

MARK SCHEME for the May/June 2013 series

0653 COMBINED SCIENCE

0653/61

Paper 6 (Alternative to Practical), maximum raw mark 60

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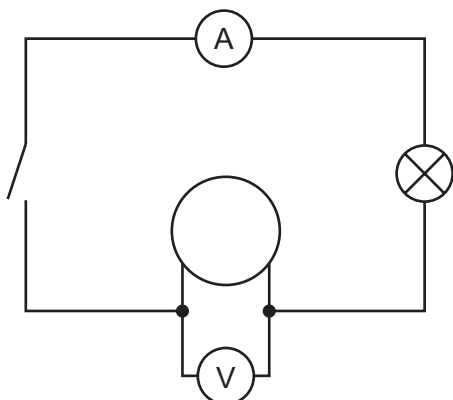
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- 1 (a) (i) large (at least half of the area) neat pencil drawing ; allow any orientation (i.e. horizontal or vertical)
drawing clearly shows petals, stamens, carpel ;
- (ii) stamen and carpel correctly labelled ;
drawing of stamen marked as male, drawing of carpel marked as female ; [2]
- (b) (i) (add Benedict's solution and) heat/warm/boil etc ; (do not award mark if any other reagent mentioned) [1]
- (ii) to attract insects/bees/pollinators ; [1]
- (iii) colours make the flower more easily visible/more attractive (to insects) ;
lines guide insects (towards nectar) ; [2]
- (iv) sugar/nectar present at the base/bottom (of the petals) ;
insects (will visit flower/petal to) collect sugar/sugar/nectar will attract insects ; [2]

[Total: 10]

2 (a) (i)



- (ignore orange) to include ammeter in series and voltmeter in parallel,
(allow two lamps OR two switches) correct symbols ;
(4 correct = 2 marks, 3 correct = 1 mark)
no gaps or short circuits ; [3]
- (ii) reading on ammeter/voltmeter **AND** lamp lights ; [1]
- (iii) 1.39 ;
1.53 ; (both answers ± 0.01) [2]

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(b)

electrodes	Voltage / PD / V
Mg and Cu	1.80
Mg and Al	1.26
Mg and Fe	1.39
Mg and Pb	1.53

(allow any other table layout, accept names or symbols)
(four sets of data for 1 mark, headings **and** units (mentioned somewhere in the table) for 1 mark) ;;

[2]

(c) greater difference between reactivity greater V / PD ;
magnesium, aluminium, iron, lead, copper ; (must be in this order, but check their answer to (a) (iii))

[2]

[Total: 10]

3 (a) stopclock readings in table 17 ; 65 ;

[2]

(b) (i) 0.059, 0.015 (either or both to 3 decimal places) ; (ecf)

[1]

(ii) axis – correct and labelled with units for volume ;
scale – uniform and numbered for both axes ;
points – points plotted correctly by eye ;
line – best straight line through origin ;

[4]

(c) (i) rate depends on (or increases with) amount (or volume) of potassium iodate / proportional / positive correlation ;

[1]

(ii) blue / black colour (with starch) ;

[1]

(iii) to keep the volume / amount of liquid constant / 10 cm^3 / to vary concentration ;

[1]

[Total: 10]

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- 4 (a) (i) 6.8 (cm³) ;
5.2 (cm³) ;
- (ii) plotting correct by eye ;
smooth curve drawn not drawn with a ruler, (ignore before pH3 and after pH7) ;
axes correctly labelled ; [3]
- (iii) pH around 5 (from student's graph) ; (if no graph allow 5) [1]
- (iv) optimum could occur between measured values/pH 4 to 6/some mention or 'around' 5 ; (ignore 'has not tried all pHs' or 'only tested between 3 and 7') [1]
- (b) do experiment without enzyme/denatured enzyme/use the same volume of water instead of pectinase/enzyme ; [1]
- (c) increase temperature/heat/warm/use 37 °C ;
increases collision (rate between enzyme and substrate)/reference to activation energy ;
OR
increase enzyme concentration ;
increases collision (rate between enzyme and substrate) ;
OR
make pieces of apple smaller ;
increases surface area (for enzyme to act) ;

(suggestion and explanation must match for 2 marks) [max 2]
- 5 (diagrams must be the 'correct idea' before labelling can score, ignore any other 'steps' if present)
- (a) diagram to show filter funnel, filter paper and receiving vessel ;
two relevant labels ; [2]
- (b) diagram to show filter paper with concentric circles with dropper/chromatography paper dipped in solvent and some form of separation ;
two relevant labels ; [2]
- (c) diagram of reaction vessel connected to a syringe ;
two relevant labels (allow labels if collected over water) ; [2]
- (d) diagram simple distillation (condenser or cooled receiver) and receiving vessel ;
two relevant labels ; [2]

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- (e) fractional distillation ;
 heat the mixture until one liquid boils off ;
 cool vapour / gas / condense vapour ;

[m

[Total: 10]

6 (a) (i) 27.9 ; 25.5 ;

[2]

(ii) 0.027

0.031

0.036

0.039

0.044

all recorded to 3 decimal places ;

any two correct ;

[2]

- (b) (i) points correct by eye ;
 straight line of best fit ;

[2]

- (ii) gradient 2353 (allow between 2000 to 2600) ;
 method clearly shown on graph ;

[2]

(c) $M = 2353/45 = 52 \text{ (g)}$; (ecf)

[1]

- (d) metre rule will break (if mass very large) ;
 rule not long enough (for large mass) ;
 too difficult to achieve a balance ;
 x too small (or large) to measure ; (ignore 'difficult to measure')

[max 1]

[Total: 10]

MARK SCHEME for the May/June 2013 series

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0653/62

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- 1 (a) plant **A** shown as brown (red-brown-orange) middle and at least one other (not yellow or brick-red alone) ;
 plant **B** shown as brown in covered regions ;
 blue / black elsewhere (either or both regions) ;
- (b) (i) to kill / soften the leaf ; [1]
 (ii) to remove chlorophyll / (green) colour / allow iodine colour to be seen ; (**do not** accept chloroplast) [1]
- (c) (i) cover other areas / whole leaf with glass / transparent material ; [1]
 (ii) removes the variable of different plants (e.g. genes) ORA (e.g. no other factors affecting plant) / more reliable / one plant may react or behave or photosynthesise differently / more / less ; [1]
- (d) use a plant with variegated leaves (or description) ;
 destarch / keep in dark before starting, (then leave in the light) ;
 test leaf for starch / use iodine test ;
 description of the two results ;
 (if two leaves used 2 marks max) [max 3]

[Total: 10]

- 2 (a) (i) 21 ;
 15 ; [2]
 (ii)

height, <i>h</i> / cm	time for 20 swings / s	time, <i>T</i> for one swing / s	T^2 / s^2
10.0			
20.0			
25.0	(21)	1.05	1.10
30.0			
40.0	(15)	0.75	0.56

column 3 both correct (ecf) (2 decimal places) ; [1]

- (iii) column 4 both correct (ecf) (2 decimal places) BUT only penalise once in (ii) or (iii) ; [1]

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- (b) (i) 5 points correct (by eye) ;
straight line of best fit ;
- (ii) evidence on graph ;
gradient = 0.035 to 0.04 ; (ignore any sign) [2]
- (iii) allow 2 to 2.15 (ecf) ; [1]
- (iv) $2.05 / 0.04 = 51.25 \text{ cm}$ (allow 50.00 to 53.75) (ecf) ; [1]

[Total: 10]

3

	aqueous sodium hydroxide	aqueous ammonia	dilute hydrochloric acid	dilute sulfuric acid	
(a) 3 drops of universal indicator are added	purple (allow blue)	purple (allow blue) both ; [1]	red / pink (not orange)	red / pink both ; [1]	[max 2]
(b) an equal volume of silver nitrate solution is added	brown ppt	no change	white ; ppt/solid ; [2]	no change	[max 2]
(c) an equal volume of barium choride solution is added	no change	no change	no change ; [1]	white ppt	[max 1]
(d) copper sulfate solution is added slowly until the test-tube is half full	blue ppt / solid ; [1]	blue ppt / solid ; [1] (dark) blue soln ; [1] (allow ppt soluble in excess)	no change	no change	[max 3]
(e) a 2 cm length of magnesium ribbon is added and any gas evolved tested with a lighted splint.	no change	no change	bubbles / fizzing / effervescence	bubbles etc. all 4 ; [1]	[max 2]
			pops	pops both ; [1]	

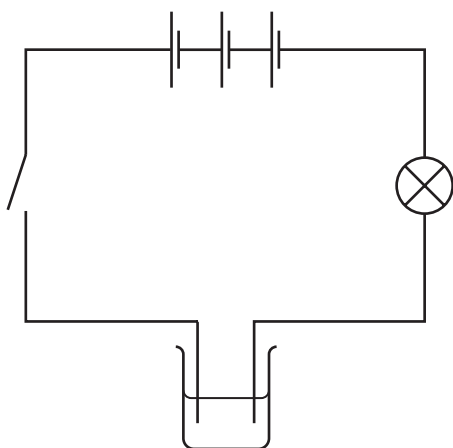
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- 4 (a) (i) 0.2 mol/dm^3 10 mm ;
 0.8 mol/dm^3 –11 mm ;
- (ii) scale and label (allow 'concentration') and units entered on horizontal axis or bottom of graph ;
correct plotting by eye (allow ecf) ;
smooth curve drawn ; [3]
- (iii) 6 mm ; [1]
- (iv) evidence on graph ;
correct value read from students graph (approximately 0.35 mol/dm^3) ; [2]
- (b) water has left dandelion / cell(s) / stalk (by osmosis) / cells go flaccid / plasmolysed ;
from (a region of) high (water) concentration (cortex cells) to (region of) low (water) concentration (sucrose solution) / from a higher concentration (of water) / to a lower concentration (of water) ORA ;
(do not allow references to sucrose moving) [2]

[Total: 10]

5 (a) (i)



- electric symbols correct ;
their circuit diagram, no gaps or short circuits, but ignore key (or lack of) ; [2]
- (ii) 14.35 ;
11.27 ; [2]
- (iii) points by eye (first point **MUST** be correct) ;
line of best fit straight ; [2]
- (iv) from graph ecf (6.7 hours / 6 hours 42 mins) $\pm$ a square ;
(do not award mark if no line extension or over 7) [1]

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(b) copper ions leave solution (and not replaced) (allow losing copper ions) ;
(reject if key mentioned but ignore references to chlorine/chloride)

(c) ions ;
move (in aqueous) ; (ignore electrons but allow electrons move for max 1)

[2]

[Total: 10]

6 (a) table e.g. (answers can be in any 'correct order')

(gas)	test	result
carbon dioxide	limewater	white ppt
hydrogen	lighted splint	pops
oxygen	glowing splint	relights

table format (any) drawn with a ruler ;
headings must have 3 columns (or rows if table drawn the other way) ;
all three gasses correct (max 1 for one gas correct) ;

[4]

(b) any named (acid) and any named (carbonate) (**but not** sulfuric/ calcium) – both ;
(allow e.g. hydrochloric and calcium (as acid and carbonate in question))

[1]

(c) reaction vessel ;
any workable collection with gradations e.g. syringe / measuring cylinder etc. ;
at least two valid labels (ignore reagents) ;
would it work / airtight etc. ;

[4]

(d) named metal Mg to Fe ;

[1]

[Total: 10]

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- 1** (a) 8, 16, 15 ;
- (b) correct plots ;
points joined by straight lines ; [2]
- (c) (i) molecules have more energy / more collisions / nearer enzyme optimum temp ; [1]
(ii) enzymes denatured ; [1]
- (d) (i) to allow temperature to stabilise / yeast to adjust to new temperature / reach equilibrium ; [1]
(ii) to check reliability of results / check for anomalous results ; [1]
(iii) because this temperature kills the yeast / yeast is dead / yeast cannot be used again ; [1]
- (e) use limewater instead of tapwater ; [1]
- (f) repeat with no yeast / killed yeast ; [1]

[Total: 10]

- 2** (a) focal length = 7.7 to 7.8 (cm) ; [1]
- (b) (i) $v = 2.4$; [1]
(ii) 24.0 ; [1]
(iii) 64.0 ; [1]
(iv) 960 ; [1]
- (c) (i) graph points ;
straight line of best fit ; [2]
(ii) gradient = 15.0 to 16.0 ;
clear indication of how ; [2]
- (d) the drawing in (a) is drawn at half life size ; [1]

[Total: 10]

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- 3 (a) 12.5 ;
6.5 ;
- (b) (i) 0.27, 0.53, 0.80, 1.54 (at least two correct) ; [1]
- (ii) greater length gives faster reaction ; [1]
- (iii) greater surface area gives faster reaction/ora ; [1]
- (iv) if states statement correct – max 2 marks
uses times ;
for 1 and 2 cm Mg ;
OR
if states statement is incorrect – max 2 marks
uses times ;
for 2 and 4 cm Mg ;
OR
statement both correct and incorrect ;
uses two sets of time ;
two sets of length ; [max 3]
- (c) inaccuracy (because of difficulty) of starting clock and pouring liquid at the same time ; [1]
- (d) lighted splint (pops) (allow burning flame etc. but not glowing) ; [1]

[Total: 10]

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- 4 (a) (i) to check it is the enzyme responsible for the reaction/control ;
- (ii) to check that temperature does not cause break down ;
- (iii) tube 1 has become lighter/paler/less cloudy ; [1]
- (iv) tube 3 has become lighter/paler/less cloudy than tube 1 ; [1]
- (v) faster rate of reaction/more overall reaction ; [1]
- (b) (i) add iodine (solution) and it goes blue/black ; [1]
- (ii) amylase/diastase ; [1]
- (iii) set up tube with apple, pectinase, amylase ;
incubate at 40 °C ;
any detail of control, e.g. tube without amylase/pectinase/volumes of
substances given ; [3]

[Total: 10]

- 5 (a) (i) 74 ;
128 ; [2]
- (ii) scales linear and labelled ;
points ;
smooth curve ; [3]
- (iii) speeds up/accelerates ; [1]
- (iv) $(99 \div 6) = 16.5 \text{ (m/s)}$; [1]
- (b) (i) *similar*. constant speed ;
different A is faster than *B* ; [2]
- (ii) it stops/crashed/engine failure (**not** run out of petrol) ; [1]

[Total: 10]

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- 6 (a) table format drawn with a ruler ;
 headings ;
 both tests correct ;
 extra words not used ;
 e.g.

(ion)	test	result
carbonate	hydrochloric acid	bubbles
chloride	silver nitrate	white ppt

[4]

- (b) adds solid to liquid ;
 stirs/warms ;
 filters ;

[3]

- (c) evaporation ;

[1]

- (d) blue ;

[1]

- (e) salt(s) ;

[1]

[Total: 10]