A-Level Biology: **w25 11**

Question 1 (Answer: **D**)

- Actual size = image size ÷ magnification.
- 25 mm ÷5000 = 0.005 mm.
- 0.005 mm is 5 μm.

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Question 1 (Answer: **C**)

- Calibrate the eyepiece graticule first, using the stage micrometer.
- Work out how many micrometres one graticule division represents.
- Then multiply by the number of divisions the cell covers.

A-Level Biology: **w25 13**

Question 1 (Answer: **B**)

- Calibrate the graticule first: line it up against the 0.1 mm stage micrometer divisions.
- Here 40 graticule divisions span 0.1 mm = 100 μm, so one division is 2.5 μm.
- A 10 μm lymphocyte therefore covers 10/2.5 = 4 divisions.

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Question 1 (Answer: **D**)

- A light microscope at ×400 resolves down to about 0.2 μm.
- Starch grains and mitochondria are large enough to be seen when stained.
- Centrioles are far too small, and higher plants do not have them anyway.

Question 2 (Answer: **C**)

- Calibrate the graticule against the stage micrometer, whose divisions are 0.01 mm = 10 μm.
- Work out the size of one graticule division in micrometres.
- Then multiply by the number of divisions the structure spans – the magnification is unchanged between the two images.

A-Level Biology: **w25 33**

2(a)(i)	1 uses most of the available space and the correct number of tissues ; 2 draws half the root <u>and</u> no cells ; 3 draws the outer region of the vascular tissue as 2 lines drawn close together ; 4 draws the correct proportion of the vascular tissue ; 5 label line to the tissue involved in transport of substances throughout the plant <u>and</u> the label **T** ;
2(a)(ii)	1 lines continuous, thin and sharp <u>and</u> no shading ; 2 draws only four cells <u>and</u> each cell touching at least one of the other cells ; 3 cell wall drawn as two lines ; 4 correct shapes of the cells ;
2(b)(i)	1 states only observable differences ; (differences) 2, 3 and 4 ; *Any **three** from* :

feature	Fig. 2.2	K1
area of vascular tissue	larger	smaller ;
presence of trichomes	absent	present ;
number of xylem vessels	more	less ;
presence of endodermis	absent	present ;

A-Level Biology: **w25 33**

2(c)(i)	1 records a value for the length of the line **A – B** ; 2 shows the length of line **A – B** divided by 35 to calculate actual length of line **A – B** ; 3 shows ½ actual length of line **A – B** squared and multiplied by π ; 4 correct answer ;
2(c)(ii)	1 take sections of the root from plants at different ages ; 2 keep the species of the plants the same ; 3 keep the variables for growing the plants the same ;

A-Level Biology: **w25 34**

2(a)(i)	1 appropriate size <u>and</u> no shading ; 2 draws correct section of the organ ; 3 draws the correct pattern of vascular bundles and the correct proportions of large vascular bundles <u>and</u> no cells drawn ; 4 draws two lines for the epidermis <u>and</u> trichomes ; *5* label line <u>and</u> label to vascular bundle ;
2(a)(ii)	1 appropriate size <u>and</u> lines are sharp and continuous ; 2 draws only four xylem vessel elements <u>and</u> each xylem vessel element touches at least one other xylem vessel element ; 3 two lines around each xylem vessel element <u>and</u> three lines where xylem vessel elements touch ; 4 draws correct shape of xylem vessel elements ; *5* label line <u>and</u> label to the wall of one xylem vessel element ;
2(a)(iii)	1 stem <u>and</u> reason ;
2(b)	1 collects differences using only observable differences ; 2, 3 two observable differences ;; *any **two** (correct differences) from:*

feature	M1	Fig. 2.2
shape	square	circular ;
vascular bundles	at corners and between bulges	in a ring ;
vascular bundles	large and small	same size ;
central tissue	cells	no cells ;

2(c)(i)	1 correct number of eyepiece graticule units ; 2 shows division of eyepiece graticule units by one <u>and</u> multiplies by 1000 ;
2(c)(ii)	1 correct measurement using eyepiece graticule units ; 2 shows the answer from **2(c)(i)** multiplied by the number of eyepiece graticule units ;
2(c)(iii)	1 3 measurements <u>and</u> calculate the mean ;