

Question number	Answer	Marks	Guidance
Application 1	Plants have mechanisms for blocking damaged phloem vessels and preventing the loss of sap. Different proteins coagulate and block the phloem vessels so the sap cannot come out of the cut ends. As a result, the rest of the plant continues to transport substances and survives.		
2	Aphids transport sugar-rich phloem sap up very narrow, delicate stylets. If the proteins in the phloem sap coagulated in the stylet, or around the entrance to the stylet, it would be blocked and the insect would be unable to transport the food from the plant into its gut so it would starve.		
3	Read around the resources and plan carefully what to include and what is not necessary Produce 6–10 slides – no more Clear, well labelled diagrams can carry a lot of information. Make every word count		
Extension 1	Key points should be included about blood clotting – rapid cascade, involves proteins such as prothrombin and fibrinogen, involves calcium ions to enable proteins to form clot. Flow chart, for example: <i>Human blood:</i> damaged tissues release platelets → platelets release enzyme thromboplastin → thromboplastin catalyses the conversion of protein prothrombin to enzyme thrombin in presence of calcium ions → thrombin acts on fibrinogen converting it to fibrin → fibrin forms a mesh of insoluble fibres → Platelets and blood cells get caught in the mesh to form a clot <i>Plant phloem systems:</i> Sieve element damage → plastids e.g., chloroplasts, amyloplasts burst open → plastid		

	<p>contents coagulate to block phloem tube</p> <p>Sieve element damage → Endoplasmic reticulum proteins become separated → coagulate to block phloem</p> <p>Sieve element damage → calcium flows into sieve element from adjacent cells → reacts with forisomes → forisomes expand and block sieve element</p> <p><i>Similarities:</i> rapid response, proteins heavily involved in response, involves calcium ions in some stages of process, involves coagulation/clotting, any other sensible points</p> <p><i>Differences:</i> clotting cascade single complex mechanism which prevents blood loss from damaged vessels, plants have a number of different responses which all help to block damaged phloem vessels, not all plant systems depend on calcium ions, any other sensible points.</p>		
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