



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCES

0653/21

Paper 2 Core Theory

May/June 2016

MARK SCHEME

Maximum Mark: 80

Published

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This document consists of **6** printed pages.

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

(b) (i) E cytoplasm; [2]
 F cell wall;

(ii) no chloroplasts (present)/no chlorophyll; [1]

(iii) iodine solution; [2]
 starch grains turn blue/black;

(c) one mark for each correct row;;; [4]

disc	starch present yes(✓) or no(X)	explanation
P	✓	light and chlorophyll are both present
Q	X	no <u>chlorophyll</u> is present
R	X	no <u>light</u> is present
S	X	no light / chlorophyll are present

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

(ii) limewater; [2]
 (turns) milky;

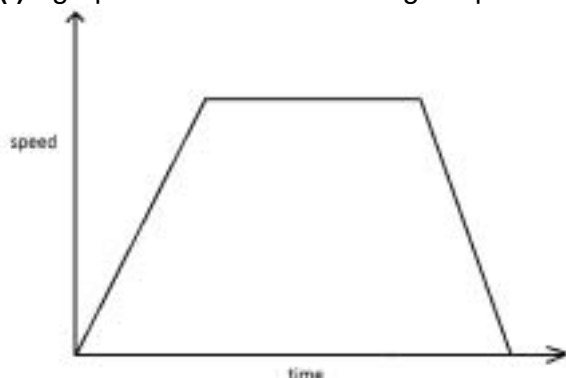
(iii) decreases / goes more slowly / slower; [1]

(b) LHS: hydrochloric acid + calcium carbonate; [2]
 RHS: carbon dioxide + water;

(c) sodium nitrate; [1]

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3 (a) (i) graph drawn of the following shape [2]



horizontal section (must be straight line, constant speed);
steep line (straight or curved) at start (initial acceleration) **and** final line (straight or curved) to zero (need not be steep);

(ii) **P** placed to label the horizontal section; [1]

(iii) **R** placed to label either sloping sections; [1]

(b) average speed (= distance/time) = $100/9.8 = 10.2$ (m/s);
(mark given for $100/9.8$ or for 10.2) [1]

(c) (i) two rays converging to a point on light sensor; [1]

(ii) 15 cm (unit required); [1]

(d) electrical; [2]
kinetic;

4 (a) (i) B and C; [1]

(ii) correctly labelled [2]
left;
atrium;

(iii) keeps oxygenated blood separate from deoxygenated blood / stops the blood mixing [1]
between the two sides of the heart;

(b) diagram **E** (no mark) [1]
has a thick(er) wall;

(c) (i) $18690/105$; [2]
 $= 178$;

(ii) breathing more deeply; [2]
breathing more quickly;

5 (a)

[3]

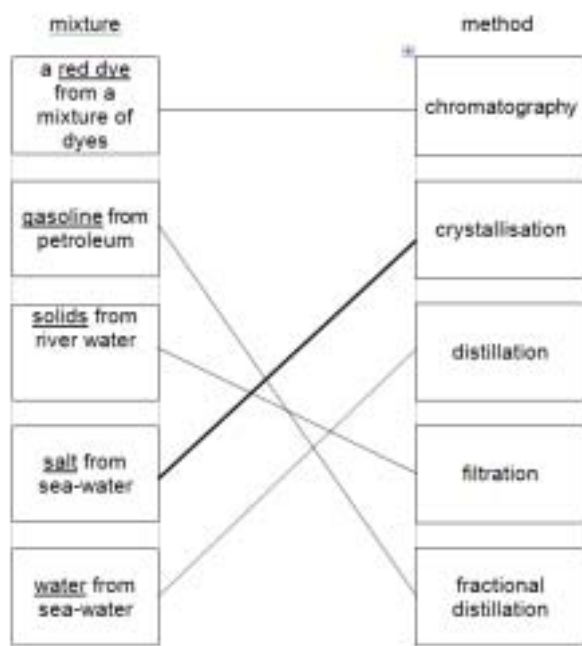


Fig. x.1

4 correct (3 marks) ;;;
 2 or 3 correct (2 marks)
 1 correct (1 mark)

(b) 26; [2]
 30;

(c) (i) ionic; [2]
 covalent;

(ii) exothermic; [1]

(d) (i) oxidised *and* (iron) gains oxygen/loses electrons; [1]

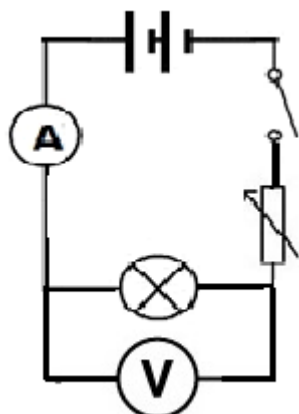
(ii) water/water vapour/steam; [1]

(iii) paint/oil/grease/zinc plate/galvanise; [2]
 barrier (to oxygen/water);
 (accept explanation of sacrificial protection)

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- 6 (a) ...mass; [3]
 ...volume;
 ...density; (in that order)
- (b) thermometer scale goes down to -20° / water is not a liquid / will be frozen at this temperature; [1]
- (c) (i) convection; [1]
 (ii) glass is a poor / bad conductor; [1]
- (d) random / not regular arrangement; *owtte* [Max2]
 most of the molecules are touching; *owtte*
- 7 (a) oxygen level decreased; [Max 2]
 due to bacteria / micro-organisms;
 used for respiration;
- (b) may have died / swum away; [2]
 due to lack of oxygen / toxins / foul water / disease-causing organisms;
- (c) idea of [1]
 may contain pathogenic organisms / toxins / poisons / chemical waste;
- 8 (a) carbon dioxide; [1]
- (b) (i) fossil (fuel); [1]
 (ii) methane; [1]
- (c) (i) compound / molecule / containing carbon and hydrogen; [2]
 only;
- (ii) double bond shown between the two carbon atoms; [2]
 correct number and positioning of hydrogen atoms;

- 9 (a) (i) variable resistor / accept variable resistance / rheostat; [1]
(ii) [2]



correct symbol for voltmeter;
voltmeter correctly connected in parallel with lamp;

- (b) correct reading of current 4A; [2]
resistance = $12/4 = 3 \text{ } (\Omega)$;

- (c) electrons; [1]

- (d) (i) [2]

gamma radiation		ultra-violet	visible light	infrared		radio waves
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visible light in correct box;
infrared in correct box;

- (ii) gamma (waves / radiation); [1]