

Reproduction

Mark Scheme 9

Level	IGCSE
Subject	Biology
Exam Board	CIE
Topic	Reproduction
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 9

CHEMISTRY ONLINE
— TUITION —

Time Allowed: 88 minutes

Score: /73

Percentage: /100

- 1 (a) **MUST USE LABEL LINES**
ACCEPT NAMES AS WELL AS LETTERS
S. – any point in the vagina
D. – the cervix
M. – the ovary
F. – the oviduct
E. – any point on the surface of the uterus or in cavity
R if line is in muscular wall 5
- (b) (ovum)
i. ref. to fallopian tube / oviduct ;
ii. ref. to presence of ciliated cells / cilia (in wall) ;
iii. ref. to (ovum) wafted down / propelled / moved / conveyed AW / sweep ; **R** passed unequal. **R** transport max 2
iv. ref. to peristaltic movement AW of oviduct ;
- (ii) (sperm)
i. ref. to presence of tail + to swim / move AW ;
ii. ref. to mitochondria + to provide energy / power ;
iii. ref. to sperm streamlined / light / very small ; 2
- (iii) (zygote)
i. ref. to a fertilised egg / fused egg and sperm (nucleus) ;
ii. contains chromosomes of egg and sperm ;
iii. egg and sperm / gametes / sex cells + are both haploid / have half normal number of chromosomes / have 23 chromosomes / (both) formed by meiosis ; max 2
- (iv) ref. to progesterone ;
secreted / produced by + placenta ; 2
- total max. 13**

- 2 (a)(i) meiosis; Ⓐ reduction division [1]
- (ii) ref. to half the number of chromosomes/haploid; Ⓐ v.v has 23 chromosomes;
Ⓐ only contains one sex chromosome AW
ref. to presence of tail/ability to move; Ⓡ refs to shape
Ⓐ less cytoplasm/less food stores AW max. [1]
- (iii) zygote; Ⓐ diploid Ⓡ [1]
- (iv) ref. to sperm cell that fertilises it must be carrying an X (chromosome);
ref. to fertilised egg cell contains XX;
Ⓐ egg cell had not been fertilised by a Y sperm AW [1]
- (b)(i) ovary; Ⓐ follicle [1]
- (ii) oviduct/fallopian tube; [1]
- (iii) uterus; Ⓐ womb [1]
- (c) (amniotic fluid)
- protects fetus from physical damage/cushions; Ⓡ protects unequal.
 - acts as shock absorber AW ; Ⓡ prevents shock unequal.
Ⓡ supports unequal.
 - prevents unequal pressures from acting on fetus/maintains constant environment/allows free movement;
 - protects fetus from temperature fluctuations AW; Ⓡ insulates unequal.
 - protects fetus from drying out AW;
 - ref. to absorbs + excretory material/urine from fetus; max. [1]
- (amniotic sac)
- secretes/produces + amniotic fluid;
 - encloses/contains + amniotic fluid AW; max. [1]

(d)(i) IGNORE REFS TO NUTRIENTS/FOOD

- ref. to exchange of up to **two** named materials e.g. oxygen/glucose/ water/amino acids/antibodies/urea/carbon dioxide; ;
 Ⓐ other correct materials ○
- ref. to physical attachment between fetus and uterus/mother;
- ref. to prevention of blood mixing/allows blood systems to be close AW;
- ref. to protection from mother's (high) blood pressure;
- ref. to protective role in preventing the entry of some pathogens AW;
 Ⓡ germs/disease **max. [4]**

- (ii)** ref. to secretion of progesterone; (ignore oestrogen refs.)
to keep lining of uterus thick/prevents menstruation/to prevent
breakdown of uterus lining;
Ⓐ prevents uterine muscle contracting

[2]

.....
Total 15
.....

CHEMISTRY ONLINE
— TUITION —

- 3 (a) column drawn and shaded correctly ;
Y axis labelled ;
X axis labelled + units ; [3]
- (b) continuous ; [1]
- (ii) ref. to different amounts of light ; ® environmental differences unequal.
ref. to different amounts of minerals ;
ref. to exposure to different temperatures ;
ref. to disease / fungal or viral infection ;
ref. to competition for water ;
ref. to genetic differences ;
ref. to trampling ;
ref. to grazing ; [max. 3]
- (c) ref. to large + petals ;
ref. to coloured + petals ;
ref. to scent ;
ref. to presence of nectar ; [max. 2]
- (ii) ref. to pollination AW ; [1]
- (d) ref. to self-pollination / ref. to other agents of pollination ;
so fertilization occurs using pollen from same flower AW ; [2]
- [max.12]

CHEMISTRY ONLINE
— TUITION —

Question		Mark	Additional Guidance																								
4 (a)	feathers ;	max [1]																									
(b)	<table><tr><td>go to 2</td><td></td></tr><tr><td>go to 4</td><td></td></tr><tr><td><i>Spinus tristis</i></td><td>D</td></tr><tr><td>go to 3</td><td></td></tr><tr><td><i>Ara ararauna</i></td><td>A</td></tr><tr><td><i>Aquila chrysaetos</i></td><td>F</td></tr><tr><td><i>Platalea regia</i></td><td>C</td></tr><tr><td>go to 5</td><td></td></tr><tr><td><i>Trochilus polytmus</i></td><td>E</td></tr><tr><td>go to 6</td><td></td></tr><tr><td><i>Recurvirostra americana</i></td><td>G</td></tr><tr><td><i>Phoenicopterus minor</i></td><td>B</td></tr></table>	go to 2		go to 4		<i>Spinus tristis</i>	D	go to 3		<i>Ara ararauna</i>	A	<i>Aquila chrysaetos</i>	F	<i>Platalea regia</i>	C	go to 5		<i>Trochilus polytmus</i>	E	go to 6		<i>Recurvirostra americana</i>	G	<i>Phoenicopterus minor</i>	B	[3]	5 or 6 correct = 3 3 or 4 correct = 2 1 or 2 correct = 1
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Question		Mark	Additional Guidance
4 (c) (i)	A – meiosis ; B – zygote ;	[2]	
(ii)	(cell/nucleus) has <u>two</u> sets of chromosomes ; has pairs of chromosomes ; has chromosomes from <u>two</u> , haploid cells/sperm and egg/two gametes ; has chromosomes from male and female (parents) ; has twice the number of chromosomes as the gametes ;	max [1]	ignore has 80 chromosomes ignore 2n unqualified
(iii)	increase in complexity ; (named) cells / tissue(s) / organ(s) / organ system(s), become specialised / differentiate / AW ;	max [1]	R ref to increase in cell number and cell size
(iv)	ref adaptation to, new / changed, environment / habitat / ecosystem ; any example ; e.g. ref to (new) disease / camouflage / escaping from (new) predators allows, selection / evolution ; ref to reduces competition ; increases chances of survival of the species / reduces chance of extinction ; AVP ; e.g. increase in gene pool	max [2]	A ref to selective advantage
		[Total: 10]	

5	<p>(a)</p> <p>taking a, gene / DNA / allele, from one species ; inserting it into another organism ;</p> <p>OR</p> <p>changing the, genetic material / chromosome of, an organism / cell ; by removing / changing / inserting, <u>genes</u> / <u>DNA</u> / <u>alleles</u> ;</p>																							
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	<p>(b)</p> <table><tr><th>Letter from fig</th><th>Name</th><th>Descrip</th></tr><tr><td>M</td><td>chromosomes</td><td>threads of DNA found in the nucleus</td></tr><tr><td>N</td><td>gene / allele ;</td><td>section of DNA removed from human cell</td></tr><tr><td>Q</td><td>plasmid</td><td>vector / loop / circle, of DNA (that can carry a foreign section of DNA) / separate piece of DNA (from chromosome) ;</td></tr><tr><td>R</td><td>bacterial (cell) ; A yeast</td><td>type of cell that is genetically engineered</td></tr><tr><td>O</td><td>insulin / protein ;</td><td>specific chain of amino acids coded by the section of DNA removed from the human cell</td></tr><tr><td>P</td><td>fermenter</td><td>(container in which) bacteria / microorganisms / cells, reproduce / grow / produce insulin ;</td></tr></table>	Letter from fig	Name	Descrip	M	chromosomes	threads of DNA found in the nucleus	N	gene / allele ;	section of DNA removed from human cell	Q	plasmid	vector / loop / circle, of DNA (that can carry a foreign section of DNA) / separate piece of DNA (from chromosome) ;	R	bacterial (cell) ; A yeast	type of cell that is genetically engineered	O	insulin / protein ;	specific chain of amino acids coded by the section of DNA removed from the human cell	P	fermenter	(container in which) bacteria / microorganisms / cells, reproduce / grow / produce insulin ;		
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5 (c)	clone/(genetically) identical ; rapid/less energy to reproduce (asexually)/only one parent/ no gametes ; large quantity of insulin produced ; all bacteria, have the insulin gene/produce insulin ; same insulin produced ; once cells are engineered does not have to be repeated ; AVP ; e.g. cheap/ethical <i>or</i> religious reasons/less allergic reaction/no immune rejection/more efficient/no risk of disease (transmission)	max [3]	A <u>no</u> variation only accept in context of comparisons with animal insulin extraction methods
		[Total: 10]	

Question	Answers	Marks	Additional Guidance
6 (a)	pollen transferred from, anther / stamen, to stigma ; within same <u>flower</u> / between <u>flowers</u> on same plant ; R if only 'same plant'	[2]	R complete answers given in context of fertilisation R 'single parent'
(b)	<p><i>cross 1</i></p> $\begin{array}{c} I^R I^R \times I^W I^W \\ I^R + I^W \\ I^R I^W ; \end{array}$ <p><i>cross 2</i></p> $\begin{array}{c} I^R I^W \times I^R I^W \\ I^R, I^W + I^R, I^W ; \\ I^R I^R, I^R I^W, (I^R I^W), I^W I^W ; \\ 1 \text{ red} : 2 \text{ pink} : 1 \text{ white} ; \quad \mathbf{A} \text{ 25\% red : 50\% pink : 25\% white} \\ \mathbf{A} \text{ multiples, e.g. 2 red: 4 pink : 2 white} \end{array}$ <p>R if two different ratios given</p>	[4]	<p>A other notation, e.g. R and r or mixture, e.g. I^R and W. R I^{RR}, etc.</p> <p><i>cross 1</i> 1 mark for parental genotypes, gametes and offspring all correct. Any mistake and no mark awarded.</p> <p><i>cross 2</i> 1 mark for cross genotypes and gametes all correct. Any mistake and no mark awarded.</p> <p>1 mark for giving all three genotypes (on answer line or in the white space e.g. in Punnett square). If correct on answer line ignore any errors in working.</p> <p>1 mark for ratio of offspring phenotypes and colours R if no colours given</p>
(c)	$\begin{array}{c} I^R I^W \times I^W I^W \\ I^R, I^W + I^W ; \\ I^R I^W, I^W I^W ; \\ 1 \text{ (pink)} : 1 \text{ (white)} ; \\ \mathbf{R} \text{ if two different ratios given} \end{array}$	[3]	<p>1 mark for parental genotypes and gametes all correct. Any mistake and no mark awarded.</p> <p>1 mark for offspring genotypes</p> <p>1 mark for ratio (colours not necessary) A if no colours given</p>

Question	Answers		Marks	Additional Guidance
6 (d)	1	ref. to meiosis ;	[max 4]	R sexual reproduction allows mutations to occur A may allow resistance to disease A 'suited to' / survive / AW for adapted R 'passed on by natural selection' R 'new species are made' A 'go to new areas' or 'spread to new areas' <i>competition is in context of seed dispersal not pollen dispersal</i> R 'multiply quicker'
	2	mutation can occur <u>in meiosis</u> ;		
	3	(gives) variation / diversity ; R 'varied species (plural)'		
	4	ref. to, alleles / genes / DNA, from different, plants / parents ;		
	5	allows mutations to be, expressed / AW ;		
	6	allows adaptation to, new conditions / changed environment / AW ;		
	7	(new species) can evolve / allows natural selection to occur ;		
	8	seeds are dispersed ; R dispersed unqualified, R pollen dispersal		
	9	can colonise new areas / AW ;		
	10	less competition (with parent plant / among offspring) ;		
[Total: 13]				