

Question			Answer	Mark	Guidance
1	(a)	(i)	<p><i>you can now see</i></p> <p>Golgi body / mitochondria / (smooth / rough) endoplasmic reticulum / ER / RER / SER / ribosomes</p> <p>OR</p> <p>organelles seen in more detail / grana (in chloroplast) / thylakoids (in chloroplast) / nuclear pore / cristae (in mitochondria) / membranes within organelles / double nuclear membrane / (double) nuclear envelope</p> <p>OR</p> <p>resolution is , higher / better ✓</p>	1	<p>IGNORE clarity</p> <p>IGNORE ref to size of organelles DO NOT ACCEPT chloroplast</p> <p>IGNORE ref to ultrastructure unqualified</p>
1	(a)	(ii)	<p><i>LSCM image</i></p> <p>has lower <u>resolution</u> (than EM)</p> <p>OR</p> <p>can have <u>fluorescent</u> tag</p> <p>OR</p> <p>can see movement (as can be used on living cells)</p> <p>OR</p> <p>can see , different layers / at different depths (of the sample) ✓</p>	1 max	<p>ORA for electron microscope needs to be comparative</p> <p>IGNORE colour</p> <p>IGNORE ref to 2D / 3D / depth of field</p>

Question			Answer	Mark	Guidance
1	(b)	(i)	prophase (1) ✓	1	DO NOT ACCEPT prophase II (as question states meiosis I)
1	(b)	(ii)	<p>1 chromosomes / chromatids , visible / condensed ✓</p> <p>2 chromosomes not , organised / yet aligned / arranged OR chromosomes not at , ends / equator ✓</p> <p>3 nuclear envelope (around chromosomes) / nuclear membrane is present / chromosomes separated from cytoplasm ✓</p> <p>4 no (visible) nucleolus ✓</p>	2 max	<p>Mark the first 2 answers</p> <p>1 Needs to be a clear statement</p> <p>2 ACCEPT chromosomes , in different positions / scattered / spread out</p> <p>3 ACCEPT nuclear membrane starting to disappear DO NOT ACCEPT nuclear membrane has disappeared</p>
1	(b)	(iii)	<p>1 independent / random , <u>assortment</u> ✓</p> <p>2 (homologous chromosomes) line up, across the centre of the cell / on the equator / on the metaphase plate ✓</p> <p>3 maternal or paternal chromosomes / either one of the homologous pair , can end up , facing either pole / in either (daughter) cell ✓</p> <p>4 each chromosome of the homologous pair , is genetically different / contains different alleles / contains different gene variant ✓</p>	3 max	<p>4 ACCEPT if described in terms of chromatids being genetically different</p>

Question	Answer	Mark	Guidance
1 (c)	<p>2 max for sources embryonic / embryo ✓ fetus / fetal ✓ umbilical cord (blood) ✓ (adult) bone marrow (tissue) ✓ convert somatic cell into pluripotent cell ✓</p> <p>ethical issue – must relate to one of their stated sources ethical issue identified – such as 1 from the list below ✓</p> <p><i>embryonic</i> E1 embryo , destroyed / killed / discarded E2 use of excess embryos from assisted fertilisation (IVF) or or E3 debate about when life begins or E4 embryo cannot give consent or</p> <p><i>fetal</i> F1 obtained from , miscarried / aborted , fetuses or <i>umbilical cord</i> U1 detached from infant at birth anyway</p> <p>or <i>bone marrow</i> B1 harvesting bone marrow is , painful / risky B2 donor babies / or babies conceived specifically to provide a bone marrow transplant for a sibling (with a condition requiring the transplant)</p> <p>a statement indicating , judgement / opinion / understanding , of this ethical</p>	<p>2 max</p> <p>2</p>	<p>ACCEPT e.g. breast milk / muscle / liver / placenta / etc. ACCEPT blastocyst</p> <p>Note: list of issues is not exhaustive – credit a well expressed issue</p> <p>F1 IGNORE ref to obtaining fetal stem cells by killing fetus but can still access the judgement mark</p> <p>Can only be awarded once the issue relating to one of their sources has been identified.</p>

			issue ✓		IGNORE 'playing God' as an opinion
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Question		Answer	Mark	Guidance
2	(a)	<p>D1 put , (leaf) stalk(s) / petiole(s) , in , dye / stain / food colouring ✓</p> <p>D2 (then) cut , transversely / cross section ✓</p> <p>OR</p> <p>M1 cut a (thin) , transverse / cross , section ✓</p> <p>M2 (then) add (named) stain / observe with microscope under low power ✓</p>	2	<p>IGNORE any observations</p> <p>D1 ACCEPT 'stick' for 'stalk'</p> <p>D2 ACCEPT cut across , (leaf) stalk / petiole (with a sharp blade) a longitudinal , cut / section cut in half</p> <p>IGNORE IGNORE</p> <p>M1 ACCEPT cut a (thin) slice of (leaf) stalk / petiole (with a sharp blade) a longitudinal , cut / section cut in half</p> <p>IGNORE IGNORE</p>