



COMBINED SCIENCES

0653/21

Paper 2 Core Theory

May/June 2016

MARK SCHEME

Maximum Mark: 80

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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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;

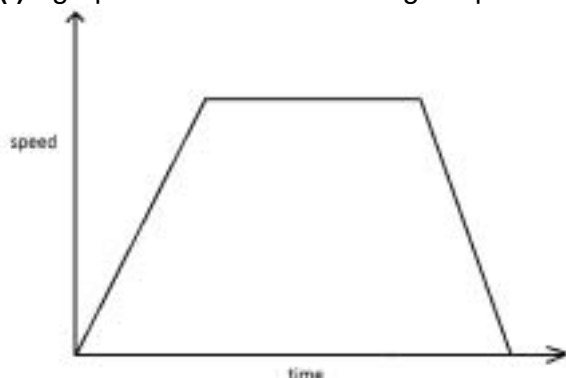
(iii) decreases / goes more slowly / slower; [1]

(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
between the two sides of the heart; [1]

- (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]

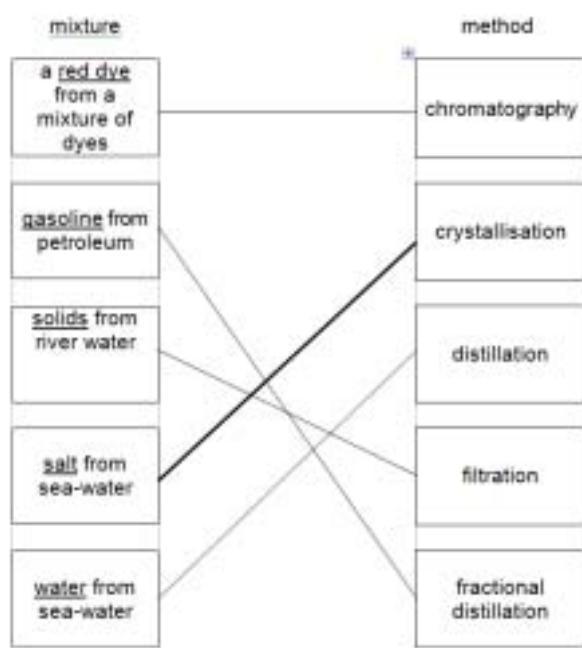


Fig. x.1

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]

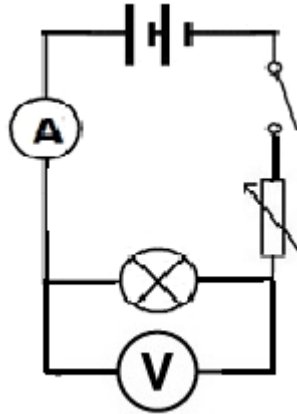
(ii) water/water vapour/steam; [1]

(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]