Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
January 2012

Biology

Assessment Unit AS 1

assessing

Molecules and Cells

[AB111]

WEDNESDAY 11 JANUARY, MORNING

MARK SCHEME

/ denotes alternative points
; denotes separate points
Comments on mark values are given in bold
Comments on marking points are given in italics

AVAILABLE MARKS

Section A

1 Reducing sugars/minimum of two appropriate examples;
diploid;
DNA probe;
(poly)unsaturated;
reverse transcriptase; [5] — 5

2 **(a)** **(i)** Hydrogen (bond); [1]

(ii) Hydrolysis (reaction); [1]

(b) **(i)** 5; [1]

(ii) 13; [1] — 4

3 **(a)** At low levels (0–4), a rise in taxane causes a small rise in inhibition/inhibition is low;
Not just inhibition is slow.
at medium levels (3–6/4–5), a rise in taxane causes a large increase in inhibition;
Not just inhibition increases more rapidly.
at high levels of taxane (6–8), there is little further rise in inhibition/inhibition levels off/inhibition is nearly complete;
Not just inhibition increases less rapidly/stops. [3]

(b) Metaphase;
taxane will interfere with the spindle formation/prevents attachment of centromere (of chromatids/chromosome);
or
Anaphase;
taxane will interfere with spindle shortening/prevents chromatids from being pulled apart;
Must link name of phase with correct reason. [2] — 5

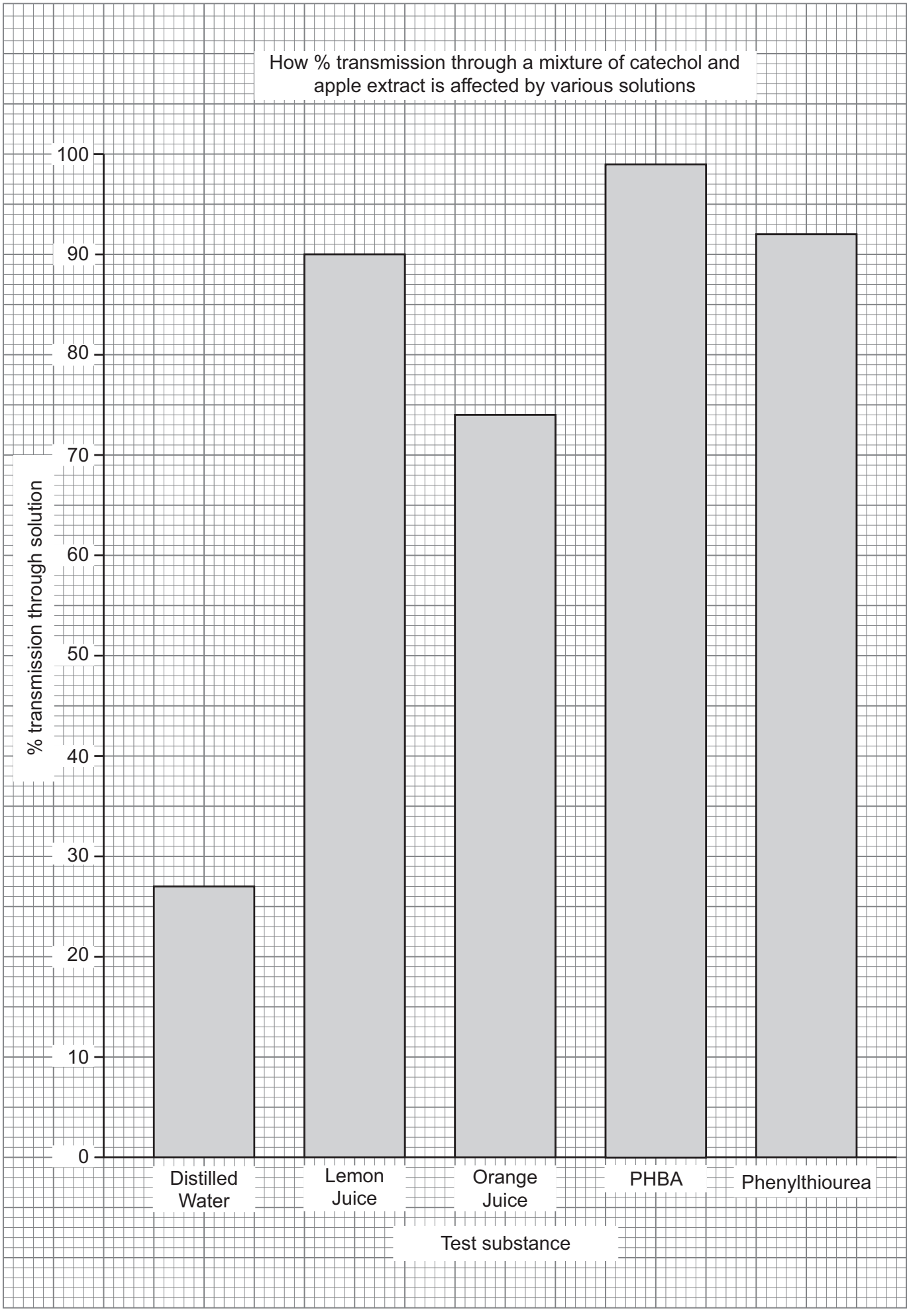
4 **(a)** **(i)** Plasmodesmata; [1]

(ii) There is no net flow of water between cells 2 and 3;
they have equal cell water potentials/both have a cell water potential of –600 kPa;
Insist on the term water potential. [2]

(b) Water moves/diffuses through the phospholipid bi-layer;
small hydrophilic molecules require a (protein) carrier/channel
or
Water moves via aquaporins;
small hydrophilic molecules require a different/specific protein carrier/channel; [2] — 5

					AVAILABLE MARKS
5	**(a)**	**(i)**	A: Vesicle/lysosome; B: RER/rough endoplasmic reticulum/ribosome; C: (mitochondrial) matrix/mitochondrion; D: cristae; [4]		
		(ii)	XY on photograph = 70 mm; 70 × 1000 = 70 000 µm; 70 000 ÷ 2 = 35 000 *[not 35 000 µm]*; [3]		
		(iii)	Large numbers of ribosomes/large amounts of RER; high numbers of vesicles; [2]		
	(b)		Branched/has 1–6 bonds; produces many terminal ends/aids hydrolysis/makes molecule more compact; **or** Large molecule; (insoluble) so exerts no osmotic effect/does not pass through the cell membrane; [2]		11
6	**(a)**		PCR will increase/amplify DNA for analysis; from small amounts of DNA; [2]		
	(b)	**(i)**	Site 2 contains all of the bands/unique bands of the ten-spot ladybird; site 2 has no bands which occur only in/does not contain all the bands of the two-spot ladybird; [2]		
		(ii)	At site 1, harlequin ladybird has not been feeding at all/is cannibalistic/not feeding on the two-spot or ten-spot ladybird; at site 3, harlequin ladybird has been preying on something other than the ten- or two-spot ladybird; [2]		6

				AVAILABLE MARKS
7	(a)	(i)	Replace the measuring cylinder with a pipette/syringe/other appropriate response; [1]	
		(ii)	The solution reflects (transmits) orange light/absorbs blue light/results in a wider/more discriminate range of percentage transmission values; [1]	
	(b)	(i)	Caption (How % transmission/enzyme activity is affected by various substances); label on each axis *(% transmission and test substance)*; independent variable (various substances) on x-axis and appropriate scaling (of y-axis); accurate plotting of bars (bars should not touch); [4]	
		(ii)	There is a lower transmission value with orange juice than lemon juice/ where pH is higher; the enzyme is more active with orange juice/where pH is higher; the higher pH of orange juice causes less denaturation of the enzyme; *Accept converse references for lemon juice* [3]	
	(c)	(i)	Non-competitive inhibition/allosteric inhibition; [1]	
		(ii)	Line rising to become horizontal at a low substrate concentration; [1]	11



AVAILABLE MARKS

8 (a) (i)

	Haemoglobin	Myoglobin
Has a secondary structure	✓	✓
Has a quaternary structure	✓	✗
Is a conjugated protein	✓	✓

[1] for each row correct [3]

(ii) Any two from
- ionic bonds
- hydrogen bonds
- disulphide bonds/bridges
- hydrophobic interactions [2]

(b) (i) Any four from
- add solvent to the chromatography vessel and allow it to saturate the atmosphere
- draw a base line in pencil towards the bottom of the chromatography paper
- add a spot of the amino acid solution to the base line, allow it to dry and re-apply the solution to make a concentrated spot
- lower the paper into the vessel, ensuring the base line is above the level of the solvent
- allow sufficient time for the solvent to rise up the paper but not reach the top/ensure chromatography paper does not touch side of vessel
- remove the paper and mark the solvent front
- handle the paper using gloves/tongs/avoid touching the paper/ touching only sides or top [4]

(ii) Avoid breathing vapour/wear gloves/carry out procedure in a fume cupboard; [1]

(c) Distance moved by spot 3 cm, distance moved by solvent 6 cm;
R_f value 3 ÷ 6 = 0.5 **[consequential to answer above]**;
X corresponds to asparagine **[consequential to R_f value calculated]**; [3]

13

Section A **60**

Section B

AVAILABLE MARKS

9 Any thirteen points

- on the outside, the serosa provides a supportive/protective layer
- inside this is the muscularis externa
- containing both longitudinal and circular muscles
- which are responsible for pendular movements/local constrictions which mix food and enzymes together
- and for peristalsis which moves food along the ileum
- inside this is the submucosa
- which contains blood vessels/lymphatic vessels/connective tissue
- the muscularis mucosa is involved in movement of the villi
- which improves contact between the absorbing surfaces and the digested food
- the mucosa is the innermost layer/in contact with food
- (it is deeply folded into) villi to increase the surface area/nutrient absorption
- in the centre of each villus there is a lacteal into which the fats are absorbed
- and a network of blood capillaries into which monosaccharides/amino acids are absorbed
- (between) the villi are the crypts of Lieberkühn
- where Paneth cells are responsible for producing new epithelial cells/have an anti-microbial function to protect the stem cells at the base of the crypts
- the surface of the villi is covered with columnar epithelium
- epithelial cells have microvilli to increase surface area/absorption
- and mitochondria to provide ATP/energy for active transport
- goblet cells secrete mucus
- which lubricates the ileum/protects the cells from enzyme action [13]

Quality of written communication

2 marks:
The candidate expresses ideas clearly and fluently through well-linked sentences, which present relationships and not merely list features. Points are generally relevant and well-structured. There are few errors of grammar, punctuation and spelling.

1 mark:
The candidate expresses ideas clearly, if not always fluently. The account may stray from the point or may not indicate relationships. There are some errors of grammar, punctuation and spelling.

0 marks:
The candidate produces an account that is of doubtful relevance or obscurely presented with little evidence of linking ideas. Errors in grammar, punctuation and spelling are sufficiently intrusive to disrupt the understanding of the account. [2]

15

Section B **15**

Total **75**