Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE	0653/31
Paper 3 Extended Theory	May/June 2016

MARK SCHEME

Maximum Mark: 80

Published

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International Examinations

[Turn over

1 (a) xylem ;
phloem ;
upwards and downwards ;
transpiration ;   [4]

(b) (i) *parts of cell in their order*
1 cell wall ;
gives the cell shape / support ;
2 (large) vacuole ;
for support / storage of water / sugar / other correct nutrients ;   [4]

(ii) no chloroplasts present ;
ref. to no requirement for photosynthesis ;   [2]

2 (a) (i) gas syringe / measuring cylinder of water inverted over water ;
delivery tube with bung from conical flask to gas syringe / measuring cylinder ;   [2]

(ii) particles become less crowded / less concentrated / fewer particles ;
less frequent collisions / less chance of collision ;   [2]

(b) $2HCl + CaCO_3 \rightarrow (CaCl_2 +) CO_2 + H_2O$
formulae correct ;
balanced dependent on correct formulae ;   [2]

(c) limewater ;
milky / white precipitate ;   [2]

(d) nitric acid ;
sodium carbonate / oxide / hydroxide ;   [2]

3 (a) (i) curved line / not a straight line ;   [1]

(ii) idea that gradient of graph = acceleration /
acceleration = change in speed ÷ 2 (or other suitable) / = 4.25 / 4.3 (m/s^2) ;   [2]

(iii) idea that under graph = distance travelled ;
($\frac{1}{2} \times 2 \times 8.5$) + ($10 \times 8.5$) 93.5 (m) ;   [2]

(b) convex lens drawn across front of camera where rays change direction and
labelled correctly ;   [1]

(c) (i) K.E. = $\frac{1}{2} m v^2$;
$\frac{1}{2} \times 10 \times 8.5 \times 8.5 = 361 / 361.25$ (J) ;   [2]

(ii) no energy is actually lost / destroyed / owtte ;
some energy transformed to thermal (heat) / sound ;   [2]

4　**(a)**　**(i)**　**B** and **C** (in either order) ;　　　　　　　　　　　　　　　　[1]

　　　　　　(ii)　aorta ;　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[1]

　　　　　　(iii)　(high pressure needed) to send blood to the body ;　　　　　　　　[1]

　　　(b)　thick wall ;
　　　　　　to withstand high pressure (of blood) ;
　　　　　　or
　　　　　　elastic fibres in wall ;
　　　　　　to allow recoil / propel blood through the artery ;　　　　　　　　　　　[2]

　　　(c)　**(i)**　to supply oxygen / glucose to the heart <u>muscle</u> ;　　　　　　　　[1]

　　　　　　(ii)　plaque / cholesterol / fatty deposits ;　　　　　　　　　　　　　　　[1]

　　　　　　(iii)　smoking ;
　　　　　　　　fatty diet ;
　　　　　　　　lack of exercise ;　　　　　　　　　　　　　　　　　　　　　　　[max 2]

5　**(a)**　**(i)**　**U** ;

　　　　　　(ii)　**P** ;　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[2]

　　　(b)　**(i)**　**A** / **D** ;　　　　　　　　　　　　　　　　　　　　　　　　　　　　[1]

　　　　　　(ii)　**C** ;
　　　　　　　　(contains a) double bond / unsaturated ;　　　　　　　　　　　　　[2]

　　　　　　(iii)　they are compounds / not (single) elements ;　　　　　　　　　　　[1]

　　　(c)　four shared pairs shown ;　　　　　　　　　　　　　　　　　　　　　　　[1]

　　　(d)　**(i)**　more (fossil) fuels burned / increased numbers of vehicles /
　　　　　　　　references to increasing deforestation / slash and burn / other correct ;　[1]

　　　　　　(ii)　global warming / runaway greenhouse effect / any relevant negative
　　　　　　　　consequence ;　　　　　　　　　　　　　　　　　　　　　　　　　[1]

6　**(a)**　mass ;
　　　　　density ;　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[2]

　　　(b)　thermometer scale goes below the freezing point of water / 0 °C / goes down to
　　　　　negative values ;　　　　　　　　　　　　　　　　　　　　　　　　　　　[1]

(c) (i) infrared ;
adjacent to microwaves ; [2]

(ii) all e/m waves/radiations travel at same speed (in a vacuum) ; [1]

(iii) paint bulb black/focus or reflect radiation onto bulb ; *owtte* [1]

7 (a) ideas of:
food chain **A** has two trophic levels/**B** has three ;
energy is always lost between trophic levels ; [2]

(b) less energy needed/reduces energy wasted ;
by respiration ;
by movement ;
by maintaining body temperature ; [max 2]

(c) (i) run off from rain/accidental spillage ; [1]

(ii) (surface plants/named example) grow rapidly/reference to algal bloom ;
(plants lower in lake/named example) die ;
due to lack of light/inability to photosynthesise ; [3]

8 (a) (i) 2, 8, 1 ; [1]

(ii) (any) oil/paraffin ;
Rb is very reactive/prevents reaction with oxygen/water ; [2]

(iii) rubidium/Rb and chlorine/Cl_2 ; [1]

(b) (i) temperature increase ; [1]

(ii) +1/Li^+ ;
–2/O^{2-} ;
electron(s) transfer/lost from lithium (atoms) to oxygen (atoms) ; [3]

9 (a) (i) variable resistor/resistance/rheostat ; [1]

(ii) to change the current in/p.d. across the lamp/owtte ;
to change the resistance in the (main) circuit ;
(in any order) [2]

(b)
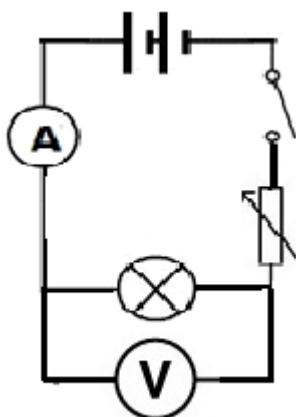
voltmeter correctly connected in parallel with lamp only ;
other components all in series ;
[accept equivalent circuits, variable resistor in any position other than in parallel
with voltmeter] [2]

(c) (i) $(R =)\ V/I$;
= 6 / 3 = 2 (Ω) ; [2]

(ii) R increases with p.d. / current ;
description of non-uniform increase ; [2]

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