

CAMBRIDGE INTERNATIONAL EXAMINATIONS**Cambridge International General Certificate of Secondary Education****MARK SCHEME for the October/November 2015 series****0653 COMBINED SCIENCE****0653/22**

Paper 2 (Core Theory), maximum raw mark 80

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1 (a) (i) *force X* = friction (force) ;
force Y = weight ; [2]

(ii) 750 N ;
 for constant speed, forces must be balanced / owtte ; [2]

(b) (i) (30–90 s) constant speed ;
 (90–120 s) (negative) acceleration / deceleration ; [2]

(ii) $20 \text{ m/s} = 20 \times 3600 \text{ m/h}$;
 $= 72000 \text{ m/h} = 72 \text{ (km/h)}$; [2]

[Total: 8]

2 (a) (i) fractional distillation ; [1]

(ii) because new substances are not made ; [1]

(b) (i) petroleum fraction boils and vapour moves into delivery tube ;
 vapour condenses in delivery tube ; [2]

(ii) increasing boiling point from **A** to **D** ; [1]

(c) (hydrocarbon) + oxygen ;
 water + carbon dioxide ; [2]

[Total: 7]

3 (a)

chemical		description
fats		can be joined together to make starch or glycogen
glycogen		turns purple with the biuret test
protein		made from fatty acids and glycerol
sugars		storage carbohydrate not found in plants

(3 correct for 2 marks, 2 or 1 correct for 1 mark)

;;

[2]

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(b) (i) respiration ; [1]

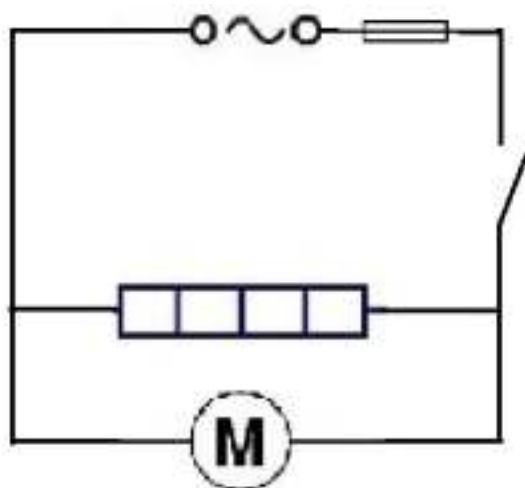
(ii) (milk **A**) it contains the highest total of fat, carbohydrate and protein ;
(athlete) would need most energy / it releases most energy ;
for (contraction of) muscles ; [max 2]

(iii) $\frac{900}{129}$ (= 6.97(8)) ;
 $\times 100 = 697.6$ **or** 698 (cm³) ; [2]

(iv) pregnant women ;
extra calcium needed for bones of fetus ;
AVP e.g. osteoporosis in older women ; [max 2]

[Total: 9]

4 (a)



complete circuit with no 'dead ends' or short circuits ;
on-off switch in main circuit using correct symbol ;
fuse in main circuit using correct symbol ; [3]

(b) (i) X marked in the heater branch, either side of heater ; [1]

(ii) heated ;
bend ;
broken ; [3]

(iii) in the air coming into the heater (owtte) ;
senses / switches off when air temperature in room is too high / so it can check room temperature ; [2]

[Total: 9]

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5 (a) (i) bubbles (gently)/owtte ; [1]

(ii) zinc is above hydrogen in the reactivity series ;
 zinc is below calcium in the reactivity series ;
 zinc is above copper in the reactivity series ; [max 2]

(b) (i) Increases ; [1]

(ii) *any two from:*
 melts ;
 moves / floats ;
 bubbles ;
 dissolves / disappears ;
and
 more vigorous / flame / explodes ; [3]

[Total: 7]

6 (a) (i) identical (with female adult aphid) ; [1]

(ii) (the genetic information) will be identical ; [1]

(iii) (the genetic information is) different from the adult female ;
 (the genetic information is) different from each other ; [2]

(b) (i) phloem ;
 because it transports dissolved food substances around the plant ; [2]

(ii) one area of phloem correctly shaded ; [1]

(c) (i) (carbon dioxide) + water → (sugar) + oxygen ; [1]

(ii) enough light ;
 (source of) carbon dioxide ; [2]

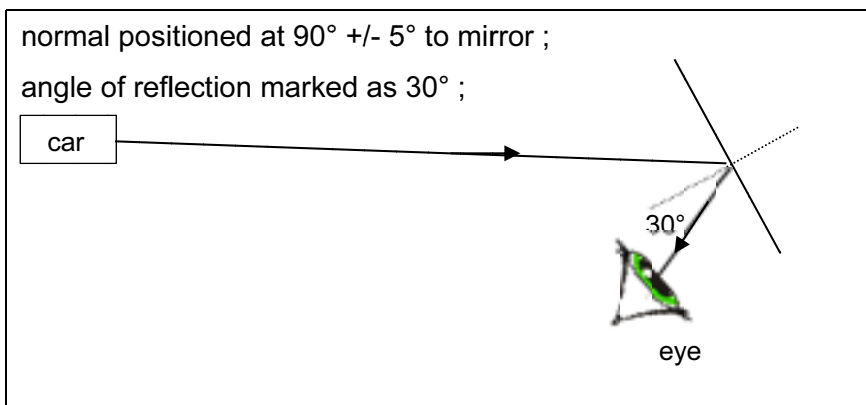
(d) (i) the starch / blue-black colour is only found in the green areas ; [1]

(ii) because chlorophyll is needed for photosynthesis ;
 green areas contain chlorophyll ;
 starch is produced in the green areas ; [max 1]

[Total: 12]

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7 (a) (i)



[2]

(ii) image in a (plane) mirror is laterally inverted ;

[1]

(b) microwaves ;

[1]

(c) (i) labelled arrow to show amplitude correctly and clearly from x-axis to peak ;

[1]

(ii) loudness / volume ;

[1]

(d) distance travelled by sound = $330 \times 2 = 660$ (m) ;
 distance from building = $660 \times \frac{1}{2} = 330$ (m) ;

[2]

(e) by friction – (feet on carpet) ;
 discharge to Earth (when touches door handle) causes shock ;

[2]

[Total: 10]

8 (a) neutrons / protons *and* protons / neutrons *have the same mass, but* electrons *have much smaller mass.* ;
 electrons / protons *and* protons / electrons *have opposite charges but* neutrons *have no charge.* ;

[2]

(b) (i) (17)
 number of electrons = number of protons / atom is has no overall charge ;

[1]

(ii) (18)
 nucleon no. = proton no. + neutron no. ;

[1]

(iii) (non-metals are) on right-hand side of Periodic Table ;

[1]

(c) (i) shared electrons ;

[1]

(ii) bond between two non-metals ;

[1]

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(d) (i) green ; [1]

(ii) 7 to any less than 4 ; [1]

(e) (i) (a) salt ; [1]

(ii) carbon dioxide ;
limewater ;
milky / cloudy ; [3]

[Total: 10]

9 (a) (i) a chart/diagram showing the flow of energy ;
from organism to organism ; [2]

(ii) badger connected to all three organisms ;
arrows point in the correct direction ; [2]

(b) use an alternative source of food ;
move to a different habitat ; [1]

[Total: 5]