

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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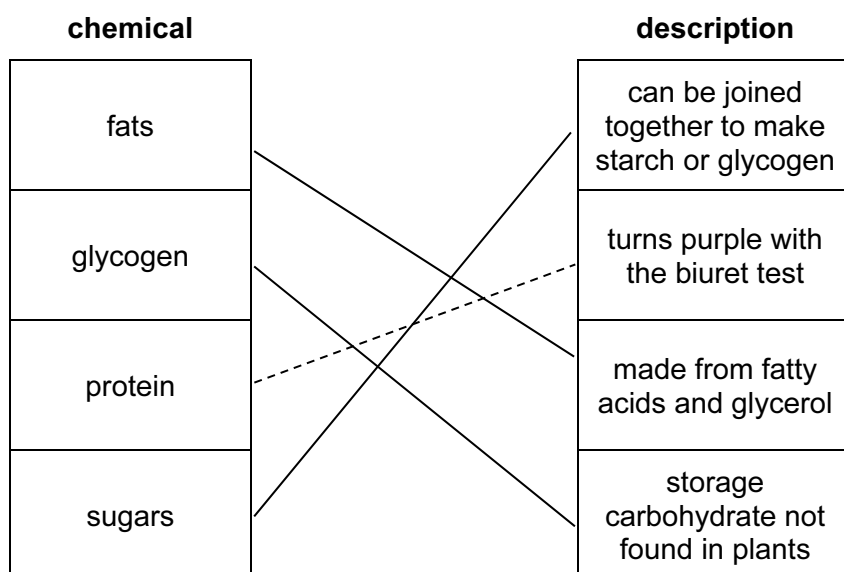
- 1 (a) (i) force X = friction (force) ;
force Y = weight ; [2]
- (ii) 750 N ;
for constant speed, forces must be balanced / owtte ; [2]
- (b) (i) (30–90 s) constant speed ;
(90–120 s) (negative) acceleration / deceleration ; [2]
- (ii) $20 \text{ m/s} = 20 \times 3600 \text{ m/h}$;
 $= 72000 \text{ m/h} = 72 \text{ (km/h)}$; [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)



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

;;

[2]

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(b) (i) respiration ; [1]

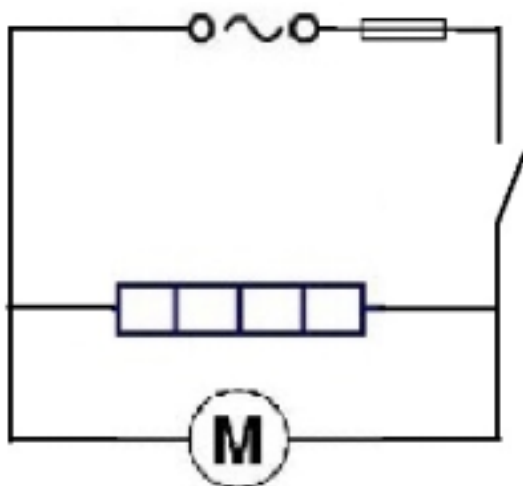
(ii) (milk **A**) it contains the highest total of fat, carbohydrate and protein ;
 (athlete) would need most energy / it releases most energy ;
 for (contraction of) muscles ; [max 2]

(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]

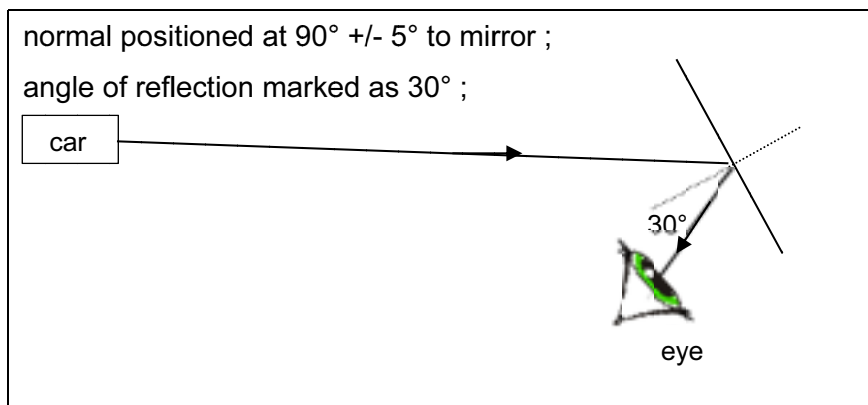
[Total: 9]

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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]