
COMBINED SCIENCE**5129/22**

Paper 2 Theory

October/November 2017

MARK SCHEME

Maximum Mark: 100

Published

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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Question	Answer	Marks
1(a)	$F = ma$ or $15 = 70 \times a$; 0.21 ;	2
1(b)	continuous line touching the flag to diver ; arrow in direction from flag to the diver ; correct refraction at surface of sea ;	3

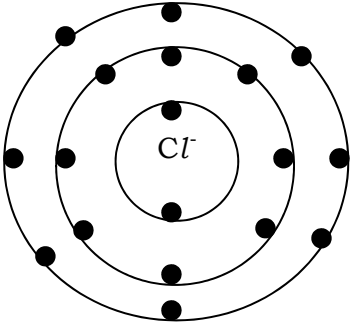
Question	Answer	Marks
2	narrower ; thicker ; away from ; oxygen ; lower ;	5

Question	Answer	Marks
3(a)	(average) mass of one <u>atom</u> of an element ; relative to one <u>atom</u> of carbon-12 ;	2
3(b)(i)	74 ;	1
3(b)(ii)	36 ; 2 ; 1.8 ;	3
3(c)	Universal Indicator ; blue ; or litmus ; blue ;	2

Question	Answer	Marks
4(a)(i)	ball changes direction ;	1
4(a)(ii)	it accelerates / its speed increases ; at a decreasing rate ;	2
4(a)(iii)	from >3.1 to < 3.4 ;	1
4(b)	slows down ; friction / air resistance ;	2

Question	Answer	Marks
5(a)	A = iris ; B = pupil ;	2
5(b)(i)	the pupil / B will become smaller ;	1
5(b)(ii)	reduces light entering the eye ; protects / prevents damage to the <u>retina</u> or <u>rods and cones</u> ;	2

Question	Answer	Marks
6(a)	giant lattice ; particles vibrating ;	2
6(b)	any two from <ul style="list-style-type: none"> • (copper) conducts electricity when solid ; • (copper is) malleable ; • copper is insoluble in water ; 	2

Question	Answer	Marks
6(c)(i)		1
6(c)(ii)	it is stable ; because outer / valence shell (of electrons) is full / complete ;	2

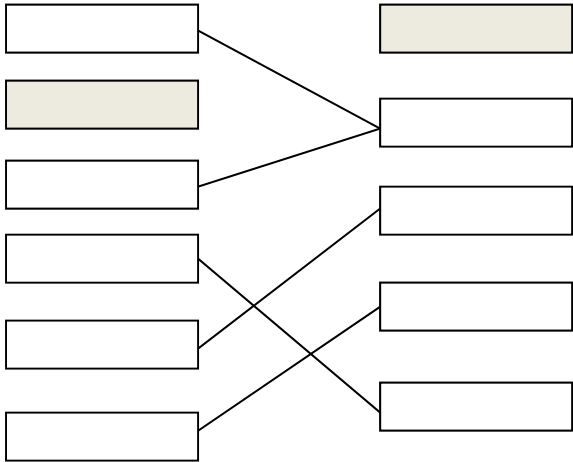
Question	Answer	Marks
7(a)(i)	$w = F \times d$ or 300×8 ; 2400 ;	2
7(a)(ii)	$E = ItV$ or $E = 10 \times 25 \times 12$; 3000 ;	2
7(a)(iii)	600 ;	1
7(b)	risk of fire / melting (of cables / insulation) ;	1

Question	Answer	Marks
8(a)(i)	16 27.7–28 ;	1
8(a)(ii)	57 or 58 ;	1
8(a)(iii)	upper mesophyll cell / palisade cell ;	1

Question	Answer	Marks
	any two from <ul style="list-style-type: none"> • as it has <u>most</u> or <u>more</u> chloroplasts / chlorophyll ; • can capture / absorb / trap <u>more</u> light / energy ; • <u>more</u> photosynthesis occurs ; 	2
8(b)	any one from <ul style="list-style-type: none"> • waterproofs the leaf ; • protects (the other leaf cells) / protection ; • reduce transpiration ; • prevent water loss ; 	1

Question	Answer	Marks
9(a)	yeast ; 25–40°C ; oxidation ; fractional distillation ;	4
9(b)	2 2 ;	1
9(c)	$ \begin{array}{ccccccc} & & \text{H} & & \text{H} & & \\ & & & & & & \\ \text{H} & - & \text{C} & - & \text{C} & - & \text{O} - \text{H} ; \\ & & & & & & \\ & & \text{H} & & \text{H} & & \end{array} $	1

Question	Answer	Marks
10(a)	15 mm ;	1
10(b)	$M = f \times d$ or 25×5 ; 125 ; Ncm ;	3
10(c)	$V = m / d$ or $120 = V \times 7.9$; 15.2 ;	2

Question	Answer	Marks
11		5

Question	Answer	Marks
12(a)	V = potassium oxide ; W = carbon ;	2
12(b)	oxidised reduced ;	1
12(c)	filtration ;	1
12(d)(i)	11–14 ;	1
12(d)(ii)	decreases ;	1

Question	Answer	Marks
13(a)	any one from <ul style="list-style-type: none"> • x-ray ; • gamma ; 	1
13(b)(i)	$c = 3 \times 10^8$; any three from	1
13(b)(ii)	$v = f\lambda$ or $v = f \times 1.0 \times 10^{-7}$; 3×10^{15} ;	2

Question	Answer	Marks
14(a)	any one from <ul style="list-style-type: none"> • protein ; • (biological) catalyst ; • has an optimum temperature ; • has an optimum pH ; • substrate specific ; 	1

Question	Answer	Marks
14(b)	C = liver ; D = ileum ; E = colon ;	3
14(c)	stomach ; liver ; pancreas / salivary gland ;	3
14(d)	any two from <ul style="list-style-type: none"> • glucose converted to glycogen ; • glycogen stored in liver cells ; • glucose respired / broken down to release energy ; • glucose metabolised by liver ; 	2

Question	Answer	Marks
15(a)	any two from <ul style="list-style-type: none"> • use oxygen ; • produce carbon dioxide ; • produce energy ; • produce water ; 	2
15(b)(i)	petroleum ;	1
15(b)(ii)	contain carbon to carbon single bonds ;	1

Question	Answer	Marks
16(a)(i)	tongs ;	1
16(a)(ii)	point source away from people ;	1
16(a)(iii)	alpha (particle) ;	1
16(b)	place absorber between source and detector ; measure the count rate ; use of different absorbers / named absorbers ;	3

Question	Answer	Marks
17	any three from <ul style="list-style-type: none"> • vitamins ; • minerals ; • water ; • fibre ; 	3

Question	Answer	Marks
18(a)	silver ; copper nitrate ;	2
18(b)	aluminium zinc copper silver ;	1