

Question	E	Answers	Marks	Additional Guidance
1 (a)	<b>NB:</b> <u>one</u> mark for <u>sites of production</u> <u>one</u> mark for <u>two</u> 2 <sup>o</sup> sexual characteristics for <u>testosterone</u> <u>one</u> mark for <u>two</u> 2 <sup>o</sup> sexual characteristics for <u>oestrogen</u>			
	sex hormones		testosterone	oestrogen
	site of production		testis / testes / testicles	follicle / ovary ;
	secondary sexual characteristics	1	<i>any two</i> <ul style="list-style-type: none"> <li>• hair on face</li> <li>• body / pubic, hair</li> <li>• increase in muscles</li> <li>• growth of genitals</li> </ul>	<i>any two</i> <ul style="list-style-type: none"> <li>• growth of breasts</li> <li>• body / pubic, hair</li> <li>• hips widen</li> <li>• fat deposition ;</li> </ul>
	2	<ul style="list-style-type: none"> <li>• growth of vocal cords / larynx / deep voice</li> <li>• broad shoulders;</li> </ul>		[3]
(b) (i)	pituitary (gland) ;		[1]	
(ii)	ovary ;		[1]	
(c) (i)	1	increasing concentration, days 0 to 2 / 3 ;		<b>A</b> ref. to levelling out 6 –10 / 11 as part of overall decrease <b>MP2</b>  <b>MP3</b> need peak / max / highest / AW not just up / down
	2	(then) decreases until day 10 –13 ;		
	3	peak at, ovulation / middle of the cycle / day 14 ;		
	4	decreases / low concentration from days 14 to 22 / 23 / 24 ;		
	5	(then) increases from day 23 / 24 ;	[max 3]	
(c) (ii)	1	FSH stimulates follicle (cells) ;		
	2	to grow ;		
	3	to secrete oestrogen ;		
	4	ref. to, development / maturation of egg ;		
	5	correct reference to subsequent effect on, oestrogen / LH at ovulation ;		
	6	low FSH after ovulation, prevents further follicle stimulation ;	[max 3]	
			<b>[Total: 11]</b>	

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2	(a)	<i>Lilium</i> ;	1	
	(b)	A stigma ; B anther ; C petal ; D style ;	4	
	(c)	parallel veins / AW ; narrow / AW, leaves ; flower parts in, 3s / 6s ;	max 2	A non-branching veins / no mid-rib A long and thin A for any named part R one cotyledon
	(d)	<b>one mark per box – ignore any neutral comments</b>		
		type of reproduction in flowering plants	advantages	disadvantages
		asexual	only one, parent / plant ; fast ; (potential) rapid spread ; less energy required / no gametes needed ; if parent well adapted, offspring will be adapted to surroundings ; <b>max 1</b>	competition ; little / no, variation ; less evolution / less able to adapt to change ; may all be killed by same disease ; converse of MP5 for asexual ; <b>max 1</b>
		sexual	variation ; evolution / formation of new species ; (seed) dispersal ; colonization / able to adapt to change ; <b>max 1</b>	may need two plants / pollinating agent; slow ; much pollen / many seeds wasted ; fertilization may not happen; loss of lots of energy ; <b>max 1</b>
		<b>[Total: 11]</b>		

Question	E	Answers	Marks	Additional Guidance
3	(a)	1 root hairs ; 2 water moves from high(er) <u>water potential</u> to low(er) <u>water potential</u> ; 3 osmosis ; 4 through partially permeable <u>membrane</u> ; 5 ref. to protein pores ;	[max 3]	<b>A</b> down a water potential gradient <b>ignore</b> water concentration <b>R</b> dilute and concentrated  <b>A</b> semi-permeable / selectively permeable
	(b)	1 large surface area ; 2 thin (cell) walls ; 3 (many) mitochondria ; 4 ref. respiration ; 5 provide / release, energy, for active transport ;  6 proteins / carriers / channels, for, diffusion / active transport (of ions) ;	[max 3]	<b>A</b> minerals for ions <b>A</b> thin wall as 'cell' is in the question  <b>A</b> active, uptake / transport, uses energy <b>A</b> active uptake <b>R</b> if water also taken up by active uptake <b>A</b> 'moving against concentration gradient' for active transport
	(c)	<i>in appropriate boxes</i>  adult and zygote = 90 ; ovum = 45 ;	[2]	<b>A ecf</b> if half incorrect diploid number <i>only allow ecf if <b>both</b> diploid numbers are the same</i>

3	<p><b>(d)</b> <i>advantages for plants</i>  only one, parent / plant ;  fast / new plants establish themselves quickly ;  (potential) rapid spread close to parent / AW ;  less energy required ;  no wastage of gametes ;  (if parent well adapted) offspring will be adapted to surroundings ;  plants grow in a suitable place / no wastage ;  AVP ; e.g. greater chance of reproduction</p>	[max 2]	<p><b>R</b> refs to number of plants produced  <b>R</b> 'does not require male and female gametes'  <b>A</b> 'more likely to leave offspring' idea</p> <p><i>ignore</i> refs to avoiding mutations unqualified</p> <p><b>A</b> 'good' traits / e.g., passed on <b>R</b> 'good' genes</p> <p><i>do not accept advantages for humans</i></p>
	<p><i>disadvantage for plants</i>  plants too crowded / overcrowding ;  (lots of) competition for resources ;  little / no, (genetic) variation ;  disease transmitted directly to offspring ;  less evolution / less able to adapt ;  (all identical so) can be wiped out by the same disease ;  no / little, dispersal ;  AVP ;</p>	[max 1]	<p><i>genetic or infectious disease</i></p> <p><b>A</b> 'disease can spread easily'</p>
		<b>[Total: 11]</b>	

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4	(a)	<b>A</b> protein ; <b>B</b> RNA / nucleic acid ;	[2]	<b>A</b> capsid / protein coat <b>R</b> membrane <b>R</b> capsule, slime coat <b>A</b> DNA
	(b)	lymphocytes stop making antibodies ;  <i>ref to</i> antibodies stop, bacteria / viruses, spreading / AW ; help <u>phagocytes</u> , ingest / AW, bacteria / AW ; lymphocytes kill infected cells ; AVP ; e.g. another function of antibodies	[max 3]	<b>A</b> lymphocytes normally make antibodies  <b>A</b> in context of lymphocytes and antibodies NOT doing their normal functions <b>A</b> pathogens for bacteria <b>R</b> 'fight diseases' e.g. clumping bacteria / attaching to antigens
	(c)	(unprotected / AW) sexual intercourse ; across placenta ; at birth ; in breast milk ; sharing, needles / syringes ; in blood products / blood for transfusion / transplants / blood to blood contact ;	[max 3]	<b>R</b> saliva  <b>R</b> other sharps, e.g. razors unless qualified by blood contact <b>R</b> using contaminated / dirty / used, needles unqualified <b>R</b> donating blood
	(d)	use of, condoms / femidoms ; provide education / suitable example ; publicity campaigns ; needle exchange schemes for drug addicts ; sterilisation of needles / safe disposal / no reuse ; screening blood / blood donors ; AVP ; e.g. HIV+ mothers should bottle feed, limit number sexual partners	[max 3]	<b>R</b> not sharing needles unqualified
			<b>[Total: 11]</b>	

Question	Expected Answers	Marks	Guidance															
5 (a) (i)	<u>ovulation</u> ;	[1]																
(ii)	one set of <u>chromosomes</u> / one of each pair of <u>chromosomes</u> ; half the number of <u>chromosomes</u> of, (named) body / normal / diploid, cell ; <b>A</b> '....of the species' (refers to) product of meiosis ;	[max 1]	<b>R</b> 'half' unqualified IGNORE refs to DNA / genes  IGNORE n rather than 2n															
(b)	<table border="1"> <thead> <tr> <th>feature</th> <th>egg cell</th> <th>sperm cell</th> </tr> </thead> <tbody> <tr> <td>site of production</td> <td><u>ovary / ovaries / follicle(s)</u></td> <td><u>testis / testes / seminiferous tubules</u> ;</td> </tr> <tr> <td>relative size</td> <td>large(r) , ~100 <math>\mu\text{m}</math></td> <td>small(er) ; 40–60 <math>\mu\text{m}</math></td> </tr> <tr> <td>numbers produced</td> <td>one per month / few / AW</td> <td>many / AW, all the time ;</td> </tr> <tr> <td>mobility</td> <td>needs to be moved <i>or</i> moved by, cilia / peristalsis (of oviduct)  <b>A</b> not mobile</td> <td>uses, tail / flagellum <i>or</i> can swim <i>or</i> description of action of tail  (highly) mobile / can move ;</td> </tr> </tbody> </table>	feature	egg cell	sperm cell	site of production	<u>ovary / ovaries / follicle(s)</u>	<u>testis / testes / seminiferous tubules</u> ;	relative size	large(r) , ~100 $\mu\text{m}$	small(er) ; 40–60 $\mu\text{m}$	numbers produced	one per month / few / AW	many / AW, all the time ;	mobility	needs to be moved <i>or</i> moved by, cilia / peristalsis (of oviduct)  <b>A</b> not mobile	uses, tail / flagellum <i>or</i> can swim <i>or</i> description of action of tail  (highly) mobile / can move ;	[4]	<i>one mark per row</i>  IGNORE epididymis if testis also give  <b>R</b> scale bar length (10 $\mu\text{m}$ ) for sperm  ACCEPT hundreds for egg cell and millions for sperm (if lifetime production)  <b>A</b> one at a time for number of eggs
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(c) (i)	<u>ovary / ovaries / follicle(s)</u> ; <b>R</b> corpus luteum / placenta	[1]																
(ii)	1 (stimulates / causes) repair of the, uterus lining / endometrium ; 2 (stimulates / causes) growth / thickening, of uterus lining / endometrium ; 3 ready for, implantation / receive 'egg' <i>or</i> embryo ; 4 inhibits (release of) FSH ; 5 stops, production / release, of more eggs ; 6 stimulates release of LH ; 7 (stimulates / causes) change in cervical mucus ;	[max 2]	<b>A</b> womb for uterus <b>1/2 A</b> ref. to glands / blood vessels in uterus as equivalent to lining <b>2 A</b> builds up / rebuilds for one mark only <b>R</b> wall if given <i>for</i> lining  <b>R</b> 'make / create, lining'															

Question	Expected Answers	Marks	Guidance
5 (d)	<p><i>if in vitro fertilisation is described mark to max 1</i></p> <p>1 semen / sperm, is collected from, male / donor / sperm bank ; <i>even if IVF described</i></p> <p>2 inserted into, vagina / cervix / uterus / womb / oviduct ;</p> <p>3 near time of ovulation / at fertile time ;</p>	[max 2]	R a / single / one, sperm
<b>[Total: 11]</b>			