

Cambridge International Examinations Cambridge International General Certificate of Secondary Education

COMBINED SCIENCES

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Paper 4 Extended Theory MARK SCHEME Maximum Mark: 80

Published

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Question	Answer	Marks
1(a)	three lines drawn to increases the concentration of carbon monoxide in the blood ; damages the cilia in the airway ; causes more mucus to be produced in the lungs ;	3
1(b)(i)	arrow drawn from <u>plasma</u> to alveolar sac ;	1
1(b)(ii)	large surface area ; thin wall ; reference to good blood supply ;	2
1(c)	carried by haemoglobin ; in red blood cells ; enters left atrium / through the pulmonary vein ; red cells carried in plasma ;	max 3
1(d)(i)	more glucose available to be broken down by cells / for oxidation / chemical (energy) converted to thermal / heat (energy)	1
1(d)(ii)	faster delivery of oxygen / glucose to cells ;	1

Question	Answer	Marks
2(a)(i)	C ₈ H ₁₈ ; allow H ₁₈ C ₈	1
2(a)(ii)	(higher up) lower boiling point ; smaller molecules ; lower intermolecular forces ;	3
2(b)	cracking ;	1
2(c)	(ethene) alkene / unsaturated ; both (ethane) and (octane) alkane / saturated ;	2
2(d)	2 pairs between carbon ; 1 pair between each H and C ; (whether dots or crosses does not affect marks)	2

Question	Answer	Marks
3(a)(i)	C A	1
3(a)(ii)	(Force B is 1000 N) no vertical motion / forces (A and B) are balanced ;	1
3(b)	1 km at 15 km/h → 1/15 h/0.067 h ; 1/15 h = 3 600 × 1/15 = 240 (s) ;	2
3(c)	$KE = \frac{1}{2} mv^{2}$ = $\frac{1}{2} \times 100 \times 4 \times 4 = 800 (J) ;$	2
3(d)(i)	energy input = 120 × 250 = 30 000 (J) ;	1
3(d)(ii)	work done = force × distance (moved) / F × d ; = 25 × 1 000 = 25 000 (J) ;	2
3(d)(iii)	efficiency (%) = (work got out ÷ work put in) × 100 / (equivalent wording) ; = (25 000 / 30 000) × 100 = 83.3 (%) ;	2

Question	Answer	Marks
4(a)	geotropism / gravitropism ;	1
4(b)(i)	drawing with shoot bending upwards ; root bending downwards ;	2
4(b)(ii)	auxins become more concentrated on lower surface ; cause more growth / cell elongation ;	2
4(c)(i)	sulfur dioxide ; dissolves in rain water ;	2
4(c)(ii)	denatures the enzymes / makes the enzymes less active ;	1

Question	Answer	Marks
5(a)	8 electrons 2 nd shell ; 2 electrons 3 rd shell ;	2
5(b)(i)	gas / H ₂ produced / lost ; reaction ends / over ;	2
5(b)(ii)	$(Mg) + 2HCl \rightarrow H_2 + (MgCl_2)$	2
	2 HC <i>l</i> ; H ₂ ;	
5(c)(i)	increases ; particles collide more often / forcefully / energetically / successfully ;	2
5(c)(ii)	increases / changes ; no change ;	2

Question	Answer	Marks
6(a)(i)	conduction ;	1
6(a)(ii)	air is a good insulator / poor conductor (of heat) ;	1
6(b)(i)	(Z – no mark) at 800 °C / such a high temperature water is formed as a gas ;	1
6(b)(ii)	ice (crystals) ; water vapour / steam from engines freezes in contact with air at a temperature well below freezing point of water ;	2
6(c)(i)	microwaves ;	1
6(c)(ii)	X-rays visible micro- light waves;	1
6(d)(i)	speed of radio waves / electromagnetic waves (much) faster than speed of sound ;	1
6(d)(ii)	vibrations produced by engines / owtte ; create series of compressions and rarefactions through air to man / vibrations passed through air from particle to particle / longitudinal (sound) waves are passed through the air ;	2

Question	Answer	Marks
7(a)	$C_6H_{12}O_6$ and $6O_2$;	1
7(b)(i)	line drawn through stoma to cell Z;	1
7(b)(ii)	xylem correctly labelled ;	1
7(c)(i)	by evaporation ; from the surfaces of the mesophyll cells / cells inside the leaf ;	2
7(c)(ii)	(greater in A) air around A is less humid than around B / ora ; transpiration happens more slowly if the air is humid / ora ;	2

Question	Answer	Marks
8(a)	(rubidium) in the range 25 to 50 (°C) inclusive ;	1
8(b)(i)	C A B D C and D correct ; A and B correct ;	2
8(b)(ii)	chemical (energy) decreases ; thermal / heat (energy) increases ;	2
8(c)(i)	cathode ;	1
8(c)(ii)	chlorine / Cl ₂ ;	1
8(c)(iii)	(so that) ions move ;	1

Question	Answer	Marks
9(a)(i)	(4.5 A) idea that current in main circuit = sum of currents in branches ;	1
9(a)(ii)	(because) same p.d. across both resistors ; (so) R_2 and R_3 must have different values ; R_2 greater than R_3 ;	max2
9(b)(i)	3A	1
9(b)(ii)	voltage across $R_1 = 12 - 3 = 9V$; $R_1 = V/I = 9/3 = 3 \Omega$;	2