

1 (a)	<p>full marks may be possible from a fully annotated genetic diagram</p> <p>females are XX, males are XY ;</p> <p>female gametes are X, male gametes are X or Y ;</p> <p>ref to random fusion of gametes / shown in a Punnett square or alternative ;</p> <p>1:1 / 50:50 / described, shown / stated ;</p>	[4]	
(b)	<p>ref to, identify / separate, sperm with X (chromosome) ;</p> <p>semen / sperm, inserted / injected, into, uterus / oviduct ;</p> <p>at / around time of, ovulation / AW ;</p>	max [2]	
(c)	<p>1 formula milk is, similar / closer in composition, to human milk ;</p> <p>2 any nutrient with similar quantities in formula and human milk ;</p> <p>3 <i>idea that</i> human milk meets requirements of human babies ; <i>comparisons with cow's milk</i></p> <p>4 formula supplies less protein which is harder to digest ;</p> <p>5 formula supplies more iron, for haemoglobin formation / to prevent anaemia ;</p> <p>6 formula supplies more vitamin D for, absorption of calcium / formation of bone / for strong bones / prevention of rickets ;</p> <p>7 formula supplies more vitamin A, for immune system / retina / rods / vision in dim light / prevention of night blindness ;</p> <p>8 use of comparative figures <u>with correct units</u> ;</p>	max [4]	
(d)	<p>biological / made by cells ;</p> <p>catalyst / speeds up the rate of a reaction ;</p> <p>made of protein ;</p>	max [2]	

<p>1 (e)</p>	<p>1 2 3  4 5 6 7  8 9 10</p>	<p><b>tubes 1 and 3 – the effect of pH</b></p> <p>lysozyme is active in, 1/pH 4.0/acid ;</p> <p><u>cell walls</u>, broken down/digested/destroyed in tube 1 ;</p> <p>no (bacterial) growth in tube 1 ;</p> <p><b>tubes 1 and 4 – the effect of type of bacteria</b></p> <p>lysozyme, destroys /AW, bacteria, <b>A</b>/in tube 1 ;</p> <p>lysozyme does not, destroy/AW, bacteria, <b>B</b>/in tube 4 ;</p> <p>ref to specificity to bacteria <b>A</b>/bacteria <b>B</b> is resistant ;</p> <p><b>ignore</b> bacteria are immune</p> <p><i>idea that</i> nothing in (cell wall of) bacteria <b>B</b> for lysozyme to digest ;</p> <p><b>tubes 1 and 2 – the effect of boiling</b></p> <p>lysozyme denatured (by boiling) ;</p> <p>lysozyme not, active ;</p> <p><i>idea that</i> tube 2 is a control to show that lysozyme is responsible for no growth in tube 1 ;</p>	<p>max [6]</p>	
<p>(f)</p>	<p>1 2 3 4</p>	<p>gives (passive) <u>immunity</u> ;</p> <p>defends against, infection/illness/disease/pathogens/AW ;</p> <p>ref to diseases that the mother has had ;</p> <p>any one function of antibodies ;</p>	<p>max [2]</p>	

Question	scheme		Guidance
2 (a) (i)	<p><i>any two suitable examples</i></p> <p>flood ;  tsunami / tidal wave ;  monsoon ;  volcanic eruption ; <b>A</b> volcano(es)  earthquake ;  typhoon / hurricane / storm / cyclone ;  fire ;  drought ;  crop / animal, disease ; <b>R</b> disease unqualified  plague of pests of, crops / animals ; (e.g. locusts)  AVP ;</p>	[max 2]	<b>R</b> snowstorms / tornadoes / landslides / avalanches / mudslides
	(ii) drought ; soil erosion ; desertification ; salinity of soils ; global warming ; rise in sea levels ; AVP ;	[max 1]	<b>R</b> volcanoes / volcanic eruptions <b>R</b> famine <b>R</b> drying up of land
(b)	1 overall increase (over the time period of Fig. 6.1) ; 2 natural disasters, fluctuates / described / irregular ; 3 human induced, increase ; 4 comparative data quote for named cause <i>or for</i> total causes ; 5 sudden onset increase / ora ; 6 economic factors increase / ora ; 7 comparative data quote for same cause ;	[max 5]	2 increase + decrease is minimum 4 with year and number of shortages for each quote 7 as for 4

Question	scheme		Guidance
2 (c)	1 land needed for, building / urbanisation / AW ; 2 (so) not enough land to grow crops ; 3 increase in food production damages land ; 4 salination ; 5 desertification / erosion ; 6 overgrazing ; 7 not enough water ;  8 <i>idea that</i> increase in demand for food makes food too expensive for poorer people to buy ; 9 richer nations take more of food / food crops exported (for foreign currency) / agricultural land used for, cash crops / non food crops ;  10 difficult to distribute food ;  11 increased competition / conflict, if food production stays the same while population increase ; 12 AVP ; e.g. food production does not keep up with population growth, increase population leads to increase pollution	[max 3]	3 <b>A</b> overcultivation  7 disruption to water supply <i>or</i> e.g. such as dams
(d)	1 suitable named crop plant or domesticated animal ; 2 suitable feature to improve ; 3 select individuals for breeding ; 4 select offspring that show improvement ; 5 use these for future breeding / AW ; <b>A</b> 'repeat the process'	[max 4]	<b>R</b> genetic modification <b>R</b> 'cows bred together' <b>A</b> cattle with high milk yield are bred together / high yielding corn are bred together = 3 marks <b>R</b> cow for milk x bull for meat
(e)	transfer of, a gene / an allele, from one species to another ; <b>A</b> 'type of organism' <i>or</i> 'from one variety to another'	[1]	
<b>[Total: 16]</b>			

3 (a) *idea that gene(s) are transferred* ; **A** genetic information / DNA **R** chromosome from one, species / organism, to another, species / organism ; [2]

(b) DNA / RNA / nucleic acid ; [1]

(c) (i) testosterone ; **R** spellings with 'oge' [1]

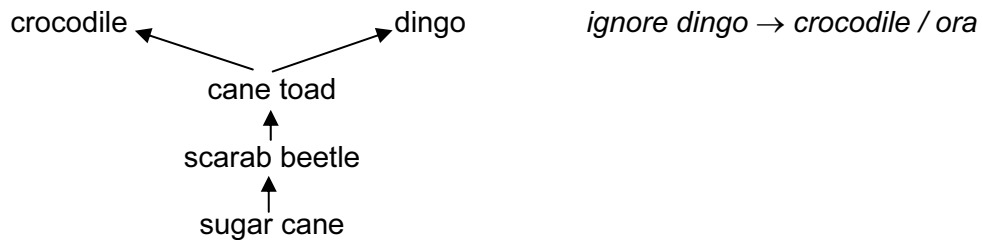
(ii) voice will break / AW ;  
 hair on, chest / face / under arms / in pubic area / around sex organs ;  
 shoulders broaden ;  
 muscle develops ;  
 penis enlarges ;  
 testes / scrotum, enlarge ; } **A** genitals, grow / enlarge  
 produce, sperm / seminal fluid / AW ;  
 named behavioural change ; [max. 2]

*put ticks and crosses in a column on right hand side of answer*

(d) (i) (x axis) time / years / months ;  
 (y axis) number of toads / number of individuals / population / AW ;  
**R** 'toads' unqualified **A** 'amount of toads'  
 S shaped curve ;  
 exponential / log, phase labelled on straight part of curve (bracket or line) ; [4]

(ii) (lack of) food / prey ; **A** fewer scarab beetles  
 ref. to habitat change or damage ;  
 change in temperature / global warming ;  
 ref. to pollution ;  
 (bacterial) disease / parasite ;  
 (lack of) breeding places ;  
 shortage of water / drought ; [max. 1]

(e) (i) *ignore references to virus*



i. arrows must point from food to feeder (even if incorrect organisms) ;  
 ii. all five organisms included in correct order with lines even if no arrows ;  
**A** if more organisms included [2]

(ii) *no other answers are acceptable*  
 (carnivore) cane toad + dingo + crocodile ;  
 (herbivore) scarab beetle ;  
 (producer) sugar cane ; [3]

**[Total: 16]**