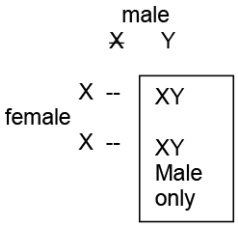
Mark scheme – Feeding the Human Race (H)

Question			Answer/Indicative content	Marks	Guidance
1			B	1 (AO 1.1)	**Examiner's Comments** This AO1.1 question testing recall of mechanisms of energy losses in food chains, showed a clear area of misconception. In general, candidates chose either B or a significant number frequently put C and did not score. **Misconception** Many candidates are unaware of the distinction between egestion and excretion.
			Total	**1**	
2			B ✓	1 (AO1.1)	
			Total	**1**	
3			C ✓	1 (AO1.1)	
			Total	**1**	
4			C ✓	**1 (AO1.2)**	
			Total	**1**	
5			A ✓	**1 (AO1.1)**	
			Total	**1**	
6		i	kills the spores / fungus ✓	1 (AO 2.1)	**ALLOW** kills/burns/eradicates the (barley) powdery mildew **Examiner's Comments** Many candidates did not score on this AO2.1 question because of the lack of reference to the specific organisms in the question. A common mistake is to give generic responses using terms like disease and infection. Rather unexpected, but throughout this question about a fungus a lot of candidates referred to bacteria and viruses.
		ii	the spores left by the fungus growing on the barley cannot infect wheat / the fungus	2 (AO 2.1)	AW barley powdery mildew for fungus AW pathogen for fungus

			does not grow onwheat / wheat is not a host for the fungus✓ (after two years) there will be less spores/fungus population / the spores/fungus will die✓		ALLOW wheat resistant to barley powdery mildew **Examiner's Comments** This AO2.1 question was approached more like a recall question by many candidates. A substantial number described crop rotation ideas about depletion/replacement of nutrients. Again, many candidates wrote about killing infections or diseases rather than spores or fungi.
			Total	**3**	
7		i	(DNA) ligase ✓	1 (AO 1.1)	**Examiner's Comments** Although many candidates did score on this AO1.1 question, the most common error was to refer to restriction enzymes. A significant minority gave lipase as their answer.
		ii	males are XY ✓ so only male rats will be born / ORA ✓ the population will contain an imbalance of sexes / (too many males and) not enough females/no females to mate/reproduce with ✓	3 (AO 1.1) (AO 2.1 x2)	**ALLOW** female is XX **DO NOT ALLOW** males are YY **ALLOW** genetic diagram for 2 marks  **Examiner's Comments** Higher ability candidates scored well on this AO1.1 and AO2.1 question. Several candidates thought the space for a diagram required them to illustrate how genetic engineering was carried out, rather than showing what would happen in a cross without an X sperm. Many candidates unfortunately replaced the X sperm with a Y, saying males were now YY. Also, there was evidence of a few candidates still mixing up the chromosomes and incorrectly recalling the male as XX and female as XY and others who had correctly done a Punnett square but did not annotate the genotypes. Lower ability candidates showed little understanding about sex-determination or the difference between a gene and a chromosome.

			Total	**4**	
8		i	**Any four from:** plasmid used to insert the gene ✓ restriction enzyme to cut open the plasmid / for removing the gene ✓ ligase enzyme to insert the gene / join ends of gene and plasmid ✓ correct reference to sticky ends ✓ correct reference to selection using antibiotic markers ✓	4 (AO4 x 1.1)	enzyme and role must be correct link
		ii	idea (this method) does not use mice / ORA ✓ people may think original method is cruel / unethical / killing mice ✓	2 (AO2.1)	**ALLOW** does not use animals **IGNORE** references to religion/playing god etc.
		iii	to repeat the work / make sure it is reproducible ✓ to make sure it worked / was safe ✓	2 (AO2 x 1.1)	**ALLOW** make sure work was valid **ALLOW** check for errors/mistakes **ALLOW** was correct **ALLOW** was reliable **ALLOW** was ethical **ALLOW** make sure work was original / authentic **ALLOW** recognise significance of work ALLOW to improve quality of report/published work
			Total	**8**	