CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 series

0653 COMBINED SCIENCE

0653/33 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 May/June 2015 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

CAMBRIDGE
International Examinations

1 (a) (i) shared pair of electrons ;
hydrogen atoms labelled and no other electrons ; [2]

(ii) ref. to the sharing of electrons / the idea that nuclei attracted to the electrons / opposite charges attract ; [1]

(iii) $2H_2 + O_2 \rightarrow 2H_2O$
formulae ; balanced ; [2]

(iv) chemical (potential) to heat / thermal ; [1]

(b) full outer electron shell ;
so, unreactive (with oxygen) / not flammable ; [2]

2 (a) (i) label line and letter **C** showing the nucleus ;
label line and letter **R** showing the cytoplasm ; [2]

(ii) O_2 and H_2O in correct places ;
equation correctly balanced ; [2]

(b) (i) (830 + 670 =) 1500 kJ ; [1]

(ii) cycling and swimming ;
needs 1680 kJ / greater amount of energy needed ; [2]

(iii) carry more oxygen / oxygen more quickly (to muscle cells) ;
carry more glucose / glucose more quickly (to muscle cells) ;
reference to respiration / energy release (in muscle cells) ;
carry more carbon dioxide / carbon dioxide more quickly (from muscle cells) ; [max 2]

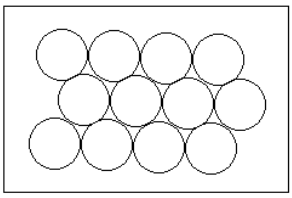
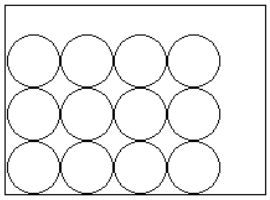
(iv) activities may be done at a faster / slower rate ;
avp ; [1]

3 (a) **A** to **B**: accelerating / going faster ;
B to **C**: constant speed ; [2]

(b) ½ × base × height / ½ × 10 × 25 ;
(squares counted allowed)
= 125 (m) ; [2]

(c) (acceleration =) change in speed ÷ time ;
= − 25 / 10 = − 2.5 (accept 2.5) ;
m/s^2 ; [3]

(d)

 or 

(at least 12 circles in total with approximately uniform diameter)
diagram must show a regular arrangement ;
most circles touching ; [2]

4 (a) (i) named indicator / pH meter ;
correct colour change / pH value <7 ; [2]

(ii) calcium chloride ;
water ; [2]

(b) (i) rate increases ; [1]

(ii) reference to particles moving (not vibrating) faster / gaining kinetic energy ;
rate of collision / collision frequency increases ;
the chance of reaction / reactive collisions is increased ; [max 2]
(allow correct reference to increased energy of collision)

(c) (i) (increasing) combustion of fossil fuels / named fossil fuel ; [1]

(ii) global warming / <u>increased</u> greenhouse effect /
consequence of global warming described e.g. rising sea level /
climate change / examples of extreme weather events ; [1]

5 (a) (i) arrow tail shown on any anther ;
arrow head on any stigma on the other flower ; [2]
(allow 1 if the arrow links the correct structures but in reverse)

(ii) anthers hanging outside the flower ;
stigma hanging outside the floret / flower ;
stigma feathery / has large surface area ; [max 2]

(b) (i) germination took place in dish 1 and did not take place in dish 3
(because it was too cold in dish 3) ; [1]

(ii) germination took place in dish 1 but not dish 4 ; [1]
(because it was too acidic in dish 4)

(iii) oxygen ; [1]

(iv) enzymes do not work / are not active ;
acidity too high / pH too low ;
ref. to denaturation / active site destroyed / shape of molecule changed ; [max 2]

6 **(a)** **(i)** harp ; [1]

(ii) harp ; [1]

(b) frequency below the lower limit of hearing / owtte ; [1]

(c) (λ =) v/f ;
(λ =) 330 ÷ 1000 = 0.33 (m) ; [2]

(d)

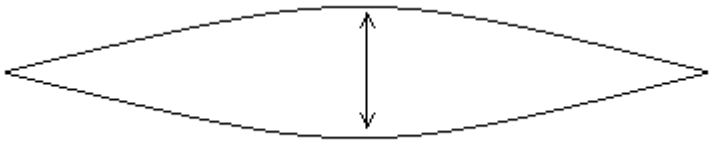


diagram illustrates a string vibrating after being plucked ;
vibrating string collides with air molecules / implication that sound / the wave requires a medium to travel ;
producing compressions and rarefactions in air / longitudinal waves / pressure waves ; [3]

7 **(a)** **(i)** high temperature ;
catalyst ;
high pressure ; [max 2]

(ii) molecules of **X** and **Y** are smaller than molecules of **D** / ora ; [1]

(iii) **X** has no effect on bromine solution and **Y** decolourises bromine solution ; [1]

(b) two Cs in each ;
single C-C bond in ethane and double C=C bond in ethene ;
all else correct ; [3]

(c) **(i)** opposite charges attract / the ions are negative / have the opposite charge ; [1]

(ii) electrons move from bromide ions to the anode ; [1]
(allow bromide ions are oxidised)

8 **(a)** **(i)** 400 / 21 000 × 100 = 1.9 ;
100 – 1.9 = 98.1 ; [2]

(ii) traps / captures light energy ;
converts it to chemical energy / enables formation of glucose / starch / cellulose / other correct biological substance ; [2]

(b) **(i)** excretion / urine ;
faeces ;
not all parts of grass digested / absorbed ; [max 2]

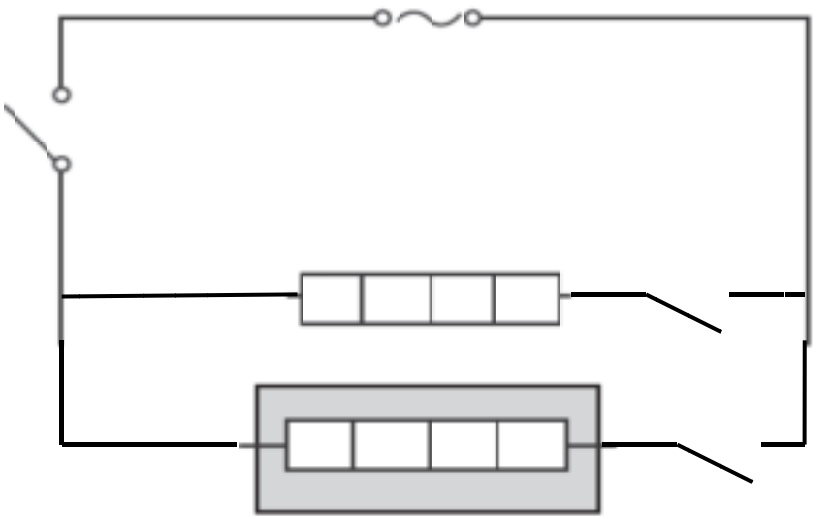
(ii) break down dead zebra / waste materials from zebra ;
which releases chemicals ;
example of recycled chemical substance ; [max 2]

9 **(a)** **(i)** convection ; [1]

(ii) warm air rises ;
warm air is less dense ; [2]
(ora)

(iii) description of thermal insulation / lagging ; [1]

(b)



switches in both heater branches (can be either side of heater) ;
rest of circuit completed properly ; [2]

(c) **(i)** (p.d. =) current × resistance / I × R ;
= 30 × 8 = 240 ;
V ; [3]

(ii) (power =) 4 × 240 = 960 (W) ; (allow e.c.f. from **(c)(i)**) [1]