



COMBINED SCIENCE

0653/42

Paper 4 Extended Theory

October/November 2017

MARK SCHEME

Maximum Mark: 80

Published

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This document consists of **6** printed pages.

Question	Answer	Marks
1(a)	red blood cells ; placenta ; umbilical cord ;	3
1(b)	sperm cell / egg cell ; zygote / body cell ;	2
1(c)	for identical twins genetic material is similar and for non-identical the genetic material is different ; (identical twins) genetic material has come from one egg / one fertilised egg / one sperm / one zygote ; (non-identical twins) genetic material has come from two eggs / two fertilised eggs / two sperms / two zygotes ; all eggs / sperms are genetically different / owtte ;	max 3
1(d)(i)	C label line to any part of the cell membrane ; R label line to any part of the cytoplasm ;	2
1(d)(ii)	$C_6H_{12}O_6$ and H_2O ; 6 before O_2 , CO_2 , H_2O ;	2

Question	Answer	Marks
2(a)(i)	D (most reactive) A C B ; (least reactive)	1
2(a)(ii)	D (most readily) B ; (least readily)	1
2(a)(iii)	initially / at the start / (the idea of during the first) two minutes ;	1
2(a)(iv)	increases ; particles collide more often / more successful collisions ;	2
2(b)	(iron(II) ions) green ppt / solid ; (iron(III) ions) brown ppt / solid ;	2

Question	Answer	Marks
2(c)(i)	R ;	1
2(c)(ii)	(alloys are) harder / more resistant to wear / more resistant to corrosion / avp ;	1

Question	Answer	Marks
3(a)	force arrow vertically upward labelled 'uplift' ; force arrow vertically downward labelled weight / gravitational force / gravity ; the two vertical force arrows in contact with helicopter / or the vertical arrows of approximately equal length by inspection ;	3
3(b)	chemical ; gravitational / potential ;	2
3(c)(i)	acceleration = (change of speed / time = 50 / 20) = 2.5 ; m / s ² ;	2
3(c)(ii)	$\frac{1}{2} \cdot 50 \cdot 20 / 500$ (m) / $50 \cdot (50 - 20) / 1500$ (m) seen ; = 2000 (m) ; (also by using the formula for the area of the trapezium, $\frac{1}{2} (30 + 50) \cdot 50$)	2
3(c)(iii)	non-constant deceleration / acceleration <i>owtte</i> ;	1

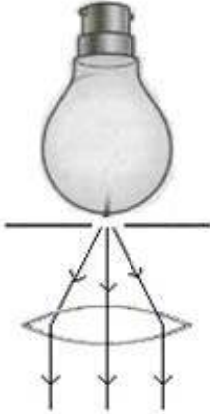
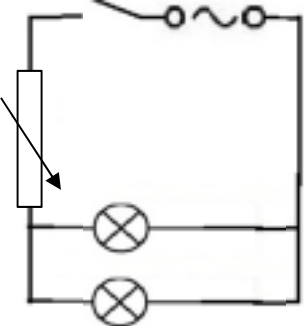
Question	Answer	Marks
4(a)	results show starch present (around A and / or B) ; reference to inactive / denatured enzymes ; because A was boiled / heated ; because B was placed in acid / pH3 / low pH ;	max 3
4(b)	traps light energy ; converts it to chemical energy / enable carbohydrates / sugar to be formed ;	2

Question	Answer	Marks
5(a)	reference to use of (fossil) fuel / named fuel / industrialisation / deforestation ; global warming / any named effect of global warming ;	2
5(b)	C_2H_5OH / C_2H_6O ;	1
5(c)(i)	(octane has higher boiling point / ora) (octane has) larger molecules / ora ; (octane has) greater intermolecular forces (of attraction) / ora ;	2
5(c)(ii)	$(2C_8H_{18}) + 25...(O_2) \rightarrow ...16 CO_2 + ...18 H_2O$ correct species ; balanced (dependent on correct species) ;	2
5(d)(i)	cracking ;	1
5(d)(ii)	(ethene) alkene / unsaturated and (ethane) alkane / saturated ;	1

Question	Answer	Marks
6(a)	atoms / molecules (in contact with water) vibrate (more) ; the idea that energy / vibrations passed on through collisions / from particle to particle (owtte) ;	2
6(b)(i)	arrows show rise (to ceiling), progress across (ceiling), downward progress (to floor) ; (past people) return to radiator ;	2
6(b)(ii)	warm air is less dense / ora ; so warm air rises / ora ;	2
6(c)	radio (waves) ;	1
6(d)	TV signal travels at speed of e / m waves ; e / m waves travel (much) faster than sound (waves) ;	2

Question	Answer	Marks
7(a)(i)	arrow drawn on Fig. 3.1 from red blood cell to any tissue cell ;	1
7(a)(ii)	lower concentration in tissue cells than in the red blood cells / blood ;	1
7(b)(i)	elongated shape / large surface area ; for increased rate / efficiency of uptake (of water) ;	max 2
7(b)(ii)	diffusion rate would slow down / stop ; because the water / solution concentrations have become similar to / the same as each other ; or water diffuses from cells into the soil (water) ; because the concentration of water is now higher inside the cell / concentration of salt is now higher outside the cell ;	max 2
7(c)	bacteria feed on dead organisms / bacteria population increases ; bacteria respire ; bacteria / respiration use up oxygen ; no oxygen left for fish ;	max 3

Question	Answer	Marks
8(a)(i)	add water / make into a solution / aqueous ; (so that) ions are mobile / can move ;	2
8(a)(ii)	electrons arranged 2,8,7 ;	1
8(a)(iii)	two electrons shown between Cl atoms ; six unshared electrons around each Cl atom ;	2
8(b)(i)	thermal / heat (energy) → chemical (energy) ;	1
8(b)(ii)	reduction ;	1
8(b)(iii)	reactive metals / high in the reactivity series extracted by electrolysis ; less reactive metals / low in the reactivity series extracted by reaction with carbon ; reference to the relative reactivity of metal / named metal with carbon ;	max 2

Question	Answer	Marks
9(a)	<p>two more rays from hole to lens with at least one additional arrow correctly shown ; all rays emerge from lens reasonably parallel ;</p> 	2
9(b)(i)	<p>correct symbol showing variable resistor ;</p> 	1
9(b)(ii)	<p>20 A ; because lamps in parallel / current is shared / current in main circuit = sum ;</p>	2
9(b)(iii)	<p>remains lit (no mark) still a complete circuit through that branch / reference to parallel circuit / <i>owtte</i> ;</p>	1
9(c)(i)	<p>$I = P/V = 3000/240 = 12.5$ (A) ;</p>	1
9(c)(ii)	<p>the idea that the resistance in the dimmer must be decreased / turn control to minimum resistance ;</p>	1