<table>
<tr><th>Question</th><th>Expected answers</th><th>Mark</th><th>Additional Guidance</th></tr>
<tr><td>1 (a)</td><td>
<table>
<tr><td>pea plant</td><td>D</td><td>E</td></tr>
<tr><td>substance transported</td><td>sucrose</td><td>pho ions</td></tr>
<tr><td>transport tissue</td><td>phloem ;</td><td>xylem ;</td></tr>
<tr><td>sink</td><td>growing tip / flower / fruit / seed / stem / root ;</td><td>growing tip / flower / fruit / seed / stem / leaves / chloroplasts ;</td></tr>
</table>
</td><td>[4]</td><td>ignore any vessels / tubes / etc

A growing point / meristems / areas where growth occurs</td></tr>
<tr><td>(b)</td><td>amino acids ;
R proteins</td><td>[1]</td><td>A (named) plant hormones</td></tr>
<tr><td>(c) 1
2
3

4

5</td><td>photosynthesis ;
light (energy) is, absorbed / trapped, by chlorophyll ;
carbon dioxide reacts with water in the presence of light (energy) ;

to make glucose (and oxygen) ;

glucose used to make sucrose ; ignore fructose</td><td>[max 3]</td><td>A word equation / balanced equation if MP3 not written out
do not award MP3 if ‘broken down’
A formula for glucose in an equation

MP5 do not award if glucose is broken down unless already penalised in MP3</td></tr>
<tr><td>(d) 1

2
3
4
5</td><td>respired / oxidised to provide energy / used to provide energy / energy for a suitable process ; R ‘produce energy’ A respiration unqualified
converted to starch for (energy) storage ;
converted to cellulose to make cell walls ;
used to make nectar to attract, pollinators / AW ;
stored in fruits to attract animals (for seed dispersal) ;</td><td>[max 2]</td><td>e.g. energy for, growth / active transpo

R to make fruit / seed unqualified</td></tr>
</table>

Question	Expected answers	Mark	Additional Guidance
1 (e) 1	root hairs / root hair cells ;		**ignore** diffusion / movement down a concentration gradient / osmosis
2	active transport ;		
3	against, concentration / diffusion, gradient **A** from low to high concentration ;		**ignore** gradient in 'from low concentration gradient to high concentration gradient'
4	using, energy / ATP ; **R** energy produced / production of energy		
5	from respiration ;		
6	ref to, proteins / carrier molecules (in membranes) ;	[max 3]	

<table>
<tr><th>Question</th><th>Expected Answers</th><th>Marks</th></tr>
<tr><td>2 (a)</td><td>
<table>
<tr><th>function</th><th>letter</th></tr>
<tr><td>peristalsis</td><td>B</td></tr>
<tr><td>protein digestion</td><td>C / H / E ;</td></tr>
<tr><td>insulin production</td><td>D ;</td></tr>
<tr><td>deamination</td><td>J ;</td></tr>
<tr><td>partially digested food is mixed with bile</td><td>H ;</td></tr>
<tr><td>most water is reabsorbed</td><td>E ;</td></tr>
</table>
</td><td>[5]</td></tr>
<tr><td>(b) (i)</td><td>
<table>
<tr><th>large molecule</th><th>nutrients absorbed</th></tr>
<tr><td>protein</td><td>acids ;</td></tr>
<tr><td>glycogen</td><td>/ $C_6H_{12}O_6$;</td></tr>
<tr><td>fat</td><td>fat acids and glycerol ;</td></tr>
</table>
</td><td>[3]</td></tr>
<tr><td>(ii)</td><td>calcium / Ca^{2+} ;
iron / Fe^{2+} ;</td><td>[2]</td></tr>
<tr><td>(iii)</td><td>vitamins / named vitamin ;</td><td>[1]</td></tr>
</table>

2 **(c)**	**MP1** platelets **;** **MP2** promote / cause / stimulate, clotting **;** **MP3** thrombin / enzyme **;** **MP4** (converts) fibrinogen to fibrin **;** **MP5** soluble to insoluble / fibrin is insoluble **;** **MP6** mesh / network / web, to trap blood (cells) / prevent blood loss **;** **MP7** forms scab / hardens **;** **MP8** phagocytes, engulf / destroy / AW, bacteria / pathogens **;** **MP9** cells divide by mitosis **;** **MP10** identical cells **;** **MP11** (tissues form to) make / grow, epidermis / capillary / new skin **;**	[max 5]
		[Total: 16]

3	**(a)**	**(i)**	transport of oxygen	[1]	
		(ii)	amino acids	[1]	**A** polypeptides, haem
		(iii)	iron / Fe / Fe^{2+}	[1]	

	(b)		fewer red blood cells		**Ig** ref to malaria
		2	less elastic / less flexible / sickle-shaped, red blood cells		
		3	haemoglobin is abnormal shape		
		4	haemoglobin / blood, less efficient at transporting oxygen		
		5	less respiration		
		6	less energy / fatigues / exhaustion / less active / feeling faint / breathlessness		
		7	death of tissues linked to oxygen supply		
		8	capillaries are blocked		
		9	pain		
		10	'sickle cell crisis'		
		11	slow / poor, growth		
		12	susceptible to infections		
		13	reduced life span		
		14	AVP e.g. problems in pregnancy, kidney disease	[max 3]	
	(c)	**1**	malaria is common in Africa		
		2	people who are, heterozygous / Hb^AHb^S		
		3	have, sickle cell trait / mild sickle cell		Mpt 4 **R** immune
		4	protected / AW, against malaria		
		5	description of sickle cells are less prone to infection		
		6	Hb^S continues to appear due to selective advantage / AW	[max 3]	**A** description of selection

3	**(d)**	**Hb^A** is dominant / **Hb^S** is recessive / (both) parents are, carriers / heterozygous Hb^AHb^S x Hb^AHb^S Hb^A, Hb^S + Hb^A , Hb^S (Hb^AHb^A , Hb^AHb^S, Hb^AHb^S) Hb^SHb^S		[max 3]	**Note:** **Ig** incorrect text if genetic diagram is correct **ECF** for Mpt 2 and 3 in diagram key. Mpt 3 linked to correct derivation in Mpt 2 *do not allow genotypes for parents or children that are single alleles*
	(e)	**1** **2** **3**	ref to (ionising) radiation causes / increased risk, mutation change to DNA / genes	[max 2]	**A** e.g. of radiation e.g. gamma rays
			[Total: 14]		