

WJEC (Wales) Biology A-level
Topic 4.1: Sexual Reproduction
in Humans
Questions by Topic - Mark
Scheme

1.

Question			Marking details	Marks Available
1.	(a)	(i)	A = Primary oocyte/ Primary follicle; B = Graafian follicle; <i>Accept secondary follicle/ theca</i> C= Corpus luteum; <i>reject yellow body</i>	3
		(ii)	Ovulation;	1
		(iii)	HCG/ human chorionic gonadotrop(h)in;	1
	(b)	(i)	W = Oogonium/ oogonia; X = primary oocyte; Y = Secondary oocyte; Z = (first) Polar body; <i>reject nucleus accept polar cell</i>	4
		(ii)	Mitosis;	1
		(iii)	Correct number of chromosomes in each; X = 4 Y =2 Cell X Prophase 1 drawn correctly; chromosomes inside nuclear membrane, not on equator Cell Y Metaphase 2 drawn correctly; must be clearly on equator	3
	(c)	Polar bodies produced/ reduction in genetic material at each stage of meiosis; ecf from bi – accept polar nucleus if used in bi Functional gamete retains (most of) the cytoplasm; (Cytoplasm) acts as a food store for zygote/ provide mitochondria for zygote; needed until implantation takes place/ obtained from placenta;		2
	Question 1 Total			[15]

Question	Marking details	Marks Available
2 (a)	A – Corona radiata / follicle (cells)/ cumulus cells/ granulosa cells; B- Zona pellucida;	2
(b) (i)	Acrosome;	1
(b) (ii)	{Releases/ contains} {enzymes/proteases/carbohydrase}; To {digest/ break down/ penetrate/ soften} {corona radiata/ zona pellucida};	2
(c) (i)	{Splitting/dividing} of {zygote/early embryo} cells to form new cells;	1
(c) (ii)	Hollow ball of cells/ ball of {undifferentiated/ partly differentiated} cells;	1
(c) (iii)	The {burying/ embedding/ implanting} of the {blastocyst/ embryo} into the {uterine lining/endometrium};	1
Question 2 Total		[8]

3.

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)	A = theca/thecal cells/follicle cells/granulosa cells (1) B = <u>Primary</u> oocyte/ <u>primary</u> follicle (1) Accept primordial follicle	2			2		1
		(ii)	$8.38 \times 10^7 = 3$ marks $83800000 = 2$ marks Accept any correct standard form $83.8 \times 10^6 = 2$ marks $4190/0.00005 = 1$ mark Ignore units		3		3	3	
	(b)		Zona pellucida and Corona radiata (1)	1			1		
	(c)		acrosome(1) releases {enzymes/named enzyme} which {hydrolyse/digest/break down} (layers)(1)	2			2		
	(d)	(i)	{ Cortical granules rupture/cortical reaction} + Zona pellucida {thickens/hardens}/fertilisation membrane forms (1) NOT corona radiata thickening (Secondary oocyte taken from graafian follicle is immature) so cannot form a fertilisation membrane/zona pellucida cannot {harden/thicken}/fewer/less developed cortical granules (1)	1	1		2		
		(ii)	Any three (x1) from : 1. Fertilisation normally in fallopian tube (1) 2. Embryo needs to reach uterus/ blastocyst to form/allow cleavage to take place(1) 3. If embryo put into uterus immediately, endometrium would not be fully developed/or description (1) 4. {Trophoblastic/chorionic villi} will not have developed (1) 5. {Embryo/blastocyst} would not {implant/survive} (1)			3	3		
			Question 3 total	6	4	3	13	3	1

4.

Question		Marking details		Marks available						
				AO1	AO2	AO3	Total	Maths	Prac	
4	(a)			Umbilical artery	Umbilical vein	2		2		
				Less oxygen	More oxygen					
				More CO ₂	Less CO ₂					
				More urea	Less urea					
				Less nutrients/named	More nutrients/named					
				Less antibodies	More antibodies					
Ignore ref to water 4 correct for 2 marks 2/3 correct for 1 mark 0/1 = 0 marks										
	(b)		Any two (x1) from: (Barrier) {against hormones/toxic substances/microorganisms/cells/mothers rhesus group/mothers antigens } (1) Protection against differences in pressure (1) Protection against mother's {immune system/antibodies} (1)	2			2			
	(c)	(i)	Maintain {concentration/diffusion} gradients/prevents equilibrium being reached(1)		1		1			
		(ii)	(Pressure difference) forces materials through (capillaries) (1)		1		1			
		(iii)	Large (surface) area for exchange.(1)		1		1			
Question 4 total				4	3	0	7	0	0	