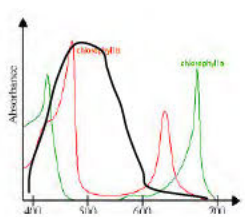
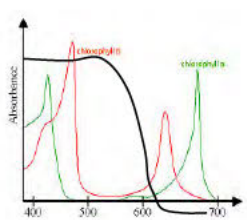
Question			Answer	Marks	Guidance
1	(a)		(cells) have partially permeable membrane (1) potato / cells are more concentrated than the distilled water (1)	2	**allow** semi-permeable membrane answer must be comparative **allow** cells have lower water concentration (than distilled water) **allow** correct ref. to concentration gradient **allow** higher level answers relating to water potential assume unqualified references to concentration refer to solute e.g. water moves from high to low concentration = 0 but water moves from high water concentration to low water concentration = 1
	(b)	(i)	**any two from:** **cells** are full of water / **cells** are rigid / **cells** swollen / AW (1) cells are **turgid** / **turgor** pressure (1) clear description of turgor: e.g. contents of cells pushing against **cell wall** (1)	2	 **ignore** cells take in water (in question) **ignore** chip is rigid **ignore** cells are stronger / hard **allow** chip is turgid **ignore** not flaccid
		(ii)	A (1)	1	
			Total	**5**	

Question	Answer	Marks	Guidance
2 a	undifferentiated cells / unspecialised cells (1) idea that can develop/change into different types of cells (1)	2	 **ignore** can change into anything
b	made from skin cells (1) normal stem cells come from embryos (1)	2	**allow** made from differentiated cells **allow** stem cells come from bone marrow / umbilical cord
c	**any two from:** (no –do not credit) produced by meiosis (1) genetically / DNA different / contain different combinations of chromosomes (1) only contain one of each pair of chromosomes (1)	2	Yes = 0 **allow** phonetic spelling e.g. miosis
d	idea that just because it was successful in mice this does not mean it will be successful in humans/human cells might react differently (1) idea that this is germline treatment / that if anything goes wrong it can affect all descendants (1)	2	**ignore** it's unethical / immoral / against God etc. **ignore** any social/cultural aspects come under the umbrella of unethical **ignore** simply 'cost' **but allow** expanded economic argument e.g. money spent on this will be money taken away from other treatments/preventions (1)
e	energy (source) (1)	1	**allow** for swimming / movement **ignore** respiration **reject** producing energy **allow** release energy **allow** higher level, specific answers, e.g. active transport
f i	protein synthesis / make proteins / join amino acids together (1)	1	**allow** higher level answer: translation
ii	mRNA / messenger RNA (1)	1	**ignore** just RNA
iii	A, T, C, G (1)	1	must have all four **ignore** order **ignore** U / uracil **allow** names: adenine, thymine, cytosine, guanine
	Total	**12**	

Question			Answer	Marks	Guidance
3	(a)	(i)	answer in range 9-10 (years) (1)	1	
		(ii)	answer in range 0-1 (years) (1)	1	
		(iii)	13.5 (years) (1) greatest (vertical) distance/height between lines / AW (1)	2	**allow** answer in range 13-14 (years) mark the two points independently
	(b)	(i)	mitosis (1)	1	**allow** phonetically correct spelling
		(ii)	DNA unzips (1) add bases (1) **but** add complementary bases (2)	3	marks may be awarded to a diagram **ignore** DNA unwinds / splits **allow** double helix unzips **ignore** chromosome unzips **ignore** descriptions of cell division **allow** add nucleotides (1) **allow** A pairs with T / C pairs with G (2)
			Total	**8**	

Question	Answer	Marks	Guidance
4 a	outside cells (1)	1	**allow** on the surface / on the leaf / on the outside **allow** secrete enzymes
b	low rate of (aerobic) respiration / need oxygen for (aerobic) respiration / ORA (1) low rate of growth/reproduction OR need oxygen for growth/reproduction (1)	2	**allow** no respiration **allow** need oxygen for metabolism/energy **allow** no growth / no reproduction
c	water **moves** into cells on outside / water **moves** out of cells on inside (1) (because) solute moves into cells on outside / solute moves out of cells on inside (1) solute moved by active transport (1)	3	 **allow** valid example of solute e.g. sugar / ions
d	a line that falls to (or almost to) zero in the red part of the spectrum (1)  or 	1	
	Total	**7**	