2805/01 Growth, Development and Reproduction

June 2005

Mark Scheme

Abbreviations, annotations and conventions used in the Mark Scheme	/	=	alternative and acceptable answers for the same marking point
	;	=	separates marking points
	NOT	=	answers which are not worthy of credit
	R	=	reject
	( )	=	words which are not essential to gain credit
	____	=	(underlining) key words which **must** be used to gain credit
	ecf	=	error carried forward
	AW	=	alternative wording
	A	=	accept
	ora	=	or reverse argument

Question			Expected Answers	Marks
1	(a)	(i)	**A** funnel (of the oviduct / Fallopian tube) / fimbria **;** **B** bladder **;** **C** oviduct / Fallopian tube **;**	**3**
		(ii)	protects, the abdominal organs / named organ / fetus / uterus / AW **;** supports, uterus / fetus / abdominal organs / weight of body /AW **;**	**1 max**
	(b)	(i)	protects against infection **;** destroys, pathogens / bacteria / fungi / microbes **;** **A** antigens **R** germs / neutralise	**1 max**
		(ii)	continually replaced / AW **;** **A** stratified mucus, lubricates the vagina / reduces friction / makes smooth **;** to assist, intercourse / birth of baby **;** flat / thin **;** **R** one cell thick fit closely together **;** (rest on) basement membrane **;** AVP **;** e.g. folded surface to allow, entry of penis / passage of baby **R** elastic or stretches	**3 max**
	(c)	(i)	head too large for birth canal if delivery is delayed / AW **;** brain, not fully grown at birth / immature / AW **;** bones of skull, slide over each other / move / AW **;** need a long period of, parental care / education **;** AVP **;**	**1 max**
		(ii)	*cervix* cervix, dilates / ripens / relaxes / widens **;** ref to prostaglandins **;** *mark uterus to max 3* *uterus* (muscle) contractions **;** become, stronger / more frequent **;** due to, release oxytocin / increased sensitivity to oxytocin **;** positive feedback effect / described **;** push / force baby, down / out / through cervix / out of vagina **;** AVP **;**	**4 max**
				[Total: 13]

Question			Expected Answers	Marks
2	(a)	(i)	tetrad ;	1
		(ii)	cells (of tetrad), separate / move apart ; **R** divide haploid / n / contain half set of chromosomes ; (each) forms exine ; of sporopollenin ; pollen grain (nucleus) divides by mitosis ; (forms) generative nucleus ; which divides to form two male gametes ; tube nucleus ; AVP ; e.g. ref to sculpturing or pit or intine	4 max
		(iii)	pollen sacs / anthers, dry ; split / dehiscence ; **R** burst at weak area in wall / AW ;	2 max
	(b)	(i)	**R** ref to colour or scent (insect takes) pollen of one flower to stigma of the other flower ; pin eyed and thrum eyed / heterostylic ; stigma of one in same position as anther of the other / AW ; insect picks up pollen on different parts of the body / ref to pollen picked up on named part of body ; in **Z**, stigma above pollen so cannot fall onto it ; self incompatible ; because of, structure of exine / growth inhibitors ; genetic incompatibility ;	3 max
		(ii)	prevents inbreeding / form of outbreeding ; increases genetic, variation / diversity ; utilises entire gene pool / 'shuffles' alleles of whole population / AW ; more evolutionary potential / natural selection possible / speciation / AW ; can withstand, environmental change / named change ; not all wiped out by disease ; recessive alleles less likely to be expressed / increase in heterozygosity / decrease in homozygosity ;	3 max
				[Total: 13]

Question	Expected Answers	Marks
3 (a) (i)	days 11-16 ; **A** days within the range two / three, days before ovulation and, two / three, days after ; temperature rises at ovulation ; due to progesterone ; oocyte lives one day ; **A** egg / ovum sperm can survive, two / three, days (after intercourse) ;	**3 max**
(ii)	temperature shows a natural variation / AW ; temperature rise may be due to, illness / exercise ; intercourse may have occurred / sperm may already be present, at ovulation ; time of ovulation not known in advance ;	**2 max**
(iii)	take temperature at the same time each day ; monitor for more than one cycle ; fertility / narrow range, thermometer / take accurate measurements ; advisable to use with another method / named ; abstain, days 11 – 16 / before and after ovulation / AW ;	**2 max**
(b) (i)	(the level rises) as the pill / hormones, are absorbed into the blood ; (and declines as it is) destroyed by the liver / metabolised / lost in urine / excreted ; pill taken each day ; drops very low because, no pill / placebo, is taken ;	**3 max**
(ii)	*accept one day either side throughout* **1** days 17 – 22, concentration fairly constant, at 2 arbitrary units ; **2** hormones / oestrogen / progesterone, from pill, inhibits FSH ; **3** by negative feedback ; **4** inhibits /slows, follicle, development / activity / secretion ; **5** days 22 – 1, increase, from 2 – 5.2 / by 3, units ; **6** inhibition / negative feedback, removed, when pill not taken ; **7** FSH secreted ; **8** stimulates, development / activity, of follicle ; **9** secretes oestrogen ; **10** days 1 – 5, secretion from follicle falls to, previous level / 2.4 units ; **11** when pill starts again / AW, inhibition operates / AW ; **12** AVP ; e.g. minor fluctuations in concentration, caused by changing levels of hormones from pill	**5 max**

(c) (i) *mark (i) and (ii) together to max 5*

mark general points to max 2

1 vaccine promotes the formation of antibodies **;**
2 by B lymphocytes **;**
3 form antigen + antibody complexes **;**

mark HCG points to max 3

4 HCG destroyed **;**
5 HCG maintains corpus luteum / without HCG corpus luteum degenerates **;**
6 progesterone level drops **;**
7 endometrium sloughs off *or* menstruation / period, occurs **;**
8 AVP **;** e.g. not contraception, aborts fetus

(ii) *mark sperm points to max 3*

9 antibodies, cover / combine with / block / AW, protein (on sperm head) **;**
10 sperm cannot lock onto zona pellucida **;**
11 ref to, specific shape / complementary shapes (of protein and its receptor on zona pellucida) **;**
12 cannot digest path through zona pellucida **; A** no acrosome reaction in correct context
13 may not, lock onto / reach, oocyte membrane **;**
14 fertilisation cannot occur **;** **5 max**

(iii) vaccine causes formation of memory cells **;**
permanent immunity / AW **;**
not everyone responds to vaccines **; R** ref to side effects
could attack self antigens **;**
ref to ethics of destroying HCG **;**
AVP **;** e.g. may be irreversible / may be sterile
may only be specific to one type of sperm
not known how long contraceptive effect lasts **1 max**

[Total: 21]

Question		Expected Answers	Marks
4	(a)	shoot tip / root tip / apical bud / cambium / nodes between areas of growth ;	1
	(b)	cells are, not differentiated / totipotent / can form all cell types ; **R** unspecialised only need to insert the gene into one cell ; throughout plant, cloned / all cells are genetically identical ; easier with one cell ; divides by mitosis ; large nucleus ; less cytoplasm ; secretes, PGRs / named ; AVP ; e.g. DNA altered before, specialisation / gene switch	3 max
	(c)	*mark process to max 6* **P1** cells stop dividing ; **P2** enlarge / elongate ; **P3** water enters ; **P4** by osmosis / down water potential gradient ; **P5** vacuoles form ; **P6** cellulose, stretches / increases area of cell walls ; **P7** synthesise new materials / named ; **P8** differentiate ; **P9** cell becomes specialised ; **P10** ref to gene switch on / off ; **P11** ref to, PGR / named PGR ; **P12** AVP ; e.g. detail of protein synthesis *mark structure to max 3* **S13** cytoplasm round edge / large central vacuole ; **S14** palisade columnar / AW ; **S15** spongy irregular ; **S16** chloroplasts form ;	7 max
		QWC – clear, well-organised using scientific terms ; *award the QWC mark if three of the following are used in correct context* osmosis — named PGR water potential gradient — palisade cellulose — spongy differentiate — chloroplasts	1
			[Total: 12]

Question			Expected Answers	Marks
5	(a)		imbalance / change in balance, of hormones ; **R** levels or concentrations oestrogen and progesterone ; decline at different rates ; progesterone decreases ; **R** hormone deficiency before menstruation ;	**3 max**
	(b)	(i)	degeneration / breakdown / may not mature / many may die / AW ; (primordial) follicles, age / divide abnormally ; monthly loss / AW ; AVP ; e.g. hormonal abnormality / pollution / smoking / named	**2 max**
		(ii)	*award two marks if correct answer (91) is given* *award one mark if not rounded up* 39874 – 3450 = 36424 $\frac{36424}{39874}$ x 100 ; *OR* $\frac{3450}{39874}$ x 100 = 8.7 100 – 8.7 ; = 91 (%) ;; *ecf = 1 max* *91.35 = 1 max*	**2 max**
	(c)		follicles less sensitive to FSH ; less / no, follicle(s) matures, therefore, no / less, oestrogen ; no ovulation therefore no progesterone ; less / no, inhibition from, oestrogen / progesterone ; FSH / LH, rises ; by negative feedback ; AVP ; e.g. ref to involvement of hypothalamus and GnRH	**3 max**

(d) *mark symptoms to max 4*

S1 hot flushes / night sweats ;
S2 dryness of, vagina / mouth / epithelia / membranes ;
S3 depression / irritability / fatigue / mood swings ;
S4 reduced, sex drive / libido ;
S5 <u>osteoporosis</u> ;
S6 increases risk of CHD ; max 4

mark therapy to max 5

T7 HRT is mainly <u>oestrogen</u> / AW ;
T8 oestrogen improves well being / mood / AW ;
T9 pill / implant / injection / patch ;
T11 reduces dryness of membranes ;
T12 (this is) antagonistic to parathormone ;
T13 which increases blood calcium ;
T14 by removing it from bone ;
T15 may be combined with progesterone ;
T16 (to reduce) side effects, blood clotting / thrombosis / increased risk of stroke *or* heart disease
T17 AVP ;
T18 AVP ; max 5 **6 max**

QWC – legible text with accurate spelling, punctuation and grammar ; **1**

[Total: 17]

Question			Expected Answers	Marks
6	(a)	(i)	<u>asexual reproduction</u> ; **R** divides asexually DNA replicates ; organelles replicate ; mitosis ; cell wall grows across / AW ; split into two / form mass of cells ; genetically identical / cloned ; AVP ; e.g. binary fission, fragmentation	**3 max**
		(ii)	too few grazers / described ; increase in temperature / AW ; increase in, intensity / duration, of light / AW ; good supply of, nutrients / named nutrient ; pollution by organic waste ; AVP ; e.g. excessive use of fertilisers	**2 max**
		(iii)	(increase in plants causes) increase in animals ; less light to lower levels results in less photosynthesis ; plants die (at lower layers) ; increase in organic material ; decomposed by, <u>aerobic</u> bacteria / micro-organisms ; correct ref to, increased oxygen consumption / increased BOD ; oxygen concentration decreases, causing death of, fish / other aquatic animals ; ref to <u>anaerobic</u> bacteria ; AVP ; e.g. eutrophication	**3 max**
	(b)		measured sample of lake water / stated volume ; randomly selected ; serial dilution / described ; replicates ; haemocytometer, total count ; measure release of oxygen as an indicator of viable count ; multiply count to take account of dilution ; repeat regularly over set time / AW ; plot, time versus count on graph ; rate calculated from tangent / AW ; calculate gradient (on graph) ; **A** calculation to show how to find rate AVP ; e.g. description of turbidity measurement	**6 max**
				[Total: 14]