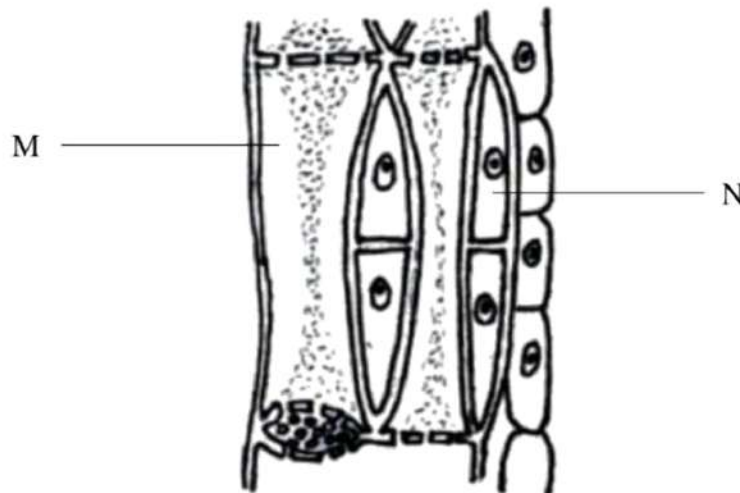


Bahagian A**Section A**

[60 markah / 60 marks]

Jawab **semua** soalan dalam bahagian ini.*Answer all question in this section.*

1. Rajah 1.1 menunjukkan tisu vaskular dalam batang tumbuhan.
Diagram 1.1 shows vascular tissue in a tree trunk.



Rajah 1.1

Diagram 1.1

- (a) (i) Namakan struktur M dan N.
Name the structure M and N.

M : **Tiub tapis / Sieve tube**

N : **Sel rakan / Companion cell**

[2 markah / 2 marks]

- (ii) Nyatakan **satu** penyesuaian struktur N dalam pengangkutan sukrosa dari daun.
State one adaptation of structure N in transportation of sucrose from the leaf.

Mempunyai mitokondria / Contains mitochondria

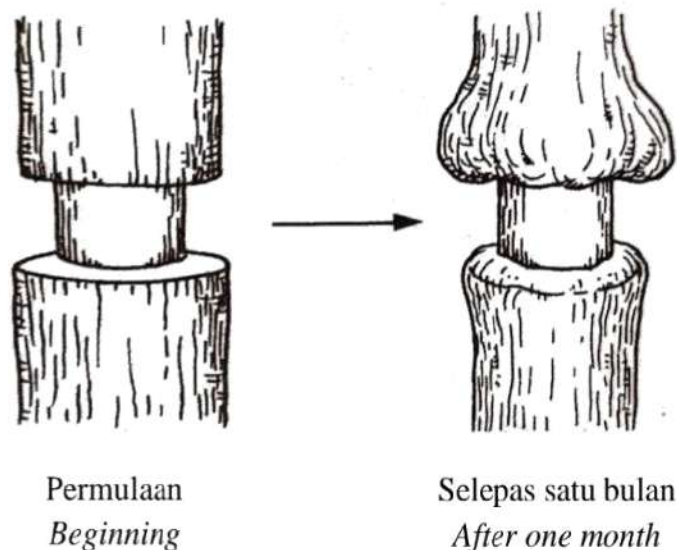
[1 markah/ 1 mark]

SULIT

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- (b) Rajah 1.2 menunjukkan bahagian batang pokok yang gelang kulitnya telah dibuang. Pokok tersebut disiram dengan air setiap hari.

Diagram 1.2 shows part of the stem of a tree where the ring of bark has been removed. The tree is watered every day.



Rajah 1.2
Diagram 1.2

- (i) Namakan proses yang menyebabkan keadaan tersebut.
Name the process that caused the condition.

Translokasi / Translocation

[1 mark/1 mark]

- (ii) Terangkan apa yang berlaku kepada pokok selepas satu bulan.
Explain what happens to the tree after one month.

P1 **Bahagian atas batang membengkak**

The upper part of the stem is swelling

P2 **Floem telah dibuang**

Phloem is removed

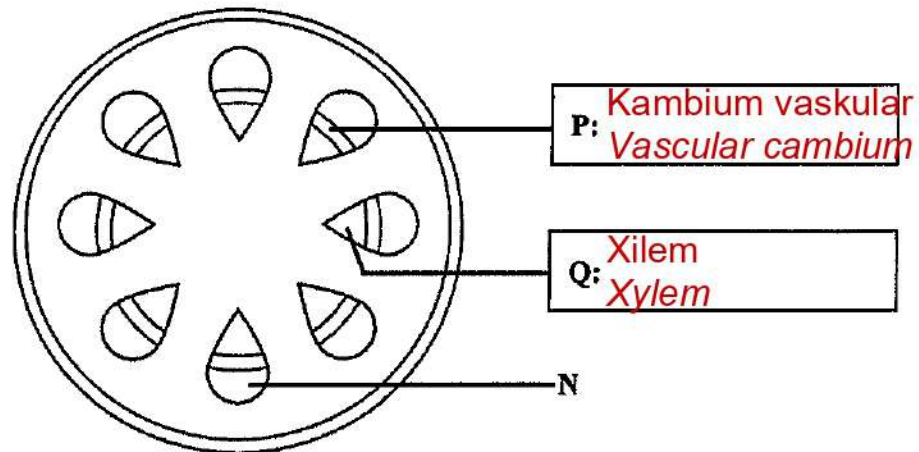
P3 **Hasil fotosintesis tidak dapat diangkut ke bahagian bawah batang**

The photosynthesis product cannot be transported to the lower part of stem

[2 marks/ 2 marks]

Untuk kegunaan pemeriksa sahaja

3. Rajah 3 menunjukkan keratan rentas batang satu tumbuhan.
 Diagram 3 shows the cross section of a stem in plant.



Rajah 3
 Diagram 3

- (a) (i) Nyatakan nama bagi P dan Q pada Rajah 3.
 State the name of P and Q in Diagram 3.

[2 markah]
 [2 marks]

- (ii) Nyatakan fungsi P.

State the function of P.

P1 P membahagi secara mitosis dengan aktif

P divides actively through mitosis

P2 P membentuk xilem baharu/sekunder / floem baharu/sekunder

P forms new/secondary xylem / new/secondary phloem

P3 P menambah lilitan / diameter batang

P increases circumference / diameter of stem

[1 markah]
 [1 marks]

SULIT

7

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Untuk kegunaan pemeriksa sahaja

(b) Nyatakan **satu** bahan yang diangkut oleh tisu N dan namakan proses tersebut.

State one substance that is transported by tissue N and name the process.

Bahan **Sukrosa / Asid amino / Hormon / Bahan organik / Hasil fotosintesis**
 Substance **Sucrose / Amino acids / Hormones / Organic substance / Photosynthesis product**

Proses **Translokasi / Translocation**
 Process

[2 markah]
 [2 marks]

3(b)

(c) Terangkan penyesuaian Q untuk membantu pengangkutan bahan dalam tumbuhan.

Explain the adaptation of Q that help the transportation of materials in plant.

F1 **Merupakan sel mati / Tiada sitoplasma**
Consists of dead cells / Does not have cytoplasm

E1 **untuk memudahkan pengangkutan air**
to allow the flow of water easily

F2 **Tersusun memanjang dari hujung ke hujung** [2 markah]
Arranged longitudinally from end to end [2 marks]

E2 **untuk memudahkan pengangkutan air**
to allow the flow of water easily

F3 **Dinding Q mempunyai penebalan lignin (tidak sekata)**
The walls of the Q vessel have (uneven) lignin thickening
 E3 **untuk memberikan kekuatan supaya Q tidak ranap**
to give strength to P thus prevent from collapsing

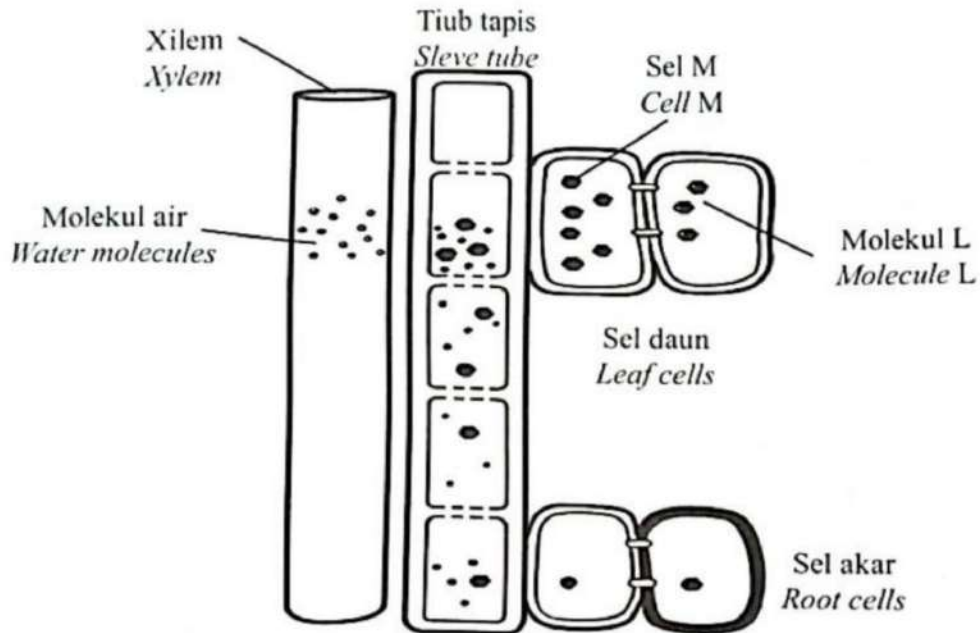
F4 **Dinding struktur Q mempunyai penebalan lignin (tidak sekata)**
The walls of Q vessel have (uneven) lignin thickening
 E4 **untuk menyokong pokok dari lenturan**
to prevent the plant from being bent

3(c)

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4. Rajah 4 menunjukkan proses pengangkutan molekul L dari daun ke akar tumbuhan melalui floem.

Diagram 4 shows the transport process of molecule L from leaves to plant roots through phloem.



Rajah 4
Diagram 4

- a. Nyatakan nama proses pengangkutan yang ditunjukkan dalam Rajah 4.
State the name of the transport process shown in Diagram 4.

Translokasi / Translocation

[1 markah]
[1 mark]

- b. Sel M dan tiub tapis membentuk salur floem.
Nyatakan nama sel M.
Cell M and sieve tubes form phloem vessels.
State the name of cell M.

Sel rakan / Companion cell

[1 markah]
[1 mark]

- c. Lengkapkan jadual di bawah untuk menunjukkan perbezaan pengangkutan antara molekul L dengan molekul air di dalam tumbuhan.

Complete the table below to show the differences between the transport of molecule L and water molecules in plants.

Molekul L <i>Molecule L</i>	Molekul air <i>Water molecules</i>
Diangkut secara pengangkutan aktif <i>Transported by active transport</i>	Diangkut secara osmosis <i>Transported by osmosis</i>
Memerlukan tenaga <i>Requires energy</i>	Tidak memerlukan tenaga <i>Does not require energy</i>

Diangkut dari daun
ke seluruh bahagian tumbuhan
Transported from leaves
to other parts of plant

Diangkut dari akar [1 markah]
ke seluruh bahagian tumbuhan [1 markah]
Transported from roots
to other parts of plant

- d. (i) Resapan molekul air ke dalam tiub tapis dari salur xilem menyebabkan tekanan hidrostatik yang tinggi terbentuk di dalam tiub tapis.
Apakah kepentingan tekanan ini?

The diffusion of water molecules into the sieve tube from the xylem causes high hydrostatic pressure to form in the sieve tube.

What is the significance of this pressure?

Untuk menolak kandungan floem / molekul L ke organ lain tumbuhan
To push the phloem sap / molecule L to other organs of the plant

[1 markah]

[1 mark]

- (ii) Sel M di dalam floem tidak dapat menjalankan pengangkutan aktif akibat kekurangan satu komponen sel.
Terangkan mengapa?

Cell M in phloem unable to carry out active transport due to lack of one of the cell components.

Explain why?

P1 Sel M tiada mitokondria / Sel M does not have mitochondria

P2 Tiada tenaga dihasilkan / No energy is produced

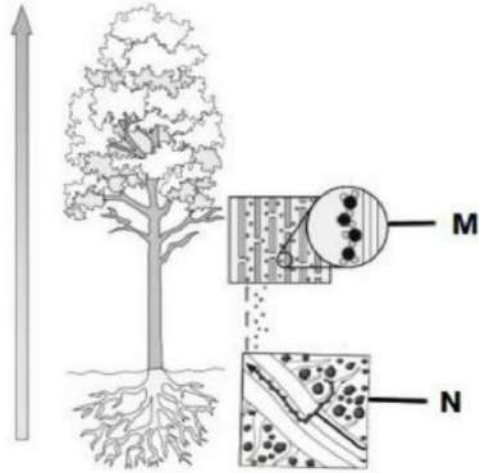
[2 markah]

[2 marks]

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5. Rajah 5.1 menunjukkan pergerakan air dari akar ke hujung pucuk tumbuhan. Proses M dan N membantu dalam proses pengangkutan ini.

Diagram 5.1 shows the movement of water from the root to the tip of the plant shoot. Process M and N help in this transport process.



Rajah 5.1 / Diagram 5.1

- (a) Namakan proses M dan proses N.

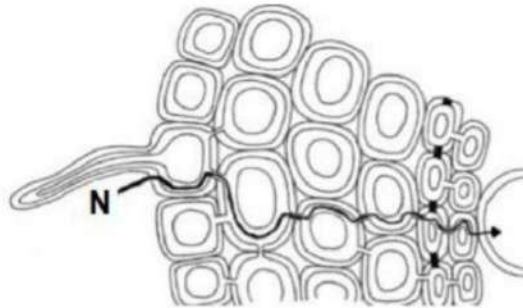
Name process M and process N.

M: *Tindakan kapilari / Capillary action*

N: *Tekanan akar / Root pressure*

[2 markah/marks]

- (b) Rajah 5.2 menunjukkan pergerakan air dari sel-sel akar ke xilem melalui laluan N.
 Diagram 5.2 shows a water movement from root cells to xylem through pathway N.



Rajah 5.2 / Diagram 5.2

Berdasarkan Rajah 5.2, terangkan laluan N.

Based on Diagram 5.2 explain pathway N.

P1 Laluan apoplas / Apoplast pathway

P2 Air bergerak melalui ruang antara gentian selulosa di dinding sel

Water moves through the spaces between cellulose fibres at the cell wall [2 markah/marks]

- (c) Rajah 5.3 menunjukkan gutasi yang berlaku pada sehelai daun.
 Diagram 5.3 shows the guttation that occurs on a leaf.



Rajah 5.3 / Diagram 5.3

- (i) Nyatakan bilakah gutasi selalunya berlaku?

State when guttation usually occurs?

Waktu malam / Awal pagi

During night / Early morning

[1 markah/mark]

- (ii) Terangkan kesan sekiranya tumbuhan tidak menjalankan gutasi?

Explain the effect if the plant does not carry out guttation?

P1 Tekanan akar yg efektif tidak dapat dikekalkan

Effective root pressure cannot be maintained

P2 Proses penyerapan air terganggu / Water absorption is disrupted

P3 Bahan kumuh tumbuhan tidak dapat disingkirkan

Plant waste substances cannot be eliminated

[3 markah/marks]

P4 Tekanan di dalam urat daun menjadi tinggi / The leaf vein pressure is high

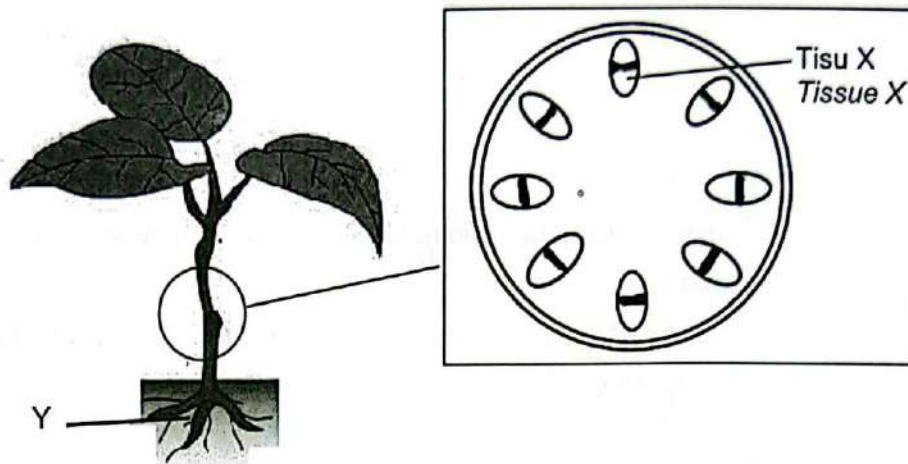
P5 Daun terdedah kepada jangkitan patogen / Leaf being exposed to pathogen

P6 Daun gugur / Leaf falls

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5. Rajah 5.1 menunjukkan pengangkutan bahan melalui Tisu X.

Diagram 5.1 shows the transportation of substances through Tissue X.



Rajah 5.1

Diagram 5.1

- (a) (i) Berdasarkan Rajah 5.1

Based on Diagram 5.1

Xilem / Xylem

Nyatakan nama Tisu X :

State the name Tissue X

Bahan yang diangkut oleh Tisu X : **Air / Mineral // Water / Mineral**

Materials transported by Tissue X

[2 markah]

- (ii) Terangkan proses yang berlaku di Y.

Explain the process that occurs in Y.

F1 **Osmosis**

P1 **Keupayaan air** di dalam tanah lebih tinggi berbanding keupayaan air di dalam sel rambut akar

The water potential in the soil is higher compare to the water potential in the root hair cells

P2 **Molekul air** dari tanah meresap masuk ke sel rambut akar

Water molecules from the soil diffuse into the root hair cells

P3 **tanpa** menggunakan **tenaga** / without using energy

F2 Ion mineral dipam secara **pengangkutan aktif**

Mineral ions are pumped through active transport

P4 **Kepekatan ion mineral** di dalam tanah lebih tinggi berbanding

di dalam sel rambut akar / The concentration of mineral ions is higher in the soil than in the root hair cells

P5 **Ion mineral** meresap dari tanah ke sel rambut akar

Mineral ions diffused from the soil into the root hair cells

BIO/2/5

(b) Nyatakan kesan yang berlaku pada proses di Y jika racun respirasi digunakan.
Describe the effect that occurs on the process in Y if a respiratory poison is applied.

P1 Racun rumpai **merencat respirasi** / *Herbicides inhibits cellular respiration*

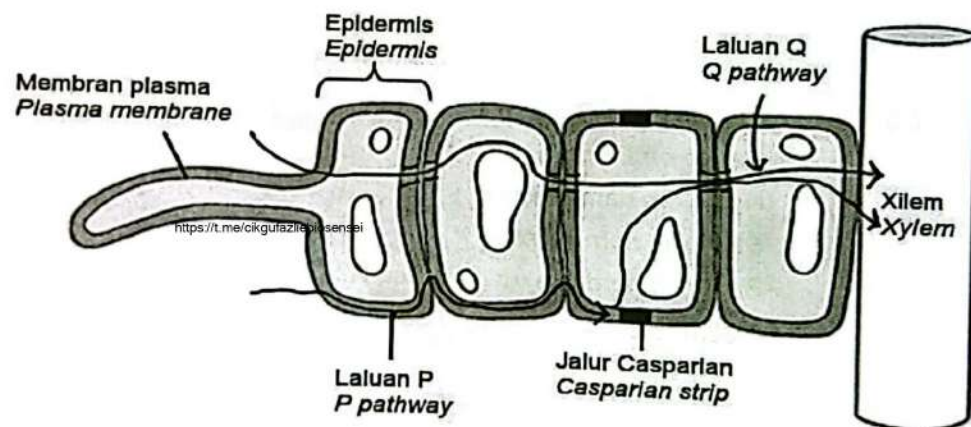
P2 **Tenaga** tidak dapat dihasilkan / *Energy cannot be generated*

P3 **Pengangkutan aktif** tidak berlaku / *Active transport does not occur*

P4 **Mineral / Ion tidak dapat diangkut** dari air tanah ke sel rambut akar
Minerals / Ions cannot be transported from soil water to root hair cells

(c) Rajah 5.2 menunjukkan dua laluan iaitu P dan Q bagi pergerakan air dari tanah ke xilem.

Diagram 5.2 shows two paths which are P and Q for the movement of water from the ground to xylem.



Rajah 5.2

Diagram 5.2

Terangkan perbezaan pergerakan air bagi Laluan P dan Q.

Explain the difference in water movement of Pathway P and Q.

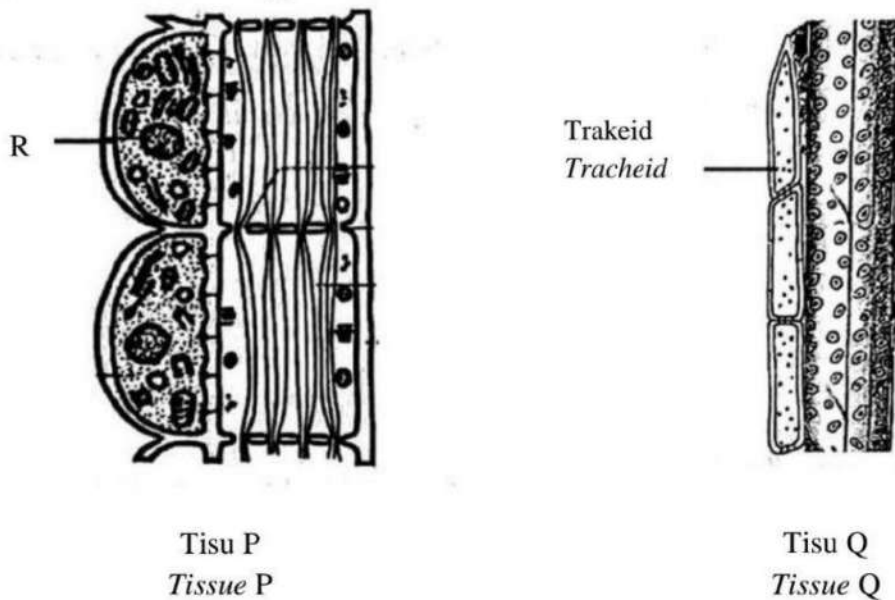
P1 Laluan P ialah laluan **apoplas**, laluan Q ialah laluan **simplas**.
Pathway P is apoplast pathway, pathway Q is symplast pathway.

P2 Laluan P air bergerak melalui **ruang antara gentian selulosa di dinding sel**, laluan Q air bergerak melalui **sitoplasma dan plasmodesmata**.
Pathway P water moves through the spaces between cellulose fibres at the cell wall, pathway Q water moves through cytoplasm and plasmodesmata.

P3 Laluan P **pergerakan air dihalang oleh jalur casparian** di endodermis, laluan Q **pergerakan air tidak dihalang oleh jalur casparian** di endodermis.
Pathway P water movement is blocked by casparian strip in endodermis, pathway Q water can move without blocking by casparian strip in endodermis.

7. Rajah 7.1 menunjukkan tisu P dan tisu Q yang terlibat dalam proses pengangkutan dalam tumbuhan.

Diagram 7.1 shows tissue P and tissue Q that involved in transportation process in plant.



Rajah 7.1(a)
Diagram 7.1(a)

Rajah 7.1(b)
Diagram 7.1(b)

Rajah 7.1
Diagram 7.1

(a) Berdasarkan Rajah 7.1(a) dan Rajah 7.1(b), nyatakan tisu P dan tisu Q.

Based on Diagram 7.1(a) and Diagram 7.1(b), state tissue P and tissue Q.

Tisu P : Floem
Tissue P: Phloem

Tisu Q : Xilem
Tissue Q: Xylem

[2 markah]
[2 marks]

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(b) Trakeid pada tisu Q tidak terbentuk dengan lengkap. Terangkan kesannya terhadap tisu Q.

Tracheid in tissue Q did not form completely. Explain the effect on tissue Q.

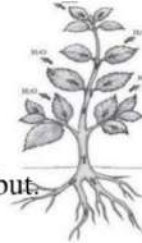
- P1 **Tiada penebalan lignin** yang mencukupi / *Not thickened with enough lignin*.....
 P2 **Kekuatan / Sokongan** tisu Q **berkurang** / *Strength / Support of tissue Q decreases*.....
 P3 **Salur** tisu Q **mudah ranap** / *Tissue Q vessel can rupture easily*.....
 P4 **Pengangkutan air berkurang** / *Transport of water decreases*

[2 markah]

[2 marks]

(c) Rajah 7.2(a) dan Rajah 7.2(b) melibatkan proses kehilangan air dari tumbuhan.

Diagram 7.2(a) and Diagram 7.2(b) involve in the process of water loss from plant.



Nyatakan **dua** perbezaan di antara kedua-dua proses tersebut.

State two differences between both processes.

Rajah 7.2(a) <i>Diagram 7.2(a)</i>	Rajah 7.2(b) <i>Diagram 7.2(b)</i>
Berlaku pada waktu malam / awal pagi <i>Happens at night / early morning</i>	Berlaku pada siang panas / berangin <i>Happens on hot / windy days</i>
Hanya berlaku dalam tumbuhan herba <i>Only happens in herbaceous plants</i>	Berlaku dalam semua tumbuhan <i>Happens in all plants</i>
Air terbebas dalam bentuk titisan air <i>Water is released in the form of water droplets</i>	Air terbebas dalam bentuk wap air <i>Water is released in the form of water vapours</i> [2 markah]
Air terbebas melalui struktur khas di urat daun <i>Water is released through special structure in leaf veins</i>	Air terbebas melalui stoma <i>Water is released through stoma</i>
Berlaku apabila tekanan akar tinggi <i>Happens when root pressure is high</i>	Dikawal pembukaan & penutupan stoma <i>Controlled by the opening & closing of stoma</i>
Membebaskan air yg kaya mineral <i>Releases water that rich in minerals</i>	Membebaskan air tulen <i>Releases pure water</i>
Gutasi / Guttation	Transpirasi / Transpiration

(d) Rajah 7.3 menunjukkan sejenis tumbuhan yang boleh digunakan untuk merawat air sisa.

Diagram 7.3 shows a type of plant that can be used to treat waste in water.



Rajah 7.3
Diagram 7.3

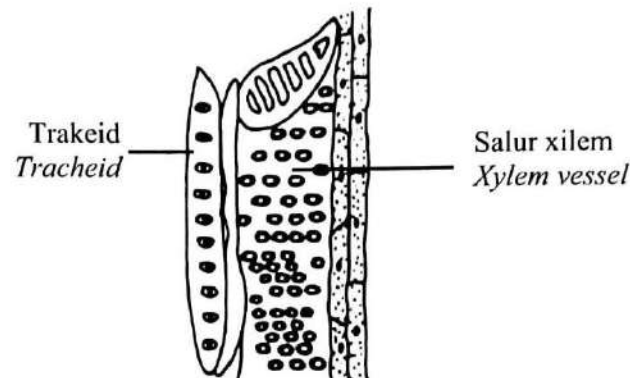
(e) Terangkan bagaimana tumbuhan dalam Rajah 7.3 boleh digunakan untuk menangani isu pencemaran sumber air.

Explain how plant in Diagram 7.3 can be used to solve the issue of water source pollution.

- P1** Kaedah **fitoremediasi** / *Phytoremediation method*
.....
- P2** Menggunakan **keladi bunting** / *Eicchornia crassipes*
Use water hyacinth / Eicchornia crassipes
.....
- P3** **Kadar pertumbuhan cepat** / *The growth rate is fast* [3 markah]
- P4** **Menambahkan bilangan akar** untuk mengakumulasi logam berat /
menyerap nutrien di loji kumbahan [3 marks]
*Increases the numbers of roots to accumulate heavy metals /
absorb nutrients in the waste plant*
- P5** **Lebih banyak logam berat** dapat diserap
More heavy metals can be absorbed

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- 9 (a) Rajah 9.1 menunjukkan satu tisu xilem.
Diagram 9.1 shows a xylem tissue.



Rajah 9.1
Diagram 9.1

- (i) Nyatakan **dua** ciri pada salur xilem bagi mengangkut air.
*State **two** characteristics of the xylem vessel to transport water.*

[2 markah] [2 marks]

- P1 Salur xilem **merupakan sel-sel mati / tidak mempunyai sitoplasma**
Xylem vessel consists of dead cells / do not have cytoplasm
- P2 **Tiub sempit / memanjang dari hujung ke hujung / membentuk turus yang berterusan**
Narrow tube / arranged longitudinally from end to end / to form a continuous tube
- P3 **Dinding salur xilem mempunyai penebalan lignin yang tidak sekata**
The walls of the xylem vessel have uneven lignin thickening

- (ii) Terangkan peranan xilem dalam memberikan sokongan mekanikal kepada tumbuhan.

Explain the role of xylem in providing mechanical support to plant.

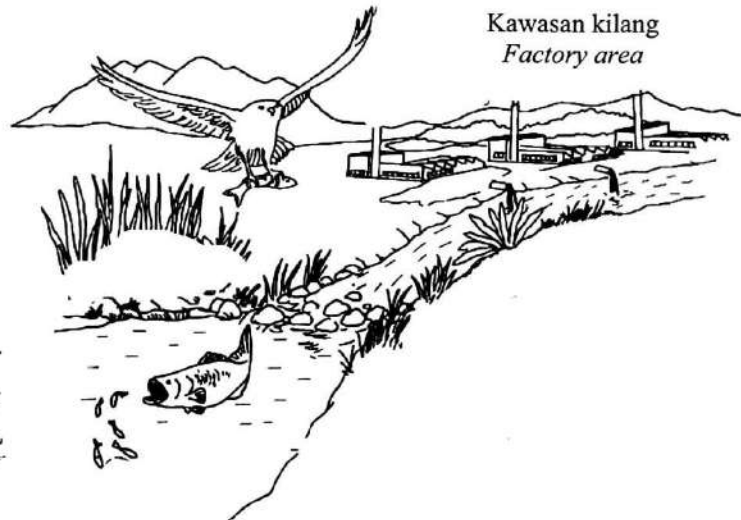
[2 markah] [2 marks]

- P1 Salur xilem mengalami **penebalan lignin yang tidak sekata**
Xylem vessel have uneven lignin thickening
- P2 untuk **mengelakkan sel xilem** daripada **ranap**
To prevent xylem cell from collapsing
- P3 untuk **mengelakkan tumbuhan lentur**
To prevent plant from being bent

- (b) Rajah 9.2 menunjukkan sejenis tumbuhan akuatik.
 Rajah 9.3 menunjukkan aktiviti yang terdapat di sepanjang Sungai X.
Diagram 9.2 shows an aquatic plant.
Diagram 9.3 shows activities along the River X.



Rajah 9.2
 Diagram 9.2



Rajah 9.3
 Diagram 9.3

Ikan yang terdapat di dalam Sungai X didapati mengandungi kandungan plumbum yang tinggi.

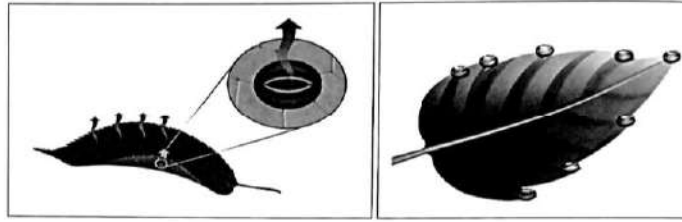
Dengan menggunakan tumbuhan di Rajah 9.2, terangkan bagaimana tumbuhan tersebut dapat mengatasi masalah ini.

The fish inside River X contain high amount of lead. Using the plant in Diagram 9.2, explain how the plant can overcome this problem.

[6 markah] [6 marks]

- P1 **Kaedah fitoremediasi / Phytoremediation method**
- P2 **Menggunakan keladi bunting / Eicchornia crassipes**
Use water hyacinth / Eicchornia crassipes
- P3 **Kadar pertumbuhan cepat / Its growth rate is fast**
- P4 **Mempunyai akar yang panjang**
Has long roots downward deep into water
- P5 **Akar menyerap plumbum di dalam sungai**
Roots absorb lead in the river
- P6 **Tumbuhan mengakumulasi plumbum di dalam sel**
The plant accumulates lead in the cells
- P7 **Melakukan fitoekstrakan / Do phytoextraction**
- P8 **Kandungan plumbum di dalam sungai berkurang**
The amount of lead in the river decreases

- (c) Rajah 9.4 menunjukkan proses X dan proses Y yang berlaku dalam tumbuhan.
Diagram 9.4 shows process X and process Y occurs in the plant.



Proses X
Process X

Proses Y
Process Y

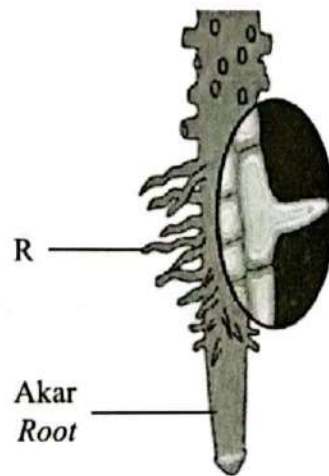
Bandingkan proses X dan proses Y.
Compare process X and process Y.

[10 markah] [10 marks]

	Proses X	Proses Y
S1	Kedua-dua berlaku melalui daun / Both occurs through leaves	
S2	Kedua-dua menyebabkan kehilangan air dari tumbuhan Both causes water loss from plants	
S3	Kedua-dua membantu pengangkutan air dan garam mineral dalam tumbuhan / Both help to transport water and mineral salt in plants	
D1	Transpirasi / Transpiration	Gutasi / Guttation
D2	Berlaku pada waktu siang panas / berangin Happens on hot / windy days	Berlaku pada waktu malam / awal pagi Happens at night / early morning
D3	Berlaku dalam semua tumbuhan Happens in all plants	Hanya berlaku dalam tumbuhan herba Only happens in herbaceous plants
D4	Air terbebas dalam bentuk wap air Water is released in the form of water vapours	Air terbebas dalam bentuk titisan air Water is released in the form of water droplets
D5	Air terbebas melalui stoma Water is released through stoma	Air terbebas melalui struktur khas di urat daun Water is released through special structure in leaf veins
D6	Dikawal oleh pembukaan & penutupan stoma Controlled by the opening & closing of stoma	Berlaku apabila tekanan akar tinggi Happens when root pressure is high
D7	Membebaskan air tulen Releases pure water	Membebaskan air kaya mineral Releases water rich in minerals
D8	Berlaku dalam keadaan keamatan cahaya / suhu tinggi Happens when light intensity / temperature is high	Berlaku dalam keadaan keamatan cahaya / suhu rendah Happens when light intensity / temperature is low
D9	Memberi kesan penyejukan kepada tumbuhan Give a coolant effect to the plant	Tidak memberi kesan penyejukan kepada tumbuhan No coolant effect to the plants

- 9 (a) Rajah 9.1 menunjukkan struktur akar suatu tumbuhan.

Diagram 9.1 shows the structure of root of a plant.



Rajah 9.1
Diagram 9.1

- (i) Struktur R terdapat di bahagian akar tumbuhan.
Namakan struktur R dan jenis sel yang membina struktur R.
*Structure R is found at the root part of plants.
Name structure R and the type of cell that made-up structure R.*

[2 markah]

P1 R ialah **rambut akar** / *R is root hair*

[2 marks]

P2 Jenis sel ialah **epidermis** / *Type of cell is epidermis*

- (ii) Terangkan adaptasi struktur R untuk meningkatkan kecekapan akar menyerap air dan garam mineral.

Explain the adaptation of structure R to increase the efficiency of root to absorb water and mineral salts.

[4 markah]

F1 **Tidak dilapisi** oleh **kutikel** / *Not layered with cuticle*

E1 untuk membenarkan penyerapan air / *to allow water absorption*

[4 marks]

F2 Mempunyai **vakuol** yang **besar** / *Has large vacuoles*

E2 untuk menyimpan air/garam mineral / meningkatkan penyerapan air
to store water/mineral salt / increase water absorption

F3 Sel epidermis mempunyai **dinding nipis** / *Epidermal cells has thin cell wall*

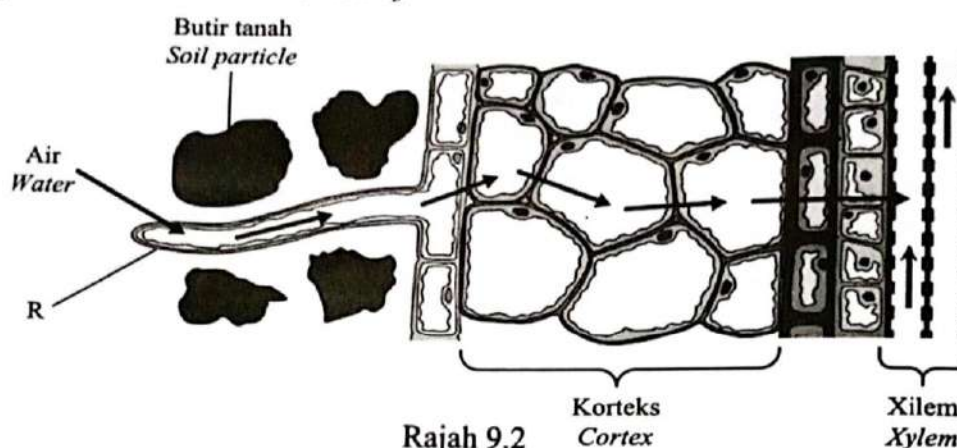
E3 untuk memudahkan pergerakan air / *to facilitate water movement*

F4 **Bilangan** yang **banyak** / *Abundant number*

E4 untuk meningkatkan luas permukaan / *to increase surface area*

(b) Rajah 9.2 menunjukkan pergerakan air merentasi sel dalam akar.

Diagram 9.2 shows the movement of water across the cells in the roots.



Rajah 9.2
Diagram 9.2

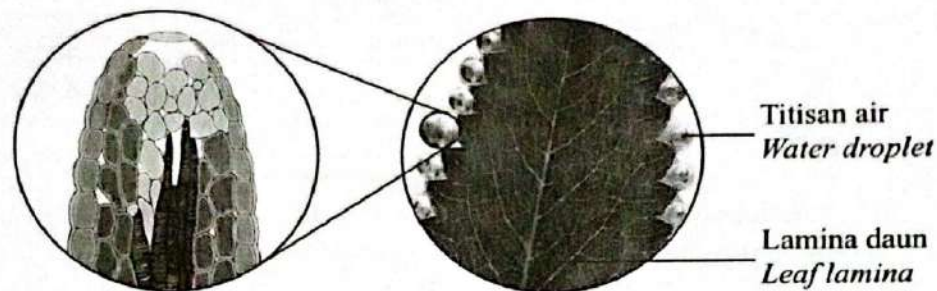
Terangkan bagaimana air meresap dari tanah ke dalam sel R dan seterusnya ke dalam korteks sehingga sampai ke xilem.

Explain how water diffuses from the soil into cell R and then into cortex until it reaches the xylem.

- P1 **Keupayaan air di dalam tanah lebih tinggi** berbanding keupayaan air di dalam sel rambut akar [4 markah]
The water potential in the soil is higher compare to the water potential in root hair cells [4 marks]
- P2 **Molekul air meresap masuk dari tanah** ke sel rambut akar secara **osmosis**
Water molecule is diffused from the soil into the root hair cells via osmosis
- P3 menyebabkan **keupayaan air di dalam sel rambut akar tinggi**
causes the water potential in root hair cells is high
- P4 **Molekul air meresap masuk dari sel rambut akar** ke korteks secara **osmosis**
Water molecule is diffused from the root hair cells to cortex via osmosis
- P5 Keadaan ini menyebabkan **osmosis berlaku secara berterusan** menerusi korteks, endodermis dan perisikel
This condition causes osmosis to be continuously occur throughout the cortex, endodermis and pericycle
- P6 dan mewujudkan **tekanan akar**
and causes root pressure
- P7 yang **menolak air ke dalam salur xilem**
that pushes water into xylem vessels

- (c) Rajah 9.3 menunjukkan satu proses rembesan titisan air yang berlaku dalam tumbuhan herba.

Diagram 9.3 shows a process of secretion of water droplets that takes place in herbaceous plant.



Rajah 9.3
Diagram 9.3

- (i) Terangkan proses rembesan titisan air tersebut ke persekitaran.

Explain the process of the secretion of water droplets to the environment.

[2 markah]

[2 marks]

- P1 Proses **gutasi** / *Guttation process*
 P2 Berlaku pada **waktu malam dan awal pagi**
Occurs at night and early morning
 P3 semasa **kelembapan udara tinggi / suhu persekitaran rendah**
when air humidity is high / surrounding temperature is low
 P4 Akibat **tekanan akar tinggi / kadar transpirasi rendah**
Caused by high root pressure / low rate of transpiration
 P5 Air dirembeskan dalam bentuk **titisan air**
Water is secreted in the form of water droplets
 P6 melalui **struktur khas** di bahagian **hujung urat daun**
through a special structure at the end of the leaf veins

- (ii) Jika proses dalam Rajah 9.3 gagal berlaku, terangkan akibatnya kepada tumbuhan herba.

If the process in Diagram 9.3 fails to occur, explain the consequence to the herbaceous plant.

[4 markah]

[4 marks]

- P1 **Tekanan akar yg efektif** tidak dapat dikekalkan
Effective root pressure cannot be maintained
 P2 **Proses penyerapan air** terganggu / *Water absorption is disrupted*
 P3 **Bahan kumuh tumbuhan** tidak dapat disingkirkan
Plant waste substances cannot be eliminated
 P4 **Tekanan di dalam urat daun** menjadi tinggi / *The leaf vein pressure is high*
 P5 **Daun** terdedah kepada **jangkitan patogen** / *Leaf being exposed to pathogen*
 P6 **Daun gugur** / *Leaf falls*

- (d) Sebatang sungai telah mengalami pencemaran logam berat daripada kilang berhampiran. Cadangkan satu kaedah yang boleh dilakukan bagi mengatasi pencemaran tersebut menggunakan spesies tumbuhan tertentu. Terangkan kaedah tersebut yang digunakan.

A river has been polluted by heavy metals from a nearby factory.

Suggest a method that can overcome the pollution using certain species of plants.

Explain the method used.

[4 markah]

[4 marks]

- P1 Kaedah **fitoremediasi** / *Phytoremediation method*
- P2 Menggunakan **keladi bunting** / *Eicchornia crassipes*
Use water hyacinth / Eicchornia crassipes
- P3 **Kadar pertumbuhan cepat** / *Its growth rate is fast*
- P4 Mempunyai **akar yang panjang**
Has long roots downward deep into water
- P5 **Akar menyerap plumbum** di dalam sungai
Roots absorb lead in the river
- P6 Tumbuhan **mengakumulasi plumbum** di dalam sel
The plant accumulates lead in the cells
- P7 Melakukan **fitoekstrakan** / *Do phytoextraction*
- P8 Kandungan plumbum di dalam sungai berkurang
The amount of lead in the river decreases