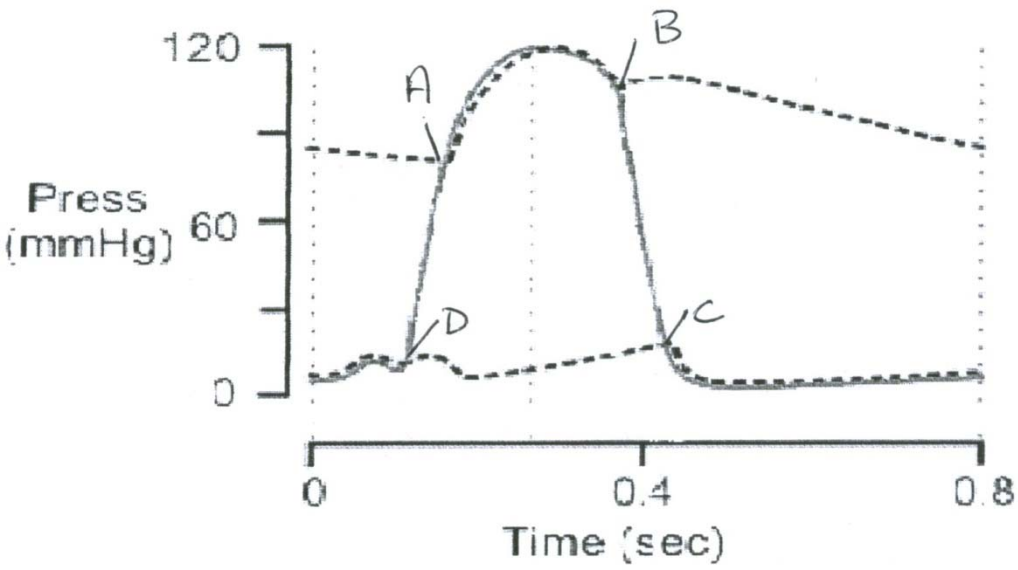
BIOLOGY - BY2

No.			Answer	Mark
1.	**(a)**	(i)	Incomplete metamorphosis	1
		(ii)	1 egg } 1 mark for both (not: zygote) 7 adult/imago } 2-6 nymphs (allow: instar)	2
	(b)	(i)	Complete metamorphosis	1
		(ii)	A Egg B Larva (allow: maggot) C Pupa (allow: chrysalis / cocoon) D Adult/Imago (1 mark per pair) Any 2 per mark	2
				Total 6 marks
2.	**(a)**		Chordata (allow: vertebrata)	1
			Mammalia/mammals	1
			Acinonyx	1
	(b)		Phylum: vertebral column/backbone well developed brain/CNS enclosed in a cranium internal skeleton (any 1)	1
			Class: endothermic (not: warm blooded) Lungs Hair / fur Double circulation Internal gestation / mammary glands /feed young on milk (allow: give birth to live young / placenta)	
			Sweat glands (any 1)	1
	(c)		(Genetic/population) bottleneck (not: low gene pool)	1
	(d)	(i)	Electrophoresis Genetic/DNA fingerprinting / DNA hybridisation / DNA profiling (not: DNA analysis) / protein sequencing (any 1)	1
		(ii)	That the DNA / sequence of bases/ genes/proteins shared between individuals is very high / closely match (allow: ref. banding patterns very similar)	1
				Total 8 marks

No.		Answer	Mark
3.	(a)	Eggs/faeces eaten by pigs/livestock	
		Tapeworm eggs in muscle	
		Undercooked meat eaten containing cysts/eggs / parasite/infected meat	2
		(any 2)	
	(b)	Suckers and hooks on (scolex/head)	
		Thick cuticle (not: coat)	
		Large numbers of embryos/eggs produced	
		(not: reproduce in huge numbers; allow: ref. offspring)	
		Resistant stages / secretion of chemicals to block the hosts digestive enzymes / immune system	
		No digestive system	
		Hermaphrodite/eq	
		Large surface area to volume ratio	3
		(any 3)	
	(c)	Ensure meat is well/thoroughly cooked/meat inspection (not: check the meat)	1
		Do not spread untreated sewage on land (not: sewage treatment unqual)	1
	(d)	Prevents scolex/hooks/suckers from holding on(to intestine) (allow: ref. worm)	1
			Total 8 marks

No.		Answer	Mark
4.	**(a)**	A Guard cells	1
		B Epidermis/al cells (not: epithelium)	1
	(b)	Allow gas exchange/CO_2 / O_2 to enter and leave the leaf	1
		Control water (vapour) loss (allow: prevents water loss qual. e.g. by closing at night not: allows transpiration)	1
	(c)	Active transport/ pumping of K^+ ions into the guard cells and starch-malate	1
		conversion **lowers Ψ**	1
		Water flows in by <u>osmosis</u> or down a water potential gradient	1
		Guard cell becomes <u>turgid</u>	1
		<u>Inner</u> wall of guard cell is inelastic/thicker so guard cells curve /bends away from each other	
	(d)	Cyanide stops respiration/is respiratory inhibitor/stops ATP synthesis	1
		Stopping <u>active transport</u> (of K^+) into (guard) cell	1
			Total 10 marks

No.		Answer	Mark
5.	**(a)**	Hydrophyte	1
	(b)	Large <u>air spaces</u> in *Nymphaea,* smaller in *Ligustrum* (not: ref. thicker spongy mesophyll / thickness of epidermis / more air spaces) Stomata on upper surface of leaf in *Nymphaea,* not in *Ligustrum* (any 2) Comparison needed. Accept converse of points	2
	(c)	Large air spaces for buoyancy/diffusion/floating Stomata on upper surface so allowing gas exchange with the air Thin cuticle as little water (vapour) loss (not: no cuticle) Little support tissue as buoyed by water Little xylem as surrounded by water Air spaces in stems allowing diffusion of gases (any 3)	3
	(d)	Rolled leaves (not: curled) Hairs Thick cuticle Sunken stomata (allow: in pits not grooves) Deep rooted Extra support tissue in leaf (any 1)	1
			Total 7 marks



6. **(a)** 2

(i) One mark for each correctly labelled point. 2
(ii) One mark for each correctly labelled point.

(b) The (aortic) semi lunar valve closes
so preventing backflow of blood into the ventricle
(left) ventricle relaxing / diastole
2 from 3 2

(c) One heartbeat takes 0.8 seconds

Therefore $\frac{60}{0.8}$ seconds

= 75 (beats per minute) 2
2 marks for correct answer, if incorrect could give 1 for correct figures and equation.

(d) Correct ref. to wall/muscle thickness affecting pressure
Atrium pushes blood into the ventricle which is very close.
The ventricle has to push blood around the entire body.
The right ventricle has to push blood to the lungs which need a lower blood pressure/closer.
3 from 4. Points require qualification not just description
(not: ref. gravity) 3

Total 11 marks

No.			Answer	Mark
7.	(a)		Lipase	1
	(b)	(i)	Hydrolysis of lipids/fats (not: digestion) Releasing fatty acids Causing a more acid pH/reducing pH (linked with previous point) (any 2)	2
		(ii)	Presence of bile salts (in tube B) causes the emulsifying of lipids Increasing surface area For action of lipase (not: ref enzymes) Fatty acids are released more quickly/eq so pH becomes acidic more quickly/in less time (any 3)	3
	(c)		Lipase/enzyme is denatured/tertiary structure altered Active site has changed shape Lipid/substrate will not fit into active site No hydrolysis of lipid/no fatty acids released (any 3)	3
	(d)		More fatty acids/products Quicker change in colour/faster reaction (any 1) (not: high fat content)	1
				Total 10 marks

8. **(a)** General re any examples

A Large S.A. qualified e.g.
B Moist surface for diffusion e.g.
C Short diffusion pathway qualified e.g. thin walls etc.
D Circulatory system with blood pigments/haemoglobin
E Internal lungs minimise loss of water / heat (not: in reference to frogs)
F Ventilation mechanism / or description e.g. ref insect abdominal movements
G Ensures fresh oxygen is brought to /carbon dioxide removed from gas exchange surface/maintain concentration gradients.

<u>Frogs</u>

H Inactive (frog) amphibian uses its moist skin for gas exchange
I Active (frog) amphibian uses lungs
J tadpole stage uses gills

<u>Reptiles and birds</u>

K More efficient lungs than amphibians
L Air sacs act as bellows

<u>Insects</u>

M Have a branched chitin lined system / presence of tracheae
N With openings called spiracles;
O Gases exchange directly with tissues/No blood pigment/ haemoglobin present

10 of the 15 marks available

(b) Diagram

A. With correct axes PPO_2
oxygen partial pressure (KPa) allow: oxygen tension
% Saturation of haemoglobin with oxygen
B. Correct numbers

C. Correct shaped curve for adult haemoglobin, labelled

D. Correct position of curve for fetal haemoglobin, labelled

E. Correct position of curve for Llama/lugworm, labelled or curve to left labelled animal at light altitude
(note: Lines not to go over 100%)

Text

F. Sigmoid / S shaped being more efficient

G. More/easier O_2 loading in lungs/fully saturated at (relatively) low partial pressure
H. Significance of this for living at altitude / low PPO_2

I. More O_2 delivered to tissues
J. Reduced affinity for O_2 at lower partial pressures

K. Bohr Effect reduces haemoglobin affinity for O_2 / more O_2 is delivered to respiring tissues

L. Correct biological explanation for this – acidity reduces affinity Hb for O_2

M. Ref. myoglobin or position on graph

N. Correct explanation for foetal haemoglobin curve position, i.e. ref. affinity

O. Correct explanation for Llama/lugworm curve position i.e. ref. affinity higher
(Note: G+H in context of loading and marks transferable to different organisms;
I+J in context of unloading)

10 of the 15 marks available