




Q	Mark Scheme	NOTES
1 (a) (i)	cut on a surface method of care in cutting described gloves / goggles (to avoid stain on body) Guidance: IGNORE 'cut carefully' unqualified IGNORE lab coats	1 Ideally, a chopping board should be used for cutting the celery stalks. Safety gloves should be worn while cutting to prevent staining of skin. Safety goggles should be worn to prevent any material from accidentally entering the eye. *Wearing lab coats is mandatory whilst performing any experiment in the laboratory and therefore does not qualify for the mark.
(ii)	table drawn with (ruled) lines and appropriate number of cells column / row, headings with appropriate units for distance two correct distances determined	3 

temperature of the red stain	number of 5 mm sections that were stained in 10 minutes	total distance moved by the red stain in 10 minutes/mm
Cool	5	25
Warm	11	55

(iii)	selected correct values selected values ÷ 10 ecf from (a)(ii)	2 total distance moved by the red stain in 10 minutes = number of 5 mm sections that were stained in 10 minutes × 5 Rate of movement of the red stain in the celery stalk = $\frac{\text{total distance moved by the red stain in 10 minutes}}{10}$ For cool temperature: $\frac{25}{10} = 2.5$ mm per minute For warm temperature: $\frac{55}{10} = 5.5$ mm per minute
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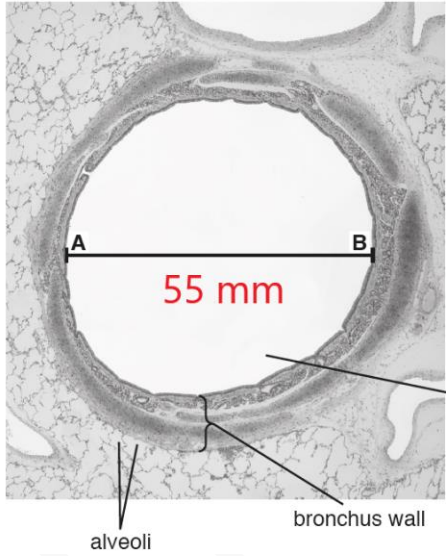


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1 (a) (iv)	the higher temperature the faster / further, the stain / water, moves / AW ; ora	1 The rate of movement of the red stain in the celery stalk is greater at a higher temperature.										
(b)	1 length / width / surface area / size, of celery (stalk) 2 size / width, of cut pieces 3 species / type (of plant) 4 time in stain 5 concentration (of stain) 6 volume / depth (of stain) 7 type / colour, of stain	2										
(c)	<table border="1"> <thead> <tr> <th><i>source of error</i></th> <th><i>improvement</i></th> </tr> </thead> <tbody> <tr> <td>stain, may change temperature / cool down / warm up</td> <td>use, water-bath / insulation / temperature controlled room / incubator / fridge / lids / AW</td> </tr> <tr> <td>stalks / xylem tissue, may be different, width / length / size / age / AW</td> <td>select stalks of same, size (for width) / age / cut to same length or select celery stalks with same, diameter / number of vascular bundles</td> </tr> <tr> <td>(5 mm) sections were too big to give precise results / AW</td> <td>cut thinner sections / cut longitudinally / AW</td> </tr> <tr> <td>stain may still move after stalks removed / length of time on tile different</td> <td>do each stalk (experiment) separately / cut both stalks at the same time</td> </tr> </tbody> </table>	<i>source of error</i>	<i>improvement</i>	stain, may change temperature / cool down / warm up	use, water-bath / insulation / temperature controlled room / incubator / fridge / lids / AW	stalks / xylem tissue, may be different, width / length / size / age / AW	select stalks of same, size (for width) / age / cut to same length or select celery stalks with same, diameter / number of vascular bundles	(5 mm) sections were too big to give precise results / AW	cut thinner sections / cut longitudinally / AW	stain may still move after stalks removed / length of time on tile different	do each stalk (experiment) separately / cut both stalks at the same time	
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	<p>Guidance: improvement must match error for both marks but accept improvements without an error or vice versa for 1 mark I human errors I thermometers unqualified A different number of xylem 'tissue' for error</p>	4										



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1 (d)	<p><i>independent variable</i></p> <p>1 test at least two humidities</p> <p>2 at least two stated humidity values with appropriate units</p> <p>3 method to create different humidity</p> <p><i>controlled variables</i></p> <p>4,5 named controlled variables</p> <p><i>dependent variable</i></p> <p>6 measure distance travelled, up the stalk by stain / use of a potometer (correct description of potometer use)</p> <p>7 in a set time</p> <p>8 divide distance by time (to determine rate)</p> <p>9 three repeat values at each humidity</p>	<p>6</p> <p>mp4,5</p> <ul style="list-style-type: none">• control temperature• control wind speed / do in still air• same light, intensity / wavelength• same carbon dioxide concentration• same, species / leaf area / age / length <p>mp6 A volume loss of liquid in beaker / mass loss of 'hanging' celery / record number of stain pieces</p>



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<p>2 (a) (i)</p>	<p>O clear outline of lumen with one minor break S lumen larger than 55 mm D details</p>	<p>4</p> 
<p>(ii)</p>	<p>measurement of AB 55 ± 1 mm (x) 36 / 37</p> <p>Guidance: A 5.5 cm ecf for incorrect AB measurement for max 1</p>	<p>2</p> <p>Magnification = $\frac{\text{length of AB on figure 2.1}}{\text{actual diameter of the bronchus}}$</p> $= \frac{55}{1.5}$ $= 36.\bar{6} \approx 37 \text{ times (to the nearest whole number)}$
<p>(b) (i)</p>	<p>40</p> <p>Guidance: ALLOW response in table if answer in working space does not Match</p>	<p>1</p> <p>average breathing rate for four minutes of running</p> $= \frac{39+41+48+42+40}{5}$ $= \frac{200}{5} = 40$
<p>(ii)</p>	<p>repeat experiment for person 2 compare with, the best fit line / other people</p> <p>Guidance: ALLOW repeat (measurement) IGNORE unexpected result unqualified</p>	<p>1</p> <p>The student can repeat the experiment for person 2 at six minutes to check if the original result was an anomaly. Alternatively, the student can plot the breathing rate for person 2 against running times and check if the result at 6 minutes lies on the line of best fit.</p>



Q	Mark Scheme		NOTES
2 (b) (iii)	<p>A axes labelled with units S linear scale for plotted points to half or more in one dimension P all plotted points accurate to \pmhalf small square L suitable best fit line</p> <p>Guidance: ecf from 2(b)(i)</p>	4	
(iv)	<p>indication on plot at 1 minute correct reading from their graph at 1 minute</p> <p>Guidance: I units ecf correct reading from indication on graph somewhere other than at 1 minute</p>	2	
(v)	<p>as running time increase breathing rate increases; levels off / AW from 6 minutes / 48 breaths per minute</p>	3	
(c) (i)	<p>suitable health comment suitable environment for exercise</p> <p>Guidance: mp2 e.g. water, level surface, footwear, first aid kit, avoid extreme weather conditions</p>	1	



<p>(c) (ii)</p>	<p>gender (of subjects) fitness / health (of subjects) age (of subjects) speed of, exercise / running running surface (named) environmental condition preparation / resting time (before and / or between runs) time interval / point after exercise, used to determine breathing rate</p> <p>ALLOW breathing rate to return to resting rate</p>	<p>2</p>	
<p>(iii)</p>	<p>running time</p>	<p>1</p>	