

MARK SCHEME for the May/June 2009 question paper
for the guidance of teachers

0653 COMBINED SCIENCE

0653/03

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.

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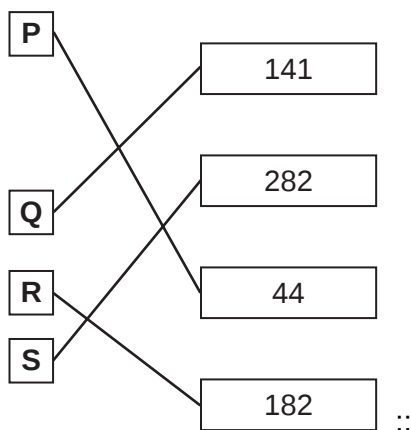
- 1** (a) **A** to liver ;
- B** to small intestine ;
- C** to stomach/small intestine ; [3]
- (b) breaks down/digests, fats/lipids ;
to fatty acids and glycerol ;
so that they can be absorbed ; [max 2]
- (c) (i) high, (blood) sugar/glucose ; [1]
- (ii) makes it absorb glucose/change glucose to glycogen/store glucose/store glycogen ; [1]
- (d) (i) plasma ; [1]
- (ii) vein has valves ;
to prevent backflow of blood ;
- artery has, thicker/more muscular/more elastic, wall ;
ref. to high pressure of blood ;
- vein has larger lumen ;
allows easier flow ; [max 2]
- [Total: 10]**
- 2** (a) (i) (speed =) distance/time ;
= $900/150 = 6 \text{ km/h}$; [2]
- (ii) 1.39 or 1.4 ; [1]
- (b) (force =) mass x acceleration ;
= $8\,000 \times 0.1 = 800 \text{ N}$; [2]
- (c) density = mass/volume or (mass =) density x volume ;
mass = $800 \times 9 = 7200 \text{ kg}$; [2]
- [Total: 7]**

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- 3** (a) chlorine ;
copper ;
neon ; [3]
- (b) (i) sodium atom: 11 electrons arranged 2.8.1 ;
oxygen atom: 8 electrons arranged 2.6 ; [2]
- (ii) 1 more proton than electron/11p and 10e ;
(other wordings possible but reject because it has lost an electron) [1]
- (c) (i) hydrogen + oxygen → water ; [reject formulae] [1]
- (ii) reference to exothermic reaction/it melts ;
gas produced (allow hydrogen)/fizzes/bubbles ;
metal, dissolves/disappears ;
floats ; [max 2]
- [Total: 9]**
- 4** (a) (i) anther/stamen ; [1]
- (ii) male gametes/male nuclei/male sex cells ; [ignore sperm] [1]
- (b) (i) the higher the temperature, the more oxygen is used ; [1]
- (ii) respiration ;
(respiration is) aerobic/using oxygen ;
(using oxygen) to produce heat ; [not to produce 'energy']
by breaking down glucose ; [max 2]
- (c) (i) infrared ;
light ; [2]
- (ii) travel at same speed/transverse waves/can travel through vacuum ; [1]
- (d) cell approx. rectangular in shape, with cell wall around the outside and vacuole inside ;
cell membrane labelled immediately inside the cell wall ;
nucleus shown and labelled in cytoplasm ;
chloroplasts shown and labelled in cytoplasm ; [4]
- [Total: 12]**

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5 (a) (i)



(4 correct 1 mark)

[1]

(ii) 4 carbons ;
suitable working ;

[2]

(b) (i) heated ;
vaporised ; ['boiled' gets mp 1 and 2]
contacted with/passed over a catalyst ;

[2]

(ii) **M** and **O** ;
these are alkenes/contain double bonds/are unsaturated ;
(bromine changes) from orange to colourless (not clear) ;

[3]

[Total: 8]

6 (a) (i) (weight of empty lift = 120 00 N)
(combined weight =) 12 800 N ;

[1]

(ii) (W =) $F \times D$ or mgh ;
 $= 12\,800 \times 9 = 115\,200 \text{ J}$; [allow e.c.f from (i)]

[2]

(iii) (Power =) work/time ;
 $= 115\,200 / 20 = 5760 \text{ W}$; [allow e.c.f from (i)]

[2]

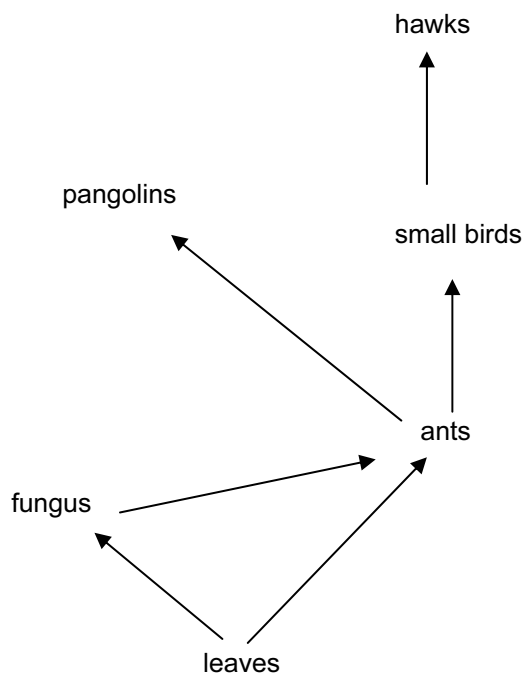
(b) $1/R = 1/R_1 + 1/R_2 + 1/R_3$;
 $= 1/2000 + 1/1000 + 1/1000 = 5/2000$;
 $R = 400 \, \Omega$;

[3]

[Total: 8]

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7 (a)



all organisms included, with lines drawn ;
arrows all correct ;

[2]

(b) (i) trees/leaves ;

[1]

(ii) fungus ;

[1]

(c) energy lost, along a food chain/between trophic levels ;
as heat/through respiration ;
so less energy available to support animals at end of chain ;

[max 2]

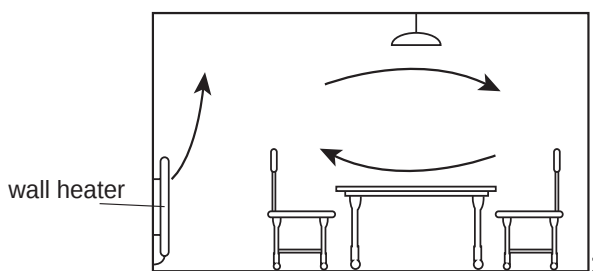
[Total: 6]

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8 (a) (i) conduction ; [1]

(ii) convection ; [1]

(iii)



[1]

(b) solid – particles touching, regular arrangement ;
liquid – most particles touching, irregular arrangement ;
gas – few particles, not touching, large spaces ; [3]

(c) (i) ray(s) drawn from picture to mirror to man – straight lines – angles approx. correct ;
arrow(s) on line(s) towards eye ; [2]

(ii) both angles required for mark ; [allow e.c.f from (i) – must be consistent with arrows] [1]

(iii) cannot be projected on screen/idea that brain interprets an image that is not there ; [1]

[Total: 10]

9 (a) (i) to speed up the reaction/so it would dissolve more quickly/because oxide less reactive than carbonate ; [1]

(ii) add excess solid ;
shown by mixture remaining cloudy ;

add solid and keep testing with indicator (paper) ;
until mixture neutral/not acidic/specific colour with named indicator ;

add solid and monitor pH with a pH meter ;
until reading is 7/very near 7 ; [2]

(b) $\text{CaO} + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O}$;; (formulae and balanced) [2]

(c) (i) positive (copper) ions are attracted to negative cathode ;
ions gain electrons (from cathode) ;
ions gain 2 electrons/have their charge cancelled/are discharged ; [max 2]

(ii) oxygen has been formed ;
oxygen has reacted with the anode/with carbon ;
(to produce) carbon dioxide ; [max 2]

(iii) 2 pairs of shared electrons and two lone pairs on each atom ; [1]

[Total: 10]