



**Cambridge International Examinations**  
Cambridge Ordinary Level

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**COMBINED SCIENCES**

**5129/21**

Paper 2 Theory

**May/June 2016**

MARK SCHEME

Maximum Mark: 100

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**Published**

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- 1 (a) **A** = cell wall ;  
**B** = vacuole ;  
**C** = chloroplast ; [3]
- (b) difference : no chloroplasts / chlorophyll present ;  
reason : cell receives no light ;
- difference : shape ;  
reason : more water absorption ; [4]
- 2 (a) **A** ; [1]
- (b) **D** ; [1]
- 3 (a) chemical ;  
gravitational potential / GPE ;  
kinetic ; [3]
- (b) (i) 800 (W) ; [1]
- (ii) 18 (m) ; [1]
- 4 (a) **T** ; [1]
- (b) only one spot / colour (in chromatogram) ; [1]
- (c) (i) it does not dissolve / is insoluble ; [1]
- (ii) **R** ; [1]
- 5 (a) (i) 4000 (kg per hectare) ; [1]
- (ii) more fertiliser added, the greater the yield ;  
effect becomes less pronounced as more is added ; [2]
- (b) any **one** from
- temperature
  - (amount of) light
  - carbon dioxide (concentration) ; [1]

| Page 3 | Mark Scheme                       | Syllabus | Paper |
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6 (a) 23.7 ; allow 23.67 [1]

(b) radiation ;  
conduction ; [2]

(c) any **one** from  
 • black absorbs heat  
 • shiny reflects heat ; [1]

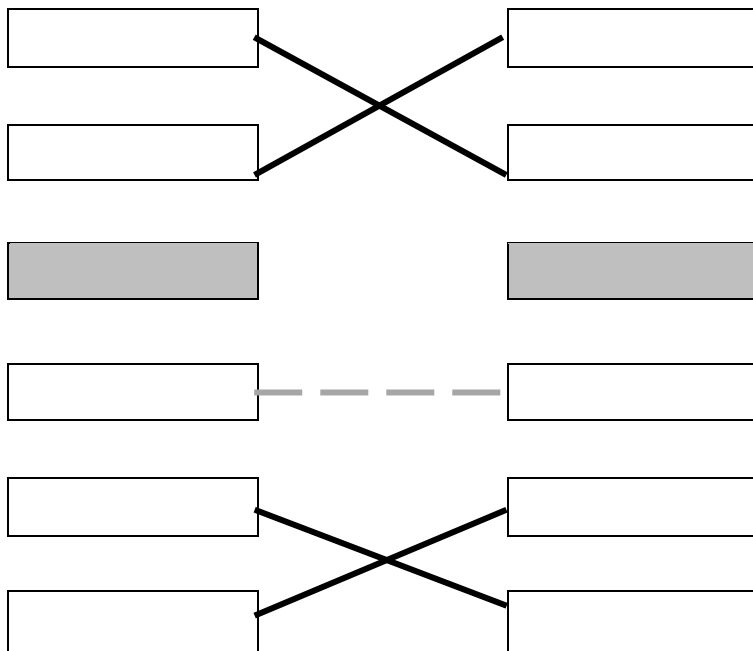
7 (a) 402 ; 32 ;  
10.05 ; [3]

(b) glowing splint ;  
relights ; [2]

(c) any **one** from  
 • making steel  
 • welding ; [1]

(d) (s) (l) (g) [1]

8



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[5]

| Page 4 | Mark Scheme                       | Syllabus | Paper |
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- 9 (a) line parallel to incident ray from the block ; [1]
- (b)  $1.5 = \sin i / \sin r$  ;  
 $r = 32.6$  ; [2]  
allow  $\sin r = \sin 54 / 1.5$   
allow 33
- 10 (a) (i) 9 ; [1]  
(ii) 19 ; [1]
- (b) 2, 7 (drawn on shells) ; [1]
- (c) (i) halogens ; [1]  
(ii) decreases ; [1]
- 11 (a) (i) any **three** from  
• water  
• light  
• temperature  
• oxygen ;;; [3]
- (ii) **E** ;  
**G** ; [2]
- (b) any **three** from  
• starch stored in seed / cotyledon  
• starch broken down  
• (amylase) starch to glucose / maltose  
• glucose / maltose soluble  
• (glucose used in) respiration  
• energy used for growth (during germination) ;;; [3]
- 12 (a) 30 ; [1]
- (b) (i) 1.5 ;  
Volts / V ; [2]
- (ii) 20(C) ; [1]

| Page 5 | Mark Scheme                       | Syllabus | Paper |
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- (c) any **two** from
- current is the same
  - more work done (by the charge against higher resistance)
  - resistance proportional to potential difference
  - **R** has the highest resistance ;;
- [2]

- 13 (a) **A** = oxidation ;  
**B** = polymerisation ;  
**C** = steam / water ;
- [3]

- (b) speed up the reaction
- [1]

- (c)
- $$\left[ \text{CH}_2 - \text{CH}_2 \right]_n$$
- ;;
- [2]
- CH<sub>2</sub> chain open ended  
 bracket showing multiple units

- 14 (a) stronger magnet ;  
more coils ;  
louder sound ;
- [3]
- answers must be **comparative**

- (b) (i)  $v = f\lambda$  ;  
 5.5 (m) ;
- [2]

allow  $\lambda = v/f$  **or**  $\lambda = 330/60$

- (ii) at least two waves drawn with  
 same frequency / equal time period ;  
 same amplitude ;
- [2]
- ignore extra waves  
 less than two waves max 1

- 15 bacteria ;  
 acid ;  
 enamel ;
- [3]

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- 16 (a) 2 H<sub>2</sub> ; both required [1]
- (b) (rocket) fuel ;  
making margarine ; [2]
- (c) evaporate to smaller volume ;  
cool / (allow to) crystallise ; [2]  
  
crystallisation alone is insufficient
- (d) any **two** from  
  - conducts electricity
  - conducts heat
  - malleable
  - ductile
  - high melting point / high boiling point
  - high density ;;
[2]
- 17 E ;  
C ;  
D ; [3]
- 18 (a) any **one** from  
  - like poles repel (allow repulsion)
  - align north-south when freely suspended
  - made from iron / steel (allow nickel / cobalt) ;;
[1]
- (b) any **one** from  
  - induced magnetism
  - steel bar has become magnetised / a magnet ;
[1]
- (c) any **one** from  
  - will not attract
  - loses magnetism more quickly ;
[1]
- 19 (a) the air ;  
(cracking) hydrocarbons ; allow water / petroleum (crude oil) / named hydrocarbon [2]
- (b) iron ; allow Fe [1]
- (c) (i) hydroxide ; allow OH<sup>-</sup> [1]  
(ii) sulfuric acid ; allow H<sub>2</sub>SO<sub>4</sub> [1]

| Page 7 | Mark Scheme                       | Syllabus | Paper |
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- 20** any **three** from
- nerve/brain damage
  - mental disorders (e.g. depression/ manias/ phobias)
  - pancreatitis/ damage to pancreas
  - liver damage/ cirrhosis
  - (Increased risk of) cancer
  - (increase risk of) heart disease
  - hypertension/ high blood pressure
  - strokes ;;;
- [3]**
- 21 (a)** 71 ;
- [1]**
- (b) (i)** beta ; allow electron
- [1]**
- (ii)** a neutron becomes a proton ;  
allow number of protons increases by 1 and number of neutrons decreases by 1
- [1]**