CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2012 series

0653 COMBINED SCIENCE

0653/31 Paper 3 (Extended Theory), maximum raw mark 80

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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2012 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

CAMBRIDGE
International Examinations

1 **(a)**

statement given	*word required*
a complete loop of conductors	circuit ;
a particle with an negative electrical charge	electron ;
measures potential difference	voltmeter ;
unit of power	watt ;

(all correct for 2 marks, 2 or 3 correct for 1 mark) [max 2]

(b) **(i)** (goes out)
incomplete circuit ; [1]

(ii) so that they can be individually turned on and off ;
so that they all get the full mains voltage ;
so that if one fails the rest still operate ; [max 2]

(iii) $1/\mathbf{R} = 1/\mathbf{R_1} + 1/\mathbf{R_2}$;
$= 1/1.2 + 1/1.2$;
$\mathbf{R} = 0.6\,\Omega$; [3]

[Total: 8]

2 **(a)** **(i)** **A** ;
B, **E**, **F** ; (all required) [2]

(ii) starch / cellulose / sugar / any other correct ; [1]

(b) feed on dead (plant or animal) material / waste products (from plants or animals) ;
use carbon-containing substances / sugar ;
for respiration ;
return carbon dioxide to the air ;
[max 2]

(c) **(i)** idea that the graph shows a maximum ;
(the maximum occurs) at 480 ± 20 Hz ;
idea of steeper decrease than increase ; [2]

(ii) crawl out of soil when they hear vibrations (of 500 Hz) ;
where moles cannot catch them ; [2]

[Total: 9]

3 **(a)** **(i)** 7 ;
> 7 up to 14 ;
< 7 down to 1 ; [2]

(ii) meter is more accurate / precise / reference to quantitative ; [1]

(iii) add (acidified) silver nitrate / ethanoate (solution) ;
white precipitate / solid indicates hydrochloric acid / chloride (ions) ; [2]

(b) (i) magnesium + copper oxide ⟶ magnesium oxide + copper ; [1]

(ii) (no reaction)
G reacts with copper oxide ;
G more reactive than copper ;
so copper cannot remove oxygen from oxide of **G** / owtte ; [max 2]

[Total: 8]

4 (a) mass = 60 kg so weight is 600 N ;
(work done =) force × distance / (P.E. gained =) gravitational field strength × height ;
= 600 × 1.3 = 780 J ; [3]

(b) 780 (J) ; [1]

(c) power = work/time ;
780/0.5 = 1560 W ; [2]

[Total: 6]

5 (a) (i) $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$;;
(left hand side and right hand side) [2]

(ii) carbon dioxide would not be absorbed ;
volume of carbon dioxide produced = volume of oxygen used ;
so no change in volume ; [max 2]

(b) (i) as a control / to check that movement was caused by germinating / living seeds ; [1]

(ii) increased rate of respiration with increased temperature / positive correlation ;
10 °C rise doubles rate ;
use of data linking distance moved and rate of respiration ; [max 2]

(iii) no movement ;
enzymes do not work at high temperatures / enzymes denatured ; [2]

[Total: 9]

6 **(a)** reference to high rate / fast reaction ;
powder has high surface area ;
high surface area (of solids) increases rate / ref. to collision frequency ; [max 2]

(b) **(i)** electrons transferred from aluminium (atoms) to oxygen (atoms) ;
reference to filled outer shells ;
reference to formation of positive and negative ions ;
correct detail i.e. aluminium ions positive and oxide ions negative ;
strong (force of) attraction between ions ; [max 4]

(ii) (not balanced)
balanced requires same number of each type of atom on both sides ;
reference to the oxygen imbalance ;
correct detail about oxygen imbalance / correctly balances equation ; [max 2]

(c) (components in) firework mixture must burn / require oxygen to burn / need to be oxidised ;
potassium perchlorate produces oxygen (when heated) ;
idea that oxygen needs to be produced in situ / air cannot easily get into firework mixture ; [max 2]

[Total: 10]

7 **(a)** amplitude labelled ;
wavelength labelled ;
correct dimensions for both ; [3]

(b) **(i)** **A** is louder than **B** ; [1]

(ii) **X** has higher pitch ; [1]

(iii) $\frac{\text{speed of sound}}{\text{m/s}}$, therefore

vacuum	0 ;
solid	5000 ;
liquid	1500 ;
gas	330 ;

[max 2]
(all correct for 2 marks, 2 or 3 correct for 1 mark)

(iv) *compression*
region of high pressure / lots of (air) particles / particles closer ;
rarefaction
region of low pressure / fewer (air) particles / particles more spaced ; [2]

(c) radiation ;
(only) radiation can travel through vacuum / conduction and convection need medium ; [2]

(d) ray continued as series of straight lines ;
angles approx correct ; [2]

[Total: 13]

8 (a) (i) **A** carries, sperm / semen ;
B produces fluid, for sperm to swim in / containing sugar / secretes seminal fluid ;
C carries, sperm / semen and urine ; [3]

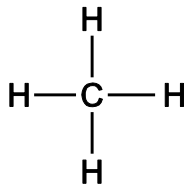
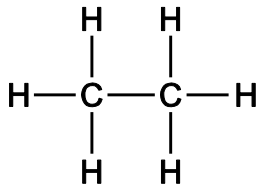
(ii) label to testis ; [1]

(b) smaller ;
produced in larger quantities ;
more mobile ;
have a tail / pointed head / streamlined ; [max 2]

(c) virus destroys / attacks white blood cells ;
reference to (T) lymphocytes / T cells ;
reduces ability to, destroy viruses / fight infection ; [max 2]

[Total: 8]

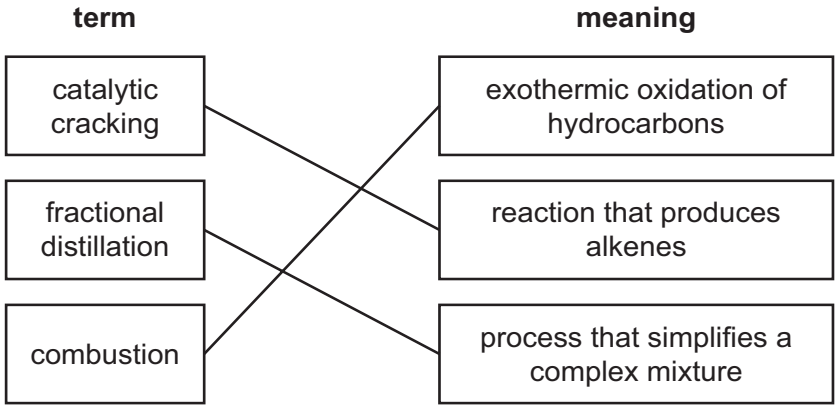
9 (a) (i)

methane	ethane
	

[2]

(ii) bottled gas ;
heating ;
cooking ; [max 1]

(b)



(all correct for 2 marks, 1 correct for 1 mark) [2]

(c) **(i)** decane reacted / decomposed / cracked ;
products include alkenes / ethene / unsaturation ;
alkenes react with bromine / decolorise bromine ; [3]

(ii) makes catalyst more efficient / work better / increases reaction rate ; [1]

[Total: 9]