Mark scheme

Question			Answer/Indicative content	Marks	Guidance
1		i	Idea to see (threatened) habitats/(endangered) species/ecosystems/nature ✓ To raise money/employment/profit/donation ✓	2 (2 x AO 1.1)	**ALLOW** in a way that will not damage / conserve the habitat/species/environment/biodiversity **ALLOW** education **Examiner's Comments** Most candidates were able to identify that ecotourism enabled people to visit habitats/see species or idea of conservation. Only a small number of candidates gained the second marking point by identifying that this would have monetary benefit.
		ii	Culling: Pain / cruel / unethical ✓ Relocation: Expensive/logistic/difficult/problematic to transport the elephants / elephants might be distressed/split up families ✓ Contraception: May have harmful side effects on the elephants / may not be able to reproduce again / population would be aging / ✓	3 (3 x AO 2.1)	**ALLOW** controversial **ALLOW** elephants could be hunted / may try and return to area / spread disease / eat crops in the new location **IGNORE** not adapted to new location/disrupt food chains/not survive **ALLOW** reduces number of breeding females /permanent effects on fertility **ALLOW** numbers drop too low/extinction if the elephants are not reproducing/less offspring. **Examiner's Comments** This question did challenge the candidates, most did not gain full marks, and some were not given any marks. It required application of knowledge to an unfamiliar context. The most common response scoring marks identified that culling was unethical/cruel and contraception could put the elephants at risk of extinction if they could no longer reproduce. The

					most common given mark was correctly identifying relocating the elephant was problematic in transportation or distressing to the animal. The most common non-scoring response here were the elephants would not be adapted to survive in the new habitat.
		iii	This method is not swallowed/orally/ingested / the (contraceptive) pill is taken orally/swallowed **OR** This method does not use hormones / (contraceptive) pill uses hormones **OR** This method allows egg to mature/release/ovulation / contraceptive pill prevents egg maturing/release/ovulation ✓	1 (AO 2.1)	**AW** female humans for contraceptive pill **ALLOW** Pill contains oestrogen/progesterone / pill decreases FSH/LH **ALLOW** (contraceptive) pill thickens mucus/uterus lining doesn't become as thick **IGNORE** references to lack of fertilisation **IGNORE** period/menstruation **Examiner's Comments** Just under half of candidates gained this mark which provided a challenge to the candidates. The most common non-scoring response were those relating to a lack of fertilisation unqualified. The most common given mark was the appreciation that the contraceptive pill contained hormones. A small number of candidates rewrote the question and stated it was a contraceptive pill and not how it was different from the new method.
			Total	**6**	
2	a		*Monitoring-* The level of thyroxine is monitored to see if it goes too low/to high/to see if there is a change / the level of thyroxine is monitored and compared with the normal level ✓ *Response-* TSH will act on the thyroid gland to change the release of thyroxine ✓ *Effect-*	3 (3 x AO 3.1a)	Simple repeat of information from the diagram = no marks **ALLOW** detects/measures thyroxine levels to see if they are too high/too low **IGNORE** regulates rather than monitors **ALLOW** TSH raising/releasing thyroxine if too low **and** reducing

			TSH will bring the thyroxine level back to normal ✓		release/lowers thyroxine if too high **IGNORE** TSH regulates thyroxine levels **Examiner's Comments** The most successful responses to this question applied the principles of negative feedback to thyroxine and included: • the monitoring of thyroxine to see if levels deviated from the norm • the production of TSH to alter production of thyroxine from the thyroid gland • the returning to normal of the thyroxine levels. Some candidates were not credited marks because they gave generic responses about negative feedback or simply repeated the information from the flow diagram.
	b		A ✓ B ✓	2 (2 x AO 1.1)	
	c		In the blood/bloodstream/blood vessels ✓ In the plasma ✓	2 (2 x AO 1.1)	**ALLOW** named type of blood vessel In the blood plasma = 2 marks **Examiner's Comments** This question discriminated well between candidates at different grades. High performing candidates were more precise in their answers, stating the plasma of the blood, rather than just in the bloodstream.
			Total	**7**	
3			Forms two named colours from red / orange / yellow / green ✓ Correct reference to which colour indicates highest concentration of glucose ✓ Use of a colorimeter/colour chart for	3 (3 x AO 1.2)	Orange-red is one colour **ALLOW** the idea that the amount of precipitate can be used to indicate glucose concentration

			comparison / compare colour to known concentrations ✓		**Examiner's Comments** Candidates were expected to apply their knowledge of the results of the Benedict's test for glucose to suggest a way of using it to give a semi-quantitative measure of glucose concentration. Many candidates realised that there was a range of colour changes from blue to green to orange and red and could relate these to different glucose concentrations. The highest scoring candidates also suggested a way of judging these colours, such as the use of colour charts.
			Total	**3**	
4	a		Auxin ✓ Ethene ✓ Gibberellins ✓ Auxin ✓	4 (4 x AO 1.1)	**ALLOW** Gibberellins **ALLOW** Cytokinins **Examiner's Comments** Some of the lower scoring candidates confused plant hormones with human hormones but there were many fully correct answers to this question. Spellings of gibberellins varied considerably but credit was given if the attempt was phonetically close.
	b		Meristem (cells) ✓ Divide by <u>mitosis</u> ✓	2 (2 x AO 1.1)	**DO NOT ALLOW** meiosis **Examiner's Comments** This question proved to be one of the more challenging questions with many candidates focusing on the role of plant hormones in tropisms rather than describing how cells are produced. The terms mitosis and meristems were only seen in responses from candidates who were given high marks throughout the paper.
			Total	**6**	
5			D	1 (AO 1.1)	**Examiner's Comments**

					Again, this question was very well answered by most candidates. A small number responded incorrectly with option A, presumably confusing fertility treatment with contraception.
			Total	**1**	
6	a		GnRHα ✓ FSH ✓ Progesterone ✓	2 (2 xAO 2.1)	Three correct = 2 marks One or two correct = 1 mark **Examiner's Comments** Most candidates correctly identified the three hormones although there were a small number of responses where alternative hormones, other than those given, were used.
	b	i	**Any two from:** The range of the number of eggs produced is 3 – 24 ✓ Very few females produce fewer than 8 eggs or more than 12 / most females produce eggs in the range of 8-12 ✓ Very few females produce high numbers / 24 eggs ✓ Very few females produce low numbers / 3 eggs ✓ The mean/average number of eggs is 10.3 / 10 eggs ✓	2 (2 xAO 3.2a)	**Answers must refer to trends not individual women** **ALLOW** the range is 21 **ALLOW** most women produce fewer than 24 eggs **ALLOW** most women produce more than 3 eggs **ALLOW** mode is 8 eggs / median is 9.5 eggs **Examiner's Comments** There were some good responses seen involving calculations of range, mean, mode or median. In many responses candidates came to conclusions that could not be made from this process and indeed did not focus on the number of eggs produced. Some other responses just quoted the data.
		ii	**First check the answer on answer line** **If answer = 6 award 2 marks** 10 × 80 ÷ 100 = 8 **OR** 8 × 80 ÷ 100 = 6.4 ✓	2 (2 xAO 2.2)	

			6.4 rounded to 6 ✓		**ALLOW** one mark for an incorrect answer if it is clearly shown that it has been correctly rounded to the nearest whole number. **Examiner's Comments** The majority of candidates scored full marks here with a correct calculation. In a small number of cases, incorrect percentages were used for the calculation but 1 mark could still be scored if the answers were correctly rounded.
	c		**Any two from:** The younger the patient, the higher the (percentage) birth rate ORA ✓ Over time the birth rate per embryo has increased ✓ Greatest increase in birth rate is seen in under 35s ✓ Lowest increase in birth rate is seen in over 44s / birth rate for over 44 has remained very low/has not increased/fluctuates ✓	2 (2 xAO 3.2b)	**ALLOW** conclusions that refer to idea that IVF is less likely to be successful for women over 44/more likely to be successful in under 35 Over time the percentage birth rate has increased for all age groups, except those over 44 = 2 marks **Examiner's Comments** Answers that scored marks concentrated on the increase in birth rate for all groups over time and the difference in the birth rate between different aged females. As was the case in Question 21 (b) (i), some candidates made conclusions that could not deduced from the graph.
			Total	**8**	
7	a		Adrenaline ✓ Digestive ✓ Glucagon ✓ Glycogen ✓	4 (4 xAO 1.1)	**ALLOW** adrenaline Spelling of glucagon/glycogen must be correct

					Examiner's Comments Adrenaline was identified by most candidates but fewer could correctly identify the system in the second gap. As is often the case, there was some confusion between glycogen, glucose and glucagon but very few hybrid spellings were seen.
	b		**Any two from:** Endocrine system uses chemical messengers/hormones but nervous system uses electrical messages/nerve impulses ✓ Endocrine is slow**er** acting ✓ Endocrine (responses) are long**er**-lived ✓ Endocrine system communicates via blood but nervous system uses neurones/nerves ✓ Idea that endocrine responses are more widespread throughout the body ✓	2 (2 xAO 1.1)	**ORA** **ORA** **Examiner's Comments** It was clear that some candidates had learned these differences and answered accurately and concisely. Some other responses involved vague references to homeostasis or specific actions.
			Total	**6**	
8			**A**	1 (AO 1.1)	
			Total	**1**	
9			**B**	1 (AO 2.1)	**Examiner's Comments** This was one of the more challenging multiple choice questions and less than half of candidates were able to identify that beta blockers and nitrates would reduce blood pressure from the information provided. **Assessment for learning** Centres could reinforce treatments of coronary heart disease as it has been identified as a knowledge gap.

			Total	**1**	
10			Sugar/glucose (level)✓ Insulin <u>and</u> glucagon ✓ Metabolic ✓ Thyroxine ✓	4 (AO 4 × 1.1)	**ALLOW** either order **DO NOT ALLOW** glycagon/glycogen **IGNORE** TSH **<u>Examiner's Comments</u>** This question discriminated well as only higher ability candidates scored full marks. The most common correct answer was sugar for the first marking point and thyroxine for the fourth marking point. Insulin was often given but the second hormone was not correct for marking point 2, with answers such as glycogen, thyroxine, and adrenaline. Some candidates missed the link to the thyroid gland in the question and thought that the third marking point was referring to heart rate and so put adrenaline as the hormone that was lacking. **Assessment for learning** Candidates should be encouraged to read and highlight or underline key parts of the question which provide relevant information. This would highlight the pancreas and thyroid as the two glands that were being affected and would help the candidate to make the link to the symptoms and hormones that would be lacking.
			Total	**4**	
11			Transports sugars ✓ Up and down ✓	2 (2 × AO1.1)	**ALLOW** transports water/mineral ions **ALLOW** transports one way/upwards Mark both lines together. If more than two reasons are given, then every wrong reason negates a correct reason. **<u>Examiner's Comments</u>** Most candidates realised that xylem transports water rather than sugar and many correctly pinpointed the direction

					of passage. However, a number incorrectly stated that the xylem is not made up of dead cells joined end to end.
			Total	**2**	
12	a		**First check answer on answer line. If answer = 1.36 million award 2 mark** 68 ÷ 100 = 0.68 ✓ 0.68 × 2 = 1.36 ✓	2 (2 × AO2.1)	**ALLOW** 68 × 0.02 ✓ One mark for 1 360 000 **Examiner's Comments** This calculation was very accessible, although some candidates were unable to give the answer in millions. Candidates writing 1 360 000 were given 1 mark.
	b		Adrenaline ✓	1 (1 × AO1.1)	**Examiner's Comments** Most candidates answered correctly.
			Total	**3**	
13	a		The dandelion stem bends/grows upwards ✓ The response is negatively geotropic/gravitropic / the stem grows away from gravity ✓ Auxin gathers on/diffuses/passes to the lower side of the stem ✓ Causes (more) cell elongation (on the lower side of the stem) ✓	4 (4 × AO2.2)	**ALLOW** there is an increase in upward movement **DO NOT ALLOW** reference to phototropism/bending towards the light **ALLOW** plant instead of stem **IGNORE** auxins are (produced) on the lower side **Examiner's Comments** Some candidates gave excellent answers referring to the mechanism of geotropism as controlled by uneven distribution of auxins, leading to cell elongation. However, there was some confusion with phototropism and light. This is shown in Exemplar 1. stems are negatively gravitropic, so grow away from direction of gravity. auxin moves to the shaded side of the stem, promoting stem growth. This causes the stem to grow upwards. however, over 6 hours the stem moves 90° as auxins cause it to grow upwards. the stem The candidate is given two marks for stating that the response is negative geotropism resulting in the stem growing upwards. However, the auxin moves to the lower part of the stem and

					not the shaded side as the whole experiment is carried out in the dark.
	b		Take measurements at smaller time intervals/more frequently ✓ (It reaches 90°) anytime between 5 and 6 hours ✓	2 (2 × AO3.3b)	**ALLOW** use of a video/timelapse **IGNORE** use minutes instead of hours **ALLOW** near to 6 hours **Examiner's Comments** Many candidates correctly suggested taking results at smaller time intervals but only the most successful answers highlighted that this needed to be between five and six hours.
	c		Break seed dormancy / elongation of shoots/cells ✓	1 (1 × AO1.1)	**ALLOW** flowering / fruit development / fruit growth / seed formation / germination / growth of shoots / produces seedless fruits **DO NOT ALLOW** fruit ripening **IGNORE** breaks dormancy unqualified **Examiner's Comments** There are a wide range of acceptable answers to this question, but some answers were too vague to be given a mark, e.g. 'allows plants to germinate' or 'makes plants grow'.
			Total	**7**	
14			A ✓	1 (AO1.1)	**Examiner's Comments** The majority of candidates correctly identified FSH but of the incorrect answers, oestrogen was the most common.
			Total	**1**	
15			A ✓	1 (AO1.1)	
			Total	**1**	