



COMBINED SCIENCE

0653/31

Paper 3 Core Theory

May/June 2018

MARK SCHEME

Maximum Mark: 80

Published

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Question	Answer	Marks
1(a)	boxes connected as shown 1 mark for each 2 correct lines	3
1(b)(i)	P, Q and R in the correct order ;	1
1(b)(ii)	green areas contain chlorophyll ; reference to photosynthesis ;	2
1(c)	(carbon dioxide) through <u>stomata</u> ; by diffusion ; (water) through <u>root hair</u> cells; from the soil / ground / by diffusion ;	4
1(d)(i)	false – no mark respiration takes place all the time / owtte ;	1
1(d)(ii)	any one of protein synthesis ; cell division ; growth ;	max1

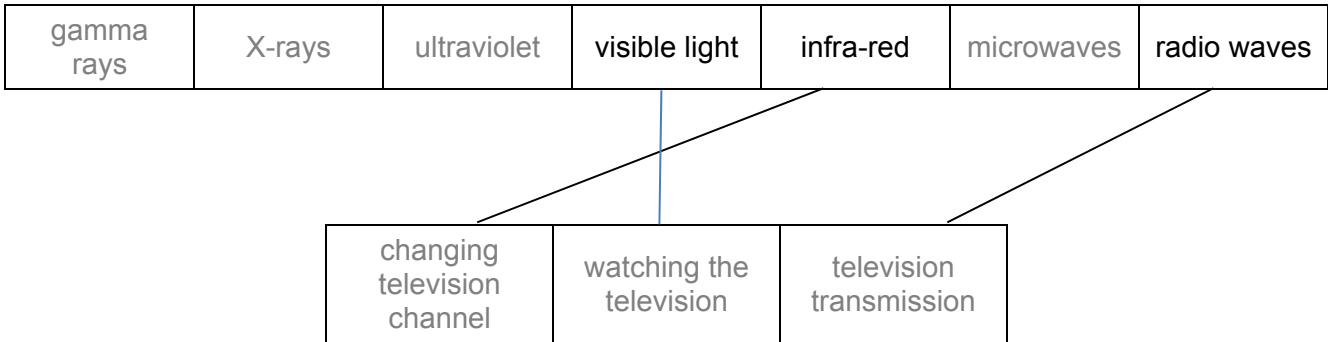
Question	Answer	Marks
2(a)(i)	calcium / Ca zinc / Zn iron / Fe copper / Cu ; 1 mark for calcium first and copper last 2 marks for all four correct	2
2(a)(ii)	increases / goes up / gets (closer) to 7 ;	1
2(b)(i)	hydrogen ;	1
2(b)(ii)	filter / filtering / filtration ;	1
2(b)(iii)	crystallisation / evaporation / heat ;	1
2(c)(i)	(atomic no.) 12 and (mass no.) 25 ;	1
2(c)(ii)	13 ;	1
2(d)(i)	(electrical) conductor ;	1
2(d)(ii)	higher strength ;	1

Question	Answer	Marks
3(a)(i)	two opposing vertical force arrows ; both arrows acting on the load ;	2
3(a)(ii)	moving at constant speed ;	1
3(a)(iii)	newton / N ;	1
3(b)(i)	3 (m / s)	1
3(b)(ii)	increasing speed, constant speed, decreasing speed <i>in this order only</i>	1

Question	Answer	Marks
3(c)(i)	volume of cube = $0.50 \times 0.50 \times 0.50 = 0.125 \text{ (m}^3\text{)}$;	1
3(c)(ii)	density = mass / volume or $d = m / V$ or $m = V \times d$ or mass = 0.125×7000 ; = 875 (kg) <i>or</i> 880 (kg) ;	2

Question	Answer	Marks
4(a)	B – no mark (expired air) contains carbon dioxide ; (inspired air) contains very little carbon dioxide ;	2
4(b)	in order in the table less ; stays the same ; increases ;	3
4(c)(i)	hormone ;	1
4(c)(ii)	increase of blood glucose concentration ; increase in pulse / heart rate ;	2
4(c)(iii)	destroyed by liver ;	1

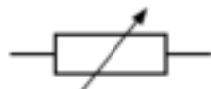
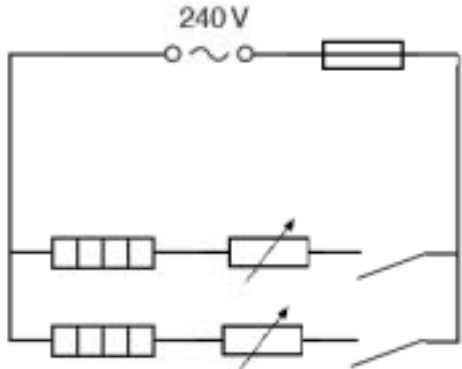
Question	Answer	Marks
5(a)(i)	<u>fractional</u> distillation ;	1
5(a)(ii)	physical ;	1
5(a)(iii)	<i>mixture</i> idea that the components are not joined / bonded (together) / idea that the components retain their original properties / components can be separated by physical processes ; <i>compound</i> <u>different</u> atoms / elements bonded / joined (together) / has different properties from the elements / elements cannot be separated by physical processes ;	2
5(b)(i)	shared (pair of) electrons) ;	1
5(b)(ii)	test white / anhydrous copper sulfate ; result (turns) blue ; or blue / anhydrous cobalt chloride (paper); result (turns) pink;	2
5(b)(iii)	exothermic ;	1

Question	Answer	Marks
6(a)	 three correct names of electromagnetic waves ; correct names in the correct positions ; two correct links ;	3
6(b)(i)	convection ;	1
6(b)(ii)	gases cool by thermal energy (heat) transfer to surroundings (by conduction though balloon) / hot gas cools down ; (causing) decrease of gas volume / contraction ;	2
6(b)(iii)	chemical ; gravitational (potential) (energy) / potential (energy) / kinetic (energy) ;	2
6(b)(iv)	(energy transfer) by radiation / infra-red	1

Question	Answer	Marks
7(a)(i)	green plants ; mice, snails, caterpillars ;	2
7(a)(ii)	green plants → mice → owl correct organisms in the correct order ; arrows correct, in correct direction ;	2

Question	Answer	Marks
7(b)	decrease – no mark the small birds will eat more snails ; or increase – no mark more food for snails when caterpillars disappear ;	1

Question	Answer	Marks
8(a)(i)	ionic ;	1
8(a)(ii)	CuCl_2 ;	1
8(a)(iii)	cathode ;	1
8(a)(iv)	chlorine ;	1
8(b)(i)	speeds up a reaction (without being used up) ;	1
8(b)(ii)	transition (metals) ;	1
8(c)(i)	(copper oxide) + carbon → copper + carbon dioxide carbon on left-hand side and copper on the right-hand side ; carbon dioxide / monoxide on the right-hand side ;	2
8(c)(ii)	oxygen is removed from the <u>copper oxide</u> / carbon reacts with oxygen / idea that oxidation and reduction occur at the same time / oxygen is transferred / loss and gain of oxygen ;	1

Question	Answer	Marks
9(a)(i)	fuse:  switch:  variable resistor:  three correct symbols for 2 marks ; one or two correct symbols for 1 mark ;	2
9(a)(ii)	 second hotplate connected in parallel ; each hotplate branch contains a variable resistor in series ; each hotplate branch has a switch in series ; fuse in main circuit ;	4
9(b)(i)	24 Ω ;	1
9(b)(ii)	$R = V / I$ or $24 = 240 / I$ or $I = V / R$ or $I = 240 / 24$; $I = 10 \text{ A}$;	2



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1(b)	idea of large amount of sugar in the drink ; <u>bacteria</u> feed on sugar ; produce acid ; acid attacks enamel ;	max 3
1(c)	brush teeth regularly ; visit dentist regularly ; reduce consumption of sugar ;	max 2

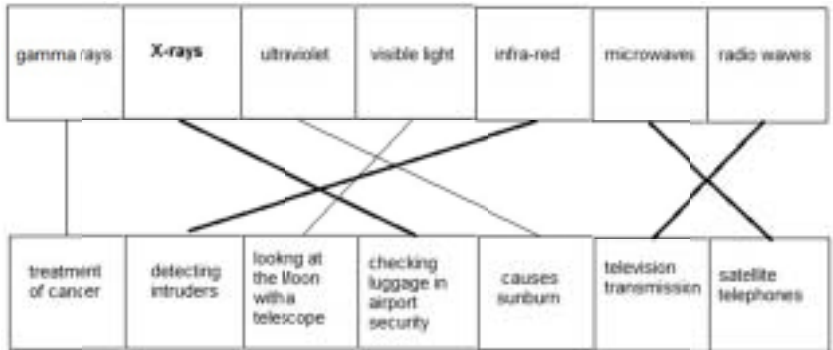
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2(a)(i)	white / anhydrous copper sulphate or anhydrous / blue cobalt chloride ;	1
2(a)(ii)	limewater ;	1
2(b)	(hexane) + oxygen → carbon dioxide + water LHS ; RHS (either order) ;	2
2(c)	methane ;	1
2(d)(i)	covalent ;	1
2(d)(ii)	 C – C bond ; Six C – H bonds ;	2
2(d)(iii)	(atomic number) 6 ; (number of neutrons) 6 ;	2

Question	Answer	Marks
3(a)(i)	two opposing vertical force arrows ; both arrows from the load ;	2
3(a)(ii)	weight / gravitational force ;	1
3(b)	speed = distance / time or time = 200 / 0.60 ; = 333 s ;	2
3(c)	density = mass / volume <i>or</i> mass = volume × density = 5000 × 1.025 ; = 5125 (kg) ;	2
3(d)(i)	watt ;	1
3(d)(ii)	idea that the same amount of energy is transferred / work done ; the same amount of energy is transferred / work done in less time ;	2

Question	Answer	Marks														
4(a)(i)	only one parent involved ; offspring (genetically) identical ;	2														
4(a)(ii)	it has flowers ;	1														
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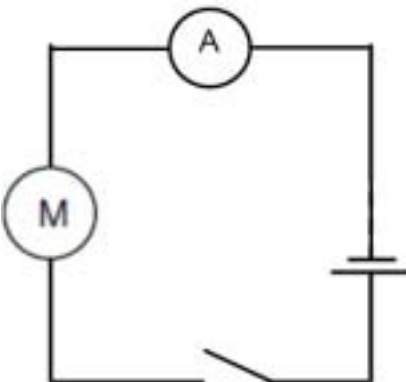
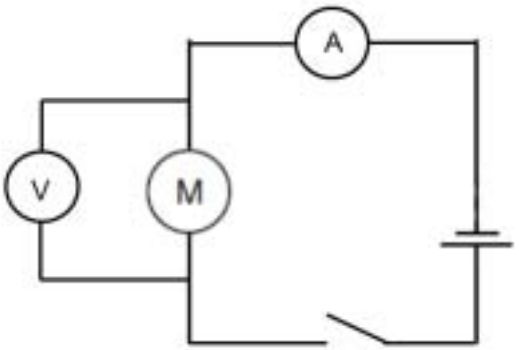
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4(c)	a protein ; (that functions as) a (biological) catalyst ;	2
4(d)(i)	glucose, oxygen ; – <i>either order</i> carbon dioxide, water ; – <i>either order</i>	2
4(d)(ii)	any two of protein synthesis ; cell division ; growth ;	2

Question	Answer	Marks
5(a)(i)	(decreases) no mark gas produced / released (during reaction) ; (gas goes) to the surroundings / (gas) leaves flask ;	2
5(a)(ii)	lower temperature / lower (acid) concentration / use lumps (instead of powder) ;	1
5(a)(iii)	increases ; calcium is more reactive (than magnesium) ;	2
5(b)(i)	electricity ;	1
5(b)(ii)	ionic ;	1
5(b)(iii)	MgCl_2 ;	1
5(b)(iv)	reduction ;	1

Question	Answer	Marks
6(a)(i)	X-rays ;	1
6(a)(ii)	 any two lines correct ; all four lines correct ;	2
6(b)(i)	conduction ;	1
6(b)(ii)	glass is a bad / poor conductor (of thermal energy) ;	1
6(b)(iii)	air / gas expands on heating / volume of gas increases on heating ;	1

Question	Answer	Marks
7(a)	July ;	1
7(b)	(more) light is available (on forest floor) ; less shading by trees ; idea that light is needed for photosynthesis ;	3
7(c)(i)	loss of habitat ; loss of food that may live in the trees ; birds migrate from / leave the area ;	max2
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8(a)(i)	(left) metal(lic) and (right) non-metal(lic) ;	1																
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8(c)	kills / destroys bacteria / microbes / microorganisms / viruses ;	1																
8(d)(i)	releases heat / thermal energy / temperature increases ;	1																
8(d)(ii)	sodium hydroxide / NaOH / sodium carbonate / Na ₂ CO ₃ / sodium hydrogen carbonate / sodium bicarbonate / NaHCO ₃ / sodium oxide / Na ₂ O ;	1																

Question	Answer	Marks
9(a)(i)	 correct symbol for cell ; correct symbol for switch ; meter identified as an ammeter and a complete series circuit connected ;	3
9(a)(ii)	 correct meter selected (V symbol) ; meter connected in parallel with motor ;	2
9(b)(i)	$I = V / R \text{ or } I = 1.5 / 5.0 ;$ $= 0.30 \text{ (A)} ;$	2

Question	Answer	Marks
9(b)(ii)	reading on ammeter increases / current increases ; (extra cell) increases pd / voltage (across motor) ;	2
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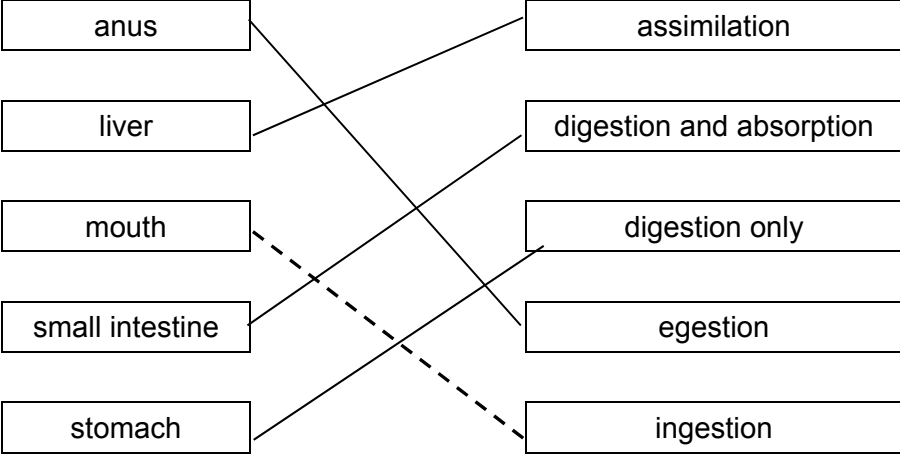
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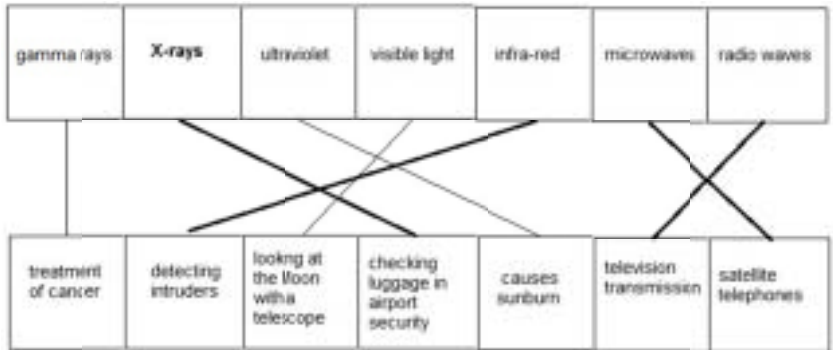
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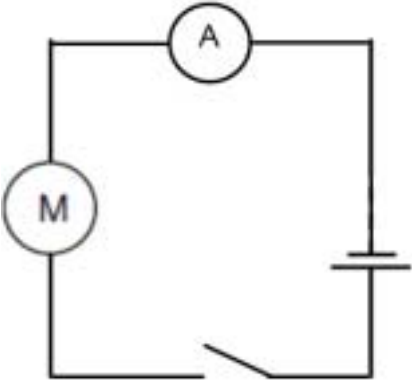
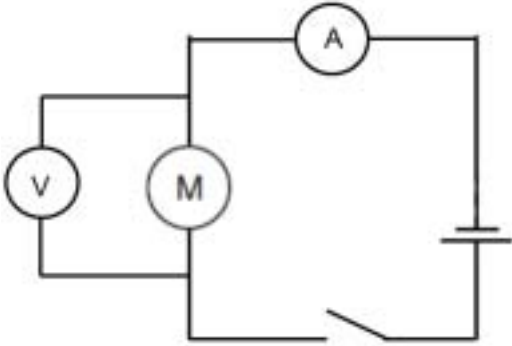
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