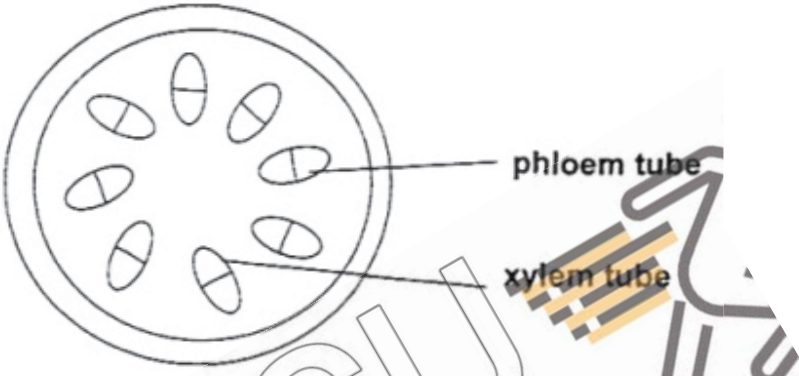


2019 Pure Biology 4E Preliminary Examination Mark Scheme

Paper 1 (40 marks)

1.	B	11.	A	21.	B	31.	B
2.	B	12.	C	22.	C	32.	C
3.	D	13.	A	23.	B	33.	B
4.	C	14.	C	24.	D	34.	A
5.	C	15.	A	25.	D	35.	A
6.	D	16.	C	26.	A	36.	D
7.	C	17.	C	27.	C	37.	A
8.	D	18.	D	28.	D	38.	D
9.	B	19.	B	29.	A	39.	C
10.	B	20.	D	30.	A	40.	A

Paper 2 Section A (50 marks)

1(a)	A: Sepal; B: Petal; C: Stamen/ anther/ filament; D: Ovary/ carpel/ pistil	1 1 1 1
(b) (i)	1 one or more vascular bundles + each oval shaped + location correct ; 2 'xylem' labelled on inside + 'phloem' labelled separately on outside of at least one oval vascular bundle ; 	1 1
(ii)	1 transports / carries AW + water / ions / minerals ; or 2 support ;	Any 1
		Total: 7
2(a)	1 any reference to up / rises / raised ; 2 out / forwards ; 3 reference to muscle ; 4 (muscle) contract(ion) ; 5 reference to (requires) energy ;	Max 2
(b)	movement of person's chest) 1 involuntary AW ; 2 intercostal (muscles) ; 3 (muscles) between the ribs / in the chest (wall) ; 4 (move) bone / ribs / ribcage ; 5 attached / hinged + to vertebrae / backbone / at back ; 6 *leads to increase in volume / decrease in pressure ; (movement of bucket handle) 7 voluntary AW ; 8 muscle in arm / finger OR reference to bicep(s) ; 9 external to / not part of + the bucket / handle ; 10 (move) metal / plastic OR reference to a single handle ; 11 attached / hinged + to bucket / at side ; 12 *does not lead to change in volume / pressure ; *accept once for either chest muscle or handle	Max 5
		Total: 7

3(a)	section of / made of / piece of + DNA / chromosome ; controls production of one protein ; may be copied ; unit of inheritance / passed on to next generation ;	Max 3
(b)	Parental genotype: Tt + Tt ; Gametes: t + t ; Offspring genotype: tt ; Offspring phenotype: tt offspring clearly indicated as white ; * At least 3 labels on genetic diagram correct	1 1 1 1
		Total: 7
4(a)	membrane or P / cytoplasm or Q / pulling away from wall/ plasmolysed / plasmolysis / flaccid ; water potential / concentration + lower outside than inside cells ORA ; water molecules + out of cells by osmosis ; through + partially AW permeable membrane ;	Max 3
(b)	(P) membrane ; (Q) cytoplasm ;	1 1
(c)	Salt solution	1
		Total: 6
5(a)	mean width of leaves from shady position = 46.2 (mm) ; mean width of leaves from sunny position = 32.7 (mm) ;	1 1
(b)	leaves from a shady position have a higher mean width ; leaves from a sunny position have more variable widths ;	1 1
(c)	leaves from shady place have a larger surface / area ; to trap more / available light ; for photosynthesis ; OR leaves from sunny position have smaller surface / area ; lose less water/ less evaporation ; due to transpiration ;	Max 3
		Total: 7
6(a)	(i) urethra (ii) bladder (iii) kidney (iv) ureter	1 1 1 1
(b)	semen / seminal fluid / sperm / gametes + carried by E / not carried by H ;	1
(c)	(contains) glucose ;	1
		Total: 6
7(a)	Top line (LHS) humans AW / nut collectors + (RHS) jaguars ; Middle line (LHS) bees + (RHS) agoutis ; Lower line (LHS) orchids + (RHS) (brazil nut) tree ; 4 four arrow heads drawn + all pointing upwards ;	1 1 1 1
(b)	1 less nectar ; 2 male bees + lack scent ;	Max 6

	3 female bees + not attracted ; 4 less reproduction of bees ; 5 less pollination + of trees ; 6 less trees ; 7 less nut / fruit production ; 8 loss of jobs (for humans) / negative economic impact AW ; 9 less food for agoutis ; 10 death / reduced population + of agoutis OR agoutis seek other food ; 11 less food for jaguars ; 12 death / reduced population + of jaguars OR jaguars seek other food ;	
		Total: 10

Paper 2 Section B (40 marks)

8(a)	axes correct orientation and both axes labelled fully ; linear scale for both axes ; all 5 points visibly plotted correctly ; plotted points joined with ruled lines and no extrapolation ;	1 1 1 1
(b)	activity / volume of oxygen produced increases as pH increases ; reaches a peak / AW at pH 7 ; then decreases ;	1 1 1
(c)(i)	60 (°C) ;	1
	breaks down protein (stains) ; named protein stain e.g. blood / food / milk ; not denatured / deactivated by hot water / AW ;	Max 2
		Total: 10
9(a)	in nucleus (human) / within nuclear membrane ORA ; in cytoplasm (bacteria) ; thread + plasmid(s) (bacteria) ; correct reference to chromosomes AW ; genes / chromosomes paired (human) ;	Max 2
(b)	(cell) wall ; (cell) membrane ;	1 1
(c)	type: asexual / binary fission / mitosis ; explanation: genetically + identical (cells produced) OR clones ; all capable of producing insulin / same product ; Accept: to produce insulin in large quantities / to produce a large number of bacteria / produce bacteria quickly	Max 2

(d)	potential advantages: increased yield / more profitable / grow quicker / reduce famine AW ; able to grow in environmental extremes / grow in new areas ; more predictable results than selective breeding / more certain; able to transfer (beneficial) genes / features between species; nutritionally improved / visually improved / desirable outcome e.g. uniform shape ; disease / pest resistance ; potential dangers: risk of genetic spread to other species ; may be patented / costs too much ; possible (unknown) risk to health of other species ; possible (unknown) risk	Max 4 Max 3 marks for each of advantages / dangers.
		Total: 10
EITHER 10 (a)	#diffusion ; epidermis / any layer of correctly named ; dermis ; #tissue fluid / plasma ; #capillary ; ----- venule / vein / vena cava ; A → *R.A + R.V. ; → correct ref. pulmonary circulation (either artery or vein) ; B → lungs ; → *L.A. + L.V. ; C → aorta / artery / arteriole ; (marks for A, B and C can be awarded if individually correct within an otherwise confused account) (* or one for heart – also available within a confused account) (# mark available anywhere so long as in correct context)	Max 7
(b)	stimulus / stimulates (R detects) ; receptor / taste bud / sensor / nerve or sensory endings ; sensory neurone (R nerve) ; impulses (R messages) ; brain / C.N.S. (ignore refs to spinal cord) ;	Max 3
		Total: 10
OR 10 (a)	absorbs + quickly ; and carries ; oxygen ; as oxyhaemoglobin ; in red blood cells ;	Max 4
(b)	large surface area ; uptake from ileum/small intestine ;	Max 6

	*of amino acids ; *of glucose ; into blood capillaries ; *fats/fatty acids/glycerol ; into lacteals ; (* allow one for digested foods)	
		Total: 10

