
HL Paper 1

Chrysanthemums are an important commercial flower. As a short-day plant, how can growers induce chrysanthemums to flower out of season?

- A. Expose plants to short bursts of light for 24 hours
- B. Expose plants to 15 hours of continuous light
- C. Expose plants to 12 hours of light and 12 hours of darkness
- D. Expose plants to 15 hours of continuous darkness

Markscheme

D

Examiners report

[N/A]

What is a role of xylem?

- A. It absorbs minerals from the soil by active transport.
- B. It translocates amino acids from source to sink.
- C. It carries glucose to the leaves.
- D. It contributes to the plant support with lignified walls.

Markscheme

D

Examiners report

This question was one of the best discriminators of the exam. Strong candidates answered D correctly while the weaker candidates were choosing A as an answer.

Which process happens first during germination of a starchy seed?

- A. Formation of gibberellin
- B. Production of amylase
- C. Absorption of water
- D. Conversion of starch into monosaccharides

Markscheme

C

Examiners report

N/A

How do most angiospermophyta improve sexual reproductive success?

- A. By flowering during long days
- B. By flowering during short days
- C. By using mutualistic pollinators
- D. By using micropropagation

Markscheme

C

Examiners report

This question was addressing section 9.4 of the guide. The NoS statement explains that 85% of plants depend on pollinators for reproduction, therefore C was the correct answer.

When a plant stem bends towards sunlight, what change does auxin promote in the cells on the side of the stem away from the light?

- A. Translocation
- B. Cell differentiation
- C. Cell elongation
- D. Transcription

Markscheme

C

Examiners report

[N/A]

How do mineral ions in the soil move into the root?

- A. Osmosis
- B. Mass flow of water
- C. Translocation
- D. Through phloem

Markscheme

B

Examiners report

This question contained an error, which a small number of G2 forms commented on. The question was intended to be based on AS 9.2.2, how mineral ions move to the root, not how they enter the root. The answer was therefore B. However the question actually asked how mineral ions move into the root. Perhaps surprisingly, this question proved to be the best discriminator on the paper. The most able candidates presumably answered it by eliminating the other answer, because they knew that mineral ions do not enter roots by osmosis, translocation or through phloem. There was some truth in the answer *mass flow of water* as mineral ions do pass through epidermis and cortex cell walls in the apoplastic flow of water, but this is certainly not expected knowledge for IB Biology candidates.

A man attaches a bird box to the trunk of a dicotyledonous tree. A few years later he returns to the tree and finds that his bird box is still attached and the tree is much taller. How high will his bird box be from the ground?

- A. Unchanged as growth from the apical meristem would be above the box.
- B. Unchanged as growth from the lateral meristem would be above the box.
- C. Higher as growth from the apical meristem would be below the box.
- D. Higher as growth from the lateral meristem would be below the box.

Markscheme

A

Examiners report

N/A

Under which conditions would the rate of transpiration be greatest?

- A. Humid and cool with wind
- B. Dry and hot with wind
- C. Dry and hot with no wind
- D. Humid and cool with no wind

Markscheme

B

Examiners report

N/A

What steps occur in germination after water uptake?

- A. Gibberellin is produced, followed by amylase activation
- B. Gibberellin stimulates photosynthesis to begin in the cotyledons
- C. Amylase breaks down starch to glucose which activates the embryo
- D. Amylase synthesis followed by activation of gibberellin

Markscheme

A

Examiners report

[N/A]

What allows most plants to continue producing more roots, leaves or stems throughout their life?

- A. Auxin
- B. Meristems
- C. Phloem
- D. Cellulose

Markscheme

B

Examiners report

This question discriminated very well. Most candidates mentioned the meristems allowing for the production of roots, stems and leaves.

Excessive irrigation can cause increased salinity in the soil. What effect does this have on water transport in the plant roots?

- A. Decreases movement of water from soil into the root
- B. Absorption of water with a higher solute concentration
- C. Increases movement of water from soil into the root
- D. Absorption of water with a lower solute concentration

Markscheme

A

Examiners report

[N/A]

What is/are the effect(s) of auxin in plants?

- I. Increasing the rate of cell elongation in stems
- II. Changing the pattern of gene expression in shoot cells
- III. Detecting the direction of light

- A. I only
- B. I and II only
- C. II and III only
- D. I, II and III

Markscheme

B

Examiners report

[N/A]

Cobalt chloride paper is blue when dry but turns pink with water. Blue cobalt chloride paper was fastened to the upper and lower surfaces of a plant leaf. After 20 minutes, many small pink dots were observed on the paper on the lower surface, and a few pink dots were seen on the upper surface.

What conclusions can be drawn?

- I. There are more stomata on the lower surface than on the upper surface.
- II. Stomata on the upper surface are blocked by the waxy cuticle.
- III. More transpiration occurs through the lower surface than through the upper surface.

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

Markscheme

B

Examiners report

[N/A]

What is transported in xylem tissue?

- A. Sucrose from leaves to fruits
- B. Starch from leaves to storage organs
- C. Water from roots to leaves
- D. Salts from soil to roots

Markscheme

C

Examiners report

[N/A]

How do auxins cause plant shoots to grow towards light?

- A. Increase cell division on the side of the stem near the light source
- B. Increase cell division on the side of the stem away from the light source

C. Increase cell elongation on the side of the stem near the light source

D. Increase cell elongation on the side of the stem away from the light source

Markscheme

D

Examiners report

[N/A]

Which is the most efficient way for some desert plants to conserve water?

A. By having no leaves, so water evaporates from the green stem with less surface

B. By loading organic compounds in the phloem of the roots

C. By accumulating salt within their tissues, so water is retained by osmosis

D. By growing long hair on their surface, so air moisture is absorbed at night

Markscheme

A

Examiners report

This question was poorly worded but most candidates had the correct answer A. This is obviously the most correct answer, as the most extreme xerophytes have modified their leaves and transpire through their stem. It is true that some xerophytes accumulate salt, but they are not the majority. It is not right to say that moisture is absorbed at night.

Which process and cause are responsible for water uptake by the roots?

	Process	Cause
A.	Simple diffusion	Solute concentration in the root lower than in the soil
B.	Osmosis	Solute concentration in the root greater than in the soil
C.	Osmosis	Solute concentration in the root lower than in the soil
D.	Cohesion	Solute concentration in the root greater than in the soil

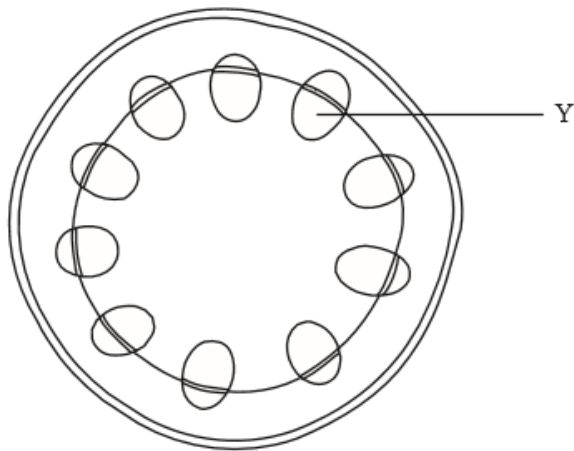
Markscheme

B

Examiners report

[N/A]

The diagram below shows a cross section of a stem. What is the structure labelled Y and one of its functions?



	Structure Y	Function
A.	phloem	storage of water and starch
B.	xylem	mechanical support
C.	phloem	gas exchange
D.	xylem	transport of sugars

Markscheme

B

Examiners report

Some candidates seemed to confuse the position of xylem and phloem. The role of xylem in support is required in addition to its role in transport (9.2.4 and 9.2.6).

Which abiotic factors affect transpiration in plants?

- A. temperature, humidity and wind
- B. pH, temperature and salinity
- C. light, pH and humidity
- D. humidity, temperature and salinity

Markscheme

A

Examiners report

[N/A]

Which process is matched with a valid example?

	Process	Example
A.	seed dispersal	a stamen explodes in the wind
B.	fertilization	a nucleus from the pollen grain fuses with a nucleus in the ovule
C.	fertilization	a bee carries pollen from flower to flower
D.	pollination	seeds are blown from a flower onto another one by the wind

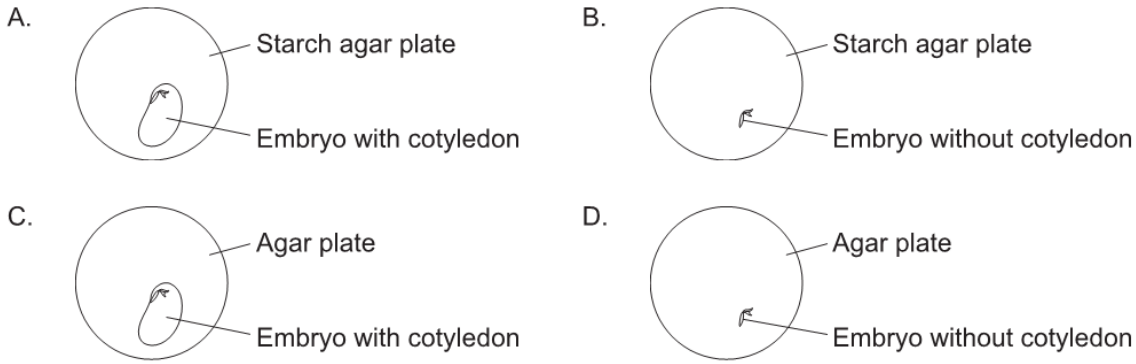
Markscheme

B

Examiners report

[N/A]

Agar is a growth medium without nutrients; starch agar is agar with starch added to it. Seed coats were removed from seeds and the seeds were used to set up the following conditions. Which plant embryo was **unable** to grow?



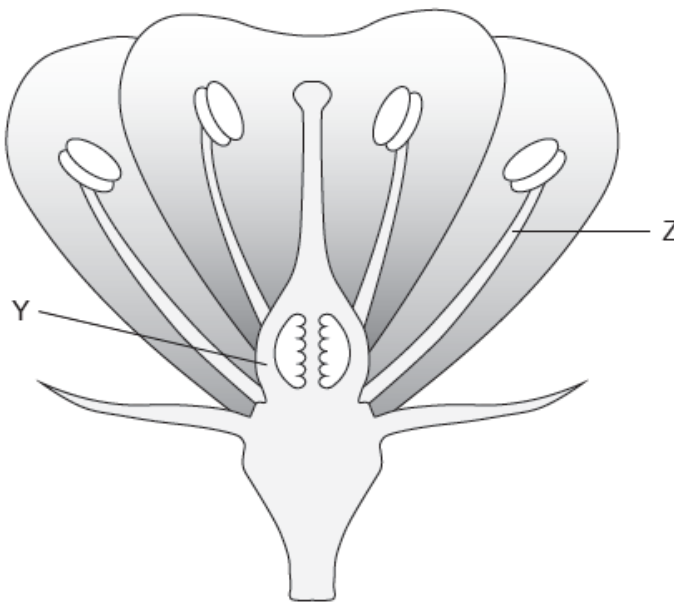
Markscheme

D

Examiners report

[N/A]

Which flower structures are indicated by the letters Y and Z?



[Source: www.ib.bioninja.com.au]

	Y	Z
A.	Ovule	Filament
B.	Ovule	Style
C.	Ovary	Style
D.	Ovary	Filament

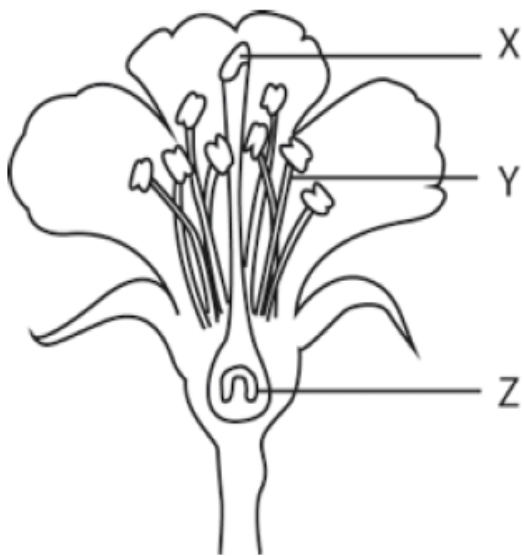
Markscheme

D

Examiners report

[N/A]

The following is a diagram of a flower.



[Source: © International Baccalaureate Organization 2014]

What structures are indicated by the letters X, Y and Z?

	X	Y	Z
A.	stigma	style	sepal
B.	anther	style	ovary
C.	stigma	filament	ovary
D.	anther	filament	ovary

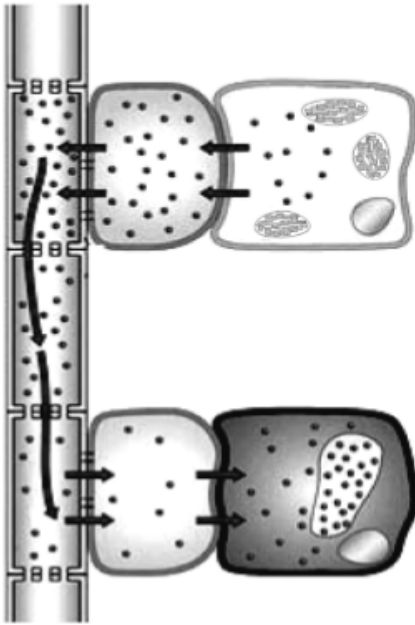
Markscheme

C

Examiners report

There was a comment to say that the diagram was a little faint. However the labeling was extremely clear and the vast majority gained the mark.

The diagram below shows part of the vascular system of a dicotyledonous plant. Which process is indicated by the arrows?



[Source: adapted from <http://www.uic.edu/classes/bios/bios100/lectf03am/translocation.jpg>]

- A. Passive translocation of sucrose from the sink to the source in the phloem
- B. Active translocation of sucrose from the source to the sink in the phloem
- C. Passive translocation of sucrose from the sink to the source in the xylem
- D. Active translocation of sucrose from the source to the sink in the xylem

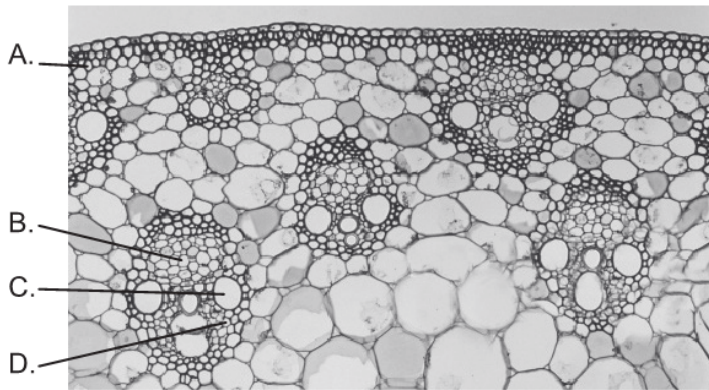
Markscheme

B

Examiners report

The options could have been worded more clearly eg. *Active translocation of sucrose in the phloem from the source to the sink*. Nevertheless, this question turned out to be a very good discriminator.

Which letter identifies phloem?



[Source: E R DEGGINGER/Getty Images]

Markscheme

B

Examiners report

[N/A]
