3

- Guidance

Solution 3

(a)(iii) Mark scheme

- max two differences from:
- spiny starfish
- / Figure 3.2
- necklace starfish
- / Figure 3.3
- spines / AW
- AND smooth / scales / no spines ;
- light / bright, in centre

Solution 3

- AND dark in centre ;
- has five, ossicles / AW,
- in the centre or has a
- central pentagon
- shape
- AND
- does not have five,
- ossicles / AW, in the centre
- or no central pentagon
- shape ;

Solution 3

- no white ends to the
- limbs
- AND white ends to the limbs ;
- more uniform shaped
- limbs
- AND less uniform shaped limbs ;
- straight limbs
- AND bent / curved / AW, limbs ;
- lines going down the
- arms

Solution 3

- AND no lines going down the
- arms ;
- max one similarity from:
- (both have)
- five, arms / AW ;
- circle in the middle ;
- dark arms / arms that are a different colour to the centre ;
- tapering limbs ;
- radial symmetry ;
- 3

Solution 3

- one mark per correct row
- 0610/62
- October/November 2025
- Guidance

Solution 3

(b)(i) Mark scheme

- any two from:
- same region ;
- same size of area / 20 m², (sampled) ;
- same day / same time of year / both in July / same date ;
- depth measured at, same time of tide / high tide / when water at its
- highest ;
- 2

Solution 3

(b)(ii) Mark scheme

- axes labelled with units ;
- suitable linear scale on number of starfish axis and ranges given for
- depth axis and data occupies at least half the grid in both directions ;
- five accurate plots $\pm$ half a small square ;
- bars of equal width $\pm$ half a small square with no gaps between them ;
- 4 i.e. depth / m and number of starfish OR
- frequency density

Solution 3

(b)(iii)

Mark scheme
■ 10–19.9
■ 1

Solution 3

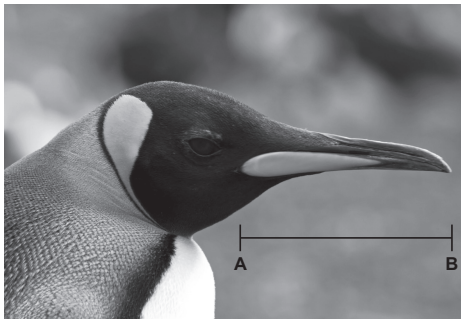
(b)(iv) Mark scheme

- total number of starfish photographed: 3428 ;
- percentage in the 0.0–9.9m range: 10 (%) ;;
- 3 MP1 correct total number of starfish
- MP2 correct calculation to any number of
- decimal places e.g. $(337 \div 3428) \times 100 = 9.831$
- MP3 correct rounding to a whole number
- ecf from previous step

Question 3

0610/63 N25 ■ Q3 ■ 15 marks

- 3 (a) Fig. 3.1 is a photograph of the head of a king penguin.



magnification $\times 0.42$

Question 3

magnification x6.12

Fig. 3.1

- (i) Make a large drawing of the head of the king penguin shown in Fig. 3.1.

Question 3

Question 3

- (ii) The length of line **AB** represents the length of the penguin's beak.

Measure the length of line **AB** in Fig. 3.1.

Question 3

Use your measurement and the formula to calculate the actual length of the penguin's beak.

$$\text{magnification} = \frac{\text{length of line } \mathbf{AB} \text{ in Fig. 3.1}}{\text{actual length of the penguin's beak}}$$

Give your answer to **one** decimal place.

Space for working.

Question 3

Question 3

Question 3

[3]

(b) Fig. 3.2 shows the heads of a gentoo penguin and a black-footed penguin.



gentoo



black-footed

Question 3

-

Question 3

not to scale

Fig. 3.2

Other than size, state **two** ways the gentoo penguin differs from the black-footed penguin in Fig. 3.2.

Question 3

Question 3

Question 3

Question 3

[2]

- (c) Penguins are covered in feathers. The feathers reduce heat loss by insulating the birds from the cold.

A beaker of hot water can be used to represent a penguin.

Plan an investigation to determine the effect of the thickness of an insulating material on heat loss in a beaker of hot water.

Question 3

[Total: 15]

Solution 3

(a)(i)

Mark scheme

- outline clear and continuous, no shading ;
- size greater than half of space provided ;
- detail 1: tear-shaped white patch on the left with a border
- and tear-shaped white patch below the beak ;
- detail 2: two or more lines on the beak ;
- 4

Solution 3

(a)(ii) Mark scheme

- 46 ± 1 (mm) ;
- 109.5 (mm) ;;
- 3 MP1 correct measurement of line AB
- MP2 correct calculation to any number of decimal places
- i.e. $46 \div 0.42 = 109.5238$
- MP3 correct rounding to one decimal place
- ecf from previous MP

Solution 3

(b) Mark scheme

- any two from:
- Gentoo has:
- less white area / white patch around eye is triangular-shaped vs semicircular-shaped ;
- rounder / bigger / wider eye ;
- slimmer / narrower / thinner / sharper, beak ;
- larger pale area on beak / no stripe vs black-footed has a
- stripe ;

Solution 3

- smoother beak ;
- 2
- 0610/63
- October/November 2025
- Guidance

Solution 3

(c) Mark scheme

- 1 independent variable
- at least two different thicknesses of insulation (used as an
- insulator) ;
- 2 dependent variable
- change in temperature / time taken for a stated fall in
- temperature ;
- 3 and 4 method ;;
- ■

Solution 3

- method of insulating beaker with named material
- ■
- measure the starting temperature and final temperature
- 5, 6 and 7 variables kept constant ;;;
- ■
- volume of water
- ■
- size
- ■
- type of beaker

Solution 3

- ■
- time left to cool / stated fall in temperature
- ■
- starting temperature
- ■
- type of insulator
- ■
- same surroundings / environmental temperature
- 8 repeat investigation twice more / at least two replicates ;
- 9 relevant safety precaution ;

Solution 3

■ 6

Question 2

0610/21 J25 ■ Q2 ■ 1 mark

2 Which set of features is characteristic only of birds?

- A** hair and wings
- B** hard-shelled eggs and feathers
- C** scales and soft-shelled eggs
- D** wings and soft-shelled eggs

Solution 2

Answer: **B**

Why

- Feathers are unique to birds – no other group has them.
- Birds also lay hard-shelled eggs.
- Hair belongs to mammals, and wings alone are not enough since insects and bats have them too.

Question 3

0610/22 J25 ■ Q3 ■ 1 mark

- 3** A single-celled organism has chloroplasts, a cell wall and a nucleus.

Which kingdom is this organism placed in?

- A** fungus
- B** plant
- C** prokaryote
- D** protocist

Solution 3

Answer: **D**

Why

- Chloroplasts and a cell wall suggest a plant, but the organism is *single-celled*.
- A nucleus rules out a prokaryote.
- A single-celled organism with a nucleus and chloroplasts belongs to the protists.

Question 4

0610/43 J25 ■ Q4 ■ 17 marks

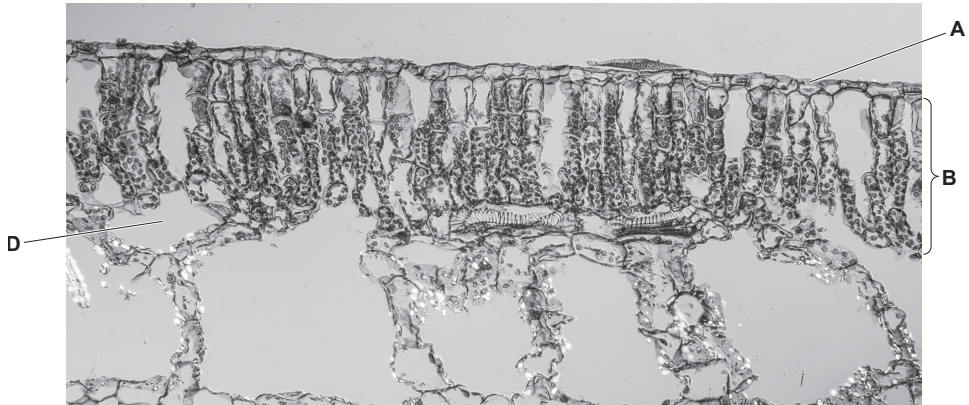
- 4 Fig. 4.1 is a photograph of a water lily, *Nymphaea alba*, in a lake.



Fig. 4.1

Question 4

Fig. 4.2 is a photomicrograph of a cross-section of part of a water lily leaf.



Question 4

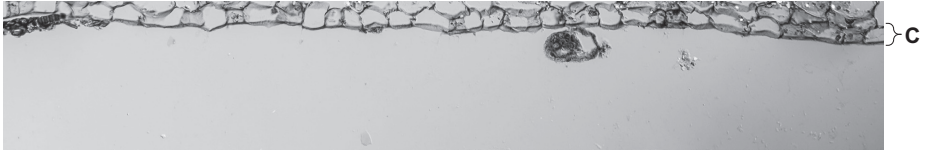


Fig. 4.2

- (a) (i) Identify tissue **B** and tissue **C** labelled in Fig. 4.2.

Question 4

Question 4

[2]

- (ii) Describe **two** functions in water lilies of the area labelled **D** in Fig. 4.2.

Question 4

Question 4

Question 4

Question 4

[2]

- (iii) A green pigment is found in tissue **B** in Fig. 4.2.

Describe the function of this pigment.

Question 4

- (iv) Water lilies have a very thin cuticle compared to a plant growing on land.

Explain how this is an adaptation for water lilies.

Question 4

(b) Table 4.1 shows the stomatal density and habitat of two different hydrophytes.

Table 4.1

type of plant	habitat	stomatal density on upper leaf surface / stomata per mm ²	stomatal density on lower leaf surface / stomata per mm ²
pondweed	under the water	0	0
water lily	leaves on the surface of the water	573	0

(i) Convert the stomatal density of the upper leaf surface of the water lily to stomata per cm².

Question 4

- (ii) Using the data in Table 4.1, explain the stomatal density found in the two different hydrophytes.

Question 4

- (c) Fig. 4.3 is a photograph of rice, *Oryza sativa*, a monocotyledonous crop plant grown in flooded fields in waterlogged soils.



Question 4



Question 4



Fig. 4.3

- (i) Identify a characteristic visible in Fig. 4.3 that can be used to classify rice as a monocotyledonous plant.

Question 4

- (ii) Waterlogged soil contains very low concentrations of oxygen.

Suggest how this limits the amount of proteins a plant can make.

Question 4

[Total: 17]

Solution 4

(a)(i)

Mark scheme

- B – palisade mesophyll ;
- C – (lower) epidermis ;
- 2
- 0610/43
- May/June 2025
- Guidance

Solution 4

(a)(ii)

Mark scheme

- any two from:
- diffusion of (named) gases for photosynthesis / respiration ;
- diffusion of water vapour for transpiration ;
- idea of buoyancy / to make the leaf float (to get more light) ;
- 2

Solution 4

(a)(iii)

Mark scheme

- any two from:
- traps light energy ;
- transfers energy from light into energy in chemicals ;
- (energy) for the synthesis of (named) carbohydrates ;
- 2

Solution 4

(a)(iv) Mark scheme

- any two from:
- 1
- water lilies do not need to prevent water loss ;
- 2
- carbon dioxide uptake is less restricted / AW ;
- 3
- use less resources to produce a cuticle ;
- 4

Solution 4

- allows more light to penetrate ;
- 5
- to the palisade (mesophyll) layer ;
- 6
- AVP ;
- 2
- e.g. leaf does not need to be rigid / AW

Solution 4

(b)(i)

Mark scheme

- 57 300 (stomata per cm²) ;
- 1

Solution 4

(b)(ii) Mark scheme

- any four from:
- 1
- pondweed is submerged in water so no need for stomata to let air into a
- leaf ;
- 2
- oxygen and carbon dioxide can diffuse into, leaf / cells, from water ;
- 3
- water lily has stomata only on upper surface ;

Solution 4

- 4
- because lower surface is, on the surface of the water / under the water ;
- 5
- constant water supply to water lily / no risk of wilting ;
- 4

Solution 4

(c)(i) Mark scheme

- any one from:
 - 1
 - thin / strap-shaped, leaves ;
 - 2
 - parallel veins ;
 - 1
 - 0610/43
 - May/June 2025

Solution 4

- Guidance

Solution 4

(c)(ii) Mark scheme

- any three from:
- 1
- reduced aerobic respiration can occur ;
- 2
- less energy released for active transport ;
- 3
- less nitrate ions absorbed ;
- 4

Solution 4

- less amino acids (to make protein) ;
- 5
- less energy released for protein synthesis ;
- 6
- more denitrifying (bacteria) ;
- 7
- less nitrogen fixing (bacteria) ;
- 8
- fewer nitrate ions in the soil ;
- 3

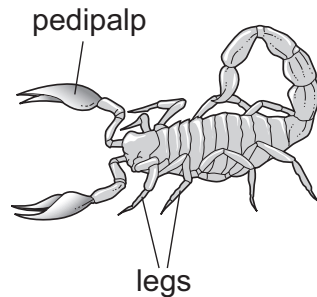
Solution 4

- Guidance

Question 2

0610/22 M25 ■ Q2 ■ 1 mark

2 The diagram shows an arthropod.



Question 2

To which group does it belong?

- A** arachnids
- B** crustaceans
- C** insects
- D** myriapods

Solution 2

Answer: **A**

Why

- Arachnids have four pairs of legs and a pair of pedipalps; insects have three pairs of legs.
- The pedipalp shown is the giveaway – no insect or crustacean has one.
- Myriapods have many body segments each bearing legs, which this animal does not.