



**Subject: Growth, Development and Reproduction**  
**Code: 2805/01**

**Session: January Year: 2002**

**Mark Scheme**

<b>MAXIMUM MARK</b>	<b>90</b>
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## ADVICE TO EXAMINERS ON THE ANNOTATION OF SCRIPTS

1. Please ensure that you use the **final** version of the Mark Scheme.  
You are advised to destroy all draft versions.
2. Please mark all post-standardisation scripts in red ink. A tick (✓) should be used for each answer judged worthy of a mark. Ticks should be placed as close as possible to the point in the answer where the mark has been awarded. The number of ticks should be the same as the number of marks awarded. If two (or more) responses are required for one mark, use only one tick. Half marks ( $\frac{1}{2}$ ) should never be used.
3. The following annotations may be used when marking. No comments should be written on scripts unless they relate directly to the mark scheme. Remember that scripts may be returned to Centres.  
  
x = incorrect response (errors may also be underlined)  
^ = omission mark  
bod = benefit of the doubt (where professional judgement has been used)  
ecf = error carried forward (in consequential marking)  
con = contradiction (in cases where candidates contradict themselves in the same response)  
sf = error in the number of significant figures
4. The marks awarded for each part question should be indicated in the margin provided on the right hand side of the page. The mark total for each question should be ringed at the end of the question, on the right hand side. These totals should be added up to give the final total on the front of the paper.
5. In cases where candidates are required to give a specific number of answers, (e.g. 'give three reasons'), mark the first answer(s) given up to the total number required. Strike through the remainder. In specific cases where this rule cannot be applied, the exact procedure to be used is given in the mark scheme.
6. Correct answers to calculations should gain full credit even if no working is shown, unless otherwise indicated in the mark scheme. (An instruction on the paper to 'Show your working' is to help candidates, who may then gain partial credit even if their final answer is not correct.)
7. Strike through all blank spaces and/or pages in order to give a clear indication that the whole of the script has been considered.
8. An element of professional judgement is required in the marking of any written paper, and candidates may not use the exact words that appear in the mark scheme. If the science is correct and answers the question, then the mark(s) should normally be credited. If you are in doubt about the validity of any answer, contact your Team Leader/Principal Examiner for guidance.

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<b>Abbreviations, annotations and conventions used in the Mark Scheme</b>	/ = alternative and acceptable answers for the same marking point ; = separates marking points NOT = answers which are not worthy of credit ( ) = words which are not essential to gain credit <u>      </u> = (underlining) key words which <b>must</b> be used to gain credit ecf = error carried forward AW = alternative wording ora = or reverse argument
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<b>Question</b>	<b>Expected Answers</b>	<b>Marks</b>
<b>1 (a)</b>	<p>Y chorionic villus;</p> <p>large surface area / microvilli, qualified;  thin selectively permeable wall qualified;  numerous fetal capillaries qualified;  numerous mitochondria;  active transport pumps;  AVP; <i>All answers must be qualified with advantage</i></p>	<b>1</b>
<b>(b)</b>	<p>encloses the amniotic cavity;  produces the amniotic fluid;  maintains sterile conditions for the fetus;  expands to hold fetus;  fluid maintains temperature;  cushions / protects against physical shock / AW;  allows movement to develop muscles / bones;  fetus practises swallowing reflex;  exchanged through skin of fetus;  AVP;; e.g. isotonic, lubrication etc</p>	<b>3 max</b>
<b>(c)</b>	<p>deoxygenated / less oxygen in umbilical artery / converse;  more CO<sub>2</sub> in umbilical artery / converse;  less glucose in umbilical artery / converse;  more nitrogenous waste / urea in umbilical artery / converse;  higher pressure in umbilical artery / converse;</p>	<b>3 max</b>
<b>(d)</b>	<p>diffusion;  passes through lipid bilayer;  fat soluble;</p>	<b>2 max</b>
<b>(e)</b>	<p>both from parent;  both soluble food reserves;</p> <p>seed embryo receives nutrition via the funicle / stalk of ovule, and fetus via placenta;  AVP;; e.g. some seeds do not develop until after dormancy</p>	<b>2 max</b>

**[Total: 15]**

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<b>Question</b>	<b>Expected Answers</b>	<b>Marks</b>
<b>2 (a)</b>	<u>mitosis</u> , increases cell numbers; meristem; protein synthesis / increase in dry mass; water uptake causes elongation / expansion; stimulated by, auxin / IAA; uptake nutrients / named; production organelles / named; synthesis of cellulose; increases size of tissues / colony; cells only grow to certain size before dividing / AW; AVP; e.g. differentiation	<b>6 max</b>
	<b>Q – legible text with accurate spelling punctuation and grammar;</b>	<b>1 7 max</b>
<b>(b) (i)</b>	maturity; no further growth; measured as % <u>total</u> growth;	<b>2 max</b>
<b>(ii)</b>	rapid increase to produce lymphocytes; to protect child from infection / provide immunity; stored as memory cells; activity immune system declines in adult / AW; AVP;	<b>2 max</b>
<b>(iii)</b>	nervous system grows while, bones still soft / skull will expand / AW; levels off as mature / maximum size reached;	<b>1 max</b>
<b>(iv)</b>	12 – 14, reproductive organs begin to grow;	<b>1</b>
<b>(c)</b>	GnRH from hypothalamus; FSH from <u>anterior</u> pituitary; LH from <u>anterior</u> pituitary	<b>2 max</b>
		<b>[Total: 15]</b>

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<b>Question</b>	<b>Expected Answers</b>	<b>Marks</b>
<b>3 (a)</b>	meiosis to produce four haploid, nuclei / cells; three degenerate; one forms embryo sac; mitosis; 2 / 4 / 8, <u>haploid</u> nuclei, form; polar nuclei fuse; to form <u>diploid</u> nucleus; female gamete / ovum, forms; ref to antipodal cells / synergids;	<b>4 max</b>
<b>(b)</b>	diploid, zygote; from male gamete and female gamete; divides by mitosis to form embryo; triploid endosperm nucleus; from male gamete, and two polar nuclei; triploid nucleus divides by mitosis; to form endosperm / food store; embryo cell; divides to form basal cell, suspensor and embryo; plumule, radicle and cotyledons; cotyledons, may absorb endosperm / food store; nutrients from nucellus; water content drops; from 95% to 10-15% of mass; ref to testa / AB / micropyle;	<b>7 max</b>
	<b>Q - clear well organised answer using specialist terms;</b>	<b>1</b> <b>8 max</b>
<b>(c)</b>	germination occurs when season favourable; avoids pregermination / germination within fruit / AW; avoids germination before dispersal; avoids germination during brief favourable conditions; AVP; e.g. germinates when pollinators around, phases germination	<b>3 max</b>

[Total: 15]

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<b>Question</b>	<b>Expected Answers</b>	<b>Marks</b>
<b>4 (a) (i)</b>	to compare low temperature with normal / AW;	<b>1</b>
<b>(ii)</b>	the percentage of flowers producing grains decreases the further they are from the base / AW, in both samples / implied; lower percentage of grains produced at 8°C in all sections; greater reduction as move from base at lower temperature / AW; comparative figs in support e.g. between sections or temperatures; low temperature slows down enzymes; less, respiration / photosynthesis; less glucose for energy; less amino acids for growth; diffusion slower at low temperatures; ) uptake slower transpiration slower at lower temperatures; ) qualified less nutrients reach apex / lower flowers get more nutrients / AW; grain is a large sink / develop from bottom upwards / AW; AVP;	<b>7 max</b>
<b>(b) (i)</b>	amylase / maltase, converts starch into maltose / maltose into glucose;  lipase; converts, lipid / fat, into fatty acids and glycerol;  protease; converts protein into amino acids;	<b>2 max</b>
<b>(ii)</b>	makes nutrients soluble; for transport to the meristem; glucose / lipid respiratory substrate / AW; energy for, growth / cell division / synthesis; amino acids for, structural protein / enzymes; AVP; e.g. endosperm is the only source of nutrients, it sustains the embryo until roots develop / photosynthesis starts	<b>3 max</b>
<b>(iii)</b>	abscissic acid; inhibits growth / inhibits germination / promotes dormancy;  gibberellin; promotes growth; stimulates enzymes; alpha amylase;  kinetin; stimulates growth;	<b>2 max</b>
<b>[Total:</b>		<b>15]</b>

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<b>Question</b>	<b>Expected Answers</b>	<b>Marks</b>
<b>5 (a) (i)</b>	<p><i>cuttings</i> stem / leaf / branch / root / shoot, segment cut; placed, in / on, suitable moist medium / compost / soil; growth regulators / rooting hormone / other named, applied; mitosis of, cambium / callus cells; differentiation, to form roots / shoots;</p>	<b>3 max</b>
<b>(ii)</b>	<p><i>grafting</i> root stock chosen (with vigorous / healthy roots); scion plant (plant with desirable flowers / fruit); matching slanting cuts in scion and stock; scion and stock tied together; <i>only penalise once if incorrect terms</i> cell division in, cambium / callus; fusion, vascular tissues / xylem and phloem / transport system forms;</p>	<p>) ® if qualified with wrong ) attribute <b>3 max</b></p>
<b>(b)</b>	<p>stolon formation, not light / dark dependent, in lower bud; stolon length from lower bud longer in dark; dark necessary for stolon formation in second lowest bud; tuber formation requires dark in stolons from both buds; may be PGR / named; differs in concentration in each bud / AW; comparative figures in support;</p>	<b>4 max</b>
<b>(c) (i)</b>	<p>genetically identical; uniform / predictable / desired characteristic; potato can be genetically engineered; no viruses / disease free; AVP; e.g. more detail, rapid or bulk production</p>	<b>2 max</b>
<b>(ii)</b>	<p>narrow gene pool; decreased chance of mutation; no combination of advantageous recessives; risk that disease will wipe out whole population; AVP;</p>	<p>® genetically identical <b>2 max</b></p>
<b>[Total:</b>		<b>14]</b>

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<b>Question</b>	<b>Expected Answers</b>	<b>Marks</b>
<b>6 (a) (i)</b>	the drug / AW, is diluted in the mother's blood / AW; the drug / AW, may not cross the placenta; the drug / AW, may be toxic to the fetus / AW; the drug, may be metabolised by the mother; AVP;	<b>2 max</b>
<b>(ii)</b>	more premature infants survive / survive at 24 weeks gestation; there is an overlap between fetal stage and premature / surviving new-born infant AW; surgery (on the fetus) in the uterus is possible; premature infants may require painful techniques to survive; abortions may cause pain; pain sensation indicates self awareness / AW; AVP;; drug may have a different effect on the fetus / baby, surgery on mother, may distress the fetus / baby, rights of fetus / baby, psychological effect on baby	<b>3 max</b>
<b>(b)</b>	pain in damaged area felt when neighbouring area stimulated; increased sensitivity to pain; continues after healing; AVP;	<b>2 max</b>
<b>(c) (i)</b>	level when, touch / stimulus, is felt / produces nerve impulse;	<b>1 max</b>
<b>(ii)</b>	sensitivity does not decrease / threshold does not rise (as much); therefore skin remains sensitive; because the area is over supplied with nerve endings; ref to increase in, nerve fibres / dendrites;	<b>2 max</b>
<b>(iii)</b>	compensates for the loss of sensation in the injured area; AVP;	<b>1 max</b>



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- (d) cells pushed back / AW;  
lose ability to divide / some retain ability to divide / ref to cambium;  
gene switch;  
enzymes synthesised;  
synthesis lignin;  
end walls break down;  
cell contents die;  
xylem forms;  
companion cells cut off;  
synthesis sieve plates;  
forms phloem;  
vascular bundles;  
genetically programmed;  
may be influenced by environment / e.g.;  
AVP; e.g. nucleus smaller relative to cells / other cell types

**5 max**

**[Total: 16]**